Mechanical Power Press

BWC Division of Safety and Hygiene Training Center

TABLE OF CONTENTS

SECTION	CONTENTS	
1	Definitions	
2	Power Press Mechanics	
3	Standards and Interpretations	
4	ANSI Standard	
5	Training	
	5 – A	Full Revolution Section One
	5 – B	Part Revolution Section Two
	5 – C	Part & Full Revolution Section Three
	5 – D	Part & Full Revolution Section Four
	5 – E	Part & Full Revolution Section Five
	5 – F	Full Revolution Section Six
	5 – G	Full Revolution Section Seven
	5 – H	Part Revolution Section Eight
	5 – I	Part Revolution Section Nine
	5 – J	Part & Full Section Ten
	5 – K	Part Revolution Section Eleven
	5 – L	Part Revolution Section Twelve
6	Ergonomics for Power Presses	
7	Industrial Hygiene for Power Presses	
8	Lockout/Tagout Standard	
	• Letters of Interpretation	
	• Sample Program	
	• OSHA Standards	
9.	Die Setting	

TABLE OF CONTENTS – Continued

10. Inspections

11. Personal Protective Equipment

12. Miscellaneous

Mechanical Power Press

Course Objectives

At the end of the course, participants will understand:

- safe operation of full-revolution and part-revolution presses
- point-of-operation guarding
- brake monitoring
- control reliability
- die setting
- electrical systems
- inspection, maintenance and training requirements
- safety codes and standards (OSHA State of Ohio and ANSI)
- industrial hygiene and ergonomics as they pertain to power presses

Mechanical Power Press

Follow up activites:

- Identified improperly guarded machines in our facility.
- Utilized the checklist from the manual to evaluate our current machine guarding status.
- Establish an effective written training outline for employees/new operators.
- Establish a written die setting procedure.

Activity Plan

	Activity	Other people involved	Target Deadline
❑			
❑			
❑			
❑			
❑			
❑			
❑			
❑			

Resources Available from the Division of Safety & Hygiene (DSH) Libraries

(800) 644-6292 (614) 466-7388

library@bwc.state.oh.us

www.ohiobwc.com

Safety training:

- Safety talks, outlines and scripts - DSH Safety leader's discussion guide, Training Center's One-hour safety presentations, reference books, web resources
- Videos – hundreds of safety and health topics
- Books and articles on training techniques

Machine and equipment safety:

- Safety standards (ANSI, NFPA, CGA)
- Books and articles on power presses, material handling equipment, lockout/tagout, etc.

Sample written programs:

- DSH program profiles and sample written programs
- Reference books
- Internet resources

Illness and injury statistics:

- Statistics from the U.S. Bureau of Labor Statistics
- National Safety Council's *Injury Facts*
- National Institute of Occupational Safety & Health (NIOSH) studies

Hazard communication and chemical safety:

- Chemical safety information
- Material safety data sheets (MSDSs)
- Sample written programs
- Videos
- Internet resources

Safety standards

- American National Standards Institute (ANSI) standards (including standards for construction, machinery and equipment, personal protective equipment)
- National Fire Protection Association (NFPA) fire codes (including the Life Safety Code and the National Electrical Code)
- Compressed Gas Association (CGA) standards

Other topics of interest (books, articles, magazines, videos and standards):

- Confined spaces
- Electrical safety
- Job safety analysis
- New employee orientation
- Powered industrial trucks
- Respiratory protection
- Scaffolds
- Spill response

Directories and lists of vendors of safety equipment

Occupational Safety & Health Administration (OSHA) regulations

Manual of Uniform Traffic Control Devices (MUTCD)

Recommendations of useful Internet sites

BWC publications

Saving You Time and Research

Requests for copies of OSHA standards, information on starting a safety committee, a video on accident investigation techniques -- these are some of the thousands of inquiries BWC's Division of Safety & Hygiene (DSH) libraries receive each year.

DSH has two libraries to serve you:

- The central library in the William Green Building in downtown Columbus;
- The resource center and video library located at the Ohio Center for Occupational Safety and Health (OCOSH) in Pickerington.

Both libraries are open 8 a.m. to 4:45 p.m., Monday through Friday. Your need for information does not require a visit to the library. You can phone, fax, or e-mail your requests and receive a quick response.

The central library provides free information services on the topics of occupational safety and health, workers' compensation and rehabilitation.

The OCOSH resource center provides similar services for those who visit OCOSH for meetings and training center classes.

The video library offers an extensive collection of videotapes to supplement your organization's safety and health training program. It is a convenient and popular source for Ohio employers to borrow quality occupational safety- and health-related training aids.

Visit our Web site at **www.ohiobwc.com.**

Central Library
30 W. Spring St., Third Floor
Columbus OH 43215-2256
1-800-OHIOBWC
(614) 466-7388
(614) 644-9634 (fax)
library@bwc.state.oh.us

OCOSH Resource Center
13430 Yarmouth Drive
Pickerington OH 43147
1-800-OHIOBWC
Resource center (614) 728-6464
Video library (614) 644-0018

INTERNET WEB SITES
for
OCCUPATIONAL SAFETY & HEALTH INFORMATION
May 2008

The Ohio Bureau of Workers' Compensation provides a variety of safety tools and resources on our web site, www.ohiobwc.com. Click on Safety Services to find out more about what BWC's Division of Safety & Hygiene offers online. Tools and resources include lifting guidelines, recordkeeping spreadsheets, sample OSHA program guides, and training materials. You'll also find a longer version of this list of web sites.

GENERAL

CANADIAN CENTRE FOR OCCUPATIONAL HEALTH & SAFETY (CCOHS)
http://ccohs.ca
This Canadian government site has an extensive Internet directory. There is also a unique feature called "OSH Answers" and a guide to safety-related acronyms.

NATIONAL SAFETY COUNCIL
http://www.nsc.org
Visit this web site for information on safety in the workplace, at home, on the road and in the community.

NYCOSH
http://www.nycosh.org
The New York Committee for Occupational Safety & Health offers news releases, links to helpful safety resources, strategies for safer workplaces, information on workplace hazards, workers' compensation and much more.

OCCUPATIONAL HAZARDS
http://www.occupationalhazards.com
The online version of the magazine *Occupational Hazards* is filled with today's headlines, articles, white papers, case studies, and product news.

OKLAHOMA STATE UNIVERSITY
http://www.pp.okstate.edu/ehs
The Department of Environmental Health & Safety at OSU has an online safety resource library with topics from A-Z. Go to the "Links Library" option.

OREGON HEALTH & SCIENCE UNIVERSITY
http://www.croetweb.com
This site consists of information on occupations & industries, chemical hazards, workplace safety issues, ergonomic issues, biological hazards, and includes materials in Spanish.

VERMONT SIRI
http://hazard.com
Contains a wide variety of resources: MSDSs, an online library of graphics, articles and PowerPoint presentations, e-mail discussion list archives, and a list of safety & health consultants.

FEDERAL GOVERNMENT

AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY
http://www.atsdr.cdc.gov
Look for information on hazardous substances, emergency response and hazardous waste sites.

BUREAU OF LABOR STATISTICS, SAFETY & HEALTH
http://www.bls.gov/bls/safety.htm
Find national statistics on work-related injuries and illnesses and fatalities.

CENTERS FOR DISEASE CONTROL & PREVENTION (CDC)
http://www.cdc.gov
A good resource for general public health issues throughout the United States. Health topics from A-Z give an in-depth look at most communicable diseases as well as topics such as safe driving, violence, and air pollution.

ENVIRONMENTAL PROTECTION AGENCY (EPA)
http://www.epa.gov
The EPA's web site provides a wealth of information on a wide range of topics. Of particular interest: resources on lead, asbestos, indoor air quality, mold, and school environmental issues.

FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)
http://www.fema.gov
For information on disasters and emergencies nationwide, access this web site. Publications include options for emergency preparedness and prevention, response and recovery, disaster fact sheets, and public awareness information.

MINE SAFETY AND HEALTH ADMINISTRATION (MSHA)
http://www.msha.gov
Features information on mine safety and health, including noise, dust, statistics, safety hazard alerts and talks, training, regulations, and rescue.

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY & HEALTH (NIOSH)
http://www.cdc.gov/niosh
NIOSH's site describes their services and research activities and provides information on many workplace safety and health topics. Most of their publications are available online.

NATIONAL LIBRARY OF MEDICINE (NLM)
http://www.nlm.nih.gov
The world's largest medical library: a reliable source for medical, health and chemical hazard information.

OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION (OSHA)
http://www.osha.gov
OSHA'S web site includes compliance assistance resources, online publications, statistics, OSHA standards & directives, and a very useful A-Z site index.

OHIO

OHIO DEPT. OF HEALTH
http://www.odh.state.oh.us
Provides a wide variety of public health information, including occupational and environmental health, women's health, and health resources.

OHIO EPA
http://www.epa.state.oh.us
Use the "Topic Index" to find Ohio EPA regulations and information on permits, hazardous waste, pollution prevention, wastewater, wetlands, and much more.

STATE LIBRARY OF OHIO/OHIOLINK
http://slonet.state.oh.us
Search the State Library of Ohio's online catalog which includes BWC's Division of Safety & Hygiene library books.

SPECIFIC (BY SUBJECT)

CONSTRUCTION
http://www.cdc.gov/elcosh
eLCOSH is a comprehensive library of construction safety information presented in both English and Spanish with items searchable by trade, hazard, job site, etc.

DRUG-FREE WORKPLACE
http://www.dol.gov/workingpartners
Working Partners for an Alcohol- and Drug-Free Workplace. Provides guidelines on establishing a workplace substance abuse program. Search the Substance Abuse Information Database. From the U.S. Dept. of Labor.

EMERGENCY MANAGEMENT GUIDE FOR BUSINESS & INDUSTRY
http://www.fema.gov/business/guide
Presents a step-by-step approach to emergency planning, response, and recovery for companies of all sizes. From the Federal Emergency Management Agency.

ERGONOMICS
http://www.ergoweb.com
Ergoweb's site offers ergonomics news, a buyer's guide and case studies, in addition to sources for software and services.

FIRE CODES
http://www.nfpa.org
The National Fire Protection Association (NFPA) codes can be viewed full-text online.

HAZARDOUS MATERIALS AND HAZARDOUS WASTE
http://tools.niehs.nih.gov/wetp
The National Clearinghouse for Worker Safety and Health Training is a resource for workers and trainers who are involved in the handling of hazardous waste or in responding to emergency releases of hazardous materials and terrorist actions.

INDOOR AIR QUALITY
http://sis.nlm.nih.gov/enviro/indoorairpollution.html
Compiled by the National Library of Medicine, this web page provides information on a variety of indoor air topics as well as glossaries, database searches and web pages in Spanish.

MSDS
http://www.ilpi.com/msds
Touted as "Where to find material safety data sheets on the Internet", this site offers links to 100 free sites as well as news, FAQs, and an MSDS glossary.

SAFETY MANUALS & SAMPLE WRITTEN PROGRAMS

ILLINOIS ONSITE SAFETY & HEALTH CONSULTATION PROGRAM
http://www2.illinoisbiz.biz/osha/resource.htm
At this site you will find sample written programs on a variety of topics. Also available are checklists and safety guide books, some in Spanish.

OSHA
http://www.osha.gov/dcsp/compliance_assistance/sampleprograms.html
OSHA provides sample written programs for employers to use as guidance when developing their own customized programs tailored to their specific workplaces.

Definitions

Adjustable barrier guard means a barrier requiring adjustment for each job or die setup.

Antirepeat means the part of the clutch/brake controls system designed to limit the press to a single stroke if the tripping means is held operated. Antirepeat requires release of all tripping mechanisms before another stroke can be initiated. Antirepeat is also called single stroke reset or reset circuit.

Automatic feeding means feeding wherein the material or part being processed is placed within or removed from the point of operation by a method or means not requiring action by an operator on each stroke of the press.

Bolster plate means the plate attached to the top of the bed of the press having drilled holes or T-slots for attaching the lower die or die shoe.

Brake means the mechanism used on a mechanical power press to stop and/or hold the crankshaft, either directly or through a gear train, when the clutch is disengaged.

Brake monitor means a sensor designed, constructed, and arranged to monitor the effectiveness of the press braking system.

Clutch means the coupling mechanism used on a mechanical power press to couple the flywheel to the crankshaft, either directly or through a gear train.

Concurrent means acting in conjunction, and is used to describe a situation wherein two or more controls exist in an operated condition at the same time.

Continuous means uninterrupted multiple strokes of the slide without intervening stops (or other clutch control action) at the end of individual strokes.

Control System means sensors, manual input and mode selection elements, interlocking and decision-making circuitry, and output elements to press operating mechanism.

Counterbalance means the mechanism that is used to balance or support the weight of the connecting rods, slide, and slide attachments.

Device means a press control or attachment that:
(i) Restrains the operator from inadvertently reaching into the point of operation; on
(ii) Prevents normal press operation if the operator's hands are inadvertently within the point of operation; or
(iii) Automatically withdraws the operator's hands, if the operator's hands are inadvertently within the point of operation as the dies close.

Die means the tooling used in a press for cutting or forming material. An upper and lower die make a complete set.

Die builder means any person who builds dies for power presses.

Die enclosure guard means an enclosure attached to the die shoe or stripper, or both, in a fixed position.

Die set means a tool holder held in alignment by guide posts and bushings and consisting of a lower shoe, an upper shoe or punch holder, and guide posts and bushings.

Die setter means an individual who places or removes dies in or from mechanical power presses, and who, as a part of his duties, makes the necessary adjustments to cause the

tooling to function properly and safely.

Die setting means the process of placing or removing dies in or from a mechanical power press, and the process of adjusting the dies, other tooling and safeguarding means to cause them to function properly and safely.

Die shoe means a plate or block upon which a die holder is mounted. A die shoe functions primarily as a base for the complete die assembly, and, when used, is bolted or clamped to the bolster plate or the face of slide.

Direct drive means the type driving arrangement wherein no clutch is used; coupling and decoupling of the driving torque is accomplished by energizing and deenergization of a motor. Even though not employing a clutch, direct drives match the operational characteristics of "part revolution clutches" because the driving power may be disengaged during the stroke of the press.

Ejector means a mechanism for removing work or material from between the dies.

Face of slide means the bottom surface of the slide to which the punch or upper die is generally attached.

Feeding means the process of placing or removing material within or from the point of operation.

Fixed barrier guard means a die space barrier attached to the press frame.

Foot control means the foot operated control mechanism designed to be used with a clutch or clutch/brake control system.

Foot pedal means the foot operated lever designed to operate the mechanical linkage that trips a full revolution clutch.

Full revolution clutch means a type of clutch that, when tripped, can not be disengaged until the crankshaft has completed a full revolution and the press slide a full stroke.

Gate or movable barrier device means a movable barrier arranged to enclose the point of operation before the press stroke can be started.

Guard means a barrier that prevents entry of the operator's hands or fingers into the point of operation.

Guide post means the pin attached to the upper or lower die shoe, operating within the bushing on the opposing die shoe, to maintain the

Hand feeding tool means any hand-held tool designed for placing or removing material or parts to be processed within or from the point of operation.

Holdout or restraint device means a mechanism, including attachments for the operator's hands, that when anchored and adjusted prevent the operator's hands from entering the point of operation.

Inch means an intermittent motion imparted to the slide (on machined using part revolution clutches) by momentary operation of the "inch" operating means. Operation of the "inch" operating means engages the driving clutch so that a small portion of one stroke or indefinite stroking can occur, depending on the length of time the "inch" operating means is held operated. "Inch" is a function used by the die setter for setup of

dies and tooling, but is not intended for use during production operations by the operator.

Interlocked press barrier guard means a barrier attached to the press frame and interlocked so that the press stroke can not be started normally unless the guard itself, or its hinged or movable section, enclose the point of operation.

Jog means an intermittent motion imparted to the slide by momentary operation of the drive motor, after the clutch is engaged with the flywheel at rest.

Knockout means a mechanism for releasing material from either die.

Liftout means the mechanism also known as knockout.

Manual feeding means feeding wherein the material or part being processed is handled by the operator on each stroke of the press.

Operator's station means the complete complement of controls used by or available to an operator on a given operation for stroking the press.

Part revolution clutch means a type of clutch that can be disengaged at any point before the crankshaft has completed a full revolution and the press slide a full stroke.

Pinch point means any point other than the point of operation at which it is possible for a part of the body to be caught between the moving parts of a press or auxiliary equipment, or between moving and stationary parts of a press or auxiliary equipment or between the material and moving part or parts of the press or auxiliary equipment.

Point of operation means the area of the press where material is actually positioned and work is being performed during any process such as shearing, punching, forming, or assembling.

Presence sensing device means a device designed, constructed and arranged to create a sensing field or area and to deactivate the clutch control of the press when an operator's hand or any other part of his body is within such field or area.

Press means a mechanically powered machine that shears, punches, forms or assembles metal or other material by means of cutting, shaping, or combination dies attached to slides. A press consists of a stationary bed or anvil, and a slide (or slides) having a controlled reciprocating motion toward and away from the bed surface, the slide being guided in a definite path by the frame of the press.

Pullout device means a mechanism attached to the operator's hands and connected to the upper die or slide of the press, that is designed, when properly adjusted, to withdraw the operator's hand as the dies close, if the operator's hands are inadvertently within the point of operation.

Repeat means an unintended or unexpected successive stroke of the press resulting from a malfunction.

Safety block means a prop that, when inserted between the upper and lower dies or between the bolster plate and the face of the slide, prevents the slide from falling of its own deadweight.

Semiautomatic feeding means feeding wherein the material or part being processed is placed within or removed from the point of operation by an auxiliary means controlled by the operator on each stroke of the press.

Single stroke means one complete stroke of the slide, usually initiated form a full open (or up) position, followed by closing (or down), and then a return to the full open position.

Single stroke mechanism means an arrangement used on a full revolution clutch to limit the travel of the slide to one complete stroke at each engagement of the clutch.

Slide means the main reciprocating press member. A slide is also called a ram, plunger, or platen.

Stop control means an operator control designed to immediately deactivate the clutch control and activate the brake to stop slide motion.

Stripper means a mechanism or die part for removing the parts or material from the punch.

Stroking selector means the part of the clutch/brake control that determines the type of stroking when the operating means is actuated. The stroking selector generally includes positions for "Off" (Clutch Control), "Inch," "Single Stroke," and "Continuous" (when Continuous is furnished).

Sweep device means a single or double arm (rod) attached to the upper die or slide of the press and designed to move the operator's hands to a safe position as the dies close, if the operator's hands are inadvertently within the point of operation.

Trip or (tripping) means activation of the clutch to "run" the press.

Turnover bar means a bar used in die setting to manually turn the crankshaft of the press.

Two-hand trip means a clutch actuating means requiring the concurrent use of both hands of the operator to trip the press.

Two-hand control device means a two-hand trip that further requires concurrent pressure from both hands of the operator during a substantial part of the die-closing portion of the stroke of the press.

Unitized tooling means a type of die in which the upper and lower members are incorporated into self-contained units arranged as to hold the die members in alignment.

Power Press Mechanics

Safeguarding Mechanical Power Press Operators

Figures 1 and 2 show the major types of power presses used in the metalworking industry.[5] These presses develop from several hundred pounds to several thousand tons of pressure to form metal, and require one to several workers to operate the press. The methods, techniques, and safety devices for safeguarding the point of operation were developed from 1914 (American Machinist)[8] to current practices (National Safety Council, 1979), and include barrier guards, pull-out devices, two-hand controls, and presence sensing devices.

With reference to Figure 1 and 2, a full revolution press is designed with a type of clutch that, when tripped, cannot be disengaged until the crankshaft has completed a full revolution, and the press slide, a full stroke. A partial revolution press is designed with a type of clutch that can be disengaged at any point before the crankshaft has completed a full revolution, and the press slide, a full stroke. Thus, providing adequate methods of operator safeguarding depends not only on the point of operation but also on the modes of press operation.

Safety Standards for presses were first published in 1926 (U.S. Department of Labor) [7] and revised periodically to the current Standard (ANSI B11.1-1971). Essentially, the Standard follows safeguarding criteria based on research conducted in 1949 (American Mutual Insurance Alliance, 1966), [9] as shown in figure 3. These criteria provide design guidelines to prevent entry of hands or fingers into the point of operation.

It has long been recognized that barrier guards, pull-out devices, and two-hand controls have limited safeguarding effectiveness due to frequent mechanical press malfunctioning caused by press component and control failures, resulting in unintentional press activation (Ryan, 1984).[10] Further, it is extremely difficult to safeguard against human error, especially in the case in which die closing occurs in a few seconds.

Proposed Presence Sensing Device Initiation

Recently, OSHA (1985) [3] has proposed a new regulation requiring all presses to be provided with a presence sensing device initiation (PSDI). Currently, the presence sensing device, as shown in Figure 4, is used to stop the press on the downward stroke in the event the operator's limbs enter the point of operation. Under the new proposal, the press downward stroke will be initiated when the operator's hands leave the point of operation. If, for any reason the hands re-enter the danger zone, the press will stop.

OSHA Standards require the safety distance (Ds) from the sensing field to point of operation to be greater than distance determined by the following equation:

Ds=63 inches/sec. x Ts
where Ds=minimum safety distances, inches;
63 inches/sec.=hand speed content;
and Ts=stopping time of the press measured at
approximately 90 degree position of the crankshaft rotation, seconds.

In a recent paper, Jensen and Pizatella (1968)[11] presented recent research results suggesting the need for a higher value for hand speed. This conclusion is also supported by OSHA safety engineers who have proposed a value of 100 inches/sec. (OSHA, 1985)[3] based on additional research in Holland, Japan, France, and England. A new equation for computing safety distance, which considers other critical variable, is also proposed.

The PSDI has been field tested by OSHA on five open back inclinable (OBI) type mechanical power presses in an Ohio stamping plant with no injuries reported since 1976. These outstanding results in mitigating press injuries prove the effectiveness of the device, and hopefully, industry will install them on all presses in the near future.

Figure 1, Typical straight side power press

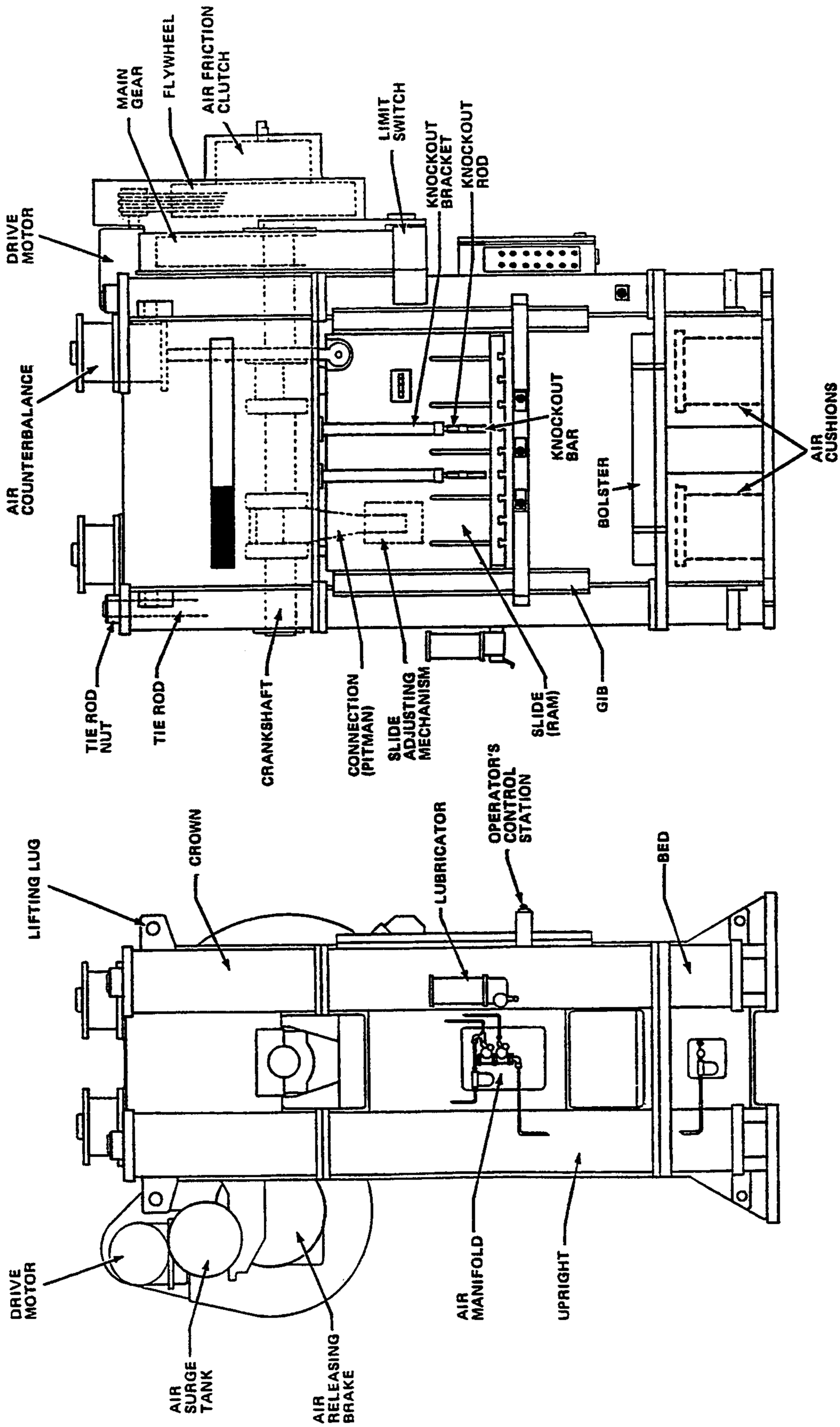

Illustration 1
Typical Straight Side Press

Figure 2, Typical open back inclinable power press

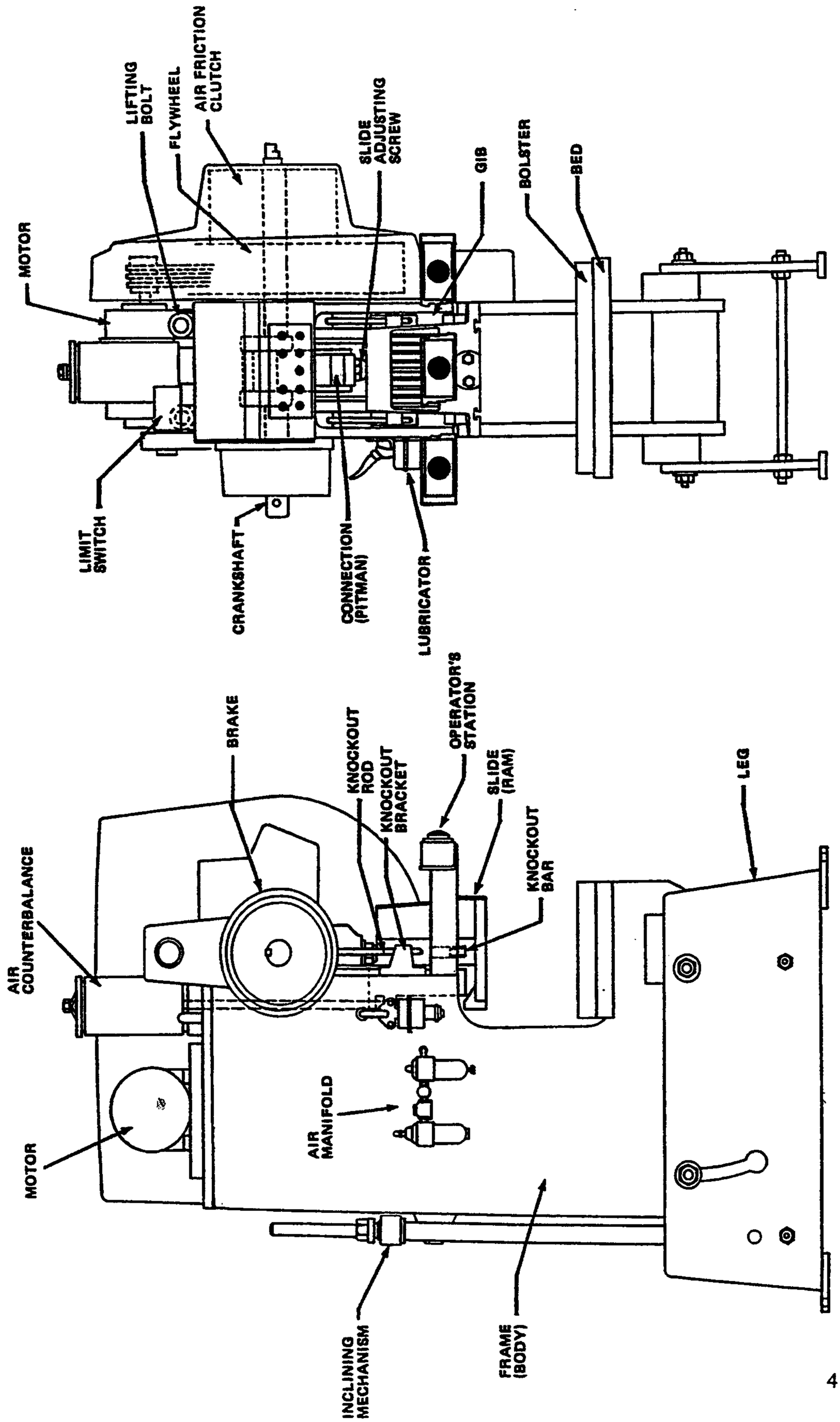

Illustration 2
Typical OBI Press

Figure 3, ANSI B11.1-1971: Positioning of guards

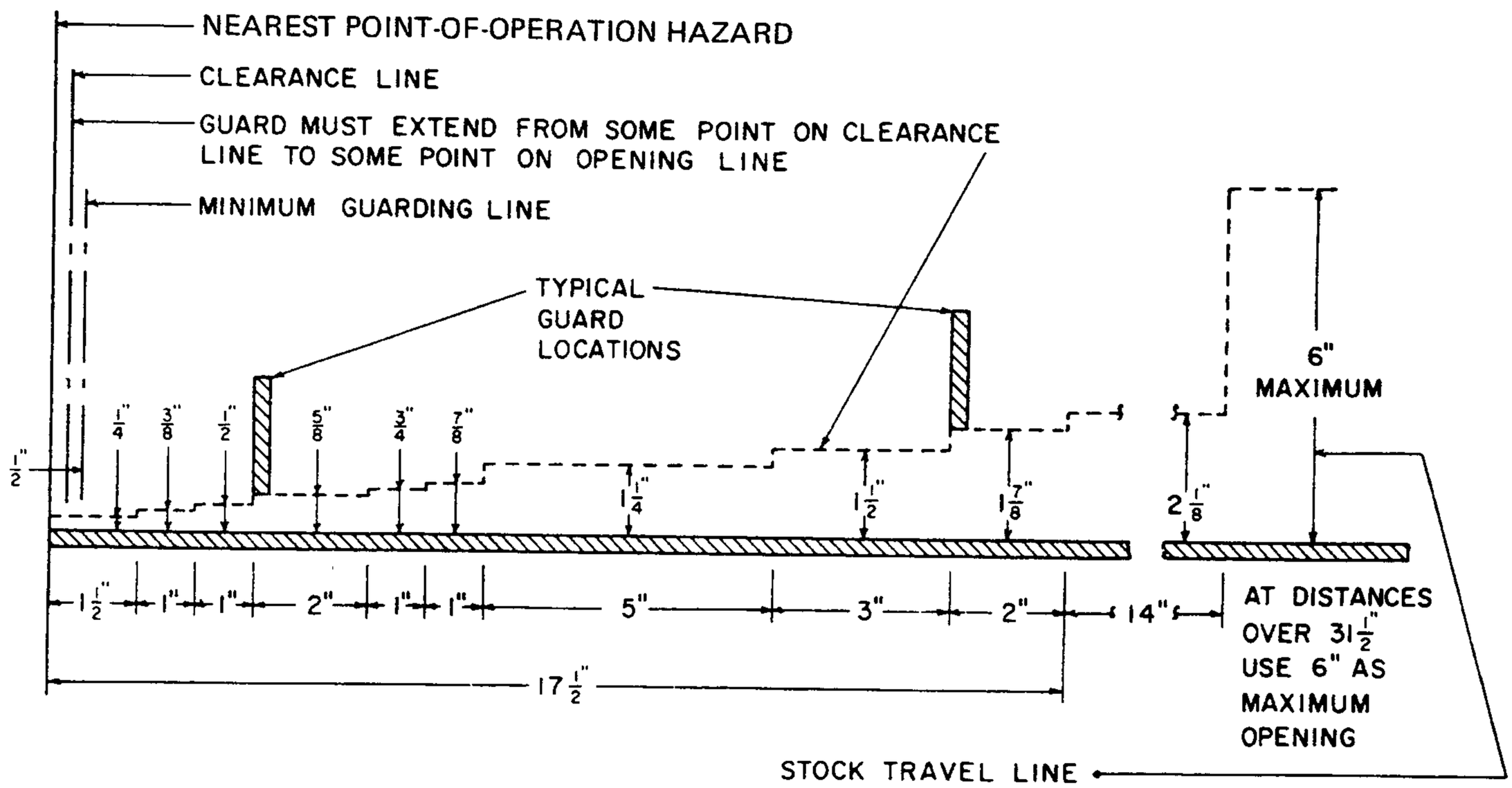

Figure 1 shows the accepted safe openings at various distances from the nearest point-of-operation hazard.
The clearance line marks the distance required to prevent contact between guard and moving parts.
The minimum guarding line is the distance between the infeed side of the guard and the nearest point of operation which is 1/2 inch from the nearest point-of-operation hazard.

Figure 1
Positioning of Guards

Table 0-10

Distance of opening from point of operation hazard (inches)				Maximum width of opening (inches)
½	to	1½	.....	¼
1½	to	2½	.....	?
2 ½	to	3 ½	.....	½
3 ½	to	5 ½	.....	?
5 ½	to	6 ½	.....	¾
6 ½	to	7 ½	.....	?
7 ½	to	12 ½	.....	1 ¼
12 ½	to	15 ½	.....	1 ½
15 ½	to	17 ½	.....	1 ?
17 ½	to	31 ½	.....	2 ?

Figure 4, Presence sensing safety device

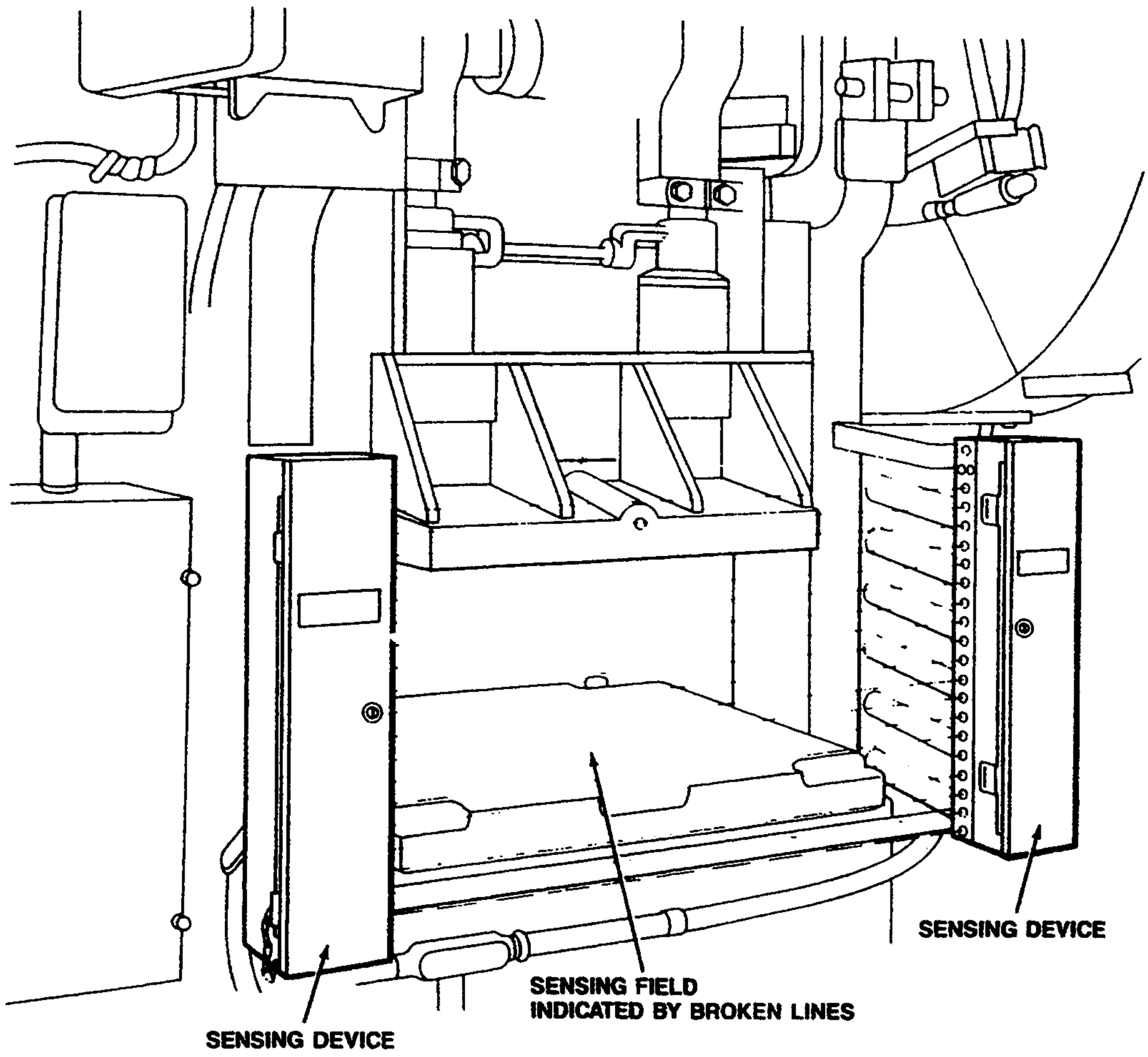

Illustration 3
An Example of a Presence-Sensing Device

Summary

It is in the public interest to reduce or eliminate the unreasonable number of mechanical power press operator injuries. A disabled worker is not cost-effective in our society. Moreover, these injuries are unacceptable from a human factor perspective, especially when there are reasonable methods to prevent these injuries.

The results of our study indicate the critical importance of human factors engineering principles in press operator accident causation. Human factors is the primary causation factor, and press safeguarding is the second causation factor.

Human factors engineers can contribute to operator safety by applying these principles to overcome the decrement in operator performance caused by human error, environment, and press malfunction. The installation of the presence sensing device initiation on all presses is strongly recommended. It is a proven effective and economical method in reducing operator injuries.

References

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BASIC OPERATING PRINCIPLES OF MECHANICAL POWER PRESSES

There are three types of power presses: mechanical, hydraulic, and pneumatic. Their control systems may be mechanical or electro-mechanical. Though these three major types of power presses share some common features, the mechanical power press is the most commonly used and researched.

The two major components of a mechanical power press are a stationary bed and a moving ram. The press shears, punches, forms, or assembles metal or other material by cutting or shaping, using combination dies attached to the ram and bed. The mechanical power press operates on a reciprocating motion principle. The main components for power transmission are the clutch, flywheel, and crankshaft. A motor powers the rotation of the flywheel. A clutch is used to couple the spinning flywheel to t he crankshaft. The crankshaft converts the rotary motion of the flywheel to the downward and upward motions of the press ram. A workpiece is fed into the lower die, either automatically or manually, and the machine cycle is initiated. On the downstroke, the ram (with an upper die) moves toward the work area, or point of operation (see Figure 1). When the upper and lower dies press together on the stock material, a re-formed piece is produced. Once the downstroke is completed, the newly formed workpiece is removed, a new workpiece fed into the die and the process repeated.

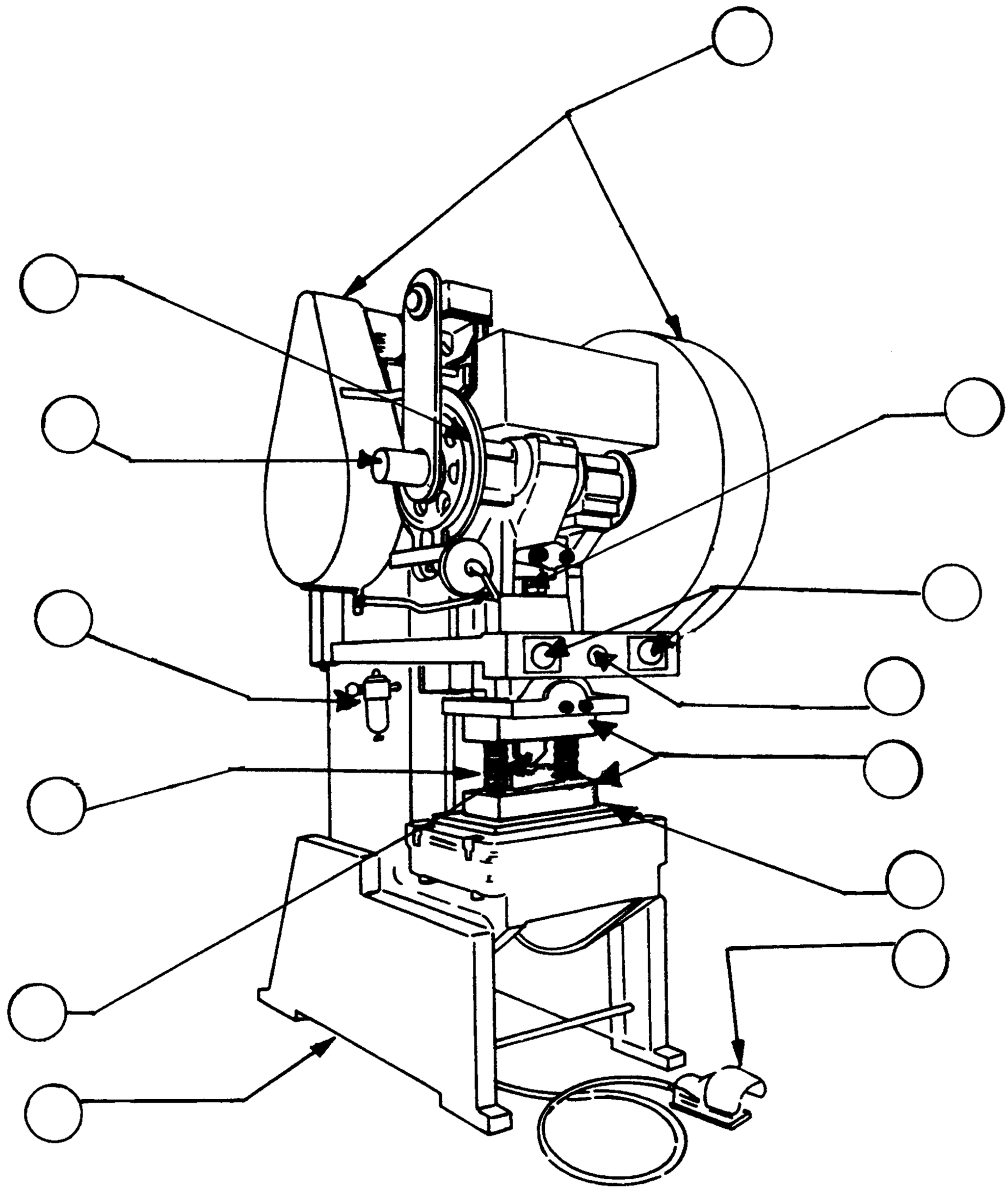
Clutches

There are two types of clutches used on mechanical power presses: full-revolution clutches and part-revolution clutches. There are important differences between the two clutches with respect to operator safety.

When the clutch is engaged, on presses with a full-revolution clutch, it remains engaged until the crankshaft has completed a full cycle. The part-revolution clutch differs in that it can be disengaged at any point in the downward cycle; thus stopping for safety reasons before the crankshaft completes the downstroke is possible. Since the full-revolution clutch makes a complete revolution before it disengages, presses equipped with this type of clutch generally pose a greater hazard after a stroke is initiated than presses equipped with a part-revolution clutch.

Foot and Hand Controls

Initiation of the power press stroke can be either automatic or manual. On manually operated presses there are two popular modes for initiating machine motion: foot or dual palm-button (two-hand) controls (see Figures 2 and 3). When foot controls are used, the press is activated by pressing down on a foot switch or pedal which allows the hands to be free during the cycling of the press. Foot controls do not intrinsically separate the operator s hands from the machine's point of operation during the operating cycle. Person's operating power presses with foot controls must be protected by safeguarding devices not always directly linked to machine operation. These safeguarding devices (i.e., barriers, gates, pullouts) may have interlocks capable of controlling initiation of the stroke. However, it also may be possible to operate the press with safeguards removed or modified so that they do not function as intended.



1. Crank Shaft
2. Air Brake
3. Air Manifold
4. Guide Post
5. Point of Operation
6. Base
7. Power Transmission
8. Pitman Screw
9. Dual Palm Buttons
10. E-Stop
11. Die Set
12. Bolster Plate
13. Foot Pedal

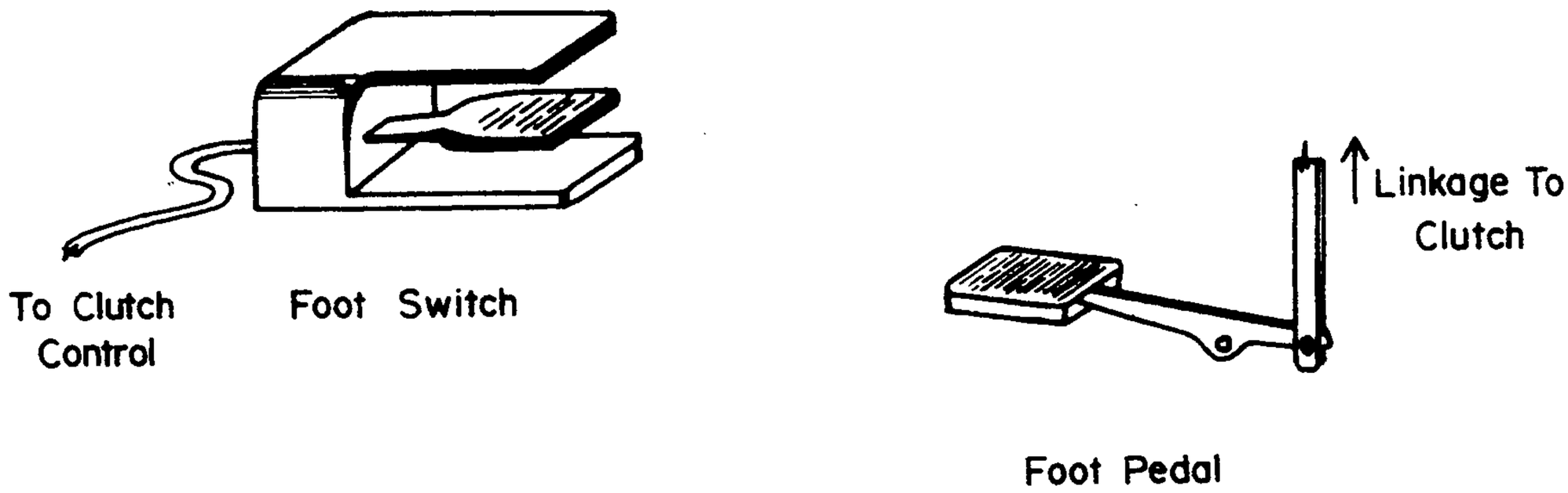


FIGURE 2. FOOT CONTROLS

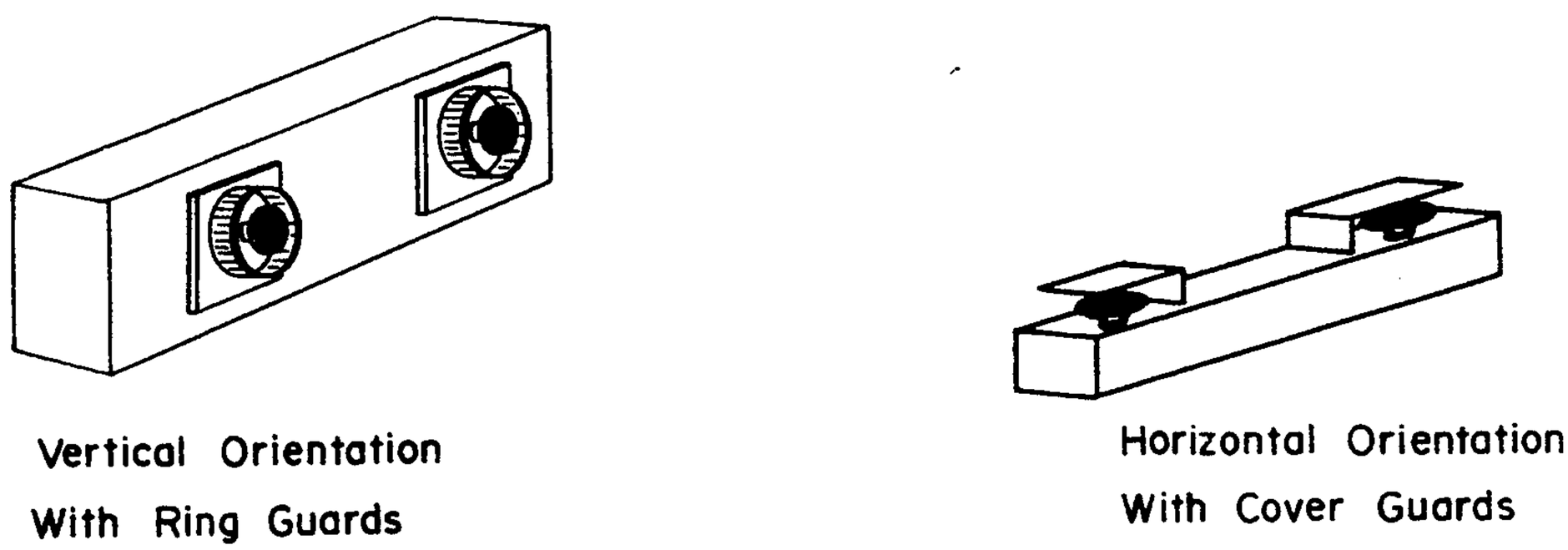


FIGURE 3. DUAL PALM-BUTTON CONTROLS

With dual palm-button controls, once a workpiece is manually positioned in the press, both hands must be removed from the point of operation to depress the palm-buttons. Dual palm-buttons require both hands to be away from the point of operation when the press cycle is initiated.

Operator productivity may be greater with foot switch operation than with dual palm-button operation since the hands are free during the entire period of the press cycle. However, this freedom of hand movement also places operators using foot switches at greater potential risk of sustaining a point-of-operation injury.

STANDARDS

Existing OSHA Standards for Foot-Controlled Power Presses

The following is a summary of OSHA standards for mechanical power presses using foot controls (29 CFR 1910.217).

- OSHA 1910.217(b)(3)(i) -- Manually fed mechanical power presses shall incorporate a single-stroke (or anti-repeat) feature that allows the clutch to engage and the press to cycle only once each time the foot control is depressed.

- OSHA 1910.217(b)(4)(i) -- A guard shall be used to protect the foot pedal against accidental operation from falling or moving objects or from another person accidentally stepping on the control.

- OSHA 1910.217(b)(4)(ii) -- A pad with a nonslip contact area shall be firmly attached to the foot pedal.

- OSHA 1910.217(b)(4)(iii) -- The pedal return spring(s) shall be of the compression type, operating on a rod or guided within a hole or tube, or designed to prevent interleaving of spring coils in the event of breakage. A double compression spring (one spring inside another with each spring wound in the opposite direction) is one way to meet this replacement.

Existing OSHA Standard for Dual Palm-Button Controlled Power Presses

The following is a summary of OSHA standards for mechanical power presses using dual palm-button controls (29 CFR 1910.217).

- OSHA 1910.217(b)(7)(v)(v) -- Mechanical power presses shall incorporate a single-stroke (or anti-repeat) feature that allows the clutch to engage and the press to cycle only once each time the dual palm-buttons are depressed.

- OHSA 1910.217(b)(7)(v)(a) -- Dual palm-buttons shall incorporate an anti-tie-down feature. This feature allows the buttons to be wired so that they must

both be depressed and released for each cycle of the press. This eliminates the possibility that operators will "tie-down" one of the palm-buttons, permitting the use of only one button to cycle the press.

- OSHA 1910.217(b)(7)(v)(a) -- Both palm-buttons shall have guards to prevent unintended operation and separation between buttons to prevent "bridging" of the palm-buttons by operators --i.e., activating the press without using both hands.

- OSHA 1910.217(c)(3)(vii)(c) -- To reduce the "after-reach" hazard, a minimum safety distance between the point of operation the dual palm-buttons shall be maintained on mechanical power presses based on the following formula:

  D = 1.6 m/sec x T (sec), or
  D = 63 in./sec x T (sec)

The safety distance, D, is the minimum safe distance between the point of operation and the palm-button. The 1.6 m/sec (63 in./sec) value is a hand-speed constant that represents the typical speed at which workers can perform a hand movement toward the point of operation. The hazard time, T, represents the time required to eliminate the point-of-operation hazard on the press. On presses with part-revolution clutches, the hazard time is defined as the stopping time of the press ram. On presses with full-revolution clutches (1910.217(c)(3)(viii)), the hazard time is defined as the maximum possible time required for the ram to complete one downstroke.

- OSHA 1910.217(e)(1)(i) -- The safety distance shall be maintained for each die used on the press; it should be checked periodically and at each new die set-up to ensure that operators are adequately protected. The most accurate method of measuring the hazard time on power pressed equipped with part-revolution clutches is through the use of a stop-time meter. This device accurately measures the time that it takes the ram to stop after the palm-buttons of a press have been released --i.e., after the stop signal has been initiated.

- OSHA 1910.217(e)(1)(ii) -- On presses with part-revolution clutches, the clutch/brake mechanism shall be checked periodically for wear and adjustment. Dangerously worn or maladjusted brakes shall be replaced or repaired before further use of the press. Brake monitors, which are devices that monitor the stopping performance of the brake, shall be installed as required.

HAZARDS OF POWER PRESS OPERATION

Information taken from:

USDL News Release: 97-73
Wednesday, March 5, 1997
Contact: Susan Hall Fleming, (202) 219-8151

OSHA Aims To Reduce Power Press Injuries

Industries with high rates of amputations and other injuries related to power press hazards are being targeted for special enforcement and education emphasis by the Occupational Safety and Health Administration (OSHA), the agency announced today.

Ten manufacturing industries, which include more than 22,000 establishments and employ more than one million workers, will receive special focus. These industries experienced more than 650 amputations in 1994 (the most recent data available)--nearly 10 percent of all amputations in manufacturing. Local offices may expand the program to include other industries.

"It is unconscionable for workers to be losing their fingers and suffering other disabling injuries simply because mechanical power presses are not properly guarded or maintained," said Greg Watchman, acting assistant secretary of labor for occupational safety and health. "Operating a mechanical power press can be extremely dangerous. Yet injuries are preventable when employers ensure that guards, which have long been required and are readily available, are installed and maintained on presses to protect workers against the punching action of metal stamping equipment."

OSHA standards require employers to report all point-of-operation injuries. Guarding devices, weekly and periodic press inspections, training for press operators and maintenance personnel and regular press maintenance are critical to preventing injuries. OSHA estimates that about 300,000 power presses are in use across the country today.

In addition to the human suffering and loss associated with amputations and related injuries, employers are paying anywhere from $5,500 to $47,000 in workers' compensation costs and indirect costs for each of the injuries.

During inspections over the past three years, OSHA identified more than 2,650 alleged violations of power press guarding and inspection requirements. Eighty percent of these violations were classified as serious, willful or repeat, indicating the grave threat to worker safety posed by the violations.

On poorly safeguarded presses, foot switches can be inadvertently activated while the workers' hands are at the point of operation, resulting in an injury. A study conducted by NIOSH researchers (Trump and Etherton, 1986) indicated that there is a critical cycling rate above which the frequency of inadvertent actuation errors increases dramatically as the cycling rate increases. For the simulated tasks in this study, this critical cycling rate was 17.5 strokes/min. These results indicated that jobs on foot-activated presses should

be evaluated to identify their critical cycling rate and steps should be taken to reduce the hazard of inadvertent actuation due to exceeding that critical cycling rate. Trump and Etherton concluded that at operational speeds in excess of a critical cycling rate "...operators performing repetitive tasks begin gradually to lose effective control over their foot movements."

Trump and Etherton (1985) also concluded that two factors interact to cause inadvertent machine activation. First, "unmediated hand movements" are made in response to workpiece and machine problems. In other words, the operator may attempt to correct the placement of a workpiece after the downstroke of the press has been initiated. Second, out-of-sequence foot movements may be caused by loss of operator balance or by a breaking of the normal task rhythm.

Safeguards used on foot-controlled mechanical power presses include pullout and restraint devices. These consist of attachments to the wrists that pull the hands away from or hold them outside the danger point. Barrier guards or gates that prevent entry into the working zone of the press during the downstroke are also used. On presses equipped with part-revolution clutches, another safeguard used is the presence-sensing device. These devices initiate a stop signal if the effective sensing field is penetrated. The two most common types of presence-sensing devices are photoelectric and radio frequency (capacitance).

The safety theory supporting the use of dual palm-buttons can be defeated if operators are able to place their hands into the point-of-operation after the press cycle has been initiated, i.e., reach between the dies while they are closing. One way this may occur is when dual palm-buttons are located so close to the machine dies that workers can place their hands into the working zone of the press before the ram has completed the downstroke. This type of movement is commonly called the after-reach hazard. NIOSH researchers have demonstrated that the physical location and orientation of dual palm-buttons in relation to the point-of-operation, as well as the operator's hand speed, have a significant effect on an operator's ability to "after-reach" (Pizatella and Moll, 1987; Horton et al., 1986). Present OSHA standards do not account for differences in hand speed, as a result of, palm-button location and orientation nor press operators capable of attaining hand speeds in excess of the current OSHA hand-speed constant of 1.6 m/sec (63 in./sec) (Pizatella and Moll, 1987). Table 1 lists the sample of power press operators working on a press simulator controlled by dual palm-buttons. The data in Table 1 was obtained at two palm-button locations: waist level and shoulder level, both with vertical orientation.

Several significant points are demonstrated by the data in Table 1. The results of this study (analyzed by an analysis of variance procedure) generally indicate that as a group, male workers have faster hand speed than female workers ($P<0.01$). Also, based on Duncan's Multiple Range Test, younger workers (under 31) have faster hand speed than older workers ($P<0.01$). Further, 28% of all subjects, 40% of males and 12% of females, exceeded the OSHA standard of 1.6 m/sec (63 ins./sec). Of males under 31, 79% exceeded the OSHA standard. The fastest hand speed measured was 3.65 m/sec (142 in./sec), more than twice the hand speed specified in the OSHA standard. Finally, locating the palm-buttons at shoulder level did not significantly alter the operator's ability to exceed the 1.6 m/sec (63 in./sec) standard. Thus, based on these data, compliance with the current OSHA hand-speed standard may not be providing adequate protection for all power press operators.

Table 1 Mean after-reach hand speed (m/s)* by palm-button location, gender and age †

Gender and age	Waist-level location			Shoulder-level location			Combined			Range	
	Mean	SD§	N**	Mean	SD	N	Mean	SD	N	Min.	Max
Male:											
20-30	2.09	0.70	12	2.18	0.68	12	2.13	0.68	24	1.01	3.63
31-40	1.01	0.44	9	1.28	0.47	9	1.13	0.46	18	0.53	2.21
41-50	1.18	0.48	4	1.38	0.41	4	1.25	0.43	8	0.72	1.86
51-60	1.11	0.38	6	1.70	0.71	6	1.41	0.62	12	0.56	2.97
Total	1.46	0.73	31	1.71	0.70	31	1.58	0.72	62	0.53	3.63
Female:											
20-30	1.13	0.63	7	1.07	0.27	7	1.10	0.46	14	0.38	2.15
31-40	1.23	0.35	4	1.48	0.37	4	1.36	0.36	8	0.81	1.86
41-50	1.07	0.74	10	1.23	0.62	10	1.15	0.67	20	0.49	3.06
51-60	0.66	0.20	8	0.97	0.30	8	0.81	0.30	16	0.48	1.41
Total	0.99	0.57	29	1.16	0.45	29	1.07	0.52	58	0.48	3.06
Combined:											
20-30	1.73	0.81	19	1.77	0.78	19	1.75	0.78	38	0.38	3.63
31-40	1.08	0.41	13	1.32	0.44	13	1.20	0.44	26	0.53	2.21
41-50	1.08	0.66	14	1.27	0.56	14	1.18	0.60	28	0.49	3.06
51-60	0.85	0.36	14	1.28	0.62	14	1.07	0.54	28	0.48	2.97
Aggregate:	1.23†	0.70	60	1.45	0.65	60	1.34	0.68	120	0.38	3.63

* To convert to in./sec, mulltiply meters by 39.37
† Adapted from Pizatella and Moll (1987)
§ Standard Deviation
** Number

Since this study identified young male press operators as having hand speeds faster than other press operators, an analysis of epidemiological data should indicate that young male press operators have a larger amputation rate. To examine this possibility, NIOSH investigators undertook an analysis of injury data from State workers' compensation agencies (Jensen and Sinkule, in press). Injury data from 29 states was used to compare amputation injury incidence rates (IR) for power press operators to identify any differences due to gender and age. While this analysis indicated that gender did not significantly affect the IR, there were differences in the IR based on age. The IR for young male press operators was compared to the IR of all other press operators. The IR for young male press operators was 1.91 cases/1,000 press operators while the IR for all other press operators was 1.58. Data from the state of Ohio was analyzed separately because of some recordkeeping differences. The Ohio data demonstrated a more dramatic difference in the IR among press operators. The IR for young male press operators in Ohio was 4.09 cases/1,000 press operators as compared to an IR of 1.41 for all other press operators. Although data analysis is not definitive in establishing that young male press operators are at a greater risk of injury, the differences in IR are in a direction consistent with the premise that young male press operators are not being adequately protected with present safeguarding mechanisms.

To enhance the protection provided to all press operators, emphasis should be placed on ensuring the proper use of existing point-of-operating safeguards and the development of improved safeguards.

Based on these findings, NIOSH concludes that even thought there are existing OSHA standards, a significant risk of injury to power press operators remains.

Operators are not always protected by the safeguarding provided because there are wide variations in hand speed among males, females, younger workers and older workers. In addition to variation in hand speed there are several reasons why existing safeguarding may not provide the desired protection, such as:

- On machines that stamp differently shaped parts, each of which needs a different guard, it may take more time to install the proper safeguarding than it takes to run the job.
- Operators sometimes defeat the purpose of safeguards by removing or overriding them for convenience or increased productivity.
- Safeguarding is not always adjusted properly. This may be a problem with pullout and restraint devices if workers with different hand sizes and arm lengths work on consecutive shifts at the same machine. In some cases, dual palm-buttons may be located too close to the point of operation because use of the existing hand-speed constant leads to erroneous placement of the palm-buttons. Also, two-hand controls or presence-sensing devices may be improperly located after dies are changed.

CONCLUSIONS

Even though there is an existing OSHA standard that addresses construction and operation of mechanical power presses, injuries and amputations among press operators are still occurring with alarming frequency. In many cases, these injuries occur when the press is inadvertently activated while the operator's hands are in the operating zone of the press. The results of a recent experiment conducted by NIOSH researchers indicate that the chance for inadvertent press activation (possibly involving injury) may increase as the cycling rate increases (Trump and Etherton, 1986).

Injuries occur as a result of "after-reach" among operators who initiate power presses using dual palm-buttons. Therefore, attention should be given to the individual operator's hand speed, keeping in mind that, in general, hand speed may be a function of age and gender.

The recommendations contained in the CIB are intended to address these problems and thereby reduce injuries among mechanical power press operators.

RECOMMENDATIONS

The following recommendations were compiled from generally accepted safety practices and research; they are intended to supplement existing OSHA standards. Implementation of these recommendations should be considered in any comprehensive safety program for the prevention of injuries among mechanical power press operators. We wish to emphasize that these data from NIOSH studies demonstrate that hand speed may be an inappropriate measure on which to base a safety distance standard for operation of mechanical power presses.

It may be impractical to implement a single hand-speed constant that would protect all workers under all power press set-ups. Implementation of such a hand-speed standard would render dual palm-buttons practically useless as a safeguarding device due to the long safety distances that would result.

Foot-Controlled Power Presses

- Foot controls should be used with point-of-operation safeguards that cannot be easily bypassed or misadjusted.

- Interlocking safeguards should be considered so that the foot control is inoperable when the safeguards are not functioning.

- An ergonomically correct, sitting work position, if possible, is preferred over a standing position, if a foot control is used.

- To reduce strain on the foot, a foot-rest should be provided near the pedal.

- Riding the pedal (keeping the foot on the pedal without actually depressing it) is hazardous, and standard operating procedures should note this unacceptable work practice.

- The rate at which presses are being cycled should be monitored periodically to ensure that operators are not working at a pace that leads to inadvertent pressing of the foot pedal.

Power Presses Controlled with Dual Palm-Buttons

- Because full-revolution clutches cannot be stopped once they are activated, they should only be used on presses with short downstroked or fast cycling rates.

- To reduce musculoskeletal stress to the wrist, arms and shoulders of press operators, ergonomic job design principles should be considered when locating and/or orienting dual palm-buttons in relation to the point-of-operation.

- Caution must be exercised in evaluating each power press set-up and operating to ensure that an adequate safety distance is maintained at all times. Employers should consider evaluating individual press operators to determine if they are exceeding the current OSHA hand-speed constant. If a worker is identified as being capable of exceeding the hand-speed constant, more positive means of point-of-operation safeguarding should be considered, such as fixed barrier guards.

Just What is Control Reliability?

How are mechanical Power Press controls different than other types of controls?

Mechanical Power Press controls are designed to act a special way when they fail. If the controls fail they must:

1. Not prevent the normal stopping action from being applied to the press when required.
2. Prevent initiation of a successive stroke until the failure is corrected.
3. Detect the failure by a simple test or be indicated by the control system.

When is Control reliability required?

1. When a two-hand control or presence sensing device or Type B Gate is used as a means of "Point of Operation guarding" on a "part revolution clutch press"
2. When hands are in the die operation.

OSHA 1910.217 CONTROL COMPLIANCE CHECK LIST FOR POWER PRESSES

1910.217 (B)(7)(i) Check braking performance.

(ii) Check presence and function of red stop control.

(iii) Observe supervisory selection for off, inch, ss, cont.

(iv) Observes that inch means requires two-hand operation or provides protection by location or the presence sensing device.

(v) Test the two-hand control to insure a single arm combination cannot be used to initiate stroking.

(vii) Observes supervisory control and presence of complete control sets for multiple operators.

(viii) Check for continuous prior act switch.

(ix) Check for hand/foot supervisory control

(x) Insure foot switch is guarded.

(xi) Check for dual monitored solenoid valve.

(xii) Check schematic for motor forward contact.

(xiii) &
(xiv) Check for clutch and counterbalance pressure switch.

(b)(8)(i) Check for main power disconnect with lockable off switch.

(iii) Check motor starter for under voltage protection.

(v) Check for Ground Fault Indicator Control

(vi) & (13) Check for control reliability (multiple relays (4-6), 4-6 cam rotary limit, chain break or motion detection, schematic and record of control changes.

(b) & (14) Check for brake monitoring as required by (c) 5 (HID with two-hand control, type B gate or presence sensing).

Recommended Checklist for Safe Operation of Mechanical Power Presses

The checklists presented below are provided as an adjunct to the above recommendations to aid in maintaining safe use of foot and dual palm-button controls for mechanical power presses.

Checklist to be used when foot controls are used:

_____ Safeguards are in place that will prevent injury if the foot control is inadvertently depressed.

_____ A guard or cover is over the foot switch to prevent activation by fallen objects.

_____ The working posture is as nonfatiguing as possible. Seating is provided where possible.

_____ Presence-sensing devices, if used, are properly maintained and aligned to ensure that the sensing field is effectively safeguarding the point-of-operation.

_____ Work rules have been established against riding the foot pedal.

_____ A check has been made to see if operators inadvertently push the foot switch because they are working at a high cycling rate with the foot control.

_____ The brake monitor, if required, is operative.

_____ The foot control must be depressed and released once before the press can be cycled again.

_____ Safeguarding devices and procedures are available for die set-up and maintenance to prevent or arrest an inadvertent downstroke of the ram.

_____ The press is routinely and frequently inspected and properly maintained.

Checklist to be used when dual palm-buttons are used:

_____ The palm-buttons are installed to meet at least the OSHA minimum safety distance requirements. Greater distances are recommended based on the operator's true hand speed.

_____ The palm-buttons are installed to reduce undue operator fatigue.

_____ The palm-buttons are protected against unintended operation and are arranged so that the only probable means of operation is by both hands of a single worker or by both hands of each operator, where more than one operator is being protected by dual palm-buttons.

_____ On presses with part-revolution clutches, the removal of a worker's hand from any palm-button during the downstroke of the ram quickly deactivates the clutch and applies the brake to stop ram motion.

_____ The brake monitor, if required, is operable.

_____ All palm-buttons must be released before an interrupted stroke can be resumed or the press can be cycled again.

_____ The palm-buttons are fixed in a position so that only a set-up person, supervisor or safety engineer can move them.

_____ The position of the palm-buttons is arranged to prevent any part of the body from entering the working zone of the press during the downstroke.

_____ The operation of the press is monitored frequently to ensure that operators are not bypassing or defeating the safety features of the dual palm-buttons.

_____ Safeguarding devices and procedures are available for die set-up and maintenance to prevent or arrest an inadvertent downstroke of the ram.

_____ Presence-sensing devices, if used, are properly maintained and aligned to ensure that the sensing field is effectively safeguarding the point-of-operation.

_____ The press is routinely and frequently inspected and properly maintained.

PRESS EVALUATION FORM

1. Manufacturer: _____

2. Press Number: _____

3. Serial Number: _____

4. Tonnage: _____

5. Length of Stroke: _____

6. Is the flywheel, gears, etc. guarded 7 feet above working surface?
   _____ YES _____ NO

7. Type of clutch? _____

8. Spring counterbalance _____ DNA _____ YES
   Is it guarded _____ YES _____ NO

9. Air counterbalance _____ DNA _____ YES

10. Is there an air counterbalance "weight and pressure" chart on the press?
    _____ YES _____ NO

If NO, how do they set the pressure? _____
_____
_____

11. Can the air counterbalance hold the slide and attachments at any point in the stroke without help from the machine brake?
    _____ YES _____ NO _____ NOT KNOWN

12. Number of surge tanks: _____
    Surge tanks for:
    _____ Air clutch/Brake*
    _____ Air counterbalance
    _____ Air _____

13. Are surge tanks drained?: _____ YES _____ NO

14. Number of air pressure switches?: (If none, explain why)

_____

_____

Are they labeled? _____ YES _____ NO

Are pressure switches for:

_____ Air counterbalance*

_____ Clutch/brake*

_____ Die cushion

_____ Tonnage monitor

15. Are the pressure switches set so if the air is not adequate or the pressure drops, the press will be inoperable?

_____ YES _____ NO

16. Dual solenoid air valve and ~~muffler~~ with a ~~pneumatic or electrical monitor~~.

_____ YES ` _____ NO (using both is best)

17. Air controlling equipment:

A. filter B. regulator/gauge

clean _____ Yes _____ NO Damaged _____ YES _____ NO

C. Lubricator _____ Full _____ Empty

18. Brake lining worn or excessive grease on brake lining:

_____ YES _____ NO _____ Cannot visually see

19. Does brake make excessive noise?

_____ YES _____ NO

20. Is electrical wiring properly installed?

_____ YES _____ NO

21. Main power disconnect capable of being locked in the off position only.

_____ YES _____ NO

22. Is it labeled? _____ YES _____ NO

23. Motor start button protected against accidental operation.

_____ YES _____ NO

24. Drive motor start (magnetic type). _____ YES _____ NO

25. Ground detector light working? _____ YES _____ NO

26. Does motor forward/reverse key selector switch exist?

_____ YES _____ NO

Who has control of the key? _____

27. How is press presently being operated when in the following mode(s):.

	Inch	**`Single Stroke**	**Continuous**
Hand Buttons	____	_____	_____
Foot Pedal	____	_____	_____
5 to 30 sec. delay switch	____	_____	_____
*Separate controls	____	_____	_____
Light curtain	____	_____	_____

*Explain_____

_____

28. Is the control selector for -- Off, Inch, Single Stroke, and Continuos, a key switch?

_____ YES _____ NO

Who has control of the key? _____

29. IS the control selector for hand or foot control a key switch?

_____. YES _____ NO

Who has control of the key? _____

30. Is the point-of-operation protected? _____ YES _____ NO

If yes, how is it protected?

_____

_____

31. Does it meet the safety distance?

_____ YES _____ NO _____ Has not been checked

Distance: _____

32. Are guards needed on the side and back of the press?

_____

33. If the press has a variable speed motor was the safety distance checked at high speed?

_____ DNA _____ YES _____ NO _____ Has not been checked

34. Two hand controls _____ DNA _____ YES

YES	NO	
_____	_____	Protected against unintended operation?
_____	_____	Separate 22 to 27 inches?
_____	_____	Secured in place?
_____	_____	Is concurrent pressure required on both hand controls?
_____	_____	Two hand control anti-repeat working?
_____	_____	Does the operator need to release all hand controls before an interrupted stroke can be resumed?
_____	_____	Does the control system require two-hand controls when used ~~on multiple-station presses~~, and a separate set of controls for each designated employee?
_____	_____	~~DOES EMERGENCY STOP WORK~~?
_____	_____	Is the emergency stop button RED?
_____	_____	If top stop button is present, is it YELLOW?

35. Foot pedal? _____ DNA _____ YES

YES	NO	
_____	_____	Protected against unintended operation?
_____	_____	Anti-repeat?
_____	_____	Requires operator to remove his/her foot off treadle before another stroke can be made?
_____	_____	With the foot switch selected press ~~should not~~ operate in the inch mode.

36. Is this a hand-in-die operation? _____ YES _____ NO

37. ~~If NO~~, what type of point-of-operation guard is being used?

_____

_____

38. ~~If YES~~, is press guarded with two-hand control, presence-sensing device, type B gate or movable barrier guard?

_____ YES _____ NO

39. IF YES to #38, is brake monitor and control reliability present?

_____ YES _____ NO

YES	NO	
_____	_____	Does the control reliability include that no failure in the control system prevent normal stopping action from occurring and no successive stroke be initiated unless the failure is cleared?
_____	_____	Does the control system also include a ~~motion detector~~ to detect chain or cam shaft failure?
_____	_____	Does the brake monitor, monitor brake performance at least once each stroke?
_____	_____	Are the cams and contract points inspected for cracks, wear or damaged points?

40. Are hand tools provided? _____ YES _____ NO

41. Are safety blocks provided? _____ YES _____ NO

Are they used? _____ YES _____ NO

42. Are dies marked? _____ YES _____ NO

Total weight _____ Tonnage _____

Upper weight _____ Stroke height _____

43. Are there two means of attaching dies? _____ YES _____ NO

44. Is the dies material handling equipment adequate?

_____ YES _____ NO

If NO, explain:

_____

_____

_____

_____

_____

_____

_____

_____

_____

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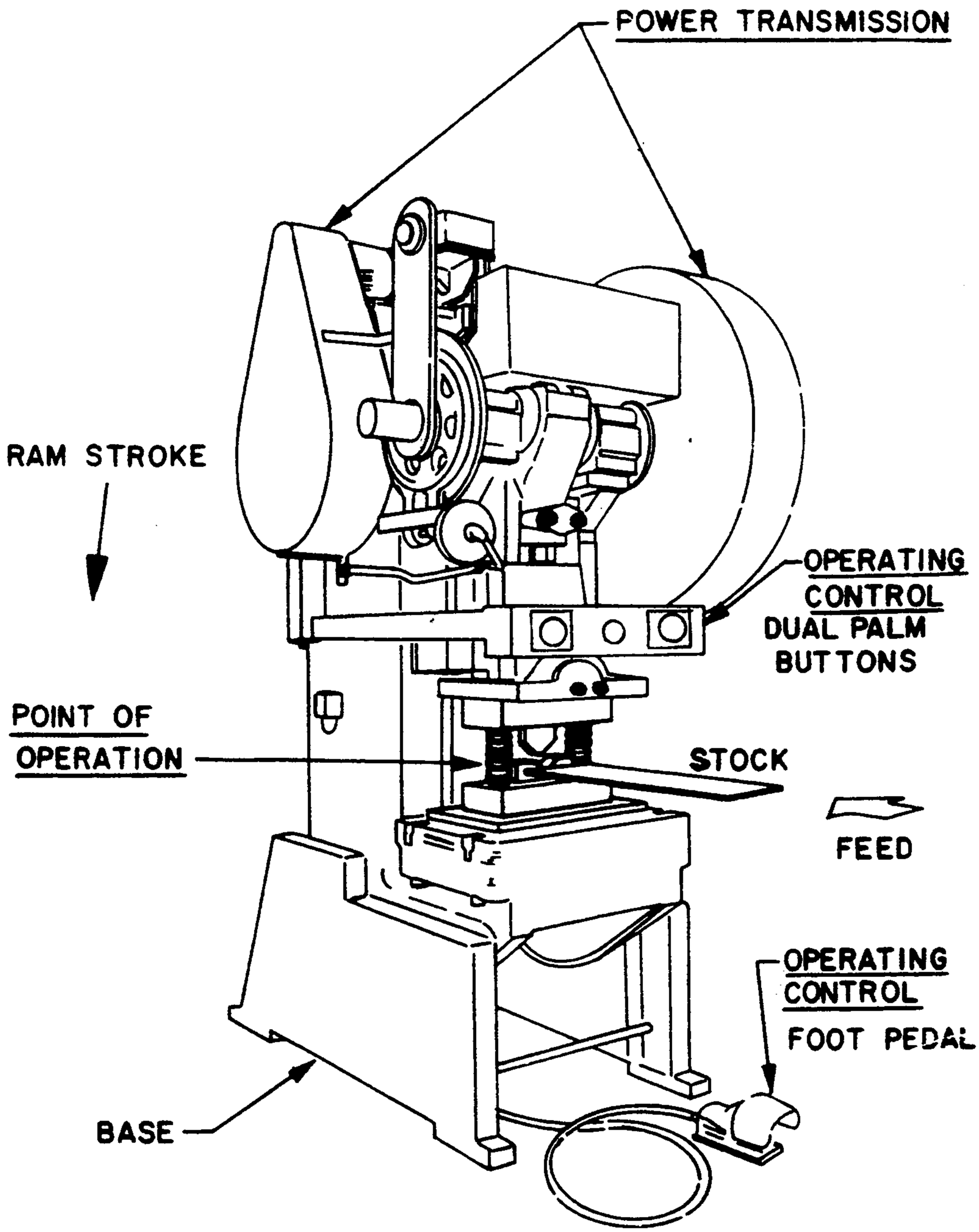


FIGURE 1. MECHANICAL POWER PRESS

Standards and Interpretations

1910.217
Mechanical Power Presses

Subpart **O**
Subpart Title **Machinery and Machine Guarding**

1910.217(a) -- General requirements.

1910.217(a)(1) -- [Reserved]

1910.217(a)(2) -- [Reserved]

1910.217(a)(3) -- [Reserved]

1910.217(a)(4) -- Reconstruction and modification. It shall be the responsibility of any person reconstructing, or modifying a mechanical power press to do so in accordance with paragraph (b) of this section.

1910.217(a)(5) -- Excluded machines. Press brakes, hydraulic and pneumatic power presses, bulldozers, hot bending and hot metal presses, forging presses and hammers, riveting machines and similar types of fastener applicators are excluded from the requirements of this section.

1910.217(b) -- Mechanical power press guarding and construction, general -

1910.217(b)(1) -- Hazards to personnel associated with broken or falling machine components. Machine components shall be designed, secured, or covered to minimize hazards caused by breakage, or loosening and falling or release of mechanical energy (i.e. broken springs).

1910.217(b)(2) -- Brakes. Friction brakes provided for stopping or holding a slide movement shall be inherently self-engaging by requiring power or force from an external source to cause disengagement. Brake capacity shall be sufficient to stop the motion of the slide quickly and capable of holding the slide and its attachments at any point in its travel.

1910.217(b)(3) -- Machines using full revolution positive clutches.

1910.217(b)(3)(i) -- Machines using full revolution clutches shall incorporate a single-stroke mechanism.

1910.217(b)(3)(ii) -- If the single-stroke mechanism is dependent upon spring action, the spring(s) shall be of the compression type, operating on a rod or guided within a hole or tube, and designed to prevent interleaving of the spring coils in event of breakage.

1910.217(b)(4) -- Foot pedals (treadle).

1910.217(b)(4)(i) -- The pedal mechanism shall be protected to prevent unintended operation from falling or moving objects or by accidental stepping onto the pedal.

1910.217(b)(4)(ii) -- A pad with a nonslip contact area shall be firmly attached to the pedal.

1910.217(b)(4)(iii) -- The pedal return spring(s) shall be of the compression type, operating on a rod or guided within a hole or tube, or designed to prevent interleaving of spring coils in event of breakage.

1910.217(b)(4)(iv) -- If pedal counterweights are provided, the path of the travel of the weight shall be enclosed.

1910.217(b)(5) -- Hand operated levers.

1910.217(b)(5)(i) -- Hand-lever-operated power presses shall be equipped with a spring latch on the operating lever to prevent premature or accidental tripping.

1910.217(b)(5)(ii) -- The operating levers on hand-tripped presses having more than one operating station shall be interlocked to prevent the tripping of the press except by the "concurrent" use of all levers.

1910.217(b)(6) -- Two-hand trip.

1910.217(b)(6)(i) -- A two-hand trip shall have the individual operator's hand controls protected against unintentional operation and have the individual operator's hand controls arranged by design and construction and/or separation to require the use of both hands to trip the press and use a control arrangement requiring concurrent operation of the individual operator's hand controls.

1910.217(b)(6)(ii) -- Two-hand trip systems on full revolution clutch machines shall incorporate an antirepeat feature.

1910.217(b)(6)(iii) -- If two-hand trip systems are used on multiple operator presses, each operator shall have a separate set of controls.

1910.217(b)(7) -- Machines using part revolution clutches.

1910.217(b)(7)(i) -- The clutch shall release and the brake shall be applied when the external clutch engaging means is removed, deactivated, or deenergized.

1910.217(b)(7)(ii) -- A red color stop control shall be provided with the clutch/brake control system. Momentary operation of the stop control shall immediately deactivate the clutch and apply the brake. The stop control shall override any other control, and reactuation of the clutch shall require use of the operating (tripping) means which has been selected.

1910.217(b)(7)(iii) -- A means of selecting Off, "Inch," Single Stroke, and Continuous (when the continuous function is furnished) shall be supplied with the clutch/brake control to select type of operation of the press. Fixing of selection shall be by means capable of supervision by the employer.

1910.217(b)(7)(iv) -- The "Inch" operating means shall be designed to prevent exposure of the workers hands within the point of operation by:

1910.217(b)(7)(iv)(a) -- Requiring the concurrent use of both hands to actuate the clutch, or

1910.217(b)(7)(iv)(b) -- Being a single control protected against accidental actuation and so located that the worker cannot reach into the point of operation while operating the single control.

1910.217(b)(7)(v) -- Two-hand controls for single stroke shall conform to the following requirements:

1910.217(b)(7)(v)(a) -- Each hand control shall be protected against unintended operation and arranged by design, construction, and/or separation so that the concurrent use of both hands is required to trip the press.

1910.217(b)(7)(v)(b) -- The control system shall be designed to permit an adjustment which will require concurrent pressure from both hands during the die closing portion of the stroke.

1910.217(b)(7)(v)(c) -- The control system shall incorporate an antirepeat feature.

1910.217(b)(7)(v)(d) -- The control systems shall be designed to require release of all operators' hand controls before an interrupted stroke can be resumed. This requirement pertains only to those single-stroke, two-hand controls manufactured and installed on or after August 31, 1971.

1910.217(b)(7)(vi) -- [Reserved]

1910.217(b)(7)(vii) -- Controls for more than one operating station shall be designed to be activated and deactivated in complete sets of two operator's hand controls per operating station by means capable of being supervised by the employer. The clutch/brake control system shall be designed and constructed to prevent actuation of the clutch if all operating stations are bypassed.

1910.217(b)(7)(viii) -- Those clutch/brake control systems which contain both single and continuous functions shall be designed so that completion of continuous circuits may be supervised by the employer. The initiation of continuous run shall require a prior action or decision by the operator in addition to the selection of Continuous on the stroking selector, before actuation of the operating means will result in continuous stroking.

1910.217(b)(7)(ix) -- If foot control is provided, the selection method between hand and foot control shall be separate from the stroking selector and shall be designed so that the selection may be supervised by the employer.

1910.217(b)(7)(x) -- Foot operated tripping controls, if used, shall be protected so as to prevent operation from falling or moving objects, or from unintended operation by accidental stepping onto the foot control.

1910.217(b)(7)(xi) --The control of air-clutch machines shall be designed to prevent a significant increase in the normal stopping time due to a failure within the operating value mechanism, and to inhibit further operation if such failure does occur. This requirement shall apply only to those clutch/brake air-valve controls manufactured and installed on or after August 31, 1971, but shall not apply to machines intended only for continuous, automatic feeding applications.

1910.217(b)(7)(xii) -- The clutch/brake control shall incorporate an automatic means to prevent initiation or continued activation of the Single Stroke or Continuous functions unless the press drive motor is energized and in the forward direction.

1910.217(b)(7)(xiii) -- The clutch/brake control shall automatically deactivate in event of failure of the power or pressure supply for the clutch engaging means. Reactivation of the clutch shall require restoration of normal supply and the use of the tripping mechanism(s).

1910.217(b)(7)(xiv) -- The clutch/brake control shall automatically deactivate in event of failure of the counterbalance(s) air supply. Reactivation of the clutch shall require restoration of normal air supply and use of the tripping mechanism(s).

1910.217(b)(7)(xv) -- Selection of bar operation shall be by means capable of being supervised by the employer. A separate pushbutton shall be employed to activate the clutch, and the clutch shall be activated only if the driver motor is deenergized.

1910.217(b)(8) -- Electrical.

1910.217(b)(8)(i) -- A main power disconnect switch capable of being locked only in the Off position shall be provided with every power press control system.

1910.217(b)(8)(ii) -- The motor start button shall be protected against accidental operation.

1910.217(b)(8)(iii) -- All mechanical power press controls shall incorporate a type of drive motor starter that will disconnect the drive motor from the power source in event of control voltage or power source failure, and require operation of the motor start button to restart the motor when voltage conditions are restored to normal.

1910.217(b)(8)(iv) -- All a.c. control circuits and solenoid value coils shall be powered by not more than a nominal 120-volt a.c. supply obtained from a transformer with an isolated secondary. Higher voltages that may be necessary for operation of machine or control mechanisms shall be isolated from any control mechanism handled by the operator, but motor starters with integral Start-Stop buttons may utilize line voltage control. All d.c. control circuits shall be powered by not more than a nominal 240-volt d.c. supply isolated from any higher voltages.

1910.217(b)(8)(v) -- All clutch/brake control electrical circuits shall be protected against the possibility of an accidental ground in the control circuit causing false operation of the press.

1910.217(b)(8)(vi) -- Electrical clutch/brake control circuits shall incorporate features to minimize the possibility of an unintended stroke in the event of the failure of a control component to function properly, including relays, limit switches, and static output circuits.

1910.217(b)(9) -- Slide counterbalance systems.

1910.217(b)(9)(i) -- Spring counterbalance systems when used shall incorporate means to retain system parts in event of breakage.

1910.217(b)(9)(ii) -- Spring counterbalances when used shall have the capability to hold the slide and its attachments at midstroke, without brake applied.

1910.217(b)(9)(iii) -- Air counterbalance cylinders shall incorporate means to retain the piston and rod in case of breakage or loosening.

1910.217(b)(9)(iv) -- Air counterbalance cylinders shall have adequate capability to hold the slide and its attachments at any point in stroke, without brake applied.

1910.217(b)(9)(v) -- Air counterbalance cylinders shall incorporate means to prevent failure of capability (sudden loss of pressure) in event of air supply failure.

1910.217(b)(10) -- Air controlling equipment. Air controlling equipment shall be protected against foreign material and water entering the pneumatic system of the press. A means of air lubrication shall be provided when needed.

1910.217(b)(11) -- Hydraulic equipment. The maximum anticipated working pressures in any hydraulic system on a mechanical power press shall not exceed the safe working pressure rating of any component used in that system.

1910.217(b)(12) -- Pressure vessels. All pressure vessels used in conjunction with power presses shall conform to the American Society of Mechanical Engineers Code for Pressure Vessels, 1968 Edition, which is incorporated by reference as specified in Sec. 1910.6.

1910.217(b)(13) – Control reliability. When required by paragraph (c)(5) of this section, the control system shall be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent initiation of a successive stroke until the failure is corrected. The failure shall be detectable by a simple test, or indicated by the control system. This requirement does not apply to those elements of the control system which have no effect on the protection against point of operation injuries.

What is Control Reliability

- It is a control system that will detect any failure within the system;
- It will not prevent the normal stopping action from being applied to the press;
- But will prevent initiation of successive stroke;
- Failure will be detectable or indicated by the control system.

CONTROL RELIABILITY-WHEN IS IT REQUIRED

- It must be a part revolution press
- Operator must have hands in die
- The press must be guarded by:
  - Presence sensing device
  - Two hand control
  - Type B gate guard
  - Movable barrier guard

(b)(4) Brake system monitoring. When required by paragraph (c) (5) of this section, the brake monitor shall meet the following requirements:

(b)(4)(i) Be so constructed as to automatically prevent the activation of a successive stroke if the stopping time or braking distance deteriorates to a point where the safety distance being utilized does not meet the requirements set forth in paragraph (c)(3)(iii)(e) or (c)(3)(vii)(c) of this section. The brake monitor used with the Type B gate or movable barrier device shall be installed in a manner to detect slide top-stop overrun beyond the normal limit reasonably established by the employer.

(b)(4)(ii) Be installed on a press such that it indicates when the performance of the braking system has deteriorated to the extent described in paragraph (b)(14)(i) of this section; and

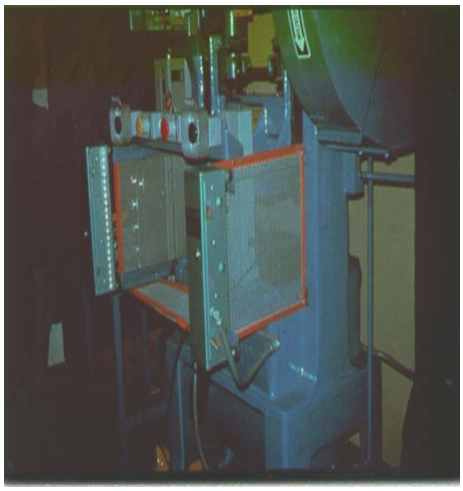
(b)(4)(iii) Be constructed and installed in a manner to monitor brake system performance on each stroke.

FULL REVOLUTION PRESSES GUARDING METHOD

- **Gate guard (Type A only)**
- **Two hand trip(Safety distance/additional guarding**
- **Pullback device**
- **Restraint device(holdouts)**
- **Barrier guards**

PART REVOLUTION PRESSES GUARDING METHODS

- Gate guards (Type A and B)
- Presence sensing devices
  - Light sensing curtains
  - Radio frequency
- Pullback device
- Restraint device(holdouts)
- Two-hand controls
- Barrier guards



1910.217(c) -- Safeguarding the point of operation -

1910.217(c)(1) -- General requirements.

1910.217(c)(1)(i) -- It shall be the responsibility of the employer to provide and insure the usage of "point of operation guards" or properly applied and adjusted point of operation devices on every operation performed on a mechanical power press. See Table O-10.

1910.217(c)(1)(ii) -- The requirement of paragraph (c)(1)(i) of this section shall not apply when the point of operation opening is one-fourth inch or less. See Table O-10.

1910.217(c)(2) -- Point of operation guards.

1910.217(c)(2)(i) -- Every point of operation guard shall meet the following design, construction, application, and adjustment requirements:

1910.217(c)(2)(i)(a) -- It shall prevent entry of hands or fingers into the point of operation by reaching through, over, under or around the guard;

1910.217(c)(2)(i)(b) -- It shall conform to the maximum permissible openings of Table O-10;

1910.217(c)(2)(i)(c) -- It shall, in itself, create no pinch point between the guard and moving machine parts;

1910.217(c)(2)(i)(d) -- It shall utilize fasteners not readily removable by operator, so as to minimize the possibility of misuse or removal of essential parts;

1910.217(c)(2)(i)(e) -- It shall facilitate its inspection, and

1910.217(c)(2)(i)(f) -- It shall offer maximum visibility of the point of operation consistent with the other requirements.

1910.217(c)(2)(ii) -- A die enclosure guard shall be attached to the die shoe or stripper in a fixed position.

1910.217(c)(2)(iii) -- A fixed barrier guard shall be attached securely to the frame of the press or to the bolster plate.

1910.217(c)(2)(iv) -- An interlocked press barrier guard shall be attached to the press frame or bolster and shall be interlocked with the press clutch control so that the clutch cannot be activated unless the guard itself, or the hinged or movable sections of the guard are in position to conform to the requirements of Table O-10.

1910.217(c)(2)(v) -- The hinged or movable sections of an interlocked press barrier guard shall not be used for manual feeding. The guard shall prevent opening of the interlocked section and reaching into the point of operation prior to die closure or prior to the cessation of slide motion. See paragraph (c)(3)(ii) of this section regarding manual feeding through interlocked press barrier devices.

1910.217(c)(2)(vi) -- The adjustable barrier guard shall be securely attached to the press bed, bolster plate, or die shoe, and shall be adjusted and operated in conformity with Table O-10 and the requirements of this subparagraph. Adjustments shall be made only by authorized personnel whose qualifications include a knowledge of the provisions of Table O-10 and this subparagraph.

1910.217(c)(2)(vii) -- A point of operation enclosure which does not meet the requirements of this subparagraph and Table O-10 shall be used only in conjunction with point of operation devices.

1910.217(c)(3) -- Point of operation devices.

1910.217(c)(3)(i) -- Point of operation devices shall protect the operator by:

1910.217(c)(3)(i)(a) -- Preventing and/or stopping normal stroking of the press if the operator's hands are inadvertently placed in the point of operation; or

1910.217(c)(3)(i)(b) -- Preventing the operator from inadvertently reaching into the point of operation, or withdrawing his hands if they are inadvertently located in the point of operation, as the dies close; or

1910.217(c)(3)(i)(c) -- Preventing the operator from inadvertently reaching into the point of operation at all times; or

1910.217(c)(3)(i)(d) -- [Reserved]

1910.217(c)(3)(i)(e) -- Requiring application of both of the operator's hands to machine operating controls and locating such controls at such a safety distance from the point of operation that the slide completes the downward travel or stops before the operator can reach into the point of operation with his hands; or

1910.217(c)(3)(i)(f) -- Enclosing the point of operation before a press stroke can be initiated, and maintaining this closed condition until the motion of the slide had ceased; or

1910.217(c)(3)(i)(g) -- Enclosing the point of operation before a press stroke can be initiated, so as to prevent an operator from reaching into the point of operation prior to die closure or prior to cessation of slide motion during the downward stroke.

1910.217(c)(3)(ii) -- A gate or movable barrier device shall protect the operator as follows:

1910.217(c)(3)(ii)(a) -- A Type A gate or movable barrier device shall protect the operator in the manner specified in paragraph (c)(3)(i)(f) of this section, and

1910.217(c)(3)(ii)(b) -- A Type B gate or movable barrier device shall protect the operator in the manner specified in paragraph (c)(3)(i)(g) of this section.

1910.217(c)(3)(iii) -- A presence sensing point of operation device shall protect the operator as provided in paragraph (c)(3)(i)(a) of this section, and shall be interlocked into the control circuit to prevent or stop slide motion if the operator's hand or other part of his body is within the sensing field of the device during the downstroke of the press slide.

1910.217(c)(3)(iii)(a) -- The device may not be used on machines using full revolution clutches.

1910.217(c)(3)(iii)(b) -- The device may not be used as a tripping means to initiate slide motion.

1910.217(c)(3)(iii)(c) -- The device shall be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent the initiation of a successive stroke until the failure is corrected. The failure shall be indicated by the system.

1910.217(c)(3)(iii)(d) -- Muting (bypassing of the protective function) of such device, during the upstroke of the press slide, is permitted for the purpose of parts ejection, circuit checking, and feeding.

1910.217(c)(3)(iii)(e) -- The safety distance (D(s)) from the sensing field to the point of operation shall be greater than the distance determined by the following formula:

D(s) = 63 inches/second X T(s)

where:

D(s) = minimum safety distance (inches); 63 inches/second
= hand speed constant;

and

T(s) = stopping time of the press measured at approximately 90 deg.
position of crankshaft rotation (seconds).

1910.217(c)(3)(iii)(f) -- Guards shall be used to protect all areas of entry to the point of operation not protected by the presence sensing device.

1910.217(c)(3)(iv) -- The pull-out device shall protect the operator as specified in paragraph (c)(3)(i)(b) of this section, and shall include attachments for each of the operator's hands.

1910.217(c)(3)(iv)(a) -- Attachments shall be connected to and operated only by the press slide or upper die.

1910.217(c)(3)(iv)(b) -- Attachments shall be adjusted to prevent the operator from reaching into the point of operation or to withdraw the operator's hands from the point of operation before the dies close.

1910.217(c)(3)(iv)(c) -- A separate pull-out device shall be provided for each operator if more than one operator is used on a press.

1910.217(c)(3)(iv)(d) -- Each pull-out device in use shall be visually inspected and checked for proper adjustment at the start of each operator shift, following a new die set-up, and when operators are changed. Necessary maintenance or repair or both shall be performed and completed before the press is operated. Records of inspections and maintenance shall be kept in accordance with paragraph (e) of this section.

1910.217(c)(3)(v) -- The sweep device may not be used for point of operation safeguarding.

1910.217(c)(3)(vi) -- A holdout or a restraint device shall protect the operator as specified in paragraph (c)(3)(i)(c) of this section and shall include attachments for each of the operator's hands. Such attachments shall be securely anchored and adjusted in such a way that the operator is restrained from reaching into the point of operation. A separate set of restraints shall be provided for each operator if more than one operator is required on a press.

1910.217(c)(3)(vii) -- The two hand control device shall protect the operator as specified in paragraph (c)(3)(i)(e) of this section.

1910.217(c)(3)(vii)(a) -- When used in press operations requiring more than one operator, separate two hand controls shall be provided for each operator, and shall be designed to require concurrent application of all operators' controls to activate the slide. The removal of a hand from any control button shall cause the slide to stop.

1910.217(c)(3)(vii)(b) -- Each two hand control shall meet the construction requirements of paragraph (b)(7)(v) of this section.

1910.217(c)(3)(vii)(c) -- The safety distance (D(s)) between each two hand control device and the point of operation shall be greater than the distance determined by the following formula:

D(s) = 63 inches/second X T(s);

where:

D(s) = minimum safety distance (inches); 63 inches/second=hand speed constant; and

T(s) = stopping time of the press measured at approximately 90 deg. position of crankshaft rotation (seconds).

1910.217(c)(3)(vii)(d) -- Two hand controls shall be fixed in position so that only a supervisor or safety engineer is capable of relocating the controls.

1910.217(c)(3)(viii) -- The two hand trip device shall protect the operator as specified in paragraph (c)(3)(i)(e) of this section.

1910.217(c)(3)(viii)(a) -- When used in press operations requiring more than one operator, separate two hand trips shall be provided for each operator, and shall be designed to require concurrent application of all operators' to activate the slide.

1910.217(c)(3)(viii)(b) -- Each two hand trip shall meet the construction requirements of paragraph (b)(6) of this section.

1910.217(c)(3)(viii)(c) -- The safety distance (D(m)) between the two hand trip and the point of operation shall be greater than the distance determined by the following formula:

D(m) = 63 inches/second X T(m);

where:

D(m) = minimum safety distance (inches); 63 inches/second=hand speed constant; and

T(m) = the maximum time the press takes for the die closure after it has been tripped (seconds). For full revolution clutch presses with only one engaging point T(m) is equal to the time necessary for one and one-half revolutions of the crankshaft. For full revolution clutch presses with more than one engaging point, T(m) shall be calculated as follows:

T(m) = [1/2 + (1 divided by Number of engaging points per revolution)] X time necessary to complete one revolution of the crankshaft (seconds).

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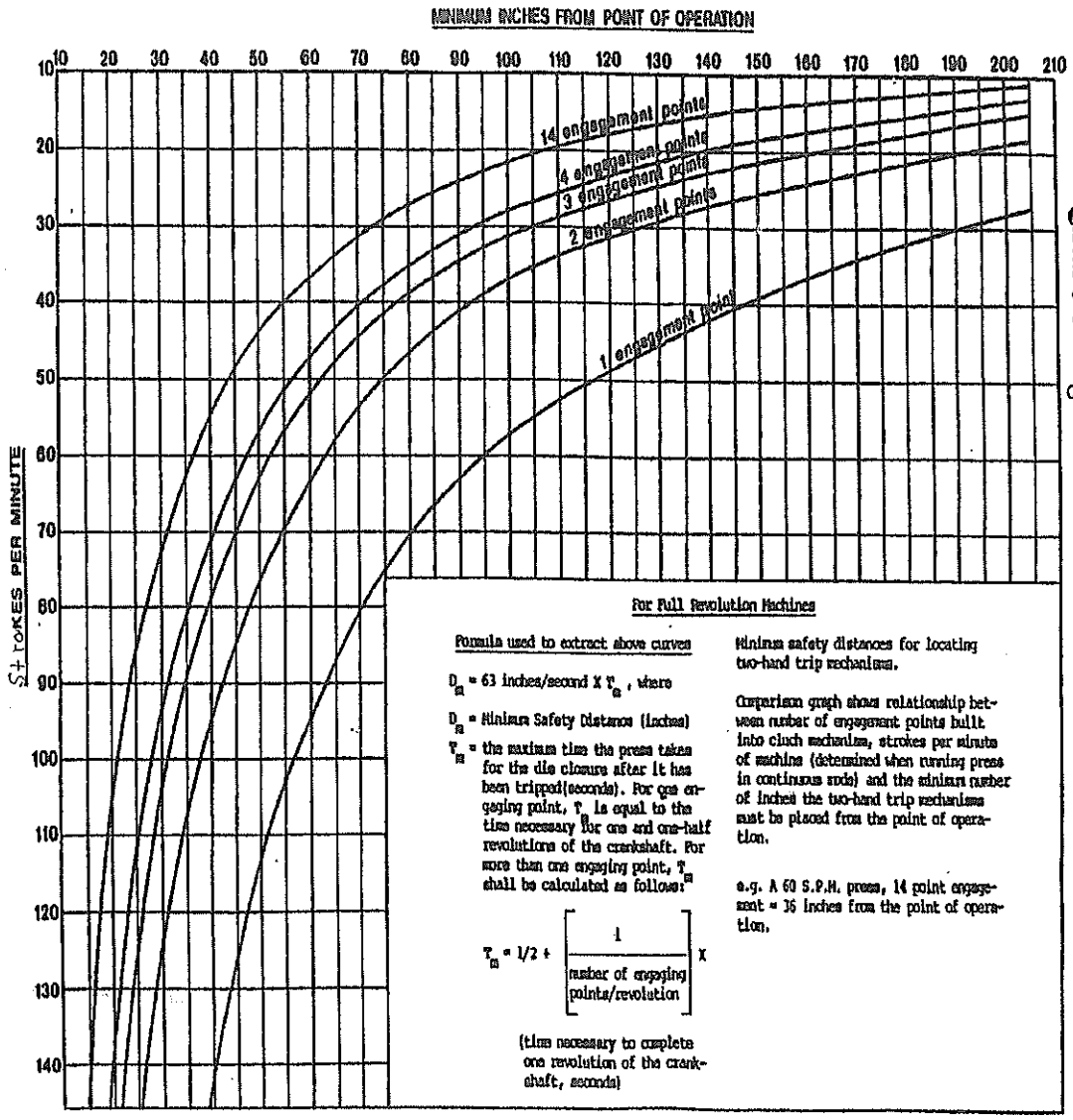

Illustration of Minimum Inches from Point of Operation

PARTIAL LIST OF ENGAGEMENT POINTS - FULL REV PRESS

# OF ENGAGEMENT POINTS	PRESS MFG
14	NIAGARA ONLY
4	* BLISS, * MINSTER * PRESS RITE
3	ALVA ALLEN JOHNSON VERSON * BLISS CLEARING CLEVELAND CONSOLATED DANLY DIAMONT FEDERAL FERRACUTE L & J TOLEDO * MINSTER * PERKINS ROBINSON ROBINSON ROCKFORD ROUSELLE V & O WALSH WILLIAM/WHITE
2	ALVA ALLEN KENCO * BENCHMASTER * PERKINS * GILRO * PRESSRITE
1	* BENCHMASTER FAMCO * GILRO

*NOTES SOME OVERLAP

1910.217(c)(3)(viii)(d) -- Two hand trips shall be fixed in position so that only a supervisor or safety engineer is capable of relocating the controls.

1910.217(c)(4) -- Hand feeding tools. Hand feeding tools are intended for placing and removing materials in and from the press. Hand feeding tools are not a point of operation guard or protection device and shall not be used in lieu of the "guards" or devices required in this section.

1910.217(c)(5) -- Additional requirements for safe-guarding. Where the operator feeds or removes parts by placing one or both hands in the point of operation, and a two hand control, presence sensing device of Type B gate or movable barrier (on a part revolution clutch) is used for safeguarding:

1910.217(c)(5)(i) -- The employer shall use a control system and a brake monitor which comply with paragraphs (b)(13) and (14) of this section;

1910.217(c)(5)(ii) -- The exception in paragraph (b) (7)(v)(d) of this section for two hand controls manufactured and installed before August 31, 1971 is not applicable under this paragraph (c)(5);

1910.217(c)(5)(iii) -- The control of air clutch machines shall be designed to prevent a significant increase in the normal stopping time due to a failure within the operating valve mechanism, and to inhibit further operation if such failure does occur, where a part revolution clutch is employed. The exception in paragraph (b)(7)(xi) of this section for controls manufactured and installed before August 31, 1971, is not applicable under this paragraph (c)(5).

1910.217(d) -- Design, construction, setting and feeding of dies -

1910.217(d)(1) -- General requirements. The employer shall:

1910.217(d)(1)(i) -- Use dies and operating methods designed to control or eliminate hazards to operating personnel; and

1910.217(d)(1)(ii) -- furnish and enforce the use of hand tools for freeing and removing stuck work or scrap pieces from the die, so that no employee need reach into the point of operation for such purposes.

1910.217(d)(2) -- [Reserved]

1910.217(d)(3) -- Scrap handling. The employer shall provide means for handling scrap from roll feed or random length stock operations. Scrap cutters used in conjunction with scrap handling systems shall be safeguarded in accordance with paragraph (c) of this section and with 1910.219.

1910.217(d)(4) -- Guide post hazard. The hazard created by a guide post (when it is located in the immediate vicinity of the operator) when separated from its bushing by more than one-fourth inch shall be considered as a point of operation hazard and be protected in accordance with paragraph (c) of this section.

1910.217(d)(5) -- Unitized tooling. If unitized tooling is used, the opening between the top of the punch holder and the face of the slide, or striking pad, shall be safeguarded in accordance with the requirements of paragraph (c) of this section.

1910.217(d)(6) -- Tonnage, stroke, and weight designation. All dies shall be:

1910.217(d)(6)(i) -- Stamped with the tonnage and stroke requirements, or have these characteristics recorded if these records are readily available to the die setter;

1910.217(d)(6)(ii) -- Stamped to indicate upper die weight when necessary for air counterbalance pressure adjustment; and

1910.217(d)(6)(iii) -- Stamped to indicate complete die weight when handling equipment may become overloaded.

1910.217(d)(7) -- Die fastening. Provision shall be made in both the upper and lower shoes for securely mounting the die to the bolster and slide. Where clamp caps or setscrews are used in conjunction with punch stems, additional means of securing the upper shoe to the slide shall be used.

1910.217(d)(8) -- Die handling. Handling equipment attach points shall be provided on all dies requiring mechanical handling.

1910.217(d)(9) -- Diesetting.

1910.217(d)(9)(i) -- The employer shall establish a diesetting procedure that will insure compliance with paragraph (c) of this section.

1910.217(d)(9)(ii) -- The employer shall provide spring loaded turnover bars, for presses designed to accept such turnover bars.

1910.217(d)(9)(iii) -- The employer shall provide die stops or other means to prevent losing control of the die while setting or removing dies in presses which are inclined.

1910.217(d)(9)(iv) -- The employer shall provide and enforce the use of safety blocks for use whenever dies are being adjusted or repaired in the press.

1910.217(d)(9)(v) -- The employer shall provide brushes, swabs, lubricating rolls, and automatic or manual pressure guns so that operators and diesetters shall not be required to reach into the point of operation or other hazard areas to lubricate material, punches or dies.

1910.217(e) -- Inspection, maintenance, and modification of presses -

1910.217(e)(1) -- Inspection and maintenance records.

1910.217(e)(1)(i) -- It shall be the responsibility of the employer to establish and follow a program of periodic and regular inspections of his power presses to ensure that all their parts, auxiliary equipment, and safeguards are in a safe operating condition and adjustment. The employer shall maintain a certification record of inspections which includes the date of inspection, the signature of the person who performed the inspection and the serial number, or other identifier, of the power press that was inspected.

1910.217(e)(1)(ii) -- Each press shall be inspected and tested no less than weekly to determine the condition of the clutch/brake mechanism, antirepeat feature and single stroke mechanism. Necessary maintenance or repair or both shall be performed and completed before the press is operated. These requirements do not apply to those presses which comply with paragraphs (b)(13) and (14) of this section. The employer shall maintain a certification record of inspections, tests and maintenance work which includes the date of the inspection, test or maintenance; the signature of the person who performed the inspection, test, or maintenance; and the serial number or other identifier of the press that was inspected, tested or maintained.

1910.217(e)(2) -- Modification. It shall be the responsibility of any person modifying a power press to furnish instructions with the modification to establish new or changed guidelines for use and care of the power press so modified.

1910.217(e)(3) -- Training of maintenance personnel. It shall be the responsibility of the employer to insure the original and continuing competence of personnel caring for, inspecting, and maintaining power presses.

1910.217(f) -- Operation of power presses -

1910.217(f)(1) -- [Reserved]

1910.217(f)(2) -- Instruction to operators. The employer shall train and instruct the operator in the safe method of work before starting work on any operation covered by this section. The employer shall insure by adequate supervision that correct operating procedures are being followed.

1910.217(f)(3) -- Work area. The employer shall provide clearance between machines so that movement of one operator will not interfere with the work of another. Ample room for cleaning machines, handling material, work pieces, and scrap shall also be provided. All surrounding floors shall be kept in good condition and free from obstructions, grease, oil, and water.

1910.217(f)(4) -- Overloading. The employer shall operate his presses within the tonnage and attachment weight ratings specified by the manufacturer.

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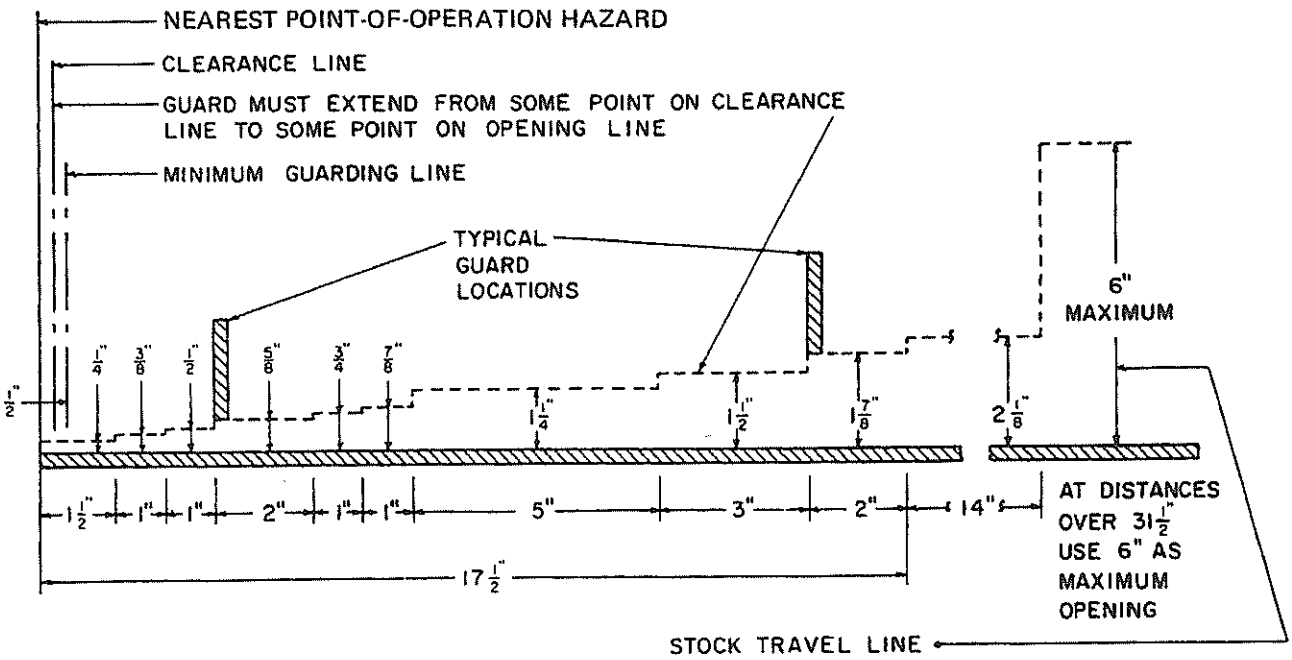

Explanation of above diagram:
This diagram shows the accepted safe openings between the bottom edge of a guard and feed table at various distances from the danger line (point of operation).
The clearance line marks the distance required to prevent contact between guard and moving parts.
The minimum guarding line is the distance between the infeed side of the guard and the danger line which is one-half inch from the danger line.
The various openings are such that for average size hands an operator's fingers won't reach the point of operation.
After installation of point of operation guards and before a job is released for operation a check should be made to verify that the guard will prevent the operator's hands from reaching the point of operation.

Table O-10 [In inches]

Distance of opening from point of operation hazard	Maximum width of opening
1/2 to 1 1/2	1/4
1 1/2 to 2 1/2	3/8
2 1/2 to 3 1/2	1/2
3 1/2 to 5 1/2	5/8
5 1/2 to 6 1/2	3/4
6 1/2 to 7 1/2	7/8
7 1/2 to 12 1/2	1 1/4
12 1/2 to 15 1/2	1 1/2
15 1/2 to 17 1/2	1 7/8
17 1/2 to 31 1/2	2 1/8

This table shows the distances that guards shall be positioned from the danger line in accordance with the required openings.

1910.217(g) -- Reports of injuries to employees operating mechanical power presses.

1910.217(g)(1) -- The employer shall, within 30 days of the occurrence, report to either the Director of the Directorate of Safety Standards Programs, OSHA, U.S. Department of Labor, Washington, D.C. 20210, or the State agency administering a plan approved by the Assistant Secretary of Labor for Occupational Safety and Health, all point of operation injuries to operators or other employees. The following information shall be included in the report:

1910.217(g)(1)(i) -- Employer's name, address and location of the workplace (establishment).

1910.217(g)(1)(ii) -- Employee's name, injury sustained, and the task being performed (operation, set-up, maintenance, or other).

1910.217(g)(1)(iii) -- Type of clutch used on the press (full revolution, part revolution, or direct drive).

1910.217(g)(1)(iv) -- Type of safeguard(s) being used (two hand control, two hand trip, pull-outs, sweeps, or other). If the safeguard is not described in this section, give a complete description.

1910.217(g)(1)(v) -- Cause of the accident (repeat of press, safeguard failure, removing stuck part or scrap, no safeguard provided, no safeguard in use, or other).

1910.217(g)(1)(vi) -- Type of feeding (manual with hands in dies or with hands out of dies, semiautomatic, automatic, or other).

1910.217(g)(1)(vii) -- Means used to actuate press stroke (foot trip, foot control, hand trip, hand control, or other).

1910.217(g)(1)(viii) -- Number of operators required for the operation and the number of operators provided with controls and safeguards.

1910.217(h) -- Presence sensing device initiation (PSDI).

1910.217(h)(1) -- General

1910.217(h)(1)(i) -- The requirements of paragraph (h) shall apply to all part revolution mechanical power presses used in the PSDI mode of operation.

1910.217(h)(1)(ii) -- The relevant requirements of paragraphs (a) through (g) of this section also shall apply to all presses used in the PSDI mode of operation whether or not cross referenced in this paragraph (h). Such cross- referencing of specific requirements from paragraphs (a) through (g) of this section is intended only to enhance convenience and understanding in relating to the new provisions to the existing standard, and is not to be construed as limiting the applicability of other provisions in paragraphs (a) through (g) of this section.

1910.217(h)(1)(iii) -- Full revolution mechanical power presses shall not be used in the PSDI mode of operation.

1910.217(h)(1)(iv) -- Mechanical power presses with a configuration which would allow a person to enter, pass through, and become clear of the sensing field into the hazardous portion of the press shall not be used in the PSDI mode of operation.

1910.217(h)(1)(v) -- The PSDI mode of operation shall be used only for normal production operations. Die-setting and maintenance procedures shall comply with paragraphs (a) through (g) of this section, and shall not be done in the PSDI mode.

1910.217(h)(2) -- Brake and clutch requirements.

1910.217(h)(2)(i) -- Presses with flexible steel band brakes or with mechanical linkage actuated brakes or clutches shall not be used in the PSDI mode.

1910.217(h)(2)(ii) -- Brake systems on presses used in the PSDI mode shall have sufficient torque so that each average value of stopping times (Ts) for stops initiated at approximately 45 degrees, 60 degrees, and 90 degrees, respectively, of crankshaft angular position, shall not be more than 125 percent of the average value of the stopping time at the top crankshaft position. Compliance with this requirement shall be determined by using the heaviest upper die to be used on the press, and operating at the fastest press speed if there is speed selection.

1910.217(h)(2)(iii) -- Where brake engagement and clutch release is effected by spring action, such springs(s) shall operate in compression on a rod or within a hole or tube, and shall be of non-interleaving design.

1910.217(h)(3) -- Pneumatic systems.

1910.217(h)(3)(i) -- Air valve and air pressure supply/control.

1910.217(h)(3)(i)(A) -- requirements of paragraphs (b)(7)(xiii), (b)(7)(xiv), (b)(10), (b)(12) and (c)(5)(iii) of this section apply to the pneumatic systems of machines used in the PSDI mode.

1910.217(h)(3)(i)(B) -- The air supply for pneumatic clutch/brake control valves shall incorporate a filter, an air regulator, and, when necessary for proper operation, a lubricator.

1910.217(h)(3)(i)(C) -- The air pressure supply for clutch/brake valves on machines used in the PSDI mode shall be regulated to pressures less than or equal to the air pressure used when making the stop time measurements required by paragraph (h)(2)(ii) of this section.

1910.217(h)(3)(ii) -- Air counterbalance systems.

1910.217(h)(3)(ii)(A) -- Where presses that have slide counterbalance systems are used in the PSDI mode, the counterbalance system shall also meet the requirements of paragraph (b)(9) of this section.

1910.217(h)(3)(ii)(B) -- Counterbalances shall be adjusted in accordance with the press manufacturer's recommendations to assure correct counterbalancing of the slide attachment (upper die) weight for all operations performed on presses used in the PSDI mode. The adjustments shall be made before performing the stopping time measurements required by paragraphs (h)(2)(ii), (h)(5)(iii), and (h)(9)(v) of this section.

1910.217(h)(4) -- Flywheels and bearings. Presses whose designs incorporate f...
(h)(4) Flywheels and bearings. Presses whose designs incorporate flywheels running on journals on the crankshaft or back shaft, or bull gears running on journals mounted on the crankshaft, shall be inspected, lubricated, and maintained as provided in paragraph (h)(10) of this section to reduce the possibility of unintended and uncontrolled press strokes caused by bearing seizure.

1910.217(h)(5) -- Brake monitoring.

1910.217(h)(5)(i) -- Presses operated in the PSDI mode shall be equipped with a brake monitor that meets the requirements of paragraphs (b)(13) and (b)(14) of this section. In addition, the brake monitor shall be adjusted during installation certification to prevent successive stroking of the press if increases in stopping time cause an increase in the safety distance above that required by paragraph (h)(9)(v) of this section.

1910.217(h)(5)(ii) -- Once the PSDI safety system has been certified/validated, adjustment of the brake monitor shall not be done without prior approval of the validation organization for both the brake monitor adjustment and the corresponding adjustment of the safety distance. The validation organization shall in its installation validation, state that in what circumstances, if any, the employer has advance approval for adjustment, when prior oral approval is appropriate and when prior approval must be in writing. The adjustment shall be done under the supervision of an authorized person whose qualifications include knowledge of safety distance requirements and experience with the brake system and its adjustment. When brake wear or other factors extend press stopping time beyond the limit permitted by the brake monitor, adjustment, repair, or maintenance shall be performed on the brake or other press system element that extends the stopping time.

1910.217(h)(5)(iii) -- The brake monitor setting shall allow an increase of no more than 10 percent of the longest stopping time for the press, or 10 milliseconds, whichever is longer, measured at the top of the stroke.

1910.217(h)(6) -- Cycle control and control systems.

1910.217(h)(6)(i) -- The control system on presses used in the PSDI mode shall meet the applicable requirements of paragraphs (b)(7), (b)(8), (b)(13), and (c)(5) of this section.

1910.217(h)(6)(ii) -- The control system shall incorporate a means of dynamically monitoring for decoupling of the rotary position indicating mechanism drive from the crankshaft. This monitor shall stop slide motion and prevent successive press strokes if decoupling occurs, or if the monitor itself fails.

1910.217(h)(6)(iii) -- The mode selection means of paragraph (b)(1)(iii) of this section shall have at least one position for selection of the PSDI mode. Where more than one interruption of the light sensing field is used in the initiation of a stroke, either the mode selection means must have one position for each function, or a separate selection means shall be provided which becomes operable when the PSDI mode is selected. Selection of PSDI mode and the number of interruptions/withdrawals of the light sensing field required to initiate a press cycle shall be by means capable of supervision by the employer.

1910.217(h)(6)(iv) -- A PSDI set-up/reset means shall be provided which requires an overt action by the operator, in addition to PSDI mode selection, before operation of the press by means of PSDI can be started.

1910.217(h)(6)(v) -- An indicator visible to the operator and readily seen by the employer shall be provided which shall clearly indicate that the system is set-up for cycling in the PSDI mode.

1910.217(h)(6)(vi) -- The control system shall incorporate a timer to deactivate PSDI when the press does not stroke within the period of time set by the timer. The timer shall be manually adjustable, to a maximum time of 30 seconds. For any timer setting greater than 15 seconds, the adjustment shall be made by the use of a special tool available only to authorized persons. Following a deactivation of PSDI by the timer, the system shall make it necessary to reset the set-up/reset means in order to reactivate the PSDI mode.

1910.217(h)(6)(vii) -- Reactivation of PSDI operation following deactivation of the PSDI mode from any other cause, such as activation of the red color stop control required by paragraph (b)(7)(ii) of this section, interruption of the presence sensing field, opening of an interlock, or reselection of the number of sensing field interruptions/withdrawals required to cycle the press, shall require resetting of the set-up/reset means.

1910.217(h)(6)(viii) -- The control system shall incorporate an automatic means to prevent initiation or continued operation in the PSDI mode unless the press drive motor is energized in the forward direction of crankshaft rotation.

1910.217(h)(6)(ix) -- The control design shall preclude any movement of the slide caused by operation of power on, power off, or selector switches, or from checks for proper operations as required by paragraph (h)(6)(xiv) of this section.

1910.217(h)(6)(x) -- All components and subsystems of the control system shall be designed to operate together to provide total control system compliance with the requirements of this section.

1910.217(h)(6)(xi) -- Where there is more than one operator of a press used for PSDI, each operator shall be protected by a separate, independently functioning, presence sensing device. The control system shall require that each sensing field be interrupted the selected number of times prior to initiating a stroke. Further, each operator shall be provided with a set-up/reset means that meets the requirements of paragraph (h)(6) of this section, and which must be actuated to initiate operation of the press in the PSDI mode.

1910.217(h)(6)(xii) -- [Reserved]

1910.217(h)(6)(xiii) -- The Control system shall incorporate interlocks for supplemental guards, if used, which will prevent stroke initiation or will stop a stroke in progress if any supplemental guard fails or is deactivated.

1910.217(h)(6)(xiv) -- The control system shall perform checks for proper operation of all cycle control logic element switches and contacts at least once each cycle. Control elements shall be checked for correct status after power "on" and before the initial PSDI stroke.

1910.217(h)(6)(xv) -- The control system shall have provisions for an "inch" operating means meeting the requirements of paragraph (b)(7)(iv) of this section. Die-setting shall not be done in the PSDI mode. Production shall not be done in the "inch" mode.

1910.217(h)(6)(xvi) -- The control system shall permit only a single stroke per initiation command.

1910.217(h)(6)(xvii) -- Controls with internally stored programs (e.g., mechanical, electro-mechanical, or electronic) shall meet the requirements of paragraph (b)(13) of this section, and shall default to a predetermined safe condition in the event of any single failure within the system. Programmable controllers which meet the requirements for controls with internally stored programs stated above shall be permitted only if all logic elements affecting the safety system and point of operation safety are internally stored and protected in such a manner that they cannot be altered or manipulated by the user to an unsafe condition.

1910.217(h)(7) -- Environmental requirements. Control components shall be selected, constructed, and connected together in such a way as to withstand expected operational and environmental stresses, at least including those outlined in Appendix A. Such stresses shall not so affect the control system as to cause unsafe operation.

1910.217(h)(8) -- Safety system.

1910.217(h)(8)(i) -- Mechanical power presses used in the PSDI mode shall be operated under the control of a safety system which, in addition to meeting the applicable requirements of paragraphs (b)(13) and (c)(5) and other applicable provisions of this section, shall function such that a single failure or single operating error shall not cause injury to personnel from point of operation hazards.

1910.217(h)(8)(ii) -- The safety system shall be designed, constructed, and arranged as an integral total system, including all elements of the press, the controls, the safeguarding and any required supplemental safeguarding, and their interfaces with the operator and that part of the environment which has effect on the protection against point of operation hazards.

1910.217(h)(9) -- Safeguarding the point of operation.

1910.217(h)(9)(i) -- The point of operation of presses operated in the PSDI mode shall be safeguarded in accordance with the requirements of paragraph (c) of this section, except that the safety distance requirements of paragraph (h)(9)(v) of this section shall be used for PSDI operation.

1910.217(h)(9)(ii) --

1910.217(h)(9)(ii)(A) -- PSDI shall be implemented only by use of light curtain (photo-electric) presence sensing devices which meet the requirements of paragraph (c)(3)(iii)(c) of this section unless the requirements of the following paragraph have been met.

1910.217(h)(9)(ii)(B) -- Alternatives to photo-electric light curtains may be used for PSDI when the employer can demonstrate, through tests and analysis by the employer or the manufacturer, that the alternative is as safe as the photo-electric light curtain, that the alternative meets the conditions of this section, has the same long term reliability as light curtains and can be integrated into the entire safety system as provided for in this section. Prior to use, both the employer and manufacturer must certify that these requirements and all the other applicable requirements of this section are met and these certifications must be validated by an OSHA-recognized third-party validation organization to meet these additional requirements and all the other applicable requirements of paragraphs (a) through (h) and Appendix A of this section. Three months prior to the operation of any alternative system, the employer must notify the OSHA Directorate of Safety Standards programs of the name of the system to be installed, the manufacturer and the OSHA-recognized third-party validation organization immediately. Upon request, the employer must make available to that office all tests and analyses for OSHA review.

1910.217(h)(9)(iii) -- Individual sensing fields of presence sensing devices used to initiate strokes in the PSDI mode shall cover only one side of the press.

1910.217(h)(9)(iv) -- Light curtains used for PSDI operation shall have minimum object sensitivity not to exceed one and one-fourth inches (31.75 mm). Where light curtain object sensitivity is user-adjustable, either discretely or continuously, design features shall limit the minimum object sensitivity adjustment not to exceed one and one-fourth inches (31.75 mm). Blanking of the sensing field is not permitted.

1910.217(h)(9)(v) -- The safety distance (Ds) from the sensing field of the presence sensing device to the point of operation shall be greater than or equal to the distance determined by the formula:

$$Ds = Hs \times (Ts + Tp + Tr + 2Tm) + Dp$$

Where:

Ds = Minimum safety distance.
Hs = Hand speed constant of 63 inches per second (1.6 m/s).
Ts = Longest press stopping time, in seconds, computed by taking averages of multiple measurements at each of three positions (45 degrees, 60 degrees, and 90 degrees) of crankshaft angular position;the longest of the three averages is the stopping time to use. (Ts is defined as the sum of the kinetic energy dissipation time plus the pneumatic/magnetic/hydraulic reaction time of the clutch/brake operating mechanism(s).)
Tp = Longest presence sensing device response time, in seconds.
Tr = Longest response time, in seconds, of all interposing control elements between the presence sensing device and the clutch/brake operating mechanism(s).
Tm = Increase in the press stopping time at the top of the stroke, in seconds, allowed by the brake monitor for brake wear. The time increase allowed shall be limited to no more than 10 percent of the longest press stopping time measured at the top of the stroke, or 10 milliseconds, whichever is longer.
Dp = Penetration depth factor, required to provide for possible penetration through the presence sensing field by fingers or hand before detection occurs. The penetration depth factor shall be determined from Graph h-1 using the minimum object sensitivity size.

Penetration Depth Factor Calculation Graph

1910.217(h)(9)(vi) -- The presence sensing device location shall either be set at each tool change and set-up to provide at least the minimum safety distance, or fixed in location to provide a safety distance greater than or equal to the minimum safety distance for all tooling set-ups which are to be used on that press.

1910.217(h)(9)(vii) -- Where presence sensing device location is adjustable, adjustment shall require the use of a special tool available only to authorized persons.

1910.217(h)(9)(viii) -- Supplemental safeguarding shall be used to protect all areas of access to the point of operation which are unprotected by the PSDI presence sensing device. Such supplemental safeguarding shall consist of either additional light curtain (photo-electric) presence sensing devices or other types of guards which meet the requirements of paragraphs (c) and (h) of this section.

1910.217(h)(9)(viii)(A) -- Presence sensing devices used as supplemental safeguarding shall not initiate a press stroke, and shall conform to the requirements of paragraph (c)(3)(iii) and other applicable provisions of this section, except that the safety distance shall comply with paragraph (h)(9)(v) of this section.

1910.217(h)(9)(viii)(B) -- Guards used as supplemental safeguarding shall conform to the design, construction and application requirements of paragraph (c)(2) of this section, and shall be interlocked with the press control to prevent press PSDI operation if the guard fails, is removed, or is out of position.

1910.217(h)(9)(ix) -- Barriers shall be fixed to the press frame or bolster to prevent personnel from passing completely through the sensing field, where safety distance or press configuration is such that personnel could pass through the PSDI presence sensing field and assume a position where the point of operation could be accessed without detection by the PSDI presence sensing device. As an alternative, supplemental presence sensing devices used only in the safeguard mode may be provided. If used, these devices shall be located so as to detect all operator locations and positions not detected by the PSDI sensing field, and shall prevent stroking or stop a stroke in process when any supplemental sensing field(s) are interrupted.

1910.217(h)(9)(x) -- Hand tools. Where tools are used for feeding, removal of scrap, lubrication of parts, or removal of parts that stick on the die in PSDI operations:

1910.217(h)(9)(x)(A) -- The minimum diameter of the tool handle extension shall be greater than the minimum object sensitivity of the presence sensing device(s) used to initiate press strokes; or

1910.217(h)(9)(x)(B) -- The length of the hand tool shall be such as to ensure that the operator's hand will be detected for any safety distance required by the press set-ups.

1910.217(h)(10) -- Inspection and maintenance.

1910.217(h)(10)(i) -- Any press equipped with presence sensing devices for use in PSDI, or for supplemental safeguarding on presses used in the PSDI mode, shall be equipped with a test rod of diameter specified by the presence sensing device manufacturer to represent the minimum object sensitivity of the sensing field. Instructions for use of the test rod shall be noted on a label affixed to the presence sensing device.

1910.217(h)(10)(ii) -- The following checks shall be made at the beginning of each ...
(h)(10)(ii) The following checks shall be made at the beginning of each shift and whenever a die change is made.

1910.217(h)(10)(ii)(A) -- A check shall be performed using the test rod according to the presence sensing device manufacturer's instructions to determine that the presence sensing device used for PSDI is operational.

1910.217(h)(10)(ii)(B) -- The safety distance shall be checked for compliance with (h)(9)(v) of this section.

1910.217(h)(10)(ii)(C) -- A check shall be made to determine that all supplemental safeguarding is in place. Where presence sensing devices are used for supplemental safeguarding, a check for proper operation shall be performed using the test rod according to the presence sensing device manufacturer's instructions.

1910.217(h)(10)(ii)(D) -- A check shall be made to assure that the barriers and/or supplemental presence sensing devices required by paragraph (h)(9)(ix) of this section are operating properly.

1910.217(h)(10)(ii)(E) -- A system or visual check shall be made to verify correct counterbalance adjustment for die weight according to the press manufacturer's instructions, when a press is equipped with a slide counterbalance system.

1910.217(h)(10)(iii) -- When presses used in the PSDI mode have flywheel or bullgear running on crankshaft mounted journals and bearings, or a flywheel mounted on back shaft journals and bearings, periodic inspections following the press manufacturer's recommendations shall be made to ascertain that bearings are in good working order, and that automatic lubrication systems for these bearings (if automatic lubrication is provided) are supplying proper lubrication. On presses with provision for manual lubrication of flywheel or bullgear bearings, lubrication shall be provided according to the press manufacturer's recommendations.

1910.217(h)(10)(iv) -- Periodic inspections of clutch and brake mechanisms shall be performed to assure they are in proper operating condition. The press manufacturer's recommendations shall be followed.

1910.217(h)(10)(v) -- When any check of the press, including those performed in accordance with the requirements of paragraphs (h)(10)(ii), (iii) or (iv) of this section, reveals a condition of noncompliance, improper adjustment, or failure, the press shall not be operated until the condition has been corrected by adjustment, replacement, or repair.

1910.217(h)(10)(vi) -- It shall be the responsibility of the employer to ensure the competence of personnel caring for, inspecting, and maintaining power presses equipped for PSDI operation, through initial and periodic training.

1910.217(h)(11) -- Safety system certification/validation.

1910.217(h)(11)(i) -- Prior to the initial use of any mechanical press in the PSDI mode, two sets of certification and validation are required:

1910.217(h)(11)(i)(A) -- The design of the safety system required for the use of a press in the PSDI mode shall be certified and validated prior to installation. The manufacturer's certification shall be validated by an OSHA- recognized third-party validation organization to meet all applicable requirements of paragraphs (a) through (h) and Appendix A of this section.

1910.217(h)(11)(i)(B) -- Alter a press has been equipped with a safety system whose design has been certified and validated in accordance with paragraph (h)(11)(i) of this section, the safety system installation shall be certified by the employer, and then shall be validated by an OSHA-recognized third-party validation organization to meet all applicable requirements of paragraphs (a) through (h) and Appendix A of this section.

1910.217(h)(11)(ii) -- At least annually thereafter, the safety system on a mechanical power press used in the PSDI mode shall be recertified by the employer and revalidated by an OSHA-recognized third-party validation organization to meet all applicable requirements of paragraphs (a) through (h) and Appendix A of this section. Any press whose safety system has not been recertified and revalidated within the preceding 12 months shall be removed from service in the PSDI mode until the safety system is recertified and revalidated.

1910.217(h)(11)(iii) -- A label shall be affixed to the press as part of each installation certification/validation and the most recent recertification/revalidation. The label shall indicate the press serial number, the minimum safety distance (Ds) required by paragraph (h)(9)(v) of this section, the fulfillment of design certification/validation, the employer's signed certification, the identification of the OSHA-recognized third-party validation organization, its signed validation, and the date the certification/validation and recertification/revalidation are issued.

1910.217(h)(11)(iv) -- Records of the installation certification and validation and the most recent recertification and revalidation shall be maintained for each safety system equipped press by the employer as long as the press is in use. The records shall include the manufacture and model number of each component and subsystem, the calculations of the safety distance as required by paragraph (h)(9)(v) of this section, and the stopping time measurements required by paragraph (h)(2)(ii) of this section. The most recent records shall be made available to OSHA upon request.

1910.217(h)(11)(v) -- The employer shall notify the OSHA-recognized third-party validation organization within five days whenever a component or a subsystem of the safety system fails or modifications are made which may affect the safety of the system. The failure of a critical component shall necessitate the removal of the safety system from service until it is recertified and revalidated, except recertification by the employer without revalidation is permitted when a non-critical component or subsystem is replaced by one of the same manufacture and design as the original, or determined by the third-party validation organization to be equivalent by similarity analysis, as set forth in Appendix A.

1910.217(h)(11)(vi) -- The employer shall notify the OSHA-recognized third-party validation organization within five days of the occurrence of any point of operation injury while a press is used in the PSDI mode. This is in addition to the report of injury required by paragraph (g) of this section; however, a copy of that report may be used for this purpose.

1910.217(h)(12) -- Die setting and work set-up.

1910.217(h)(12)(i) -- Die setting on presses used in the PSDI mode shall be performed in accordance with paragraphs (d) and (h) of this section.

1910.217(h)(12)(ii) -- The PSDI mode shall not be used for die setting or set-up. An alternative manual cycle initiation and control means shall be supplied for use in die setting which meets the requirements of paragraph (b)(7) of this section.

1910.217(h)(12)(iii) -- Following a die change, the safety distance, the proper application of supplemental safeguarding, and the slide counterbalance adjustment (if the press is equipped with a counterbalance) shall be checked and maintained by authorized persons whose qualifications include knowledge of the safety distance, supplemental safe-guarding requirements, and the manufacturer's specifications for counterbalance adjustment. Adjustment of the location of the PSDI presence sensing device shall require use of a special tool available only to the authorized persons.

1910.217(h)(13) -- Operator training.

1910.217(h)(13)(i) -- The operator training required by paragraph (f)(2) of this section shall be provided to the employee before the employee initially operates the press and as needed to maintain competence, but not less than annually thereafter. It shall include instruction relative to the following items for presses used in the PSDI mode.

1910.217(h)(13)(i)(A) -- The manufacturer's recommended test procedures for checking operation of the presence sensing device. This shall include the use of the test rod required by paragraph (h)(10)(i) of this section.

1910.217(h)(13)(i)(B) -- The safety distance required.

1910.217(h)(13)(i)(C) -- The operation, function and performance of the PSDI mode.

1910.217(h)(13)(i)(D) -- The requirements for hand tools that may be used in the PSDI mode.

1910.217(h)(13)(i)(E) -- The severe consequences that can result if he or she attempts to circumvent or by-pass any of the safe-guard or operating functions of the PSDI system.

1910.217(h)(13)(ii) -- The employer shall certify that employees have been trained by preparing a certification record which includes the identity of the person trained, the signature of the employer or the person who conducted the training, and the date the training was completed. The certification record shall be prepared at the completion of training and shall be maintained on file for the duration of the employee's employment. The certification record shall be made available upon request to the Assistant Secretary for Occupational Safety and Health. [39 FR 32502, June 27, 1974. as amended at 39 FR 41846, Dec. 23, 1974; 40 FR 3982, Jan. 27, 1975; 43 FR 49750, Oct. 24, 1978; 45 FR 8594, Feb. 8. 1980; 49 FR 18295, Apr. 30, 1984; 51 FR 34561, Sept. 29, 1986; 53 FR 8353, Mar. 14, 1988; 54 FR 24333, June 7, 1989; 61 FR 5507, Feb. 13, 1996; 61 FR 9227, March 7, 1996]

1910.217 App A Mandatory requirements for certification/validation of safety systems for presence sensing deviceinitiation of mechanical power presses

Subpart O

SubPart Title Machinery and Machine Guarding

Purpose

The purpose of the certification/validation of safety systems for presence sensing device initiation (PSDI) of mechanical power presses is to ensure that the safety systems are designed, installed, and maintained in accordance with all applicable requirements of 29 CFR 1910.217 (a) through (h) and this Appendix A.

General

The certification/validation process shall utilize an independent third-party validation organization recognized by OSHA in accordance with the requirements specified in Appendix C of this section.

While the employer is responsible for assuring that the certification/validation requirements In 1910.217(h)(11) are fulfilled, the design certification of PSDI safety systems may be initiated by manufacturers, employers, and/or their representatives. The term "manufacturers" refers to the manufacturer of any of the components of the safety system. An employer who assembles a PSDI safety system would be a manufacturer as well as employer for purposes of this standard and Appendix.

The certification/validation process includes two stages. For design certification, in the first stage, the manufacturer (which can be an employer) certifies that the PSDI safety system meets the requirements of 29 CFR 1910.217 (a) through (h) and this Appendix A, based on appropriate design criteria and tests. In the second stage. the OSHA-recognized third-party validation organization validates that the PSDI safety system meets the requirements of 29 CFR 1910.217 (a) through (h) and this Appendix A and the manufacturer's certification by reviewing the manufacturer's design and test data and performing any additional reviews required by this standard or which it believes appropriate.

For installation certification/validation and annual recertification/revalidation, in the first stage the employer certifies or recertifies that the employer is installing or utilizing a PSDI safety system validated as meeting the design requirements of 29 CFR 1910.217 (a) through (h) and this Appendix A by an OSHA-recognized third-party validation organization and that the installation, operation and maintenance meet the requirements of 29 CFR 1910.217 (a) through (h) and this Appendix A. In the second stage. the OSHA-recognized third-party validation organization validates or revalidates that the PSDI safety system installation meets the requirements of 29 CFR 1910.217 (a) through (h) and this Appendix A and the employer's certification, by reviewing that the PSDI safety system has been certified; the employer's certification, designs and tests, if any; the installation, operation, maintenance and training; and by performing any additional tests and reviews which the validation organization believes is necessary.

Summary

The certification/validation of safety systems for PSDI shall consider the press, controls, safeguards, operator, and environment as an integrated system which shall comply with all of the requirements in 29 CFR 1910.217 (a) through (h) and this Appendix A. The certification/validation process shall verify that the safety system complies with the OSHA safety requirements as follows:

A. Design Certification/Validation

1. The major parts, components and subsystems used shall be defined by part number or serial number, as appropriate, and by manufacturer to establish the configuration of the system.
2. The identified parts, components and subsystems shall be certified by the manufacturer to be able to withstand the functional and operational environments of the PSDI safety system.
3. The total system design shall be certified by the manufacturer as complying with all requirements in 29 CFR 1910.217 (a) through (h) and this Appendix A.
4. The third-party validation organization shall validate the manufacturer's certification under paragraphs 2 and 3.

B. Installation Certification/Validation

1. The employer shall certify that the PSDI safety system has been design certified and validated, that the installation meets the operational and environmental requirements specified by the manufacturer, that the installation drawings are accurate, and that the installation meets the requirements of 29 CFR 1910.217 (a) through (h) and this Appendix A. (The operational and installation requirements of the PSDI safety system may vary for different applications.)
2. The third-party validation organization shall validate the employer's certifications that the PSDI safety system is design certified and validated, that the installation meets the installation and environmental requirements specified by the manufacturer, and that the installation meets the requirements of 29 CFR 1910.217 (a) through (h) and this Appendix A.

C. Recertification/Revalidation

1. The PSDI safety system shall remain under certification/validation for the shorter of one year or until the system hardware is changed, modified or refurbished, or operating conditions are changed (including environmental, application or facility changes), or a failure of a critical component has occurred.
2. Annually, or after a change specified in paragraph 1., the employer shall inspect and recertify the installation as meeting the requirements set forth under B., Installation Certification/Validation.
3. The third-party validation organization, annually or after a change specified in paragraph 1., shall validate the employer's certification that the requirements of paragraph B., Installation Certification/Validation have been met.
(NOTE: Such changes in operational conditions as die changes or press relocations not involving disassembly or revision to the safety system would not require recertification/revalidation.)

Certification/Validation Requirements

A. General Design Certification/Validation Requirements

1. Certification/Validation Program Requirements. The manufacturer shall certify and the OSHA-recognized third-party validation organization shall validate that:
(a) The design of components, subsystems, software and assemblies meets OSHA performance requirements and are ready for the intended use; and
(b) The performance of combined subsystems meets OSHA's operational requirements.
2. Certification/Validation Program Level of Risk Evaluation Requirements. The manufacturer shall evaluate and certify, and the OSHA-recognized third-party validation organization shall validate, the design and operation of the safety system by determining conformance with the following:
a. The safety system shall have the ability to sustain a single failure or a single operating error and not cause injury to personnel from point of operation hazards. Acceptable design features shall demonstrate, in the following order or precedence, that:
(1) No single failure points may cause injury; or
(2) Redundancy, and comparison and/or diagnostic checking, exist for the critical items that may cause injury, and the electrical, electronic, electromechanical and mechanical parts and components are selected so that they can withstand operational and external environments. The safety factor and/or derated percentage shall be specifically noted and complied with.

b. The manufacturer shall design, evaluate, test and certify, and the third-party validation organization shall evaluate and validate, that the PSDI safety system meets appropriate requirements in the following areas.
(1) Environmental Limits:
(a) Temperature
(b) Relative humidity
(c) Vibration
(d) Fluid compatibility with other materials
(2) Design Limits
(a) Power requirements
(b) Power transient tolerances
(c) Compatibility of materials used
(d) Material stress tolerances and limits
(e) Stability to long term power fluctuations
(f) Sensitivity to signal acquisition
(g) Repeatability of measured parameter without inadvertent initiation of a press stroke
(h) Operational life of components in cycles, hours, or both
(i) Electromagnetic tolerance to:
(1) Specific operational wave lengths; and
(2) Externally generated wave lengths
(3) New Design Certification/Validation. Design certification/validation for a new safety system, i.e., a new design or new integration of specifically identified components and subsystems, would entail a single certification/validation which would be applicable to all identical safety systems. It would not be necessary to repeat the tests on individual safety systems of the same manufacture or design. Nor would it be necessary to repeat these tests in the case of modifications where determined by the manufacturer and validated by the third- party validation organization to be equivalent by similarity analysis. Minor modifications not affecting the safety of the system may be made by the manufacturer without revalidation.
Substantial modifications would require testing as a new safety system, as deemed necessary by the validation organization.

B. Additional Detailed Design Certification/Validation Requirements

1. General. The manufacturer or the manufacturer's representative shall certify to and submit to an OSHA-recognized third-party validation organization the documentation necessary to demonstrate that the PSDI safety system design is in full compliance with the requirements of 29 CFR 1910.217(a)-(h) and this Appendix A, as applicable, by means of analysis, tests, or combination of both, establishing that the following additional certification/validation requirements are fulfilled.

2. Reaction Times. For the purpose of demonstrating compliance with the reaction time required by 1910.217(h), the tests shall use the following definitions and requirements:

a. "Reaction time" means the time, in seconds, it takes the signal, required to activate/deactivate the system, to travel through the system, measured from the time of signal initiation to the time the function being measured is completed.

b. "Full stop" or "No movement of the slide or ram" means when the crankshaft rotation has slowed to two or less revolutions per minute, just before stopping completely.

c. "Function completion" means for, electrical, electromechanical and electronic devices, when the circuit produces a change of state in the output element of the device.

d. When the change of state is motion, the measurement shall be made at the completion of the motion.

e. The generation of the test signal introduced into the system for measuring reaction time shall be such that the Initiation time can be established with an error of less than 0.5 percent of the reaction time measured.

f. The instrument used to measure reaction time shall be calibrated to be accurate to within 0.001 second.

3. Compliance with 1910.21 7(h)(2)(ii). For compliance with these requirements, the average value of the stopping time, Ts, shall be the arithmetic mean of at least 25 stops for each stop angle initiation measured with the brake and/or clutch unused, 50 percent worn, and 90 percent worn. The recommendations of the brake system manufacturer shall be used to simulate or estimate the brake wear. The manufacturer's recommended minimum lining depth shall be identified and documented, and an evaluation made that the minimum depth will not be exceeded before the next (annual) recertification/revalidation. A correlation of the brake and/or clutch degradation based on the above tests and/or estimates shall be made and documented. The results shall document the conditions under which the brake and/or clutch will and will not comply with the requirement. Based upon this determination, a scale shall be developed to indicate the allowable 10 percent of the stopping time at the top of the stroke for slide or ram overtravel due to brake wear. The scale shall be marked to indicate that brake adjustment and/or replacement is required. The explanation and use of the scale shall be documented. The test specification and procedure shall be submitted to the validation organization for review and validation prior to the test. The validation organization representative shall witness at least one set of tests.

4. Compliance with 1910.217(h)(5)(iii) and (h)(9)(v). Each reaction time required to calculate the Safety Distance, including the brake monitor setting, shall be documented in separate reaction time tests. These tests shall specify the acceptable tolerance band sufficient to assure that tolerance build-up will not render the safety distances unsafe.

a. Integrated test of the press fully equipped to operate in the PSDI mode shall be conducted to establish the total system reaction time.

b. Brakes which are the adjustable type shall be adjusted properly before the test.

5. Compliance with 1910.21 7(h)(2)(iii).

a. Prior to conducting the brake system test required by paragraph (h)(2)(ii), a visual check shall be made of the springs. The visual check shall include a determination that the spring housing or rod does not show damage sufficient to degrade the structural integrity of the unit, and the spring does not show any tendency to interleave.

b. Any detected broken or unserviceable springs shall be replaced before the test is conducted. The test shall be considered successful If the stopping time remains within that which is determined by paragraph (h)(9)(v) for the safety distance setting. If the increase in press stopping time exceeds the brake monitor setting limit defined in paragraph (h)(5)(iii), the test shall be considered unsuccessful, and the cause of the excessive stopping time shall be investigated. It shall be ascertained that the springs have not been broken and that they are functioning properly.

6. Compliance with 1910.21 7(h)(7).

a. Tests which are conducted by the manufacturers of electrical components to establish stress, life, temperature and loading limits must be tests which are in compliance with the provisions of the National Electrical Code.

b. Electrical and/or electronic cards or boards assembled with discreet components shall be considered a subsystem and shall require separate testing that the subsystems do not degrade in any of the following conditions:

(1) Ambient temperature variation from -20 deg. C to +50 deg. C.

(2) Ambient relative humidity of 99 percent.

(3) Vibration of 45G for one millisecond per stroke when the item is to be mounted on the press frame.

(4) Electromagnetic interference at the same wavelengths used for the radiation sensing field, at the power line frequency fundamental and harmonics, and also from outogenous radiation due to system switching.

(5) Electrical power supply variations of + or - 15 percent.

c. The manufacturer shall specify the test requirements and procedures from existing consensus tests in compliance with the provisions of the National Electrical Code.

d. Tests designed by the manufacturer shall be made available upon request to the validation organization. The validation organization representative shall witness at least one set of each of these tests.

7. Compliance with 1910.21 7(h)(9)(iv).
a. The manufacturer shall design a test to demonstrate that the prescribed minimum object sensitivity of the presence sensing device is met.
b. The test specifications and procedures shall be made available upon request to the validation organization.
8. Compliance with 1910.217(h)(9)(x).
a. The manufacturer shall design a test(s) to establish the hand tool extension diameters allowed for variations in minimum object sensitivity response.
b. The test(s) shall document the range of object diameter sizes which will produce both single and double break conditions.
c The test(s) specifications and procedures shall be made available upon request to the validation organization.
9. Integrated Tests Certification/Validation
a. The manufacturer shall design a set of integrated tests to demonstrate compliance with the following requirements:
Sections 1910.217(h)(6) (ii); (iii); (iv); (v); (vi); (vii); (viii); (ix); (xi); (xii); (xiii); (xiv); (xv); and (xvii).
b. The integrated test specifications and procedures shall be made available to the validation organization.
10. Analysis.
a. The manufacturer shall submit to the validation organization the technical analysis such as Hazard Analysis, Failure Mode and Effect Analysis, Stress Analysis, Component and Material Selection Analysis, Fluid Compatibility, and/or other analyses which may be necessary to demonstrate, compliance with the following requirements:
Sections 1910.217(h)(8) (i) and (ii); (h)(2)(ii) and (iii); (h)(3)(i) (A) and (C), and (ii); (h)(5) (i), (ii) and (iii); (h)(6) (i), (iii), (iv), (vi), (vii), (viii), (ix), (x), (xi), (xiii), (xiv), (xv), (xvi), and (xvii); (h)(7) (i) and (ii); (h)(9) (iv), (v), (viii), (ix) and (x); (h)(10) (i) and (ii).
11. Types of Tests Acceptable for Certification/Validation.
a. Test results obtained from development testing may be used to certify/validate the design.
b. The test results shall provide the engineering data necessary to establish confidence that the hardware and software will meet specifications, the manufacturing process has adequate quality control and the data acquired was used to establish processes, procedures, and test levels supporting subsequent hardware design, production, installation and maintenance.
12. Validation for Design Certification/Validation. If, after review of all documentation, tests, analyses, manufacturer's certifications, and any additional tests which the third-party validation organization believes are necessary, the third-party validation organization determines that the PSDI safety system is in full compliance with the applicable requirements of 29 CFR 1910.217(a) through (h) and this Appendix A, it shall validate the manufacturer's certification that it so meets the stated requirements.

C. Installation Certification/Validation Requirements

1. The employer shall evaluate and test the PSDI system installation, shall submit to the OSHA-recognized third-party validation organization the necessary supporting documentation, and shall certify that the requirements of 1910.217(a) through (h) and this Appendix A have been met and that the installation is proper.

2. The OSHA-recognized third-party validation organization shall conduct tests, and/or review and evaluate the employer's installation tests, documentation and representations. If it so determines, it shall validate the employer's certification that the PSDI safety system is in full conformance with all requirements of 29 CFR 1910.217(a) through (h) and this Appendix A.

D. Recertification/Revalidation Requirements

1. A PSDI safety system which has received installation certification/validation shall undergo recertification/revalidation the earlier of:

a. Each time the systems hardware is significantly changed, modified, or refurbished;

b. Each time the operational conditions are significantly changed (including environmental, application or facility changes, but excluding such changes as die changes or press relocations not involving revision to the safety system);

c. When a failure of a significant component has occurred or a change has been made which may affect safety; or

d. When one year has elapsed since the installation certification/validation or the last recertification/revalidation.

2. Conduct or recertification/revalidation. The employer shall evaluate and test the PSDI safety system installation, shall submit to the OSHA-recognized third-party validation organization the necessary supporting documentation, and shall recertify that the requirements of 1910.217(a) through (h) and this Appendix are being met. The documentation shall include, but not be limited to, the following items:

a. Demonstration of a thorough inspection of the entire press and PSDI safety system to ascertain that the installation, components and safeguarding have not been changed, modified or tampered with since the installation certification/validation or last recertification/revalidation was made.

b. Demonstrations that such adjustments as may be needed (such as to the brake monitor setting) have been accomplished with proper changes made in the records and on such notices as are located on the press and safety system.

c. Demonstration that review has been made of the reports covering the design certification/validation, the installation certification/validation, and all recertification/revalidations, in order to detect any degradation to an unsafe condition, and that necessary changes have been made to restore the safety system to previous certification/validation levels.

3. The OSHA-recognized third-party validation organization shall conduct tests, and/or review and evaluate the employer's installation, tests, documentation and representations. If It so determines, It shall revalidate the employer's recertification that the PSDI system is in full conformance with all requirements of 29 CFR 1910.217(a) through (h) and this Appendix A.

[53 FR 8358, Mar. 14, 1988]

1910.217 App B Title Nonmandatory guidelines for certification/validation of safety systems for presence sensing deviceinitiation of mechanical power presses

Subpart O

SubPart Title Machinery and Machine Guarding

Objectives

This Appendix provides employers, manufacturers, and their representatives, with nonmandatory guidelines for use in developing certification documents. Employers and manufacturers are encouraged to recommend other approaches if there is a potential for improving safety and reducing cost. The guidelines apply to certification/validation activity from design evaluation through the completion of the installation test and the annual recertification/revalidation tests.

General Guidelines

A. The certification/validation process should confirm that hazards identified by hazard analysis, (HA), failure mode effect analysis (FMEA), and other system analyses have been eliminated by design or reduced to an acceptable level through the use of appropriate design features, safety devices, warning devices, or special procedures. The certification/validation process should also confirm that residual hazards identified by operational analysis are addressed by warning, labeling safety instructions or other appropriate means.

B. The objective of the certification/validation program is to demonstrate and document that the system satisfies specification and operational requirements for safe operations.

Quality Control

The safety attributes of a certified/validated PSDI safety system are more likely to be maintained if the quality of the system and its parts, components and subsystem is consistently controlled. Each manufacturer supplying parts, components, subsystems, and assemblies needs to maintain the quality of the product, and each employer needs to maintain the system in a non-degraded condition.

Analysis Guidelines

A. Certification/validation of hardware design below the system level should be accomplished by test and/or analysis.

B. Analytical methods may be used in lieu of, in combination with, or in support of tests to satisfy specification requirements.

C. Analyses may be used for certification/validation when existing data are available or when test is not feasible.

D. Similarity analysis may be used in lieu of tests where it can be shown that the article is similar in design, manufacturing process, and quality control to another article that was previously certified/validated in accordance with equivalent or more stringent criteria. If previous design, history and application are considered to be similar, but not equal to or more exacting than earlier experiences, the additional or partial certification/validation tests should concentrate on the areas of changed or increased requirements.

Analysis Reports

The analysis reports should identify: (1) The basis for the analysis; (2) the hardware or software items analyzed; (3) conclusions; (4) safety factors; and (5) limit of the analysis. The assumptions made during the analysis should be clearly stated and a description of the effects of these assumptions on the conclusions and limits should be included.

Certification/validation by similarity analysis reports should identify, in addition to the above, application of the part, component or subsystem for which certification/validation is being sought as well as data from previous usage establishing adequacy of the item. Similarity analysis should not be accepted when the internal and external stresses on the item being certified/validated are not defined.

Usage experience should also include failure data supporting adequacy of the design.

[53 FR 8360, Mar. 14, 1988]

1910.217 App C Title Mandatory requirements for OSHA recognition of third-party validation organizations for the PSDIstandard

Subpart O

SubPart Title Machinery and Machine Guarding

This Appendix prescribes mandatory requirements and procedures for OSHA recognition of third-party validation organizations to validate employer and manufacturer certifications that their equipment and practices meet the requirements of the PSDI standard. The scope of the Appendix includes the three categories of certification/validation required by the PSDI standard: Design Certification/Validation, Installation Certification/Validation, and Annual Recertification/Revalidation.
If further detailing of these provisions will assist the validation organization or OSHA in this activity, this detailing will be done through appropriate OSHA Program Directives.
I. Procedure for OSHA Recognition of Validation Organizations

A. Applications
1. Eligibility. a. Any person or organization considering itself capable of conducting a PSDI-related third-party validation function may apply for OSHA recognition.
b. However, in determining eligibility for a foreign-based third-party validation organization, OSHA shall take into consideration whether there is reciprocity of treatment by the foreign government after consultation with relevant U.S. government agencies.
2. Content of application. a. The application shall identify the scope of the validation activity for which the applicant wishes to be recognized, based on one of the following alternatives:
(1) Design Certification/Validation, Installation Certification/Validation, and Annual Recertification/Revalidation;
(2) Design Certification/Validation only; or
(3) Installation/Certification/Validation and Annual Recertification/Revalidation.
b. The application shall provide information demonstrating that it and any validating laboratory utilized meet the qualifications set forth in section II of this Appendix.
c. The applicant shall provide information demonstrating that it and any validating laboratory utilized meet the program requirements set forth in section III of this Appendix.
d. The applicant shall identify the test methods it or the validating laboratory will use to test or judge the components and operations of the PSDI safety system required to be tested by the PSDI standard and Appendix A, and shall specify the reasons the test methods are appropriate.
e. The applicant may include whatever enclosures, attachments, or exhibits the applicant deems appropriate. The application need not be submitted on a Federal form.
f. The applicant shall certify that the information submitted is accurate.

3. Filing office location. The application shall be filed with: PSDI Certification/Validation Program, Office of Variance Determination, Occupational Safety and Health Administration, U.S. Department of Labor, Room N3653, 200 Constitution Avenue, NW., Washington, DC 20210.
4. Amendments and withdrawals. a. An application may be revised by an applicant at any time prior to the completion of the final staff recommendation.
b. An application may be withdrawn by an applicant, without prejudice, at any time prior to the final decision bY the Assistant Secretary in paragraph I.B.8.b.(4) of this Appendix.

B. Review and Decision Process
1. Acceptance and field inspection. All applications submitted will be accepted by OSHA, and their receipt acknowledged in writing. After receipt of an application, OSHA may request additional information if it believes information relevant to the requirements for recognition have been omitted. OSHA may inspect the facilities of the third-party validation organization and any validating laboratory, and while there shall review any additional documentation underlying the application. A report shall be made of each field inspection.
2. Requirements for recognition. The requirements for OSHA recognition of a third-party validation organization for the PSDI standard are that the program has fulfilled the requirements of section II of this Appendix for qualifications and of section III of this Appendix for program requirements, and the program has identified appropriate test and analysis methods to meet the requirements of the PSDI standard and Appendix A.
3. Preliminary approval. If, after review of the application, any additional information, and the inspection report, the applicant and any validating laboratory appear to have met the requirements for recognition, a written recommendation shall be submitted by the responsible OSHA personnel to the Assistant Secretary to approve the application with a supporting explanation.
4. Preliminary disapproval. If, after review of the application, additional information, and inspection report, the applicant does not appear to have met the requirements for recognition, the Director of the PSDI certification/validation program shall notify the applicant in writing, listing the specific requirements of this Appendix which the applicant has not met, and the reasons.
5. Revision of application. After receipt of a notification of preliminary disapproval the applicant may submit a revised application for further review by OSHA pursuant to subsection I.B. of this Appendix or any request that the original application be submitted to the Assistant Secretary with a statement of reasons supplied by the applicant as to why the application should be approved.
6. Preliminary decision by Assistant Secretary. a. The Assistant Secretary, or a special designee for this purpose, will make a preliminary decision whether the applicant has met the requirements for recognition based on the completed application file and the written staff recommendation, as well as the statement of reasons by the applicant if there is a recommendation of disapproval.
b. This preliminary decision will be sent to the applicant and subsequently published in the FEDERAL REGISTER.

7. Public review and comment period. a. The FEDERAL REGISTER notice of preliminary decision will provide a period of not less than 60 calendar days for the written comments on the applicant's fulfillment of the requirements for recognition. The application, supporting documents, staff recommendation, statement of applicant's reasons, and any comments received, will be available for public inspection in the OSHA Docket Office.
b. If the preliminary decision is in favor of recognition, a member of the public, or if the preliminary decision is against recognition, the applicant may request a public hearing by the close of the comment period, if it supplies detailed reasons and evidence challenging the basis of the Assistant Secretary's preliminary decision and justifying the need for a public hearing to bring out evidence which could not be effectively supplied through written submissions.
8. Final decision by Assistant Secretary - a. Without hearing. If there are no valid requests for a hearing, based on the application, supporting documents, staff recommendation, evidence and public comment, the Assistant Secretary shall issue the final decision (including reasons) of the Department of Labor on whether the applicant has demonstrated by a preponderance of the evidence that it meets the requirements for recognition.
b. After hearing. If there is a valid request for a hearing pursuant to paragraph I.B.7.b. of this Appendix, the following procedures will be used:
(1) The Assistant Secretary will issue a notice of hearing before an administrative law judge of the Department of Labor pursuant to the rules specified in 29 CFR Part 1905, Subpart C.
(2) After the hearing, pursuant to Subpart C, the administrative law judge shall issue a decision (including reasons) based on the application, the supporting documentation, the staff recommendation, the public comments and the evidence submitted during the hearing (the record), stating whether it has been demonstrated, based on a preponderance of evidence, that the applicant meets the requirements for recognition. If no exceptions are filed, this is the final decision of the Department of Labor.
(3) Upon issuance of the decision, any party to the hearing may file exceptions within 20 days pursuant to subpart C. If exceptions are filed, the administrative law judge shall forward the decision, exceptions and record to the assistant secretary for the final decision on the application.
(4) The Assistant Secretary shall review the record, the decision by the administrative law judge, and the exceptions. based on this, the assistant secretary shall issue the final decision (including reasons) of the department of labor stating whether the applicant has demonstrated by a preponderance of evidence that it meets the requirements for recognition.
b. Publication. a notification of the final decision shall be published in the FEDERAL REGISTER.

C. Terms and Conditions of Recognition, Renewal and Revocation

1. The following terms and conditions shall be part of every recognition:

a. The recognition of any validation organization will be evidenced by a letter of recognition from OSHA. the letter will provide the specific details of the scope of the OSHA recognition as well as any conditions imposed by OSHA, including any Federal monitoring requirements.

b. The recognition of each validation organization will be valid for five years, unless terminated before or renewed after the expiration of the period. The dates of the period of recognition will be stated in the recognition letter.

c. The recognized validation organization shall continue to satisfy all the requirements of this appendix and the letter of recognition during the period of recognition.

2. A recognized validation organization may change a test method of the PSDI safety system certification/validation program by notifying the Assistant Secretary of the change, certifying that the revised method will be at least as effective as the prior method, and providing the supporting data upon which its conclusions are based.

3. A recognized validation organization may renew its recognition by filing a renewal request at the address in paragraph I.A.3. of this Appendix, above, not less than 180 calendar days, nor more than one year, before the expiration date of its current recognition. When a recognized validation organization has filed such a renewal request, its current recognition will not expire until a final decision has been made on the request. The renewal request will be processed in accordance with subsection I.B. of this Appendix, above, except that a reinspection is not required but may be performed by OSHA. A hearing will be granted to an objecting member of the public if evidence of failure to meet the requirements of this Appendix is supplied to OSHA.

4. A recognized validation organization may apply to OSHA for an expansion of its current recognition to cover other categories of PSDI certification/validation in addition to those included in the current recognition. The application for expansion will be acted upon and processed by OSHA in accordance with subsection I.B. of this Appendix, subject to the possible reinspection exception. If the validation organization has been recognized for more than one year, meets the requirements for expansion of recognition, and there is no evidence that the recognized validation organization has not been following the requirements of this Appendix and the letter of recognition, an expansion will normally be granted. A hearing will be granted to an objecting member of the public only if evidence of failure to meet the requirements of this Appendix is supplied to OSHA.

5. A recognized validation organization may voluntarily terminate its recognition, either in its entirety or with respect to any area covered in its recognition, by giving written notice to OSHA at any time. The written notice shall indicate the termination date. A validation organization may not terminate its installation certification and recertification validation functions earlier than either one year from the date of the written notice, or the date on which another recognized validation organization is able to perform the validation of installation certification and recertification.

6. a. OSHA may revoke its recognition of a validation organization if its program either has failed to continue to satisfy the requirements of this Appendix or its letter of recognition, has not been performing the validation functions required by the PSDI standard and Appendix A, or has misrepresented itself in its applications. Before proposing to revoke recognition, the Agency will notify the recognized validation organization of the basis of the proposed revocation and will allow rebuttal or correction of the alleged deficiencies. If the deficiencies are not corrected, OSHA may revoke recognition, effective in 60 days, unless the validation organization requests a hearing within that time.
b. If a hearing is requested, it shall be held before an administrative law judge of the Department of Labor pursuant to the rules specified in 29 CFR Part 1905, Subpart C.
c. The parties shall be OSHA and the recognized validation organization. The decision shall be made pursuant to the procedures specified in paragraphs I.B.8.b.(2) through (4) of this Appendix except that the burden of proof shall be on OSHA to demonstrate by a preponderance of the evidence that the recognition should be revoked because the validation organization either is not meeting the requirements for recognition, has not been performing the validation functions required by the PSDI standard and Appendix A, or has misrepresented itself in its applications.

D. Provisions of OSHA Recognition
Each recognized third-party validation organization and its validating laboratories shall:
1. Allow OSHA to conduct unscheduled reviews or on-site audits of it or the validating laboratories on matters relevant to PSDI, and cooperate in the conduct of these reviews and audits;
2. Agree to terms and conditions established by OSHA in the grant of recognition on matters such as exchange of data, submission of accident reports, and assistance in studies for improving PSDI or the certification/validation process.

II. Qualifications

The third-party validation organization, the validating laboratory, and the employees of each shall meet the requirements set forth in this section of this Appendix.

A. Experience of Validation Organization
1. The third-party validation organization shall have legal authority to perform certification/validation activities.
2. The validation organization shall demonstrate competence and experience in either power press design, manufacture or use, or testing, quality control or certification/validation of equipment comparable to power presses and associated control systems.

3. The validation organization shall demonstrate a capability for selecting, reviewing, and/or validating appropriate standards and test methods to be used for validating the certification of PSDI safety systems, as well as for reviewing judgements on the safety of PSDI safety systems and their conformance with the requirements of this section.
4. The validating organization may utilize the competence, experience, and capability of its employees to demonstrate this competence, experience and capability.

B. Independence of Validation Organization
1. The validation organization shall demonstrate that:
a. It is financially capable to conduct the work;
b. It is free of direct influence or control by manufacturers, suppliers, vendors, representatives of employers and employees, and employer or employee organizations; and
c. Its employees are secure from discharge resulting from pressures from manufacturers, suppliers, vendors, employers or employee representatives.
2. A validation organization may be considered independent even if it has ties with manufacturers, employers or employee representatives if these ties are with at least two of these three groups; it has a board of directors (or equivalent leadership responsibilities for the certification/validation activities) which includes representatives of the three groups; and it has a binding commitment of funding for a period of three years or more.

C. Validating Laboratory
The validation organization's laboratory (which organizationally may be a part of the third-party validation organization):
1. Shall have legal authority to perform the validation of certification;
2. Shall be free of operational control and influence of manufacturers, suppliers, vendors, employers, or employee representatives that would impair its integrity of performance; and
3. Shall not engage in the design, manufacture, sale, promotion, or use of the certified equipment.

D. Facilities and Equipment
The validation organization's validating laboratory shall have available all testing facilities and necessary test and inspection equipment relevant to the validation of the certification of PSDI safety systems, installations and operations.

E. Personnel
The validation organization and the validating laboratory shall be adequately staffed by personnel who are qualified by technical training and/or experience to conduct the validation of the certification of PSDI safety systems.

1. The validation organization shall assign overall responsibility for the validation of PSDI certification to an Administrative Director. Minimum requirements for this position are a Bachelor's degree and five years professional experience, at least one of which shall have been in responsible charge of a function in the areas of power press design or manufacture or a broad range of power press use, or in the areas of testing, quality control, or certification/validation of equipment comparable to power presses or their associated control systems.
2. The validating laboratory, if a separate organization from the validation organization, shall assign technical responsibility for the validation of PSDI certification to a Technical Director. Minimum requirements for this position are a Bachelor's degree in a Technical field and five years of professional experience, at least one of which shall have been in responsible charge of a function in the area of testing, quality control or certification/validation of equipment comparable to power presses or their associated control systems.
3. If the validation organization and the validating laboratory are the same organization, the administrative and technical responsibilities may be combined In a single position, with minimum requirements as described in E.1. and 2. for the combined position.
4. The validation organization and validating laboratory shall have adequate administrative and technical staffs to conduct the validation of the certification of PSDI safety systems.

F. Certification/Validation Mark or Logo
1. The validation organization or the validating laboratory shall own a registered certification/validation mark or logo.
2. The mark or logo shall be suitable for incorporation into the label required by paragraph (h)(11)(iii) of this section.

III. Program Requirements

A. Test and Certification/Validation Procedures
1. The validation organization and/or validating laboratory shall have established written procedures for test and certification/validation of PSDI safety systems. The procedures shall be based on pertinent OSHA standards and test methods, or other publicly available standards and test methods generally recognized as appropriate in the field, such as national consensus standards or published standards of professional societies or trade associations.
2. The written procedures for test and certification/validation of PSDI systems, and the standards and test methods on which they are based, shall be reproducible and be available to OSHA and to the public upon request.

B. Test Reports

1. A test report shall be prepared for each PSDI safety system that is tested. The test report shall be signed by a technical staff representative and the Technical Director.
2. The test report shall include the following:
a. Name of manufacturer and catalog or model number of each subsystem or major component.
b. Identification and description of test methods or procedures used. (This may be through reference to published sources which describe the test methods or procedures used.)
c. Results of all tests performed.
d. All safety distance calculations.
3. A copy of the test report shall be maintained on file at the validation organization and/or validating laboratory, and shall be available to OSHA upon request.

C. Certification/Validation Reports

1. A certification/validation report shall for which the certification is validated. The certification/validation report shall be signed by the Administrative Director and the Technical Director.
2. The certification/validation report shall include the following:
a. Name of manufacturer and catalog or model number of each subsystem or major component.
b. Results of all tests which serve as the basis for the certification.
c. All safety distance calculations.
d. Statement that the safety system conforms with all requirements of the PSDI standard and Appendix A.
3. A copy of the certification/validation report shall be maintained on file at the validation organization and/or validating laboratory, and shall be available to the public upon request.
4. A copy of the certification/validation report shall be submitted to OSHA within 30 days of its completion.

D. Publications System

The validation organization shall make available upon request a list of PSDI safety systems which have been certified/validated by the program.

E. Follow-up Activities

1. The validation organization or validating laboratory shall have a follow-up system for inspecting or testing manufacturer's production of design certified/validated PSDI safety system components and subassemblies where deemed appropriate by the validation organization.
2. The validation organization shall notify the appropriate product manufacturer(s) of any reports from employers of point of operation injuries which occur while a press is operated in a PSDI mode.

F. Records
The validation organization or validating laboratory shall maintain a record of each certification/validation of a PSDI safety system, including manufacturer and/or employer certification documentation, test and working data, test report, certification/validation report, any follow-up inspections or testing, and reports of equipment failures, any reports of accidents involving the equipment, and any other pertinent information. These records shall be available for inspection by OSHA and OSHA State Plan offices.

G. Dispute Resolution Procedures
1. The validation organization shall have a reasonable written procedure for acknowledging and processing appeals or complaints from program participants (manufacturers, producers, suppliers, vendors and employers) as well as other interested parties (employees or their representatives, safety personnel, government agencies, etc.), concerning certification or validation.
2. The validation organization may charge any complainant the reasonable charge for repeating tests needed for the resolution of disputes.
[53 FR 8361, Mar. 14, 1988]

1910.217 App D Title Nonmandatory supplementary information

Subpart O

SubPart Title Machinery and Machine Guarding

This Appendix provides nonmandatory supplementary information and guidelines to assist in the understanding and use of 29 CFR 1910.217(h) to allow presence sensing device initiation (PSDI) of mechanical power presses. Although this Appendix as such is not mandatory, it references sections and requirements which are made mandatory by other parts of the PSDI standard and appendices.

1. General
OSHA intends that PSDI continue to be prohibited where present state-of-the-art technology will not allow it to be done safely. Only part revolution type mechanical power presses are approved for PSDI. Similarly, only presses with a configuration such that a person's body cannot completely enter the bed area are approved for PSDI.

2. Brake and Clutch

Flexible steel band brakes do not possess a long-term reliability against structural failure as compared to other types of brakes, and therefore are not acceptable on presses used in the PSDI mode of operation.

Fast and consistent stopping times are important to safety for the PSDI mode of operation. Consistency of braking action is enhanced by high brake torque. The requirement in paragraph (h)(2)(ii) defines a high torque capability which should ensure fast and consistent stopping times. Brake design parameters important to PSDI are high torque, low moment of inertia, low air volume (if pneumatic) mechanisms, non-interleaving engagement springs, and structural integrity which is enhanced by over-design. The requirement in paragraph (h)(2)(iii) reduces the possibility of significantly increased stopping time if a spring breaks.

As an added precaution to the requirements in paragraph (h)(2)(iii), brake adjustment locking means should be secured. Where brake springs are externally accessible, lock nuts or other means may be provided to reduce the possibility of backing off of the compression nut which holds the springs In place.

3. Pneumatic Systems

Elevated clutch/brake air pressure results in longer stopping time. The requirement in paragraph (h)(3)(i)(C) is intended to prevent degradation in stopping speed from higher air pressure. Higher pressures may be permitted, however, to increase clutch torque to free "jammed" dies, provided positive measures are provided to prevent the higher pressure at other times.

4. Flywheels and Bearings

Lubrication of bearings is considered the single greatest deterrent to their failure. The manufacturer's recommended procedures for maintenance and inspection should be closely followed.

5. Brake Monitoring

The approval of brake monitor adjustments, as required in paragraph (h)(5)(ii), is not considered a recertification, and does not necessarily involve an on-site inspection by a representative of the validation organization. It is expected that the brake monitor adjustment normally could be evaluated on the basis of the effect on the safety system certification/validation documentation retained by the validation organization.

Use of a brake monitor does not eliminate the need for periodic brake inspection and maintenance to reduce the possibility of catastrophic failures.

6. Cycle Control and Control Systems

The PSDI set-up/reset means required by paragraph (h)(6)(iv) may be initiated by the actuation of a special momentary pushbutton or by the actuation of a special momentary pushbutton and the initiation of a first stroke with two hand controls.

It would normally be preferable to limit the adjustment of the time required in paragraph (h)(6)(vi) to a maximum of 15 seconds. However, where an operator must do many operations outside the press, such as lubricating, trimming, deburring, etc., a longer interval up to 30 seconds is permitted.

When a press is equipped for PSDI operation, it is recommended that the presence sensing device be active as a guarding device in other production modes. This should enhance the reliability of the device and ensure that it remains operable.

An acceptable method for interlocking supplemental guards as required by paragraph (h)(6)(xiii) would be to incorporate the supplemental guard and the PSDI presence sensing device into a hinged arrangement in which the alignment of the presence sensing device serves, in effect, as the interlock. If the supplemental guards are moved, the presence sensing device would become misaligned and the press control would be deactivated. No extra micro switches or interlocking sensors would be required. Paragraph (h)(6)(xv) of the standard requires that the control system have provisions for an "inch" operating means; that die-setting not be done in the PSDI mode; and that production not be done in the "inch" mode. It should be noted that the sensing device would be by-passed in the "inch" mode. For that reason, the prohibitions against die-setting in the PSDI mode, and against production in the "inch" mode are cited to emphasize that "inch" operation is of reduced safety and is not compatible with PSDI or other production modes.

7. Environmental Requirements

It is the intent of paragraph (h)(7) that control components be provided with inherent design protection against operating stresses and environmental factors affecting safety and reliability.

8. Safety system

The safety system provision continues the concept of paragraph (b)(13) that the probability of two independent failures in the length of time required to make one press cycle is so remote as to be a negligible risk factor in the total array of equipment and human factors. The emphasis is on an integrated total system including all elements affecting point of operation safety.

It should be noted that this does not require redundancy for press components such as structural elements, clutch/brake mechanisms, plates, etc., for which adequate reliability may be achieved by proper design, maintenance, and inspection.

9. Safeguarding the Point of Operation

The intent of paragraph (h)(9)(iii) is to prohibit use of mirrors to "bend" a single light curtain sensing field around corners to cover more than one side of a press. This prohibition is needed to increase the reliability of the presence sensing device in initiating a stroke only when the desired work motion has been completed.

"Object sensitivity" describes the capability of a presence sensing device to detect an object in the sensing field, expressed as the linear measurement of the smallest interruption which can be detected at any point in the field. Minimum object sensitivity describes the largest acceptable size of the interruption in the sensing field. A minimum object sensitivity of one and one fourth inches (31.75 mm) means that a one and one-fourth inch (31.75 mm) diameter object will be continuously detected at all locations in the sensing field.

In deriving the safety distance required in paragraph (h)(9)(v), all stopping time measurements should be made with clutch/brake air pressure regulated to the press manufacturer's recommended value for full clutch torque capability. The stopping time measurements should be made with the heaviest upper die that is planned for use in the press. If the press has a slide counterbalance system, it is important that the counterbalance be adjusted correctly for upper die weight according to the manufacturer's instructions. While the brake monitor setting is based on the stopping time it actually measures, i.e., the normal stopping time at the top of the stroke, it is important that the safety distance be computed from the longest stopping time measured at any of the indicated three downstroke stopping positions listed in the explanation of Ts. The use in the formula of twice the stopping time increase, Tm, allowed by the brake monitor for brake wear allows for greater increases in the downstroke stopping time than occur in normal stopping time at the top of the stroke.

10. Inspection and Maintenance. [Reserved]

11. Safety System Certification/Validation

Mandatory requirements for certification/validation of the PSDI safety system are provided in Appendix A and Appendix C to this standard. Nonmandatory supplementary information and guidelines relating to certification/validation of the PSDI safety system are provided to Appendix B to this standard.

[53 FR 8364, Mar. 14, 1988; 61 FR 9227, March 7, 1996]

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Ohio Division of Safety and Hygiene

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Phone: (740) 450-5161
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George V. Voinovich, Governor
James Conrad, Administrator
Kevin Kenney, Superintendent

August 24, 1998

Occupational Safety & Health Administration
230 S. Dearborn Street, Room 3244
Chicago, Illinois 60604
(312) 353-2220

Attn: Technical Support

This is to request an interpretation of the standard **29 CFR 1910.217(d)(1)(i).** The question I would like an interpretation on is;

Is there a problem with an operator removing the part and the scrap from the die if it is not stuck and both can be removed at the same time?

Your quick response to this question would be very much appreciated. I look forward to your answer.

Sincerely,

Michael A. Marr

Michael A. Marr
Safety Consultant

U.S. Department of Labor

Occupational Safety and Health Administration
230 South Dearborn Street, Room 3244
Chicago, Illinois 60604
(312) 353-2220

August 31, 1998

Mr. Michael A. Marr
Ohio Division of Safety and Hygiene
905 Zane Street
P.O. Box 37
Zanesville, Ohio 43701-0037

Re: Removing scrap from a mechanical power press.

Dear Mr. Marr:

This is in response to your letter dated August 24, 1998, in which you request an interpretation of 1910.217(d)(1)(i). Specifically, you ask if there is a problem with an operator removing the part and the scrap from the die if it is not stuck and both can be removed at the same time.

1910.217(d)(1)(ii) states that the employer shall furnish and enforce the use of hand tools for freeing and removing stuck work or scrap pieces from the die. If the part or scrap pieces are not stuck, the standard does not prohibit the operator from removing the part or scrap pieces by hand.

Your interest in occupational safety and health is appreciated. If any further assistance is needed in this matter, please contact John M. Maronic of my staff at (312) 886-3074.

Sincerely,

WQ Wiehrdt

William Q. Wiehrdt
Assistant Regional Administrator
Technical Support

U.S. Department of Labor

Occupational Safety and Health Administration
230 South Dearborn Street, Room 3244
Chicago, Illinois 60604
(312) 353-2220

July 17, 1998

Mr. Robert L. Brockmeyer
Safety Consultant
6127 Alice Drive
Westerville Ohio, 43081

Dear Mr. Brockmeyer:

In response to your memo of July 13, 1998,please be advised that our regulations are very clear and precise with regard to the subject of hands in points of operation.

Subject: 1910.217 (d) (3)

 # 1" Can you remove scrap by hand in point of operation when running one piece at the time? "

No. *You have to provide alternative means for removing the scrap from the danger zone.*

 # 2" Can you remove scrap by hand when press is lock out?"

YES. *If the press is securily locked there is " 0 " energy and it is safe to remove the scrap.*

 # "3 Can you remove scrap by hand in point of operation when set up? "

The set up man has his hands in the point of operation. While he sets the die

he can also remove the scrap, but it is not recommended

Subject 1910.217 (d)(9)(v)

 # 1" Can you lubricating hand in point of operation when lock out? "

YES. *The lock out is to provide "0" energy. If there is no energy there will be no motion, therefore it is safe.*

Thank yopu for your interest in safety and health.If you have any questions with regard to this matter please contact Mr James Kontos, M. E.., of my staff at (312) 353-5105.

Sincerely

W Q Wiehrdt

William Q. Wiehrdt

Assistant Regional Administrator

Technical Support

July 13, 1998

Attn: Technical Support

SUBJECT: 1910.217 (d)(3) Scrap handling when lock out.

1. Can you remove scrap by hand in point of operation when running one piece at time?

2. Can you remove scrap by hand when press is lock out?

3. Can you remove scrap by hand in point of operation when set-up

SUBJECT: 1910.217(d)((9)(v)

1. Can you lubricating hand in point of operation when lock out?

Thank you. I hope you responsive to this letter.

ROBERT L. BROCKMEYER
6127 ALICE DR.
WESTERVILLE,43081
1-614-855-2374

Sincerely,

Robert L. Brockmeyer

Safety Consultant

ANSI Standard

MECHANICAL POWER PRESSES

	Section	ANSI BII.1-1982	STATE 4121:1-5-10	OSHA 1910.217
1.	Reserved	-----	-----	(a) (1) (3)
2.	Reconstruction And Modification	3.1.2	-----	(a) (4)
3.	Excluded Machines	1.1	(A)	(a) (5)
4.	Broken Or Falling Parts	3.2.3	-----	(b) (1)
5.	Definitions	2.1-54	(B)	.211 (d) (1-60)
6.	Brakes (Friction)	3.3	(C) (1)	(b) (2)
7.	Full Revolution Single Stroke	3.4.1	(C)(2) (a)	(b) (3) (i)
8.	Compression Springs	3.4.2	(C) (2) (b)	(b) (3) (ii)
9.	Foot Pedal (Protect)	3.4.3.3	(C) (3) (a)	(b) (4) (i)
10.	Foot Pedal (Non-Slip Pad)	3.4.3.1	-----	(b) (4) (ii)
11.	Pedal Return Springs	3.4.3.2	(C) (3) (b)	(b) (4) (iii)
12.	Pedal Counterweights	3.4.3.4	(C) (3) (c)	(b) (4) (iv)
13.	Levers, Spring Latch	3.4.4.1	(C) (4) (a)	(b) (5) (i)
14.	Levers, Multiple Operators	3.4.4.2	(C) (4) (b)	(b) (5) (ii)
15.	2 Hand Trip, Protect	3.4.5 (1) (2) (3)	(C) (2) (c)	(b) (6) (i)
16.	2 Hand Trip, Anti-Repeat	3.4.5.2	(C) (2) (d)	(b) (6) (ii)
17.	2 Hand Trip, Multiple Stations	3.4.5.3	(C) (2) (e)	(b) (6) (iii)
18.	Part Revolution, Clutch/Brake	3.5.1	(C) (5) (a)	(b) (7) (i)
19.	Stop Control	3.5.2.1	(C) (5) (b)	(b) (7) (ii)
20.	Control Selection	3.5.2.2	(C) (5) (c)	(b) (7) (iii)
21.	Inch, Both Hands	3.5.2.3 (1)	(C) (5) (d) (i)	(b) (7) (iv)
22.	Inch, Single	3.5.2.3 (2)	(C) (5) (d) (ii)	(b) (7) (iv) (a)
23.	2 Hand Control, Protect	3.5.2.4 (1)	(C) (5) (e) (i)	(b) (7) (v) (a)
24.	2 Hand Control, Concurrent	3.5.2.4 (2)	(C) (5) (e) (ii)	(b) (7) (v) (b)
25.	2 Hand Control, Anti-Repeat	3.5.2.4 (3)	(C) (5) (e) (iii)	(b) (7) (v) (c)

26.	2 Hand Control, Release	3.5.2.4 (4)	(C) (5) (e) (iv)	(b) (7) (v) (d)
27.	2 Hand Control, Multiple Stations	3.5.2.5	(C) (5) (e) (v)	(b) (7) (vii)
28.	Continuous Run	3.5.2.6	(C) (5) (e) (vi)	(b) (7) (viii)
29.	Foot and Hand, Supervised	3.5.2.7	(C) (5) (e) (vii)	(b) (7) (ix)
30.	Foot Pedal, Protect	3.5.2.8	(C) (5) (e) (viii)	(b) (7) (x)
31.	Normal Stopping Time	3.5.2.9 Exceptions (1) & (2)	-----	(b) (7) (xi)
32.	Drive Motor Energized Forward	3.5.2.10	-----	(b) (7) (xii)
33.	Clutch/Brake Power Loss	3.5.2.11	(C) (5) (e) (ix)	(b) (7) (xiii)
34.	Failure of Counterbalance	3.5.2.12	-----	(b) (7) (xiv)
35.	Drive Motor De-energized-Bar Operator	3.5.2.13	-----	(b) (7) (xv)
36.	Disconnect Switch	3.6.1	(C) (6) (a)	(b) (8) (i)
37.	Motor Start Button	3.6.2	(C) (6) (b)	(b) (8) (ii)
38.	Drive Motor Starter	3.6.3	(C) (6) (c)	(b) (8) (iii)
39.	Transformer/Isolated Secondary	3.6.4	-----	(b) (8) (iv)
40.	Accidental Ground	3.6.5	(C) (6) (d)	(b) (8) (v)
41.	Failure of Control Component	3.6.6	-----	(b) (8) (vi)
42.	Spring Counterbalance, Retain Parts	3.7.1.1	(C) (7) (a) (i)	(b) (9) (i)
43.	Spring Counterbalance, Hold Slide	3.7.1.2	(C) (7) (a) (ii)	(b) (9) (ii)
44.	Air Counterbalance, Retain Parts	3.7.2.1	(C) (7) (b) (i)	(b) (9) (iii)
45.	Air Counterbalance, Hold Slide	3.7.2.2	(C) (7) (b) (ii)	(b) (9) (iv)
46.	Air Counterbalance, Prevent Failure	3.7.2.3	(C) (7) (b) (iii)	(b) (9) (v)
47.	Air Controlling Equipment	3.8	(C) (8)	(b) (10)
48.	Hydraulic Equipment	3.9	(C) (9)	(b) (11)

49.	Pressure Vessels	3.10	(C) (10)	(b) (12)
50.	Control Reliability	3.11	(C) (11)	(b) (13)
51.	Brake Monitor, Prevent Next Stroke	3.12 (1)	(C) (12) (a)	(b) (14) (i)
52.	Brake, Indicate Deterioration	3.12 (2)	(C) (12) (b)	(b) (14) (ii)
53.	Brake, Monitor Each Stroke	3.12 (3)	(C) (12) (c)	(b) (14) (iii)
54.	Ensure Usage, Guards	5.1	(D) (1) (a)	(c) (1) (i)
55.	1/4" or Less, No Guard	5.1 Exception	(D) (1) (b)	(c) (1) (ii)
56.	Over, Under, Around, Through	5.2 (1)	(D) (2) (a) (i)	(c) (2) (i) (a)
57.	Permissible Openings	5.2 (Figure 1)	(D) (2) (a) (ii)	(c) (2) (i) (b)
58.	Create No Pinch Points	5.2 (2)	(D) (2) (a) (iii)	(c) (2) (i) (c)
59.	Fasteners, Not Readily Removable	5.2 (3)	(D) (2) (a) (iv)	(c) (2) (i) (d)
60.	Easy to Inspect	5.2 (4)	(D) (2) (a) (v)	(c) (2) (i) (e)
61.	Maximum Visibility	5.2 (5)	(D) (2) (a) (vi)	(c) (2) (i) (f)
62.	Die Enclosure Guard	5.2.1	(D) (2) (b)	(c) (2) (ii)
63.	Fixed Barrier Guard	5.2.2	(D) (2) (c)	(c) (2) (iii)
64.	Interlocked Press Barrier Guard	5.2.3	(D) (2) (d) (i)	(c) (2) (iv)
65.	Hinged or Moveable	5.2.3.1	(D) (2) (d) (ii)	(c) (2) (v)
66.	Adjustable Barrier Guard	5.2.4	(D) (2) (e)	(c) (2) (vi)
67.	Pt. Op. Guard & Pt. Op. Device	5.2.5	(D) (2) (f)	(c) (2) (vii)
68.	Presence Sensing	5.3 (1)	(D) (3) (a) (i)	(c) (3) (i) (a)
69.	Pull Backs	5.3 (2)	(D) (3) (a) (ii)	(c) (3) (i) (b)
70.	Hold Outs (Restraints)	5.3 (3)	(D) (3) (a) (iii)	(c) (3) (i) (c)
71.	2 Hand Controls, Trips	5.3 (4)	(D) (3) (a) (iv)	(c) (3) (i) (e)
72.	Type A Gate Guard	5.3 (5)	(D) (3) (a) (v)	(c) (3) (i) (f)
73.	Type B Gate Guard	5.3 (6)	(D) (3) (a) (vi)	(c) (3) (i) (g)
74.	Type A Gate Guard	5.3.1 (1)	(D) (3) (b) (i)	(c) (3) (ii) (a)
75.	Type B Gate Guard	5.3.1 (2)	(D) (3) (b) (ii)	(c) (3) (ii) (b)
76.	Presence Sensing, Not on Full Revolution	5.3.2 (1)	(D) (3) (c) (i)	(c) (3) (iii) (a)

77.	Presence Sensing, No Tripping	5.3.2 (2)	(D) (3) (c) (ii)	(c) (3) (iii) (b)
78.	Presence Sensing, No Prev. Normal Stp.	5.3.2 (3)	(D) (3) (c) (iii)	(c) (3) (iii) (c)
79.	Presence Sensing, Muting/By Pass	5.3.2 (4)	(D) (3) (c) (iv)	(c) (3) (iii) (d)
80.	Safety Distance	5.3.2 (5)	(D) (3) (c) (v)	(c) (3) (iii) (e)
81.	Guard Other Areas	5.3.2 (6)	(D) (3) (c) (vi)	(c) (3) (iii) (f)
82.	Pullbacks, Press Slide / Upper Die	5.3.3 (1)	(D) (3) (d) (i)	(c) (3) (iv) (a)
83.	Pullbacks, Adjusted	5.3.3 (2)	(D) (3) (d) (ii)	(c) (3) (iv) (b)
84.	Pullbacks, Multiple Operators	5.3.3 (3)	(D) (3) (d) (iii)	(c) (3) (iv) (c)
85.	Visually Inspect & Adjust	5.3.3 (4)	-----	(c) (3) (iv) (d)
86.	No Sweeps	-----	(D) (3) (e)	(c) (3) (v)
87.	Hold Out, Restraint	5.3.4	(D) (3) (f)	(c) (3) (vi)
88.	2 Hand Controls, Multiple Operators	5.3.5 (1)	(D) (3) (g) (i)	(c) (3) (vii) (a)
89.	2 Hand Controls, Construction Requirements	5.3.5 (2)	(D) (3) (g) (ii)	(c) (3) (vii) (b)
90.	2 Hand Controls, Safety Distance	5.3.5 (3)	(D) (3) (g) (iii)	(c) (3) (vii) (c)
91.	2 Hand Controls, Fixed Position	5.3.5 (4)	-----	(c) (3) (vii) (d)
92.	2 Hand Trips, Multiple Operators	5.3.6 (1)	(D) (3) (h) (i)	(c) (3) (viii) (a)
93.	2 Hand Trips, Construction Requirements	5.3.6 (2)	(D) (3) (h) (ii)	(c) (3) (viii) (b)
94.	2 Hand Trips, Safety Distance	5.3.6 (3)	(D) (3) (h) (iii)	(c) (3) (viii) (c)
95.	2 Hand Trips, Fixed Position	5.3.6 (4)	-----	(c) (3) (viii) (d)
96.	Hand Feeding Tools	5.4	(D) (4)	(c) (4)
97.	Brake Monitor	5.5 (1)	(D) (5) (a)	(c) (5) (i)
98.	Dual Air Valve	5.5 (3)	(D) (5) (b)	(c) (5) (ii)
99.	Eliminate Hazard Designs	6.1	-----	(d) (1) (i)

100.	Tools to Free Stuck Work	6.1 (2)	(E) (1)	(d) (1) (ii)
101.	Scrap Handling	6.3	(E) (2)	(d) (3)
102.	Guide Post Handling	6.4	(E) (3)	(d) (4)
103.	Unified Tooling	6.5	(E) (4)	(d) (5)
104.	Stamp Tonnage & Stroke	6.6 (1)	-----	(d) (6) (i)
105.	Stamp Upper Die Weight	6.6 (2)	-----	(d) (6) (ii)
106.	Weight Designation	6.6 (3)	(E) (5)	(d) (6) (iii)
107.	Die Fastening	6.7	(E) (6)	(d) (7)
108.	Die Handling	6.8	(E) (7)	(d) (8)
109.	Establish Die Set Procedure	6.9.1	-----	(d) (9) (i)
110.	Spring-Loaded Turnover Bar	6.9.2	(E) (8) (a)	(d) (9) (ii)
111.	Die Stops	6.9.3	(E) (8) (b)	(d) (9) (iii)
112.	Safety Blocks	6.9.4	(E) (8) (c)	(d) (9) (iv)
113.	Brushes, Swabs, etc.	6.9.5	(E) (8) (d)	(d) (9) (v)
114.	Press Brake When Used as Punch Press	-----	(F)	-----
115.	Inspection & Maintenance Records	4.1.3	-----	(e) (1)
116.	Modifications	4.1.1.2	(E) (2)	(e) (2)
117.	Training Maintenance Personnel	4.1.2	-----	(e) (3)
118.	Training of Operators	7.1	-----	(f) (2)
119.	Housekeeping / Work Area	7.2	-----	(f) (3)
120.	Overloading	7.3	-----	(f) (4)
121.	Report Injuries to OSHA	-----	-----	(g)
122.	Press Brake When Bending	-----	(A) or (F)	1910.212(a)(3)(iii)

U.S. Department of Labor

Occupational Safety & Health Administration

Appendix H

Sample Report - MECHANICAL POWER PRESSES Point of Operation Injury Report [1910.217(g)]

OSHA RECORDABLE CASES

EMPLOYER

Name _____

Address _____

Zip _____

INJURED EMPLOYEE

Name _____

Description of Injury _____

_____

Date of Injury _____

Task Being Performed _____

_____
(Operation, Set-Up, Maintenance or Others - **Be Specific**)

PRESS DESCRIPTION

Type of Press Clutch _____
(Full Revolution, Part Revolution or Direct Drive)

Type of Safeguards Being Used _____

_____
(2-Hand Control; 2-Hand Trip; Fixed Barrier Guard; Adjustable Barrier Guard; Type"A" Gate or Movable Barrier Guard; Type "B" Gate or Movable Barrier Guard; Presence Sensing Device; Pull Outs, Restraints, Hold Outs; etc.)

ACCIDENT CAUSE

Cause of Accident _____

_____
(Repeat of Press; Safeguard Failure; Removing Stock Part of Scrap; No Safeguard Provided; Safeguard Provided but not Being Used; Incorrect Control Mode Used or Other; Improper Usage of Adjustment; **Be Specific**)

MACHINE LOADING

Type of Feeding _____

_____
(Manual with Hands in Die or with Hands Out of Dies; with Hand Tools; Semi-Automatic or Others; **Be Specific**)

PRESS ACTUATION

Means Used to Actuate Press Stroke _____

_____
(Foot Trip; Foot Control; Hand Trip; Hand Control; **Be Specific**)

OPERATORS

Number of Personnel Required for Operation _____

Number of Operators Provided with Controls and Safeguards _____

DATE OF REPORT _____

PREPARED BY _____

OFFICIAL POSITION _____

INDEX

TAB:

5-A Full Revolution Section One General Requirements

5-B Part Revolution Section Two General Requirements

5-C Part & Full Revolution Section Three Counterbalance (if press has counterbalance)

5-D Part & Full Revolution Section Four Barrier Guards

5-E Part & Full Revolution Section Five Holdout & Restraint Pull-Backs

5-F Full Revolution Section Six Two-Hand Trips

5-G Full Revolution Section Seven Foot Pedals

5-H Part Revolution Section Eight Light Curtain & Radio Frequency

5-I Part Revolution Section Nine Two-Hand Controls (Palm-Buttons)

5-J Part & Full Section Ten Revolution Type “A” Gate

5-K Part Revolution Section Eleven Type “B” Gate

5-L Part Revolution Section Twelve Foot Control

Training

MINIMUM REQUIREMENTS FOR POWER PRESS OPERATORS' TRAINING

The operators of mechanical power presses must be trained in all phases of the operation of the equipment and its capabilities and limitations, and:

A. All press controls and how to use them.

B. The operator must be informed of the safety guards and devices incorporated on the machine and the correct use of each.

C. Each operator must be instructed in the use of tools for removing stuck work and the use of swabs, brushes, or oil cans for lubricating dies and stock.

D. Press operators will need to understand why, when and how to use personal protective equipment, such as safety glasses, gloves safety shoes, and hearing protection.

E. The storage of parts, tools, or other objects on dies, die sets, bolster plates, or press components not designed to retain them, present hazards of falling on operators; and possible pinch points with moving components. Operators must be aware of these hazards, as well as the basic housekeeping around the press areas.

F. Press operators must be instructed not to operate the press until the press has been checked and tested several times prior to production operations. He should report any problems which he observes to the proper person.

G. Employees who are going to operate presses must receive a minimum of 8 hours on the job training under supervision prior to being assigned to operate the presses.

   * this could be up to 2 weeks or more, depending on the complexities of the operation.

MINIMUM TRAINING REQUIREMENTS FOR PRESSMEN SUPERVISORS

A. The foreman must be informed of his responsibilities to the employer and the employees who work with him.

B. He must know the hazards of power press operations and their set-hp and maintenance.

C. The pressroom foreman must be knowledgeable of what the safety guards and devices are intended to do and the correct adjustment and use of each.

D. He must check each set-up and be sure that all operators are instructed in safe power press operations before they start work.

E. It is his responsibility to insure that correct operating procedures are being followed.

F. The foreman must see that all maintenance is performed and that presses are in safe repair prior to their operations.

As the employer's representative, the pressroom supervisor is responsible for the training and operations of the employees under his control.

Mechanical Power Presses – Die Setting Safety Procedures

MACHINE # _____ DEPARTMENT _____ DATE _____

The Die Setter Must Be Properly Trained in Die Setting Techniques and Safety.

1. Lock off the main power to the press with a lock. The die setter should retain the key until the press is again ready to be operated. If more than one person is working on the press, then that number of locks should be used to lock off power to the press and each person working on the press should have separate and different keys.

2. Safeguards should be clear of any danger that may arise during the die setting procedure, i.e., forklift trucks, etc.

3. Insert safety blocks. Make sure the flywheel has come to a complete rest.

4. Clean the bolster plate, dies and press surfaces before installing dies. Misalignment caused by dirt, chips of metal or other foreign materials could result in injury to operator or damage to press and dies.

5. Make sure the floor and general press area is clean and free of material to allow free movement.

6. Clamp bolster plate firmly to press. Be sure bolts are in good condition so that constant vibration will not allow plate to move out of position.

7. Do not install worn or damaged dies. Use the proper die for the press size to prevent overloading, which could cause damage to press, dies or injury to operator.

8. All dies must be securely fastened to truck before moving.

9. When a die set is being placed in a press, the crack should be straight down, the drive motor shut off and the slide adjustment high enough to properly clear the die set.

10. Clamp dies to bolster plated and slide with enough clamps and the proper size clamps to hold dies firmly in position.

11. Before inching or cycling the slide, make a visual press inspection of the press area to make certain the press is ready to run and employees or visitors are free from danger.

12. Before cycling the press, perform all necessary adjustments during and after die installation. Be sure slide height adjusting shaft clamps are tight. If optional slide height lock assembly is furnished, make certain lock nut is up tight and locking clamp screws are secured.

13. Reset counterbalance air pressure to compensate for weight of upper die.

14. Reposition the safeguard(s) and make certain it is properly secured to press, is properly adjusted

15. Before turning the press over to the operator, make certain the operator has been properly trained to operate the press and is aware of safety procedures for the press operator.

16. Observe press operation for a sufficient length of time to determine that the press is working properly.

17. Before leaving the press area, make sure all tools, bolts or other obstructions in or near the press are taken or removed.

NOTE: Use extra care in setting, coining, embossing or forming dies. These dies are of the closed type and do not provide relief for flow or displacement of excess material. Setting these dies too close or bottoming a dies will cause a rapid increase in pressure required to carry the crankshaft beyond bottom dead center and will increase the possibility of seriously damaging the press and dies, or injury to the operator.

I, the undersigned, certify that I have followed the above procedures when setting dies in the machine described above. I further certify to the best of my ability, the safeguard is in proper working order, as is the press and the safeguard is adjusted to the OSHA 1910.217 standards.

Signature _____ Date _____ Time _____

(Name)

_____

(Job Title)

REPORTS OF INJURIES TO EMPLOYEES OPERATING MECHANICAL POWER PRESSES

The employer shall, within 30 days of the occurrence, report to either the Director of the Office of Standards Development, OSHA, U. S. Department of Labor, Washington, D. C., 20210, or the State agency administering a plan approved by the Assistant Secretary of Labor for Occupational Safety and Health, all point of operation injuries to operators or other employees. The following information shall be included in the report:

(I) Employer's name, address, and location of the workplace (establishment).

(ii) Employee's names, injury sustained, and the task performed (operation, set-up, maintenance, or other).

(iii) Type of clutch used on the press (full revolution, part revolution, or direct drive).

(iv) Type of safeguard(s) being used (two-hand control, two-hand trip, pullouts, sweeps or other). If the safeguard is not described in this section, give a complete description.

(v) Cause of the accident (repeat of press, safeguard failure, removing stuck part or scrap, no safeguard provided, not safeguard in use, or other).

(vi) Type of feeding (manual with hands in dies or with hands out of dies, semi-automatic, or other).

(vii) Means used to actuate press stroke (foot trip, foot control, hand trip, hand control, or other).

REPORT OF INJURIES

- **Must be a point of operation injury(mechanical press only)**
- **Within 30 days of the occurrence**
- **Employer's name, address & location**
- **Employee's name, injury sustained, & task at the time of injury(set-up, operating, etc)**
- **Type of clutch(Full or Partial)**
- **Safeguarding method, cause, type of feeding,means of actuation, & number of operators required and operators provided with controls or safeguards.**

POWER PRESS POINT-OF-OPERATION INJURY REPORT

Mailing address at which accident occurred:

Company name_____
Address_____
City_____ State_____ Zip_____

Name of injured employee:_____
Injury sustained: _____

Task being performed _____ Operation _____ Maintenance
_____ Set-Up _____ Other

Type of feeding:
_____ Manual with hand in point-of-operation _____ Semi Automatic
_____ Manual with hand not in point-of-operation _____ Other
_____ Not applicable

Description of press involved:
Type of clutch:
_____ Full revolution
_____ Part revolution
_____ Direct drive

Type of safeguard:
_____ Die enclosure guard
_____ Fixed barrier guard
_____ Interlock press barrier guard
_____ Adjustable barrier guard

Devices:
_____ Moveable barrier
_____ Presence sensing
_____ Pull-out
_____ Hold out
_____ Two-hand control
_____ Two-hand tip
_____ Other _____

Means used to actuate press:
_____ Foot trip
_____ Hand control
_____ Foot treadle
_____ Other _____

Number of operators required for this operation:_____

Number of operators provided with control and safeguard:_____

Alleged cause of accident:
(Repeat of press, Removing stuck part, Safeguard not provided, Safeguard failure, Operation error, Safeguard not used)
_____

Describe:_____

_____

_____

_____

Corrective action to prevent similar accident:_____

_____

U.S. Department of Labor

Occupational Safety & Health Administration

Appendix H

Sample Report - MECHANICAL POWER PRESSES Point of Operation Injury Report [1910.217(g)]

OSHA RECORDABLE CASES

EMPLOYER

Name _____

Address _____

Zip _____

INJURED EMPLOYEE

Name _____

Description of Injury _____

_____

Date of Injury _____

Task Being Performed _____

_____
(Operation, Set-Up, Maintenance or Others - **Be Specific**)

PRESS DESCRIPTION

Type of Press Clutch _____
(Full Revolution, Part Revolution or Direct Drive)

Type of Safeguards Being Used _____

_____
(2-Hand Control; 2-Hand Trip; Fixed Barrier Guard; Adjustable Barrier Guard; Type"A" Gate or Movable Barrier Guard; Type "B" Gate or Movable Barrier Guard; Presence Sensing Device; Pull Outs, Restraints, Hold Outs; etc.)

ACCIDENT CAUSE

Cause of Accident _____

_____
(Repeat of Press; Safeguard Failure; Removing Stock Part of Scrap; No Safeguard Provided; Safeguard Provided but not Being Used; Incorrect Control Mode Used or Other; Improper Usage of Adjustment; **Be Specific**)

MACHINE LOADING

Type of Feeding _____

_____
(Manual with Hands in Die or with Hands Out of Dies; with Hand Tools; Semi-Automatic or Others; **Be Specific**)

PRESS ACTUATION

Means Used to Actuate Press Stroke _____

_____
(Foot Trip; Foot Control; Hand Trip; Hand Control; **Be Specific**)

OPERATORS

Number of Personnel Required for Operation _____

Number of Operators Provided with Controls and Safeguards _____

DATE OF REPORT _____

PREPARED BY _____

OFFICIAL POSITION _____

INDEX

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5-A Full Revolution Section One General Requirements

5-B Part Revolution Section Two General Requirements

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5-E Part & Full Revolution Section Five Holdout & Restraint Pull-Backs

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5-H Part Revolution Section Eight Light Curtain & Radio Frequency

5-I Part Revolution Section Nine Two-Hand Controls (Palm-Buttons)

5-J Part & Full Section Ten Revolution Type “A” Gate

5-K Part Revolution Section Eleven Type “B” Gate

5-L Part Revolution Section Twelve Foot Control

5 - A

FULL REVOLUTION SECTION ONE GENERAL REQUIREMENTS

1910.217 Mechanical Power Presses

.217 (a) General requirements.

(a) (1) (3) [Revoked]

(a) (4) Reconstruction and modification. It shall be the responsibility of any person reconstructing, or modifying a mechanical power press to do so in accordance with paragraph (b) of this section.

(a) (5) Excluded machines. Press brakes, hydraulic and pneumatic power presses, bulldozers, hot bending and hot metal presses, forging presses and hammers, riveting machines and similar types of fastener applicators are excluded from the requirements of this section.

(b) Mechanical power press guarding and construction, general-

(b) (1) Hazards to personnel associated with broken or falling machine components. Machine components shall be designed, secured, or covered to minimize hazards caused by breakage, loosening and falling or release of mechanical energy (i.e. broken springs).

(b) (2) Brakes. Friction brakes provided for stopping or holding a slide movement shall be inherently self-engaging by requiring power or force from an external source to cause disengagement. Brake capacity shall be sufficient to stop the motion of the slide quickly and capable of holding the slide and its attachments at any point in its travel.

(b) (3) Machines using full revolution positive clutches.

(b) (3) (i) Machines using full revolution clutches shall incorporate a single-stroke mechanism.

(b) (3) (ii) If the single-stroke mechanism is dependent upon spring action, the spring(s) shall be of the compression type, operating on a rod or guided within a hole or tube, and designed to prevent interleaving of the spring coils in event of breakage.

<u>Note: Look at foot pedal linkage</u>.

(b) (8) Electrical.

(b) (8) (i) A main power disconnect switch capable of being locked only in the Off position shall be provided with every power press control system.

(b) (8) (ii) The motor start button shall be protected against accidental operation.

(b) (8) (iii) All mechanical power press controls shall incorporate a type of drive motor starter that will disconnect the drive motor from the power source in event of control voltage or power source failure, and require operation of the motor start button to restart the motor when voltage conditions arc restored to normal.

Note: Magnetic switch

(b) (8) (iv) All a.c. control circuits and solenoid value coils shall be powered by not more than a nominal 120-volt a.c. supply obtained from a transformer with an isolated secondary. Higher voltages that may be necessary for operation of machine or control mechanisms shall be isolated from any control mechanism handled by the operator, but motor starters with integral Start-Stop buttons may utilize line voltage control. All d.c. control circuits shall be powered by not more than a nominal 240-volt d.c. supply isolated from any higher voltages.

(b) (8) (v) All clutch/brake control electrical circuits shall be protected against the possibility of an accidental ground in the control circuit causing false operation of the press.

(b) (8) (vi) Electrical clutch/brake control circuits shall incorporate features to minimize the possibility of an unintended stroke in the event of the failure of a control component to function properly, including relays, limit switches, and static output circuits.

(b) (l0) Air controlling equipment. Air controlling equipment shall be protected against foreign material and water entering the pneumatic system of the press. A means of air lubrication shall be provided when needed.

(b) (11) Hydraulic equipment. The maximum anticipated working pressures in any hydraulic system on a mechanical power press shall not exceed the safe working pressure rating of any component used in that system.

(b) (12) Pressure vessels. All pressure vessels used in conjunction with power presses shall conform to the American Society of Mechanical Engineers Code for Pressure Vessels, 1968 Edition. **NOTE: Vessel not required, however, code applies to existing vessels.**

(c) Safeguarding the point of operation-

(c) (1) General requirements.

(c) (1) (i) It shall be the responsibility of the employer to provide and insure the usage of "point of operation guards" or properly applied and adjusted point of operation devices on every operation performed on a mechanical power press. See Table O-10.
Note: see back page of this section

(c) (1) (ii) The requirement of subdivision (I) of this subparagraph shall not apply when the point of operation opening is one-fourth inch or less. See Table O-10.
Note: see back page of this section

(c) (3) Point of operation devices.

(c) (3) (i) Point of operation devices shall protect the operator by:

(c) (3) (i) (a) Preventing and/or stopping normal stroking of the press if the operator's hands are inadvertently placed in the point of operation; or

(c) (3) (i) (b) Preventing the operator from inadvertently reaching into the point of operation, or withdrawing his hands if they are inadvertently located in the point of operation, as the dies close; or

(c) (3) (i) (c) Preventing the operator from inadvertently reaching into the point of operation at all times; or

(c) (3) (i) (d) [Revoked]

(c) (3) (i) (e) Requiring application of both of the operator's hands to machine operating controls and locating such controls at such a safety distance from the point of operation that the slide completes the downward travel stops before the operator can reach into the point of operation with his hands; or

(c) (3) (i) (f) Enclosing the point of operation before a press stroke can be initiated, and maintaining this closed condition until the motion of the slide had ceased; or

(c) (3) (i) (g) Enclosing the point of operation before a press stroke can be initiated, so as prevent an operator from reaching into the point of operation prior to die closure or prior to cessation of slide motion during the downward stroke.

(c) (3) (v) The sweep device may not be used for point of operation safeguarding after December 31, 1976.

(c) (4) Hand feeding tools. Hand feeding tools are intended for placing and removing materials in and from the press. Hand feeding tools are not a point of operation guard or protection device and shall not be used in lieu of the guards" or devices required in this section.

(d) Design, construction, setting and feeding of dies-

(d) (1) General requirements. Effective February 1, 1975, the employer shall:

(d) (1) (i) Use dies and operating methods designed to control or eliminate hazards to operating personnel, and

(d) (1) (ii) furnish and enforce the use of hand tools for freeing and removing stuck work or scrap
pieces from the die, so that no employee need reach into the point of operation for such purposes.

(d) (2) [Revoked]

(d) (3) Scrap handling. The employer shall provide means for handling scrap from roll feed or random length stock operations. Scrap cutters used in conjunction with scrap handling systems shall be safeguarded in accordance with paragraph (c) of this section and with 1910.219.

(d) (4) Guide post hazard. The hazard created by a guide post when it is located in the immediate vicinity of the operator) when separated from its bushing by more than one fourth inch shall be considered as a point of operation hazard and be protected in accordance with paragraph (c) of this section.

(d) (5) Unitized tooling. If unitized tooling is used, the opening between the top of the punch holder and the face of the slide, or striking pad, shall be safeguarded in accordance with the requirements of paragraph (c) of this section.

(d) (6) Tonnage, stroke, and weight designation. All dies shall be:

(d) (6) (i) Stamped with the tonnage and stroke requirements, or have these characteristics recorded if these records are readily available to the die setter;

(d) (6) (ii) Stamped to indicate upper die weight when necessary for air counterbalance pressure adjustment; and

(d) (6) (iii) Stamped to indicate complete die weight when handling equipment may become overloaded.

(d) (7) Die fastening. Provision shall be made in both the upper and lower shoes for securely mounting the die to the bolster and slide. Where clamp caps or setscrews are used in conjunction with punch stems, additional means of securing the upper shoe to the slide shall be used.

(d) (8) Die handling. Handling equipment attach points shall be provided on all dies requiring mechanical handling.

(d) (9) Diesetting.

(d) (9) (i) The employer shall establish a diesetting procedure that will insure compliance with paragraph (c) of this section.

(d) (9) (ii) The employer shall provide spring loaded turnover bars, for presses designed to accept such turnover bars.

(d) (9) (iii) The employer shall provide die stops or other means to prevent losing control of the die while setting or removing dies in presses which are inclined.

(d) (9) (iv) The employer shall provide and enforce the use of safety blocks for use whenever dies are being adjusted or repaired

(d) (9) (v) The employer shall provide brushes, swabs, lubricating rolls, and automatic or manual pressure guns so that operators and diesetters shall not be required to reach into the point of operation or other hazard areas to lubricate material, punches or dies.

(e) Inspection, maintenance, and modification of presses-

(e) (1) Inspection and maintenance records.

(e) (1) (i) It shall be the responsibility of the employer to establish and follow a program of periodic and regular inspections of his power presses to ensure that all their parts, auxiliary equipment, and safeguards are in a safe operating condition and adjustment. The employer shall maintain a certification record of inspections which includes the date of inspection, the signature of the person who performed the inspection and the serial number, or other identifier, of the power press that was inspected.

(e) (1) (ii) Each press shall be inspected and tested no less than weekly to determine the condition of the clutch brake mechanism, antirepeat feature and single stroke

mechanism. Necessary maintenance or repair or both shall be performed and completed before the press is operated.

(e) (2) Modification. It shall be the responsibility of any person modifying a power press to furnish instructions with the modification to establish new or changed guidelines for use and care of the power press so modified.

(e) (3) Training of maintenance personnel. It shall be the responsibility of the employer to insure the original and continuing competence of personnel caring for, inspecting, and maintaining power presses.

(f) Operation of power presses-

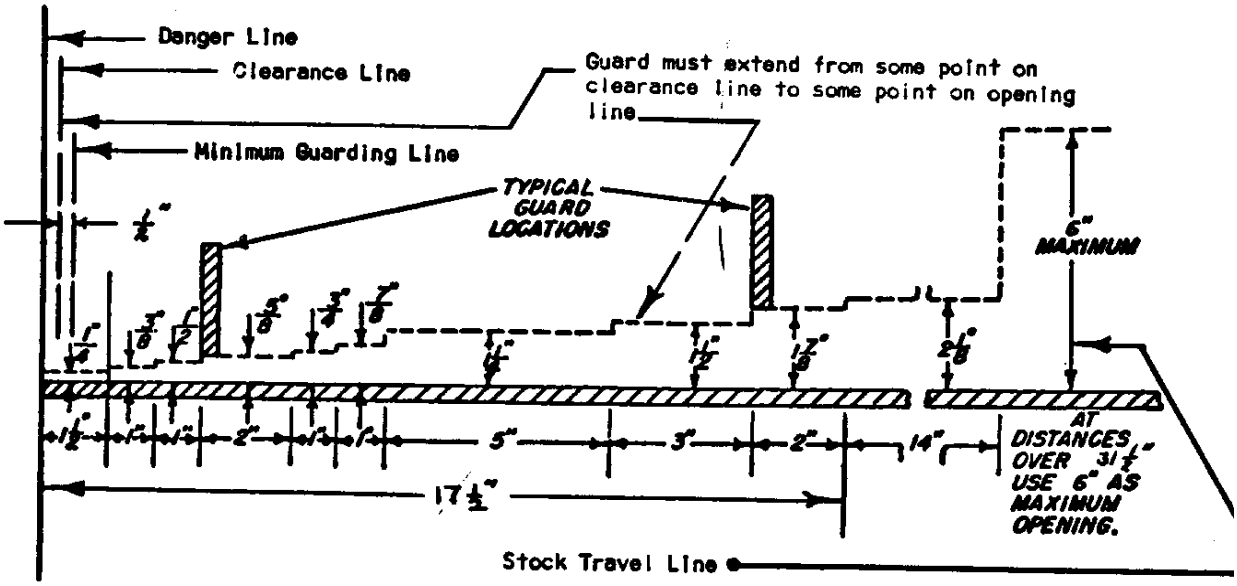
(f) (1) Employment of Minors [Revoked]

(f) (2) Instruction to operators. The employer shall train and instruct the operator in the safe method of work before starting work on any operation covered by this section. The employer shall insure by adequate supervision that correct operating procedures are being followed.

(f) (3) Work area. The employer shall provide clearance between machines so that movement of one operator will not interfere with the work of another. Ample room for cleaning machines, handling material, work pieces, and scrap shall also be provided. All surrounding floors shall be kept in good condition and free from obstructions, grease, oil, and water.

(f) (4) Overloading. The employer shall operate his presses within the tonnage and attachment weight ratings specified by the manufacturer.

Press Diagram - Safe Openings



Explanation of above diagram:

This diagram shows the accepted safe openings between the bottom edge of a guard and feed table at various distances from the danger line (point of operation).
The clearance line marks the distance required to prevent contact between guard and moving parts.
The minimum guarding line is the distance between the infeed side of the guard and the danger line which is one-half inch from the danger line.
The various openings are such that for average size hands an operator's fingers won't reach the point of operation.
After installation of point of operation guards and before a job is released for operation a check should be made to verify that the guard will prevent the operator's hands from reaching the point of operation.

Table O-10
[In inches]

Distance of opening from point of operation hazard	Maximum width of opening
1/2 to 1 1/2.....	1/4
1 1/2 to 2 1/2	3/8
2 1/2 to 3 1/2	1/2
1 1/2 to 5 1/2	5/8
5 1/2 to 6 1/2	3/4
6 1/2 to 7 1/2	7/8

7 1/2 to 12 1/2	1 1/4
12 1/2 to 15 1/2	1 1/2
15 1/2 to 17 1/2	1 7/8
17 1/2 to 31 1/2	2 1/8

This table shows the distances that guards shall be positioned from the danger line in accordance with the required openings.

(g) Reports of injuries to employees operating mechanical power presses.

(g) (1) The employer shall, within 30 days of the occurrence, report to either the Director of the Office of Standards Development, OSHA, U.S. Department of Labor, Washington, D.C. 20210, or the State agency administering a plan approved by the Assistant Secretary of Labor for Occupational Safety and Health, all point of operation injuries to operators or other employees. The following information shall be included in the report:

(g) (1) (i) Employer's name, address and location of the workplace (establishment).

(g) (1) (ii) Employee's name, injury sustained, and the task being performed (operation, set-up, maintenance, or other).

(g) (1) (iii) Type of clutch used on the press (full revolution, part revolution, or direct drive).

(g) (1) (iv) Type of safeguard(s) being used (two hand control, two hand trip, pull-outs, sweeps, or other). If the safeguard is not described in this section, give a complete description.

(g) (1) (v) Cause of the accident (repeat of press, safeguard failure, removing stuck part or scrap, no safeguard provided, no safeguard in use, or other).

(g) (1) (vi) Type of feeding (manual with hands in dies or with hands out of dies, semiautomatic, automatic, or other).

(g) (1) (vii) Means used to actuate press stroke (foot trip, foot control, hand trip, hand control, or other).

(g) (1) (viii) Number of operators required for the operation and the number of operators provided with controls and safeguard.

Reference: Excerpts from ANSI B11.1-1988

PR & FR 4.1.2. Reconstruction & Modification- any individual in accordance with B11.1-1988 section 4.

PR & FR 4.4.1. Main power disconnect switch located in close proximity to the press.

PR & FR 4.9 Fluid powered die-clamping system if provided.

(1) Holding the upper and lower die throughout the slide stroke.

(2) Incorporate means to prevent sudden loss of pressure.

(3) When loss of pressure results in no hazards the standard does not apply.

PR & FR 4.10.2 Programmable Logic Controllers shall not be converted to Programmable Logic or Programmable Microprocessor Logic System. Also not permitted are clutch/brake controls or trip controls.

PR & FR 4.12.4.

(1) If furnished shall be capable of supervision by employer.

(2) More than one stroking selector shall be in the remote position before operation can be enabled.

(3) Off modes-stop source of power.

(4) Jog-Prevent exposure of the worker's hands.

(5) Single stroke capability shall be equipped. Incorporate an anti-repeat.

6) CONTINUOUS operating mode shall be designed so that:

(i) It is capable of employer supervision.

(ii) Shall require a prior action.

4.12.4.6 Trip Control System Air Valve Failure.
Note: Compliance required if currently utilizing trip control system

P S D I

1910 H 1 (iii)

Shall not be used in the PSDI mode of operation.

FULL REVOLUTION

Name of Press _____ Stroke _____
Serial # _____ Press #
Tonnage _____

MUST HAVE A DOG OR ROLLING BEARINGS WITH ENGAGING POINTS

YES	NO			
_____	_____	1. Reconstruction modification	(a) (4)	Page 2
_____	_____	2. Excluded machines	(a) (5)	Page 2
_____	_____	3. Broken and secured	(b) (1)	Page 2
_____	_____	4. Brake	(b) (2)	Page 2
_____	_____	5. Single Stroke	(b) (3) (i)	Page 2
_____	_____	6. Spring Rod	(b) (3) (ii)	Page 2
_____	_____	7. Main Power disconnect off power _____	(b) (8) (i)	Page 2
_____	_____	8. Motor start button protected	(b) (8) (ii)	Page 2
_____	_____	9. Drive motor starter & 120 volt _____	(b) (8) (iii)	Page 3
_____	_____	10. Ground	(b) (8) (v)	Page 3
_____	_____	11. Air controlling equipment	(b) (10)	Page 3
_____	_____	12. Hydraulic vessels	(b) (12)	Page 3
_____	_____	13. Pressure vessels	(b) (12)	Page 3
_____	_____	14. Hand tools freeing and stuck work scrap	(d) (1) (ii)	Page 4
_____	_____	15. Guide post hazard	(d) (4)	Page 4
_____	_____	16. Unitized tooling	(d) (5)	Page 5
_____	_____	17. Die stamped or recorded upper die weight _____		
_____	_____	Complete die weight	(d) (6)	Page 5
_____	_____	18. Die clamp caps	(d) (7)	Page 5
_____	_____	19. Securely	(d) (7)	Page 5
_____	_____	20. Diehandling	(d) (8)	Page 5
_____	_____	21. Die set procedure	(d) (9) (i)	Page 5
_____	_____	22. Turnover bars	(d) (9) (ii)	Page 5
_____	_____	23. Die stops	(d) (9) (iii)	Page 5
_____	_____	24. Safety blocks	(d) (9) (iv)	Page 5
_____	_____	25. Lubricating	(d) (9) (v)	Page 5
_____	_____	26. Maintenance records	(e) (1) (i)	Page 5
_____	_____	27. Training	(e) (3)	Page 6
_____	_____	28. Work area	(f) (3)	Page 6
_____	_____	29. Overloading	(f) (4)	Page 6
_____	_____	30. Supervision	PR & FR 4.12.(4)(1)	Page 8
_____	_____	31. Jog exposure	(3)	Page 9

_____ _____
_____ _____ 32. Continuous (4) Page 9

5 - B

PART REVOLUTION
SECTION TWO
GENERAL
REQUIREMENTS

1910.217 Mechanical power presses

(a) General requirements

.

(a) (1)-(3) [Revoked]

(a) (4) Reconstruction and modification. It shall be the responsibility of any person reconstructing or modifying a mechanical power press to do so in accordance with paragraph (b) of this section.

(a) (5) Excluded machines. Press brakes, hydraulic and pneumatic power presses, bulldozers, hot bending and hot metal presses, forging presses and hammers, riveting machines and similar types of fastener applicators are excluded from the requirements of this section.

(b) Mechanical power press guarding and construction, general-

(b) (1) Hazards to personnel associated with broken or falling machine components. Machine components shall be designed, secured, or covered to minimize hazards caused by breakage, loosening and falling or release of mechanical energy (i.e. broken springs).

(b) (2) Brakes. Friction brakes provided for stopping or holding a slide movement shall be inherently self-engaging by requiring power or force from an external source to cause disengagement. Brake capacity shall be sufficient to stop the motion of the slide quickly and capable of holding the slide and its attachments at any point in its travel.

(b) (7) Machines using part revolution clutches.

b) (7) (i) The clutch shall release and the brake shall be applied when the external clutch engaging means is removed, deactivated, or deenergized.

b) (7) (ii) A red color stop control shall be provided with the clutch/brake control system. Momentary operation of the stop control shall immediately deactivate the clutch and apply the brake. The stop control shall override any other control, and reactuation of the clutch shall require use of the operating (tripping) means which has been selected.

(b) (7) (iii) A means of selecting Off, “Inch,” Single Stroke, and Continuous (when the continuous function is furnished) shall be supplied with the clutch/brake

control to select type of operation of the press. Fixing of selection shall be by means capable of supervision by the employer.

(b) (7) (iv) The "Inch" operating means shall be designed to prevent exposure of the workers' hands within the point of operation by:

(b) (7) (iv) (a) Requiring the concurrent use of both hands to actuate the clutch, or

(b) (7) (iv) (b) Being a single control protected against accidental actuation and so located that the worker cannot reach into the point of operation while operating the single control.

(b) (7) (viii) Those clutch/brake control systems which contain both single and continuous functions shall be designed so that completion of continuous circuits may be supervised by the employer. The initiation of continuous run shall require a prior action or decision by the operator in addition to the selection of Continuous on the stroking selector, before actuation of the operating means will result in continuous stroking.

(b) (7) (xi) The control of air-clutch machines shall be designed to prevent a significant increase in the normal stopping time due to a failure within the operating value mechanism, and to inhibit further operation if such failure does occur. This requirement shall apply only to those clutch/brake air-valve controls manufactured and installed on or after August 31, 1971, but shall not apply to machines intended only for continuous, automatic feeding applications. **Note: Dual air valves, air switches and muffler.**

(b) (7) (xii) The clutch/brake control shall incorporate an automatic means to prevent initiation or continued activation of the Single Stroke or Continuous functions unless the press drive motor is energized and in the forward direction.

(b) (7) (xiii) The clutch/brake control shall automatically deactivate in event of failure of the power or pressure supply for the clutch engaging means. Reactivation of the clutch shall require restoration of normal supply and the use of the tripping mechanism(s).

(b) (7) (xiv) The clutch/brake control shall automatically deactivate in event of failure of the counterbalance(s) air supply. Reactivation of the clutch shall require restoration of normal air supply and use of the tripping mechanism(s).

(b) (7) (xv) Selection of bar operation shall be by means capable of being supervised by the employer. A separate push-button shall be employed to activate the clutch, and the clutch shall be activated only if the driver motor is deenergized.

(b) (8) Electrical.

(b) (8) (i) A main power disconnect switch capable of being locked only in the Off position shall be provided with every power press control system.

(b) (8) (ii) The motor start button shall be protected against accidental operation.

(b) (8) (iii) All mechanical power press controls shall incorporate a type of drive motor starter that will disconnect the drive motor from the power source in event of control voltage or power source failure, and require operation of the motor start button to restart the motor when voltage conditions arc restored to normal.

(b) (8) (iv) All a.c. control circuits and solenoid value coils shall be powered by not more than a nominal 120-volt a.c. supply obtained from a transformer with an isolated secondary. Higher voltages that may be necessary for operation of machine or control mechanisms shall be isolated from any control mechanism handled by the operator, but motor starters with integral Start-Stop buttons may utilize line voltage control. All d.c. control circuits shall be powered by not more than a nominal 240-volt d.c. supply isolated from any higher voltages.

(b) (8)(v) All clutch/brake control electrical circuits shall be protected against the possibility of an accidental ground in the control circuit causing false operation of the press.

(b) (8) (vi) Electrical clutch/brake control circuits shall incorporate features to minimize the possibility of an unintended stroke in the event of the failure of a control component to function properly, including relays, limit switches, and static output circuits.

(b) (l0) Air controlling equipment. Air controlling equipment shall be protected against foreign material and water entering the pneumatic system of the press. A means of air lubrication shall be provided when needed.

(b) (11) Hydraulic equipment. The maximum anticipated working pressures in any hydraulic system on a mechanical power press shall not exceed the safe working pressure rating of any component used in that system.

(b) (12) Pressure vessels. All pressure vessels used in conjunction with power presses shall conform to the American Society of Mechanical Engineers Code for Pressure Vessels, 1968 Edition. **NOTE: Vessel not required, however, code applies to existing vessels.**

(c) Safeguarding the point of operation

(c) (1) General requirements.

(c) (1) (i) It shall be the responsibility of the employer to provide and insure the usage of "point of operation guards" or properly applied and adjusted point of operation devices on every operation performed on a mechanical power press. See Table O-10. **Note: See table behind this section**

(c) (1) (ii) The requirement of subdivision (i) of this subparagraph shall not apply when the point of operation opening is one-fourth inch or less. See Table O-10. **Note: See table behind this section**

(c) (3) Point of operation devices

(c) (3) (i) Point of operation devices shall protect the operator by:

(c) (3) (i) (a) Preventing and / or stopping normal stroking of the press if the operator's hands are inadvertently placed in the point of operation; or

(c) (3) (i) (b) Preventing the operator from inadvertently reaching into the point of operation, or withdrawing his hand if they are inadvertently located in the point of operation, as the dies close; or

(c) (3) (i) (c) Preventing the operator from inadvertently reaching into the point of operation at all times; or

(c) (3) (i) (d) [Revoked]

(c) (3) (i) (e) Requiring application of both of the operator's hands to machine operating controls and locating such controls at such a safety distance from the point of operation that the slide completes the downward travel or stops before the operator can reach into the point of operation with his hands; or

(c) (3) (i) (f) Enclosing the point of operation before a press stroke can be initiated, and maintaining this closed condition until the motion of the slide had ceased; or

(c) (3) (i) (g) Enclosing the point of operation before a press stroke can be initiated, so as to prevent an operator from reaching into the point of operation prior to die closure or prior to cessation of slide motion during the downward stroke.

(c) (3)(v) The sweep device may not be used for point of operation safeguarding after December 31, 1976.

(c) (4) Hand feeding tools. Hand feeding tools are intended for placing and removing materials in and from the press. Hand feeding tools are not a point of operation guard or protection device and shall not be used in lieu of the "guards" or devices required in this section.

(d) Design, construction, setting and feeding of dies-

(d) (1) General requirements.
Effective February 1, 1975, the employer shall: (i) Use dies and operating methods designed to control or eliminate hazards to operating personnel, and (ii) furnish and enforce the use of hand tools for freeing and removing stuck work or scrap pieces from the die, so that no employee need reach into the point of operation for such purposes.

(d) (2) [Revoked]

(d) (3) Scrap handling. The employer shall provide means for handling scrap from roll feed or random length stock operations. Scrap cutters used in conjunction with scrap handling systems shall be safeguarded in accordance with paragraph c of this section and with 1910.219.

(d) (4) Guide post hazard. The hazard created by a guide post (when it is located in the immediate vicinity of the operator) when separated from its bushing by more than one fourth inch shall be considered as a point of operation hazard and be protected in accordance with paragraph c of this section.

(d)(5) Unitized tooling. If unitized tooling is used, the opening between the top of the punch holder and the face of the slide, or striking pad, shall be safeguarded in accordance with the requirements of paragraph c of this section.

(d) (6) Tonnage, stroke, and weight designation. All dies shall be:

(d) (6) (i) Stamped with the tonnage and stroke requirements, or have these characteristics recorded if these records are readily available to the die setter;

(d) (6) (ii) Stamped to indicate upper die weight when necessary for air counterbalance pressure adjustment; and

(d) (6) (iii) Stamped to indicate complete die weight when handling equipment may become overloaded.

(d) (7) Die fastening. Provision shall be made in both the upper and lower shoes for securely mounting the die to the bolster and slide. Where clamp caps or setscrews are used in conjunction with punch stems, additional means of securing the upper shoe to the slide shall be used.

(d) (8) Die handling. Handling equipment attach points shall be provided on all dies requiring mechanical handling.

(d) (9) Diesetting.

(d) (9) (i) The employer shall establish a diesetting procedure that will insure compliance with paragraph C of this section.

(d) (9) (ii) The employer shall provide spring loaded turnover bars, for presses designed to accept such turnover bars.

(d) (9) (iii) The employer shall provide die stops or other means to prevent losing control of the die while setting or removing dies in presses which are inclined.

(d) (9) (iv) The employer shall provide and enforce the use of safety blocks for use whenever dies are being adjusted or repaired.

(d) (9) (v) The employer shall provide brushes, swabs, lubricating rolls, and automatic or manual pressure guns so that operators and diesetters shall not be required to reach into the point of operation or other hazard areas to lubricate material, punches or dies.

.

(e) Inspection, maintenance, and modification of presses-

(e) (1) Inspection and maintenance records.

(e) (1) (i) It shall be the responsibility of the employer to establish and follow a program of periodic and regular inspections of his power presses to ensure that

all their parts, auxiliary equipment, and safeguards are in a safe operating condition and adjustment. The employer shall maintain a certification record of inspections which includes the date of inspection, the signature of the person who performed the inspection and the serial number, or other identifier, of the power press that was inspected.

(e) (1) (ii) Each press shall be inspected and tested no less than weekly to determine the condition of the clutch brake mechanism, antirepeat feature and single stroke mechanism. Necessary maintenance or repair or both shall be performed and completed before the press is operated. These requirements do not apply to those presses which comply with paragraphs (b) (13) and (14) of this section. The employer shall maintain a certification record of inspections, tests and maintenance work which includes the date of the inspection, test or maintenance; the signature of the person who performed the inspection, test, or maintenance; and the serial number or other identifier of the press that was inspected, tested or maintained.

(e) (2) Modification. It shall be the responsibility of any person modifying a power press to furnish instructions with the modification to establish new or changed guidelines for use and care of the power press so modified.

(e) (3) Training of maintenance personnel. It shall be the responsibility of the employer to insure the original and continuing competence of personnel caring for, inspecting, and maintaining power presses.

(f) Operation of power presses-

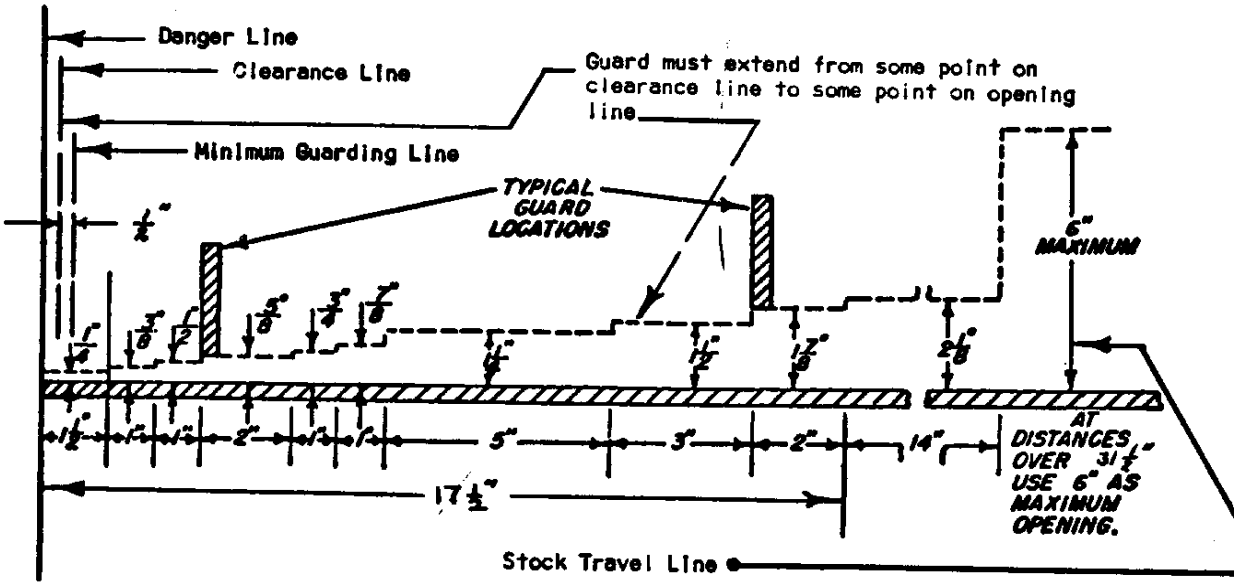
(f) (1) Employment of Minors [Revoked]

(f) (2) Instruction to operators. The employer shall train and instruct the operator in the safe method of work before starting work on any operation covered by this section. The employer shall insure by adequate supervision that correct operating procedures are being followed.

(f) (3) Work area. The employer shall provide clearance between machines so that movement of one operator will not interfere with the work of another. Ample room for cleaning machines, handling material, work pieces, and scrap shall also be provided. All surrounding floors shall be kept in good condition and free from obstructions, grease, oil, and water.

(f) (4) Overloading. The employer shall operate his presses within the tonnage and attachment weight ratings specified by the manufacturer.

Press Diagram - Safe Openings



Explanation of above diagram:
This diagram shows the accepted safe openings between the bottom edge of a guard and feed table at various distances from the danger line (point of operation).
The clearance line marks the distance required to prevent contact between guard and moving parts.
The minimum guarding line is the distance between the infeed side of the guard and the danger line which is one-half inch from the danger line.
The various openings are such that for average size hands an operator's fingers won't reach the point of operation.
After installation of point of operation guards and before a job is released for operation a check should be made to verify that the guard will prevent the operator's hands from reaching the point of operation.

Table O-10
[In inches]

Distance of opening from point of operation hazard	Maximum width of opening
1/2 to 1 1/2	1/4
1 1/2 to 2 1/2	3/8
2 1/2 to 3 1/2	1/2
1 1/2 to 5 1/2	5/8
5 1/2 to 6 1/2	3/4
6 1/2 to 7 1/2	7/8
7 1/2 to 12 1/2	1 1/4
12 1/2 to 15 1/2	1 1/2
15 1/2 to 17 1/2	1 7/8
17 1/2 to 31 1/2	2 1/8

This table shows the distances that guards shall be positioned from the danger line in accordance with the required openings.

(g) Reports of injuries to employees operating mechanical power presses.

(g) (1) The employer shall, within 30 days of the occurrence, report to either the Director of the Office of Standards Development, OSHA, U.S. Department of Labor, Washington, D.C. 20210, or the State agency administering a plan approved by the Assistant Secretary of Labor for Occupational Safety and Health, all point of operation injuries to operators or other employees. The following information shall be included in the report:

(g) (1) (i) Employer's name, address and location of the workplace (establishment).

(g) (1) (ii) Employee's name, injury sustained, and the task being performed (operation, set-up, maintenance, or other).

(g) (1) (iii) Type of clutch used on the press (full revolution, part revolution, or direct drive).

(g) (1) (iv) Type of safeguard(s) being used (two hand control, two hand trip, pull-outs, sweeps, or other). If the safeguard is not described in this section, give a complete description.

(g) (1) (v) Cause of the accident (repeat of press, safeguard failure, removing stuck part or scrap, no safeguard provided, no safeguard in use, or other).

(g) (1) (vi) Type of feeding (manual with hands in dies or with hands out of dies, semiautomatic, automatic, or other).

(g) (1) (vii) Means used to actuate press stroke (foot trip, foot control, hand trip, hand control, or other).

(g) (1) (viii) Number of operators required for the operation and the number of operators provided with controls and safeguards.

Reference: Excerpts from ANSI B11.1-1988

PR & FR 4.1.2. Reconstruction & Modification- any individual in accordance with B11.1-1988 section 4.

PR & FR 4.4.1. Main power disconnect switch located close proximity to the press.

PR & FR 4.9 Fluid powered die-clamping system if provided.

(1) Holding the upper and lower die throughout the slide stroke.
(2) Incorporate means to prevent sudden loss of pressure.
(3) When loss of pressure results in no hazardous condition the requirement does not apply.

PR 4.13.1 Top stop shall be yellow.

PR & FR 4.10.2 Programmable Logic Controllers shall not be converted to Programmable Logic or Programmable Microprocessor Logic System. Also not permitted are clutch/brake controls or trip controls.

PR & FR 4.13.3.3 INCH operating mode shall not be used as a production mode.

PR & FR 4.13.5 Turnover Bar operation must be by means capable of being supervised by the employer.

PR & FR 4.13.6 Data Plate- Each press having an air friction clutch shall post the rated clutch air pressure near the pressure-regulating means.

PR & FR 5.1 Manufacturer shall furnish instructions.

PR & FR 5.1.2 Modification Individual shall furnish instructions.

PR & FR 5.4 Die Cushion - If furnished shall be used within pressure rating.

PR & FR 5.5 Installation of press to prevent walking during operation.

P S D I

PRESENCE SENSING DEVICE INITIATION

OSHA 1910.217 (a) through (h) and Appendix A of this section

Prior to use, both the employer and manufacturer must certify that these requirements and all the other applicable requirements of this section are met and these certifications must be validated by an OSHA-Recognized Third-Party Validation Organization to meet these additional requirements and all the other applicable requirements of paragraphs (a) through (h) and Appendix A of this section.

PART REVOLUTION

Name of Press _____ Stroke _____
Serial # _____ Press #
Tonnage _____

MUST HAVE AIR CLUTCH TO BE A PART-REVOLUTION PRESS

YES	NO			
_____	_____	1. Reconstruction modification	(a) (4)	Page 2
_____	_____	2. Excluded PRESS	(a) (5)	Page 2
_____	_____	3. Broken and secured	(b) (1)	Page 2
_____	_____	4. Brake	(b) (2)	Page 2
_____	_____	5. Single Stroke	(b) (7) (i)	Page 2
_____	_____	6. Red color stop	(b) (7) (ii)	Page 2
_____	_____	7. Off	(b) (7) (iii)	Page 2
_____	_____	8. Inch	(b) (7) (iv)	Page 2
_____	_____	9. Inch both hands	(b) (7) (iv) (a)	Page 2
_____	_____	10. Inch control protected and cannot reach	(b) (7) (iv) (b)	Page 2
_____	_____	11. Supervised	(b) (7)	Page 3
_____	_____	12. Continuous	(b) (7) (viii)	Page 3
_____	_____	13. Prior action	(b) (7) (viii)	Page 3
_____	_____	14. Dual air valve	(b) (7) (xi)	Page 3
_____	_____	15. Air switches	(b) (7) (xi)	Page 3
_____	_____	16. Selection bar	(b) (7) (xv)	Page 3
_____	_____	17. Main power locked off	(b) (8) (i)	Page 3
_____	_____	18. Motor start button	(b) (8) (ii)	Page 3
_____	_____	19. Drive motor starter	(b) (8) (iii)	Page 3
_____	_____	20. Control circuits 120-volt arc	(b) (8) (iv)	Page 3
_____	_____	21. Ground	(b) (8) (v)	Page 4
_____	_____	22. Air controlling	(b) (10)	Page 4
_____	_____	23. Hydraulic equipment	(b) (11)	Page 4
_____	_____	24. Pressure vessels	(b) (12)	Page 4
_____	_____	25. Hand tools freeing stuck and scrap	(d) (1)	Page 5
_____	_____	26. Guide post hazard	(d) (4)	Page 5
_____	_____	27. Unitized tooling	(d) (5)	Page 5
_____	_____	28. Die stamped	(d) (6) (i)	Page 6
_____	_____	29. Upper die weight _____	(d) (6) (ii)	Page 6
_____	_____	30. Complete die weight _____	(d) (6) (iii)	Page 6
_____	_____	31. Die fastening clamp caps	(d) (7)	Page 6
_____	_____	32. Securely	(d) (8)	Page 6

_____	_____			
_____	_____	33. Die setting procedure	(d) (9) (i)	Page 6
_____	_____	34. Turnover bars	(d) (9) (ii)	Page 6
_____	_____	35. Die stops	(d) (9) (iii)	Page 6
_____	_____	36. Safety blocks	(d) (9) (iv)	Page 6
_____	_____	37. Lubricating	(d) (9) (v)	Page 6
_____	_____	38. Maintenance records	(e) (1) (i)	Page 6
_____	_____	39. Tested no less weekly brake, single stroke	(e) (1) (ii)	Page 6
_____	_____	40. Training	(e) (3)	Page 7
_____	_____	41. Work area	(f) (3)	Page 7
_____	_____	42. Overloading	(f) (4)	Page 7
_____	_____	43. Press prevent from walking	PR&FR 5.5	Page 10

5 - C

PART & FULL REVOLUTION SECTION THREE COUNTERBALANCE (IF PRESS HAS COUNTERBALANCE)

FULL & PART REVOLUTION

SPRING COUNTER BALANCE
AIR COUNTER BALANCE

1910.217 Mechanical power presses.

(b) (9) Slide counterbalance systems.

(b) (9) (i) Spring counterbalance systems when used shall incorporate means to retain system parts in event of breakage.

(b) (9) (ii) Spring counterbalances when used shall have the capability to hold the slide and its attachments at midstroke, without brake applied.

(b) (9)(iii) Air counterbalance cylinders shall incorporate means to retain the piston and rod in case of breakage or loosening.

(b) (9) (iv) Air counterbalance cylinders shall have adequate capability to hold the slide and its attachments at any point in stroke, without brake applied.

(b) (9) (v) Air counterbalance cylinders shall incorporate means to prevent failure of capability (sudden loss of pressure) in event of air supply failure.

(b) (l0) Air controlling equipment. Air controlling equipment shall be protected against foreign material and water entering the pneumatic system of the press. A means of air lubrication shall be provided when needed.

(d) Design, construction, setting and feeding of dies

(d) (6) Tonnage, stroke, and weight designation. All dies shall be:

(d) (6) (ii) Stamped to indicate upper die weight when necessary for air counterbalance pressure adjustment; and

PART OR FULL REVOLUTION COUNTERBALANCE

Name of Press _____ Stroke _____
Serial # _____ Press #
Tonnage _____

YES	NO			
_____	_____	1. Spring retain system breakage	(b) (9) (i)	Page 2
_____	_____	2. Air retain the piston and rod	(b) (9) (iii)	Page 2
_____	_____	3. Air switcher	(b) (9) (v)	Page 2
_____	_____	4. Protected against foreign	(b) (10)	Page 2

5 - D

PART & FULL REVOLUTION SECTION FOUR BARRIER GUARDS

FULL & PART REVOLUTION

BARRIER - DIE ENCLOSURE INTERLOCKED GUARD HINGED OR MOVABLE

1910.217 Mechanical power presses.

(c) Safeguarding the point of operation-

(c) (1) General requirements.

(c) (1) (i) It shall be the responsibility of the employer to provide and insure the usage of "point of operation guards" or properly applied and adjusted point of operation devices on every operation performed on a mechanical power press. See Table O-10.

(c) (1) (ii) The requirement of subdivision (i) of this subparagraph shall not apply when the point of operation opening is one-fourth inch or less. See Table O-10. **Note: See table behind this section.**

(c) (2) Point of operation guards.

(c) (2) (i) Every point of operation guard shall meet the following design, construction, application, and adjustment requirements:

(c) (2) (i) (a) It shall prevent entry of hands or fingers into the point of operation by reaching through, over, under or around the guard;

(c) (2) (i) (b) It shall conform to the maximum permissible openings of Table O-10: **Note: See table behind this section.**

(c) (2) (i) (c) It shall, in itself, create no pinch point between the guard and moving machine parts;

(c) (2) (i) (d) It shall utilize fasteners not readily removable by operator, so as to minimize the possibility of misuse or removal of essential parts;

(c) (2) (i) (e) It shall facilitate its inspection, and

(c) (2) (i) (f) It shall offer maximum visibility of the point of operation consistent with the other requirements.

(c) (2) (ii) A die enclosure guard shall be attached to the die shoe or stripper in a fixed position.

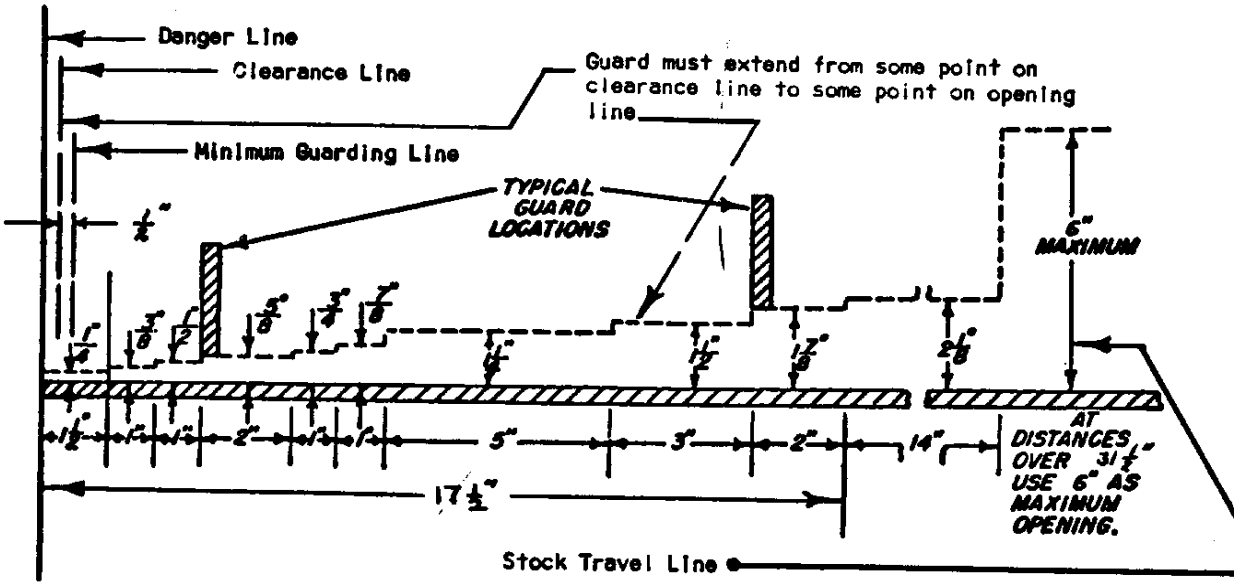
(c) (2) (iii) A fixed barrier guard shall be attached securely to the frame of the press or to the bolster plate.

(c) (2) (iv) An interlocked press barrier guard shall be attached to the press frame or bolster and shall be interlocked with the press clutch control so that the clutch cannot be activated unless the guard itself, or the hinged or movable sections of the guard are in position to conform to the requirements of Table O-10.
Note: See table behind this section.

(c) (2) (v) The hinged or movable sections of an interlocked press barrier guard shall not be used for manual feeding. The guard shall prevent opening of the interlocked section and reaching into the point of operation prior to die closure or prior to the cessation of slide motion. See paragraph (c)(3)(ii) of this section regarding manual feeding through interlocked press barrier devices.

(c) (2) (vi) The adjustable barrier guard shall be securely attached to the press bed, bolster plate, or die shoe, and shall be adjusted and operated in conformity with Table O-10 and the requirements of this subparagraph. Adjustments shall be made only by authorized personnel whose qualifications include a knowledge of the provisions of Table O-10 and this subparagraph.

(c) (2) (vii) A point of operation enclosure which does not meet the requirements of this subparagraph and Table O-10 shall be used only in conjunction with point of operation devices.



Explanation of above diagram:

This diagram shows the accepted safe openings between the bottom edge of a guard and feed table at various distances from the danger line (point of operation).

The clearance line marks the distance required to prevent contact between guard and moving parts.

The minimum guarding line is the distance between the infeed side of the guard and the danger line which is one-half inch from the danger line.

The various openings are such that for average size hands an operator's fingers won't reach the point of operation.

After installation of point of operation guards and before a job is released for operation a check should be made to verify that the guard will prevent the operator's hands from reaching the point of operation.

Table 0-10
(In inches)

Distance of opening from point of operation hazard	Maximum width of opening
1/2 to 1 1/2	1/4

1 1/2 to 2 1/2	3/8
2 1/2 to 3 1/2	1/2
1 1/2 to 5 1/2	5/8
5 1/2 to 6 1/2	3/4
6 1/2 to 7 1/2	7/8
7 1/2 to 12 1/2	1 1/4
12 1/2 to 15 1/2	1 1/2
15 1/2 to 17 1/2	1 7/8
17 1/2 to 31 1/2	2 1/8

This table shows the distances that guards shall be positioned from the danger line in accordance with the required openings.

PART & FULL REVOLUTION BARRIER GUARDS

Name of Press _____ Stroke _____
Serial # _____ Press #
Tonnage _____

MUST HAVE AIR CLUTCH TO BE A PART-REVOLUTION PRESS

YES	NO			
_____	_____	44. Opening is one-fourth or less. Does not apply.	(c) (1) (ii)	Page 2
_____	_____	45. Reaching through, over, under or around	(c) (2) (i) (a)	Page 2
_____	_____	46. Conform to Table O-10	(c) (2) (i) (b)	Page 2
_____	_____	47. Create no pinch point	(c) (2) (i) (c)	Page 2
_____	_____	48. Readily removable fasteners	(c) (2) (i) (d)	Page 2
_____	_____	49. Guard maximum visibility	(c) (2) (i) (f)	Page 2
_____	_____	50. Die enclosure guard attached to die shoes	(c) (2) (ii)	Page 2
_____	_____	51. Fixed barrier securely to frame	(c) (2) (iii)	Page 2
_____	_____	52. Hinged or movable guard interlocked	(c) (2) (v)	Page 3

_____	No guard		
_____	One side	_____	Add
_____	Both side	_____	Add
_____	Back side	_____	Add
_____	Front	_____	Add

PART & FULL REVOLUTION SECTION FIVE HOLDOUT & RESTRAINT PULL-BACKS

PART & FULL REVOLUTION

PULL-OUT DEVICE HOLDOUT OR RESTRAINT

1910.217 Mechanical power presses.

(c) Safeguarding the point of operation:

(c) (1) General requirements.

(c) (1) (i) It shall be the responsibility of the employer to provide and insure the usage of "point of operation guards" or properly applied and adjusted point of operation devices on every operation performed on a mechanical power press. See Table 0-10.
Note: See table behind this section.

(c) (1) (ii) The requirement of subdivision (i) of this subparagraph shall not apply when the point of operation opening is one-forth inch or less. See Table 0-10.
Note: See table behind this section.

(c) (3) Point of operation devices.

(c) (3) (i) Point of operation devices shall protect the operator by:

(c) (3) (i) (a) Preventing and/or stopping normal stroking of the press if the operator's hands are inadvertently placed in the point of operation; or

(c) (3) (i) (b) Preventing the operator from inadvertently reaching into the point of operation, or withdrawing his hands if they are inadvertently located in the point of operation, as the dies close; or

(c) (3) (i) (c) Preventing the operator from inadvertently reaching onto the point of operation at all times; or

(c) (3) (i) (d) [Revoked]

(c) (3) (i) (e) Requiring application of both of the operator's hands to machine operating controls and locating such controls at such a safety distance from the point of operation that the slide completes the downward travel or stops before the operator can reach into the point of operation with his hand; or

(c) (3) (i) (f) Enclosing the point of operation before a press stroke can be initiated, and maintaining this closed condition until the motion of the slide had ceased; or

(c) (3) (i) (g) Enclosing the point of operation before a press stroke can be initiated, so as to prevent an operator from reaching into the point of operation prior to die closure or prior to cessation of slide motion during the downward stroke.

(c) (3) (iv) The pullout device shall protect the operator as specified in paragraph (c) (3) (i) (b) of this section, and shall include attachments for each of the operator's hands.

(c) (3) (iv) (a) Attachments shall be connected to and operated only by the press slide of upper die.

(c) (3) (iv) (b) Attachments shall be adjusted to prevent the operator from reaching into the point of operation or to withdraw the operator's hands from the point of operation before the dies close.

(c) (3) (iv) (c) A separate pull out device shall be provided for each operator of more than one operator is used on a press.

(c) (3) (iv) (d) Each pull out device in use shall be visually inspected and checked for proper adjustment a t the start of each operator shift, following a new die set up, and when operators are changed. Necessary maintenance or repair or both shall be performed and completed before the press is operated. Records of inspections and maintenance shall be kept in accordance with paragraph (e) of this section.

(c) (3)(v) The sweep device may not be used for point of operation safeguarding after December 31, 1976.

(c) (3) (vi) A holdout or a restraint device shall protect the operator as specified in paragraph (c)(3)(i)(c) of this section and shall include attachments for each of the operator's hands. Such attachments shall be securely anchored and adjusted in such a way that the operator is restrained from reaching into the point of operation. A separate set of restraints shall be provide for each operator if more than one operator is required on a press.

PART & FULL REVOLUTION HOLDOUT & PULL BACKS

Name of Press _____ Stroke _____
Serial # _____ Press #
Tonnage _____

YES	NO			
_____	_____	1. Preventing or stopping	(c) (3) (i) (a)	Page 2
_____	_____	2. Withdrawing his hands	(c) (3) (i) (b)	Page 2
_____	_____	3. Both hands	(c) (3) (i) (e)	Page 2
_____	_____	4. Attachments to slide or die	(c) (3) (iv) (a)	Page 3
_____	_____	5. Separate pull back each operator	(c) (3) (iv) (c)	Page 3
_____	_____	6. Visually inspected	(c) (3) (iv) (d)	Page 3
_____	_____	7. Checked for proper adjustment start each shift	(c) (3) (iv) (d)	Page 3
_____	_____	8. New die set-up and operators are changed	(c) (3) (iv) (d)	Page 3
_____	_____	9. Records of inspections	(c) (3) (iv) (d)	Page 3
_____	_____	10. No sweep device	(c) (3) (v)	Page 3
_____	_____	11. Holdout each operator	(c) (3) (vi)	Page 3
_____	_____	12. Attachments anchored	(c) (3) (vi)	Page 3

5 - F

FULL REVOLUTION
SECTION SIX
TWO-HAND TRIPS

FULL REVOLUTION

TWO-HAND TRIP -- HAND OPERATED LEVERS

1910.217 Mechanical power presses.

(b) (5) Hand operated levers.

(b) (5) (i) Hand-lever-operated power presses shall be equipped with a spring latch on the operating lever to prevent premature or accidental tripping.

(b) (5) (ii) The operating levers on hand-tripped presses having more than one operating station shall be interlocked to prevent the tripping of the press except by the concurrent" use of all levers.

(b) (6) Two-hand trip.

(b) (6) (i) A two-hand trip shall have the individual operator's hand controls protected against unintentional operation and have the individual operator's hand controls arranged by design and construction and/or separation to require the use of both hands to trip the press and use a control arrangement requiring concurrent operation of the individual operator's hand controls.

(b) (6) (ii) Two-hand trip systems on full revolution clutch machines shall incorporate an anti-repeat feature.

(b) (6) (iii) If two-hand trip systems are used on multiple operator presses, each operator shall have a separate set of controls.

(c) Safeguarding the point of operation-

(c) (1) General requirements.

(c) (1)(i) It shall be the responsibility of the employer to provide and insure the usage of "point of operation guards" or properly applied and adjusted point of operation devices on every operation performed on a mechanical power press. See Table O-10. **Note: See table behind this section.**

(c) (1) (ii) The requirement of subdivision (i) of this subparagraph shall not apply when the point of operation opening is one-fourth inch or less. See Table O-10. **Note: See table behind this section.**

(c) (3) Point of operation devices.

(c) (3) (i) Point of operation devices shall protect the operator by:

(c) (3) (i) (a) Preventing and/or stopping normal stroking of the press if the operator's hands are inadvertently placed in the point of operation; or

(c) (3) (i)(b) Preventing the operator from inadvertently reaching into the point of operation, or withdrawing his hands if they are inadvertently located in the point of operation, as the dies close; or

(c) (3) (i) (c) Preventing the operator from inadvertently reaching into the point of operation at all times; or:

(c) (3) (i) (d) [Revoked

(c) (3) (i) (e) Requiring application of both of the operator's hands to machine operating controls and locating such controls at such a safety distance from the point of operation that the slide completes the downward travel or stops before the operator can reach into the point of operation with his hands; or

(c) (3) (i) (f) Enclosing the point of operation before a press stroke can be initiated, and maintaining this closed condition until the motion of the slide had ceased; or

(c) (3) (i) (g) Enclosing the point of operation before a press stroke can be initiated, so as to prevent an operator from reaching into the point of operation prior to die closure or prior to cessation of slide motion during the downward stroke.

(c) (3) (viii) The two hand trip device shall protect the operator as specified in paragraph (c)(3)(i)(e) of this section.

(c) (3) (viii) (a) When used in press operations requiring more than one operator, separate two hand trips shall be provided for each operator, and shall be designed to require concurrent application of all operators' to activate the slide.

(c) (3) (viii) (b) Each two hand trip shall meet the construction requirements of paragraph (b)(6) of this section.

(c) (3) (viii) (c) The safety distance (Dm) between the two hand trip and the point of operation shall be greater than the distance determined by the following formula:

Dms = 63 inches/second X Tms;

where:

Dms = minimum safety distance (inches); 63 inches/second=hand speed constant;

and

Tms = the maximum time the press takes for the die closure after it has been tripped (seconds). For full revolution clutch presses with only one engaging point Tms is equal to the time necessary for one and one-half revolutions of the crankshaft. For full revolution clutch presses with more than one engaging point, Tms shall be calculated as follows:

Tms = [1/2 + (1 Number of engaging points per revolution)] x time necessary to complete one revolution of the crankshaft (seconds).

(c) (3) (viii) (d) Two hand trips shall be fixed in position so that only a supervisor or safety engineer is capable of relocating the controls.

FULL REVOLUTION TWO-HAND TRIPS

Name of Press _____ Stroke _____
Serial # _____ Press #
Tonnage _____

YES	NO				
_____	_____	1.	Hand levers spring latch	(b) (5) (i)	Page 2
_____	_____	2.	More than one operating station interlocked	(b) (5) (ii)	Page 2
_____	_____	3.	Two-hand trip controls protected	(b) (6) (i)	Page 2
_____	_____	4.	Separation or design both hands	(b) (6) (i)	Page 2
_____	_____	5.	Concurrent	(b) (6) (i)	Page 2
_____	_____	6.	Anti-repeat	(b) (6) (ii)	Page 2
_____	_____	7.	Multiple operator	(b) (6) (iii)	Page 2
_____	_____	8.	Engaging point _____ Time per stroke _____	(c) (3) (viii) (d)	Page 4
_____	_____	9.	Two hand trips fixed position	(c) (3) (viii)	Page 4

5 - G

FULL REVOLUTION
SECTION SEVEN
FOOT PEDALS

FULL REVOLUTION - FOOT PEDALS

1910.217 Mechanical power presses.

(b) (4) Foot pedals (treadle).

(b) (4) (i) The pedal mechanism shall be protected to prevent unintended operation from falling or moving objects or by accidental stepping onto the pedal.

(b) (4) (ii) A pad with a nonslip contact area shall be firmly attached to the pedal.

(b) (4) (iii) The pedal return spring(s) shall be of the compression type, operating on a rod or guided within a hole or tube, or designed to prevent interleaving of spring coils in event of breakage.

(b) (4)(iv) If pedal counterweights are provided, the path of the travel of the weight shall be enclosed.

FULL REVOLUTION FOOT PEDALS

Name of Press _____ Stroke _____
Serial # _____ Press #
Tonnage _____

YES	NO			
_____	_____	1. Treadle guard falling or moving	(b) (4) (i)	Page 2
_____	_____	2. Treadle pad non-slip	(b) (4) (ii)	Page 2
_____	_____	3. Pedal return spring compression	(b) (4) (iii)	Page 2
_____	_____	4. Counterweight guard	(b) (5) (iv)	Page 2

5 - H

PART REVOLUTION SECTION EIGHT LIGHT CURTAIN AND RADIO FREQUENCY

1910.217 Mechanical Power Presses.

(b) (13) Control reliability. When required by paragraph (c)(5) of this section, the control system shall be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent initiation of a successive stroke until the failure is corrected. The failure shall be detectable by a simple test, or indicated by the control system. This requirement does not apply to those elements of the control system which have no effect on the protection against point of operation injuries.

(b) (14) Brake system monitoring. When require by paragraph (c)(5) of this section, the brake monitor shall meet the following requirements:

(b) (14) (i) Be so constructed as to automatically prevent the activation of a successive stroke if the stopping time or braking distance deteriorates to a point where the safety distance being utilized does not meet the requirements set forth in paragraph (c)(3)(iii)(e) or (c)(3)(vii)(c) of this section. The brake monitor used with the Type B gate or movable barrier device shall be installed in a manner to detect slide top-stop overrun beyond the normal limit reasonably established by the employer.

(b) (14) (ii) Be installed on a press such that it indicates when the performance of the braking system has deteriorated to the extent described in paragraph (b)(14)(i) of this section; and

(b) (14) (iii) Be constructed and installed in a manner to monitor brake system performance on each stroke.

(c) Safeguarding the point of operation-

(c) (1) General requirements.

(c) (1) (i) It shall be the responsibility of the employer to provide and insure the usage of "point of operation guards" or properly applied and adjusted point of operation devices on every operation performed on a mechanical power press. See Table 0-10. **Note: See table behind this section.**

(c) (1) (ii) The requirement of subdivision (i) of this subparagraph shall not apply when the point of operation opening is one-fourth inch or less. See Table 0-10.

Note: See table behind this section.

(c) (3) Point of operation devices.

(c) (3) (i) Point of operation devices shall protect the operator by:

(c) (3) (i) (a) Preventing and/or stopping normal stroking of the press if the operator's hands are inadvertently placed In the point of operation; or

(c) (3) (i) (b) Preventing the operator from inadvertently reaching into the point of operation, or withdrawing his hands if they are inadvertently located in the point of operation, as the dies close; or

(c) (3) (i) (c) Preventing the operator from inadvertently reaching into the point of operation at all times; or

(c) (3) (i) (d) [Revoked]

(c) (3) (i) (e) Requiring application of both of the operator's hands to machine operating controls and locating such controls at such a safety distance from the point of operation that the slide completes the downward travel or stops before the operator can reach into the point of operation with his hands; or

(c) (3) (i) (f) Enclosing the point of operation before a press stroke can be initiated, and maintain this closed condition until the motion of the slide had ceased; or

(c) (3) (i) (g) Enclosing the point of operation before a press stroke can be initiated, so as to prevent an operator from reaching into the point of operation prior to die closure or prior to cessation of slide motion during the downward stroke.

(c) (3) (iii) A presence sensing point of operation device shall protect the operator as provided in paragraph (c)(3)(i)(a) of this section, and shall be interlocked into the control circuit to prevent or stop slide motion of the operator's hand or other part of his body is within the sensing field of the device during the downstroke of the press slide.

(c) (3) (iii) (a) The device may not be used on machines using full revolution clutches.

(c) (3) (iii) (b) The device may not be used as a tripping means to initiate slide motion, except when used in total conformance with paragraph (h) of this section.

(c) (3) (iii) (c) The device shall be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent the initiation of a successive stroke until the failure is corrected. The failure shall be indicated by the system.

(c) (3) (iii) (d) Muting (bypassing of the protective function) of such device, during the upstroke of the press slide, is permitted for the purpose of parts ejection, circuit checking, and feeding.

(c) (3) (iii) (e) The safety distance (Dm) from the sensing field to the point of operation shall be greater than the distance determined by the following formula:

Dms=63 inches/second X Tms

where:

Dms = minimum safety distance (inches);63 inches/second=hand speed constant; and
Tms = stopping time of the press measured at approximately 90° position of crankshaft rotation (seconds).

(c) (3) (iii) (f) Guards shall be used to protect all areas of entry to the point of operation not protected by the presence sensing device.

P S D I

PRESENCE SENSING DEVICE INITIATION

OSHA 1910.217 (a) through (h) and Appendix A of this section

Prior to use, both the employer and manufacturer must certify that these requirements and all the other applicable requirements of this section are met and these certifications must be validated by an OSHA-Recognized Third-Party Validation Organization to meet these additional requirements and all the other applicable requirements of paragraphs (a) through (h) and Appendix A of this section.

PART REVOLUTION LIGHT OR RADIO

Name of Press _____ Stroke _____
Serial # _____ Press #
Tonnage _____

YES	NO			
_____	_____	1. Dual air valve		
_____	_____	2. Air switches		
_____	_____	3. Brake systerm monitoring	(b) (14)	Page 2
_____	_____	4. Stop time _____		
_____	_____	5. Guards all areas	(c) (3) (iii)	Page 4

5 - I

PART REVOLUTION
SECTION NINE
TWO-HAND
CONTROLS
(PALM BUTTONS)

PART REVOLUTION

TWO HAND CONTROLS

1910.217 Mechanical power presses.

(b) (7) (ii) A red color stop control shall be provided with the clutch/brake control system. Momentary operation of the stop control shall immediately deactivate the clutch and apply the brake. The stop control shall override any other control, and reactuation of the clutch shall require use of the operating (tripping) means which has been selected.

(b) (7) (v) Two-hand controls for single stroke shall conform to the following requirements:

(b) (7) (v) (a) Each hand control shall be protected against unintended operation and arranged by design, construction, and/or separation so that the concurrent use of both hands is required to trip the press.

(b) (7) (v)(b) The control system shall be designed to permit an adjustment which will require concurrent pressure from both hands during the die closing portion of the stroke.

(b) (7) (v) (c) The control system shall incorporate an anti-repeat feature.

(b) (7) (v) (d) The control systems shall be designed to require release of all operators' hand controls before an interrupted stroke can be resumed. This requirement pertains only to those single-stroke, two-hand controls manufactured and installed on or after August 31, 1971.

(b) (7) (vi) [Reserved]

(b) (7) (vii) Controls for more than one operating station shall be designed to be activated and deactivated in complete sets of two operator's hand controls per operating station by means capable of being supervised by the employer. The clutch/brake control system shall be designed and constructed to prevent actuation of the clutch if all operating stations are bypassed.

(b) (7) (viii) Those clutch/brake control systems which contain both single and continuous function shall be designed so that completion of continuous circuits may be supervised by the employer. The initiation of continuous run shall require a prior action or decision by the operator in addition to the selection of Continuous on the stroking selector, before actuation of the operating means will result in continuous stroking.

(b) (13) Control reliability. When required by paragraph (c)(5) of this section, the control system shall be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent initiation of a successive stroke until the failure is corrected. The failure shall be detectable by a simple test, or indicated by the control system. This requirement does not apply to those elements of the control system which have no effect on the protection against point of operation injuries.

(b) (14) Brake system monitoring. When required by paragraph (c) (5) of this section, the brake monitor shall meet the following requirements:

(b) (14) (i) Be so constructed as to automatically prevent the activation of a successive stroke if the stopping time or braking distance deteriorates to a point where the safety distance being utilized does not meet the requirements set forth in paragraph (c)(3)(iii) (e) or (c)(3)(vii) (c) of this section. The brake monitor used with the Type B gate or movable barrier device shall be installed in a manner to detect slide top-stop overrun beyond the normal limit reasonably established by the employer.

(b) (14) (ii) Be installed on a press such that it indicates when the performance of the braking system has deteriorated to the extent described in paragraph (b)(14) (i) of this section; and

(b) (14) (iii) Be constructed and installed in a manner to monitor brake system performance on each stroke.

(c) Safeguarding the point of operation-

(c) (1) General requirements.

(c) (1) (i) It shall be the responsibility of the employer to provide and insure the usage of "point of operation guards" or properly applied and adjusted point of operation devices on every operation performed on a mechanical power press. See Table O-10. **Note: See table behind this section.**

(c) (1) (ii) The requirement of subdivision (i) of this subparagraph shall not apply when the point of operation opening is one-fourth inch or less. See Table O-10.

Note: See table behind this section.

(c) (3) Point of operation devices.

(c) (3) (i) Point of operation devices shall protect the operator by:

(c) (3) (i) (a) Preventing and/or stopping normal stroking of the press if the operator's hands are inadvertently placed in the point of operation; or

(c) (3) (i) (b) Preventing the operator from inadvertently reaching into the point of operation, or withdrawing his hands if they are inadvertently located in the point of operation, as the dies close; or

(c) (3) (i) (c) Preventing the operator from inadvertently reaching into the point of operation at all times; or

(c) (3) (i) (d) [Revoked]

(c) (3) (i) (e) Requiring application of both of the operator's hands to machine operating controls and locating such controls at such a safety distance from the point of operation that the slide completes the downward travel or stops before the operator can reach into the point of operation with his hands; or

(c) (3) (i) (f) Enclosing the point of operation before a press stroke can be initiated, and maintaining this closed condition until the motion of the slide had ceased; or

(c) (3) (i) (g) Enclosing the point of operation before a press stroke can be initiated, so as to prevent an operator from reaching into the point of operation prior to die closure or prior to cessation of slide motion during the downward stroke.

(c) (3) (iii) A presence sensing point of operation device shall protect the operator as provided in paragraph (c)(3)(i)(a) of this section, and shall be interlocked into the control circuit to prevent or stop slide motion if the operator's hand or other part of his body is within the sensing field of the device during the downstroke of the press slide.

(c) (3) (iii) (a) The device may not be used on machines using full revolution clutches.

(c) (3) (iii) (b) The device may not be used as a tripping means to initiate slide motion, except when used in total conformance with paragraph (h) of this section.

(c) (3) (iii) (c) The device shall be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required,

but does prevent the initiation of a successive stroke until the failure is corrected. The failure shall be indicated by the system.

(c) (3) (iii) (d) Muting (bypassing of the protective function) of such device, during the upstroke of the press slide, is permitted for the purpose of parts ejection, circuit checking, and feeding.

(c) (3) (vii) The two hand control device shall protect the operator as specified in paragraph (c)(3)(i)(e) of this section.

(c) (3) (vii) (a) When used in press operations requiring more than one operator, separate two hand controls shall be provided for each operator, and shall be designed to require concurrent application of all operators' controls to activate the slide. The removal of a hand from any control button shall cause the slide to stop.

(c) (3) (vii) (b) Each two hand control shall meet the construction requirements of paragraph (b)(7)(v) of this section.

(c) (3) (vii) (c) The safety distance (Dms) between each two hand control device and the point of operation shall be greater than the distance determined by the following formula:

Dms = 63 inches/second X Tms;

where:

Dms = minimum safety distance (inches); 63 inches/second = hand speed constant;

and

Tms = stopping time of the press measured at approximately 90° position of crankshaft rotation (seconds).

(c) (3) (vii) (d) Two hand controls shall be fixed in position so that only a supervisor or safety engineer is capable of relocating the controls.

(c) (4) Hand feeding tools. Hand feeding tools are intended for placing and removing materials in and from the press. Hand feeding tools are not a point of operation guard or protective device and shall not be used in lieu of the “guards” or devices required in this section.

(c) (5) Additional requirements for safe-guarding. Where the operator feeds or removes parts by placing one or both hands in the point of operation, and a two hand

control, presence sensing device of Type B gate or movable barrier (on a part revolution clutch) is used for safeguarding.

(c) (5) (i) The employer shall use a control system and a brake monitor which comply with paragraphs (b) (13) and (14) of this section. This requirement shall be complied with by November 1, 1975;

(c) (5) (ii) The exception in paragraph (b) (7) (v) (d) of this section for two hand controls manufactured and installed before August 31, 1971 is not applicable under this paragraph (c) (5);

(c) (5) (iii) The control of air clutch machines shall be designed to prevent a significant increase in the normal stopping time due to a failure within the operating valve mechanism, and to inhibit further operation if such failure does occur, where a part revolution clutch is employed. The exception in paragraph (b) (7) (xi) of this section for controls manufactured and installed before August 31, 1971, is not applicable under this paragraph (c) (5).

(e) Inspection, maintenance, and modification of presses

(e) (1) (ii) Each press shall be inspected and tested no less than weekly to determine the condition of the clutch/brake mechanism, antirepeat feature and single stroke mechanism. Necessary maintenance or repair or both shall be performed and completed before the press is operated. These requirements do not apply to those presses which comply with paragraphs (b) (13) and (14) of this section. The employer shall maintain a certification record of inspections, tests and maintenance work which includes the date of the inspection, test or maintenance; the signature of the person who performed the inspection, test, or maintenance; and the serial number or other identifier of the press that was inspected, tested or maintained.

PART REVOLUTION TWO HAND CONTROLS

Name of Press _____ Stroke _____
Serial # _____ Press #
Tonnage _____

YES	NO			
_____	_____	1. Red color stop	(b) (7) (ii)	Page 2
_____	_____	2. Single stroke	(b) (7) (v)	Page 2
_____	_____	3. Guard against unintended operation	(b) (7) (v)	Page 2
_____	_____	4. Separating, design and construction	(b) (7) (v)	Page 2
_____	_____	5. Concurrent pressure both hands	(b) (7) (v)	Page 2
_____	_____	6. Anti-repeat	(b) (7) (v)	Page 2
_____	_____	7. Release control	(b) (7) (v)	Page 2
_____	_____	8. Two hand per operating	(b) (7) (vii)	Page 2
_____	_____	9. Supervised	(b) (7) (viii)	Page 3
_____	_____	10. Control reliability dual air valves	(b) (13)	Page 3
_____	_____	11. Air switches	(b) (13)	Page 3
_____	_____	12. Brake monitoring	(b) (14)	Page 3
_____	_____	13. Stop time	(c) (3) (vii)	Page 5
_____	_____	14. Two hand fixed	(c) (3) (vii) (d)	Page 5
_____	_____	15. Inspection	(e) (1) (ii)	Page 6

PART & FULL SECTION TEN REVOLUTION TYPE "A" GATE

TYPE “A” GATE

1910.217 Mechanical power presses.

(c) Safeguarding the point of operation-

(c) (1) General requirements.

(c) (1) (i) It shall be the responsibility of the employer to provide and insure the usage of "point of operation guards" or properly applied and adjusted point of operation devices on every operation performed on a mechanical power press. See Table O-10.
Note: See table behind this section

(c) (1) (ii) The requirement of subdivision (i) of this subparagraph shall not apply when the point of operation opening is one-fourth inch or less. See Table O-10.
Note: See table behind this section.

(c) (3) Point of operation devices.

(c) (3) (i) Point of operation devices shall protect the operator by:

(c) (3) (i) (a) Preventing and/or stopping normal stroking of the press if the operator's hands are inadvertently placed in the point of operation; or

(c) (3) (i) (b) Preventing the operator from inadvertently reaching into the point of operation, or withdrawing his hands if they are inadvertently located in the point of operation, as the dies close; or

(c) (3) (i) (c) Preventing the operator from inadvertently reaching into the point of operation at all times; or

(c) (3) (i) (d) [Revoked]

(c) (3) (i) (e) Requiring application of both of the operator's hands to machine operating controls and locating such controls at such a safety distance from the point of operation that the slide completes the downward travel or stops before the operator can reach into the point of operation with his hands; or

(c) (3) (i) (f) Enclosing the point of operation before a press stroke can be initiated, and maintaining this closed condition until the motion of the slide had ceased; or

(c) (3) (i) (g) Enclosing the point of operation before a press stroke can be initiated, so as to prevent an operator from reaching into the point of operation prior to die closure or prior to cessation of slide motion during the downward stroke.

(c) (3) (ii) A gate or movable barrier device shall protect the operator as follows:

(c) (3) (ii) (a) A Type A gate or movable barrier device shall protect the operator in the manner specified in paragraph (c)(3) (i)(f) of this section, and

PART & FULL REVOLUTION TYPE "A" GATE

Name of Press _____ Stroke _____
Serial # _____ Press # _____
Tonnage _____

YES	NO			
_____	_____	1. Stop stroke	(c) (3) (i) (a)	Page 2
		2. Closed condition until the motion	(c) (3) (i) (f)	Page 2

5 - K

PART REVOLUTION
SECTION ELEVEN
TYPE “B” GATE

TYPE "B" GATE

1910.217 Mechanical power presses.

(b) (13) Control reliability. When required by paragraph (c)(5) of this section, the control system shall be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent initiation of a successive stroke until the failure is corrected. The failure shall be detectable by a simple test, or indicated by the control system. This requirement does not apply to those elements of the control system which have no effect on the protection against point of operation injuries.

(b) (14) Brake system monitoring. When required by paragraph (c) (5) of this section, the brake monitor shall meet the following requirements:

(b) (14) (i) Be so constructed as to automatically prevent the activation of a successive stroke if the stopping time or braking distance deteriorates to a point where the safety distance being utilized does not meet the requirements set forth in paragraph (c)(3)(iii) (e) or (c) (3) (vii) (c) of this section. The brake monitor used with the Type B gate or movable barrier device shall be installed in a manner to detect slide top-stop overrun beyond the normal limit reasonably established by the employer.

(b) (14) (ii) Be installed on a press such that it indicates when the performance of the braking system has deteriorated to the extent described in paragraph (b)(14) (i) of this section; and

(b) (14) (iii Be constructed and installed in a manner to monitor brake system performance on each stroke.

(c) Safeguarding the point of operation-

(c) (1) General requirements.

(c) (1) (i) It shall be the responsibility of the employer to provide and insure the usage of "point of operation guards" or properly applied and adjusted point of operation devices on every operation performed on a mechanical power press. See Table O-10. **Note: See table behind this section.**

(c) (1) (ii) The requirement of subdivision (I) of this subparagraph shall not apply when the point of operation opening is one-fourth inch or less. See Table O-10.
Note: See table behind this section.

(c) (3) Point of operation devices.

(c) (3) (i) Point of operation devices shall protect the operator by:

(c) (3) (i) (a) Preventing and/or stopping normal stroking of the press if the operator's hands are inadvertently placed in the point of operation; or

(c) (3) (i) (b) Preventing the operator from inadvertently reaching into the point of operation, or withdrawing his hands if they are inadvertently located in the point of operation, as the dies close; or

(c) (3) (i) (c) Preventing the operator from inadvertently reaching into the point of operation at all times; or

(c) (3) (i) (d) [Revoked]

(c) (3) (i) (e) Requiring application of both of the operator's hands to machine operating controls and locating such controls at such a safety distance from the point of operation that the slide completes the downward travel or stops before the operator can reach into the point of operation with his hands; or

(c) (3) (i) (f) Enclosing the point of operation before a press stroke can be initiated, and maintaining this closed condition until the motion of the slide had ceased; or

(c) (3) (i) (g) Enclosing the point of operation before a press stroke can be initiated, so as to prevent an operator from reaching into the point of operation prior to die closure or prior to cessation of slide motion during the downward stroke.

(c) (3) (ii) A gate or movable barrier device shall protect the operator as follows:

(c) (3) (ii) (b) A type B gate or movable barrier device shall protect the operator in the manner specified in paragraph (c) (3) (i) (g).

(c) (3) (iii) A presence sensing point of operation device shall protect the operator as provided in paragraph (c) (3) (i) (a) of this section, and shall be interlocked into the control circuit to prevent or stop slide motion if the operator's hand or other part of his body is within the sensing field of the device during the downstroke of the press slide.

(c) (3) (iii) (a) the device may not be used on machines using full revolution clutches.

(c) (3) (iii) (b) The device may not used as a tripping means to initiate slide motion.

(c) (3) (iii) (c) The device shall be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent the initiation of a successive stroke until the failure is corrected. The failure shall be indicated by the system.

(c) (3) (iii) (d) Muting (bypassing of the protective function) of such device, during the upstroke of the press slide, is permitted for the purpose of parts ejection, circuit checking, and feeding.

(c) (3) (iii) (e) the safety distance (D(s)) from the sensing field to the point of operation shall be greater than the distance determined by the following formula:

D(s) = 63 inches/second X T (s)

where:

D (s) = minimum safety distance (inches); 63 inches/second = hand speed constant;

and:

T (s) = stopping time of the press measured at approximately 90° position of crankshaft rotation (seconds).

(c) (3) (iii) (f) Guards shall be used to protect all areas of entry to the point of operation not protected by the presence sensing device.

PART REVOLUTION TWO HAND CONTROLS

Name of Press _____ Stroke _____
Serial # _____ Press #
Tonnage _____

YES	NO			
_____	_____	1. Control reliability dual air valves	(b) (13)	Page 2
_____	_____	2. Air switches	(b) (13)	Page 2
_____	_____	3. Brake monitoring	(b) (14)	Page 2
_____	_____	4. Table O-10	(b) (1) (ii)	Page 2
_____	_____	5. Movable barrier		

5 - L

PART REVOLUTION
SECTION TWELVE
FOOT CONTROL

PART REVOLUTION

FOOT CONTROL

1910.217 Mechanical power presses.

(b) (7) (ix) If foot control is provided, the selection method between hand and foot control shall be separate from the stroking selector and shall be designed so that the selection may be supervised by the employer.

(b) (7) (x) Foot operated tripping controls, if used, shall be protected so as to prevent operation from falling or moving objects, or from unintended operation by accidental stepping onto the foot control.

PART REVOLUTION FOOT CONTROL

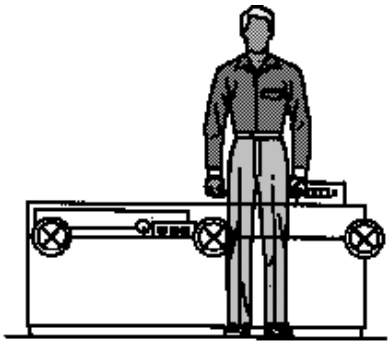
Name of Press _____ Stroke _____
Serial # _____ Press #
Tonnage _____

YES	NO			
_____	_____	1. Supervised hand and foot	(b) (7) (ix)	Page 2
		2. Guard		

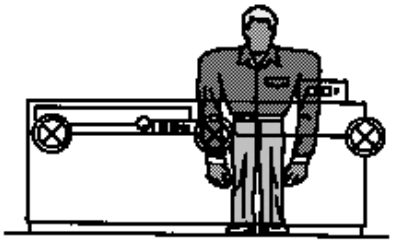
Ergonomics for Power Presses

Design Error

Most people look like this...



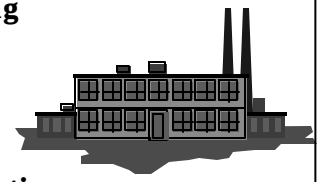
Some designers think that people look like this...



What is Ergonomics?

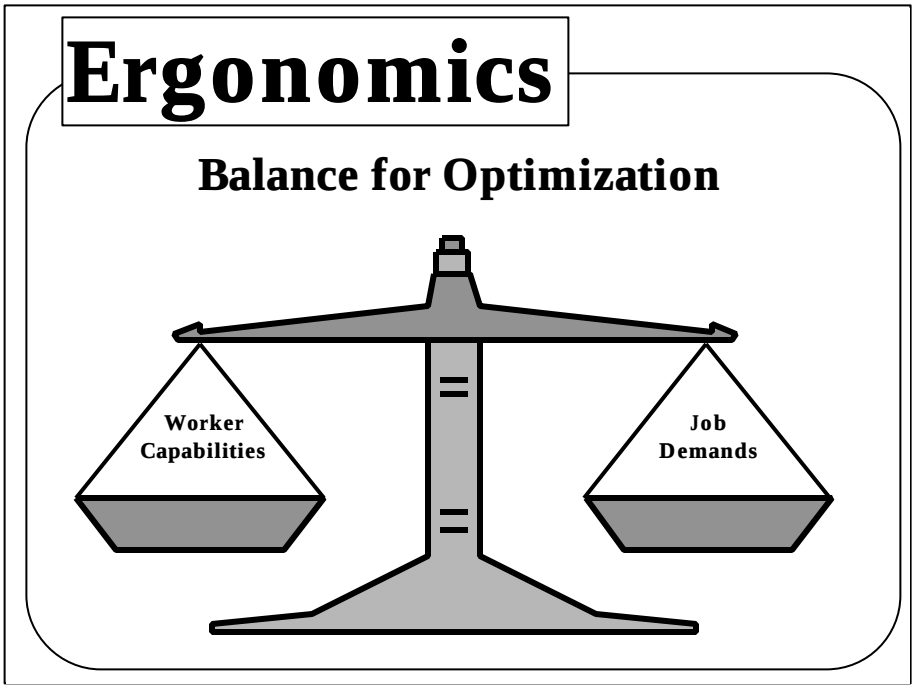
The study of man's relationship with his workplace.

***Fitting the task to the man* rather than forcing him/her to adapt to his working environment.**



***Designing the workplace* to *prevent* occupational injury and illness.**

Discovering the capabilities and limitations of the human body.

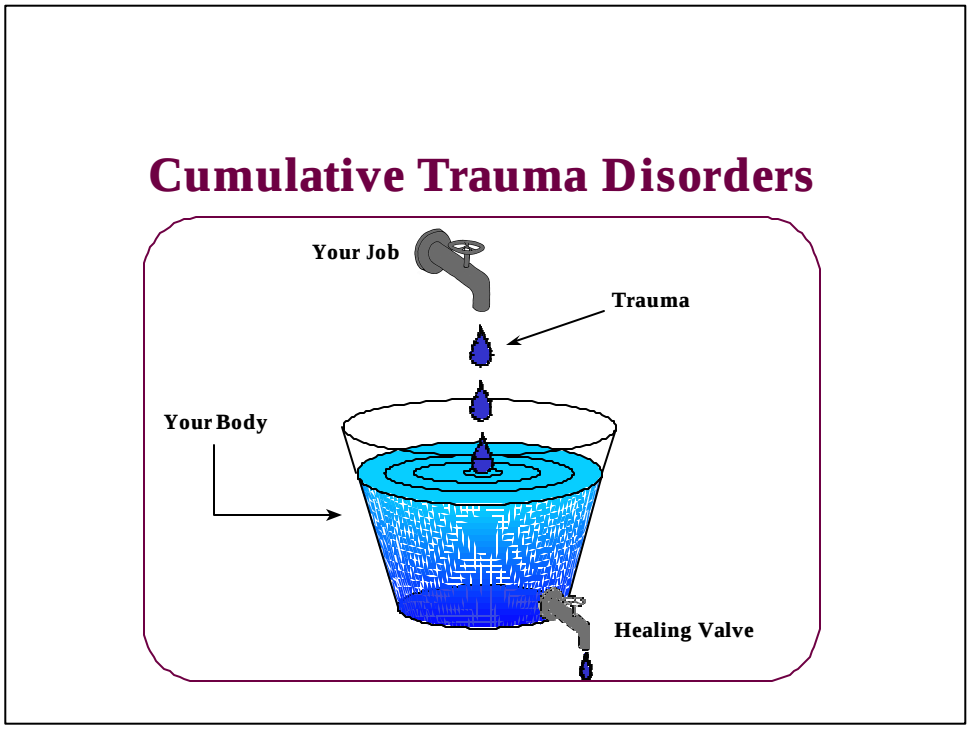

Ergonomics
Balance for Optimization
Worker Capabilities
Job Demands

Ergonomics

CUMULATIVE TRAUMA DISORDERS (CTDs)

Term assigned to identify a group of injuries that classically result from long-term and repeated “wear and tear” on the musculoskeletal system.

- **CUMULATIVE** indicates injuries that develop gradually over time, and result from many repeated stresses on a particular body part.
- **TRAUMA** signifies bodily insult or injury from mechanical stresses.
- **DISORDERS** describes the adverse health effects that arise from chronic exposure to repeated trauma.



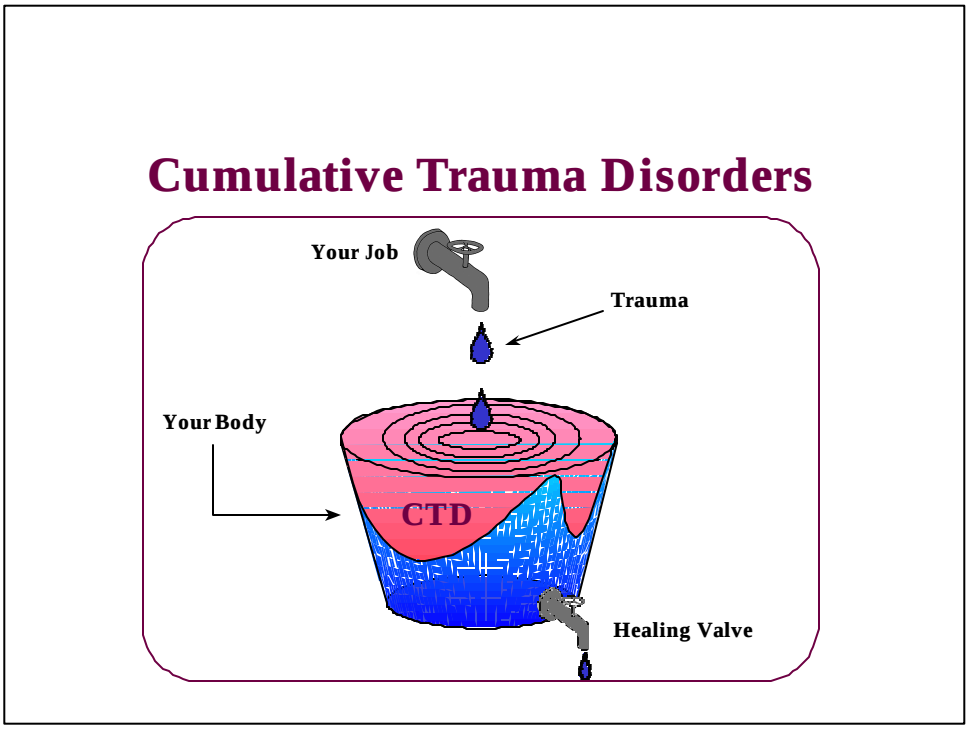
- The Cumulative Trauma Bucket helps to demonstrate why it is so difficult sometimes to predict who will develop a CTD, when a person will develop a CTD, or what will cause a CTD.

- The Bucket represents an individual's body and the amount of stress & strain, and wear & tear that it can handle without undue complications and illness. Everyone has a different size bucket which can also change day to day based on their overall stress level, how much sleep they got the night before, if they have recently been sick, etc.

- The Healing Valve represents the body's ability to heal itself. The rate at which it heals can vary from day to day based on the person's overall health and stress levels.

- The liquid in the bucket represents the Trauma (stress and damage) accumulated by the body which needs to be healed. This Trauma is the result of every day living, work, illness, etc.

- The Job Valve represents the input of Trauma into this system from the job. Realistically we cannot eliminate this input completely. However, it is the only part of this system that an employer can control. Therefore, reduction of the trauma input is the only prevention approach available to control the development of CTDs.



- The reason for taking all practical steps possible to reduce the flow from the Job Valve is that if the Bucket overflows, the employee will develop a Cumulative Trauma Disorder.

- The fact that the volume of the bucket, the heal rate, and other sources of trauma that take place off the job are uncontrollable by the company increases the difficulty of prevention. That is why, in addition to the reduction of the Job Valve's flow rate, education should be provided to the employees to allow them the ability to participate in protecting themselves.

- Also, keep in mind that in many cases reduction in the stress and strain on the body from the Job Valve will not only prevent the condition from worsening but will allow the body to heal and eliminate the CTD.

Ergonomics

Workplace Applications

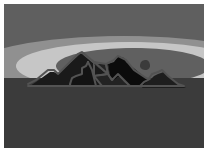
Manual Materials Handling

Cumulative Trauma Disorders (CTDs)

Video Display Terminals (VDTs)

Workplace/Workspace Design

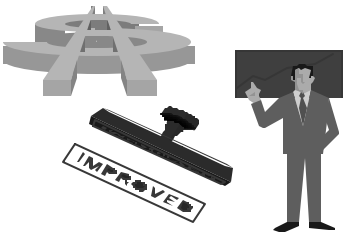
Control & Display Design



Adverse Environmental Conditions

Ergonomics

Win - Win



Production

Quality

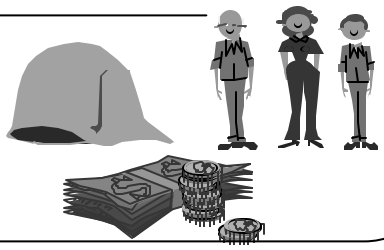
Compliance

Compensation Costs

Healthy Workforce

Careers/Employment

Safety Working Conditions



Ergonomics

OSHAct 1970
"General Duty Clause"

DUTIES

Section 5. (a) Each employer -

(1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees;

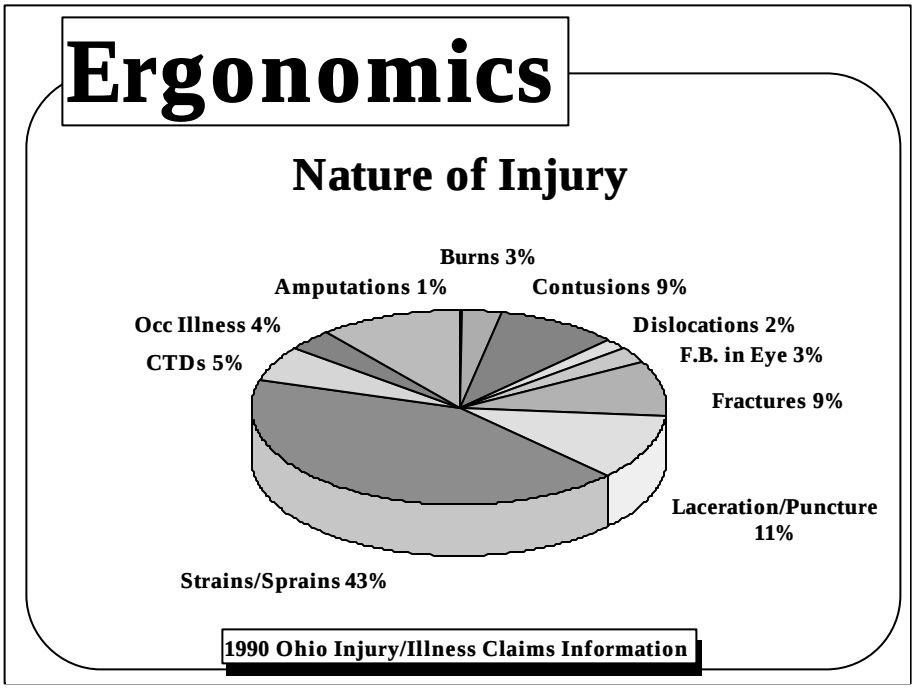
Ergonomics and safety in general is the employers responsibility.

Placing blame on the workers and the unsafe act theory doesn't hold water with OSHA.

Ergonomics

Voluntary Guidelines

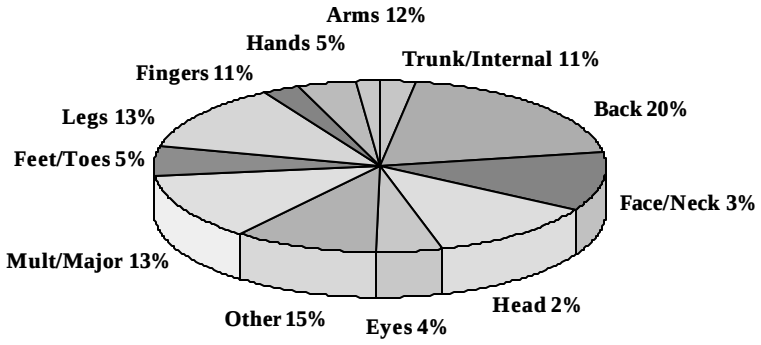
- OSHA Meatpacking Guidelines
- General Industry Guidelines
  (dropped in lieu of standard)
- Food Distribution Warehouses
- ANSI HFS-100/1988; VDTs
- ANSI Z-365; Control of CTDs



What types of injuries can ergonomics have an effect on?

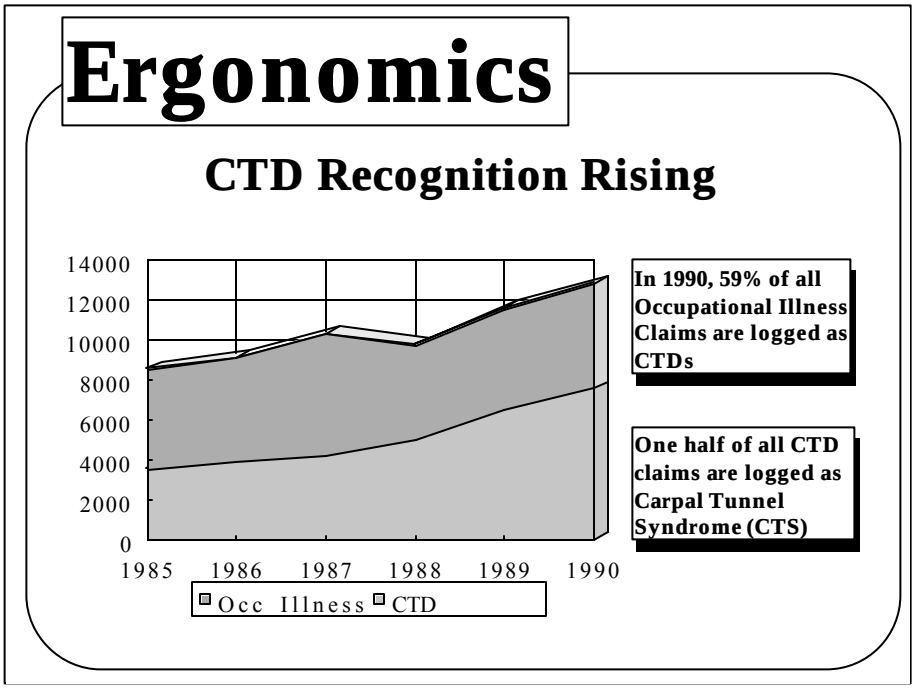
Ergonomics

Part of Body



1990 Ohio Injury/Illness Claims Information

Which parts of the body can ergonomic hazards effect?

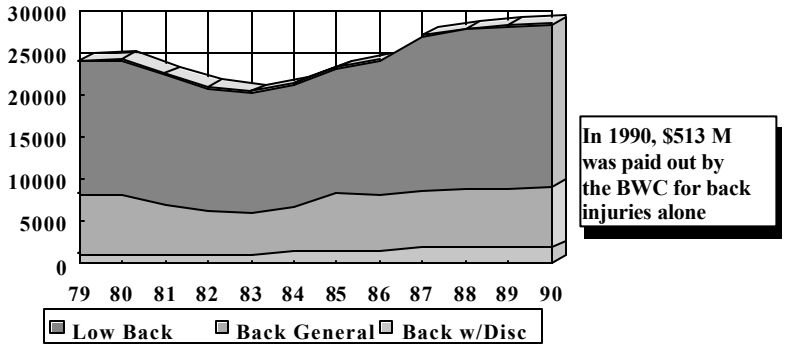


Cumulative Trauma Disorders (CTDs) are on the rise. Why?

- Technology increase
- Aging work force
- Increased Awareness
- Job specialization
- Miniaturization of products

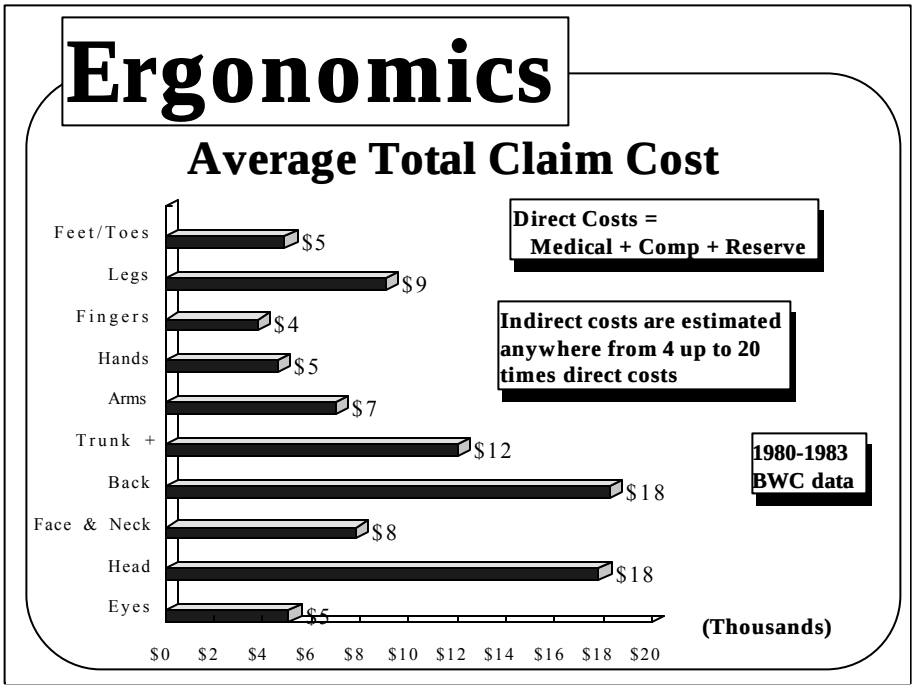
Ergonomics

Ohio Back Injury Claims

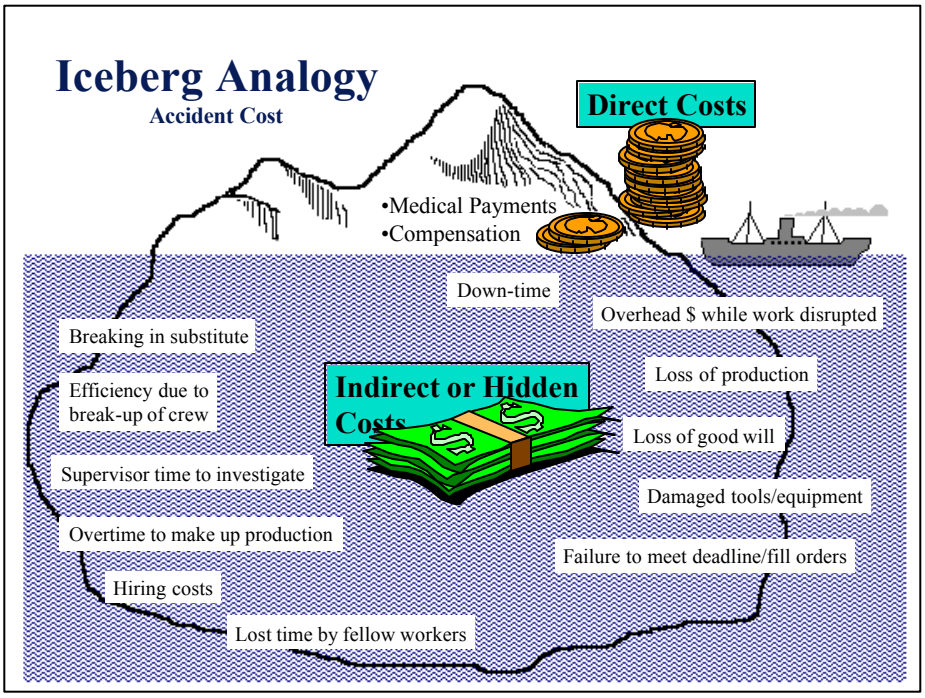


Why the increasing trend?

- Aging work force
- Specialization
- Change in Social Values



How much do injuries cost your company. The above figures are from the early eighties. Imagine what the averages are today! The only numbers that truly matter are the costs that are actually happening to your people and how much they are costing.



Direct costs are typically estimated to equal four to twenty times the indirect costs.

Worksite Analysis
Key Elements

I. Records Analysis

Worksite Analysis

Records Analyses help identify & prioritize jobs to evaluate.

Accident Records	Production Records	Personnel Records	Employer/Employee Survey
OSHA log 200	Seasonal Trends	Turn-over Rate	Symptoms survey
Incidence Rate	Quality Control	Absenteeism	Early reporting mechanism
Prevalence Rate	Model Changes		Suggestion award program
First-aid logs	Bottlenecks		
Accident Invest.			
Workers' Comp.			

Worksite Analysis

Key Elements

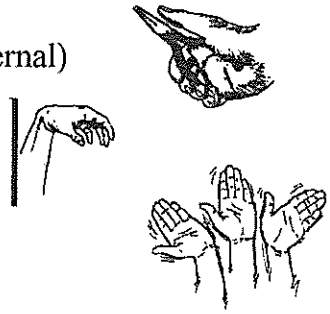
I. Records Analysis

II. Risk Factor Recognition

OCCUPATIONAL RISK FACTORS

Attributes of a job or task that we know increase the probability of developing a musculoskeletal cumulative trauma disorder (CTD)

- **FORCE** (Internal & External)
- **POSTURE**
- **REPETITION**
- **INSUFFICIENT REST**
- **ENVIRONMENTAL**

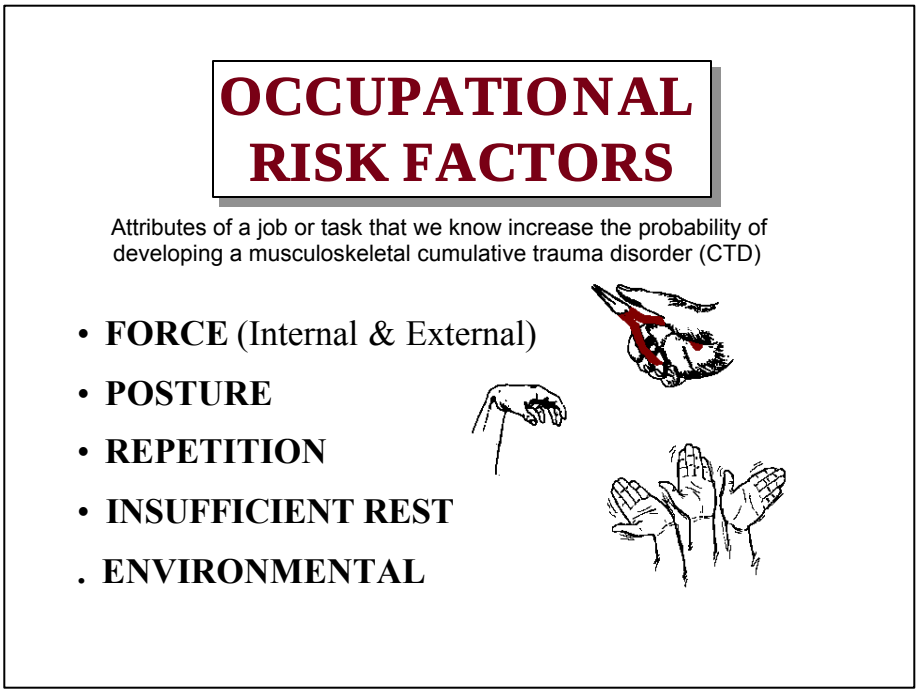


Worksite Analysis

- Force
- Internal: The force exerted by the body to perform an action which requires more muscular recovery time than is available.
- External: The force exerted by the environment (tools, tables, guarding, protective equipment, etc.) on the body, restricting blood flow, nerve conduction, and range of motion.
- Posture
- Any position of the body that deviates from the neutral, relaxed, and mechanically optimal positions.
- Repetition
- Performing the same short duration task or many short duration tasks with similar actions without appropriate rest to the body. Many guidelines are available. For example for the hands one measure of repetitiveness from Univ. of Mich. is

Very Low	=	hands are idle most of the time
Low	=	frequent pauses to wait for equip.
Medium	=	body parts are in steady motion
High	=	hands are in rapid motion
Very High	=	body parts are in constant rapid motion, difficult keeping up

All of these risk factors can cause or promote injuries by themselves, however, when they are combined the risk of injury is multiplied



Worksite Analysis

- Insufficient Rest

- The muscles and other tissues of the body utilize reserve energy and oxygen when a person performs a task. This energy reserve takes longer to build back up than it takes to deplete it and even longer the more depleted the reserves are. Also, the replenishing of the reserves can not happen while the tissue is working.

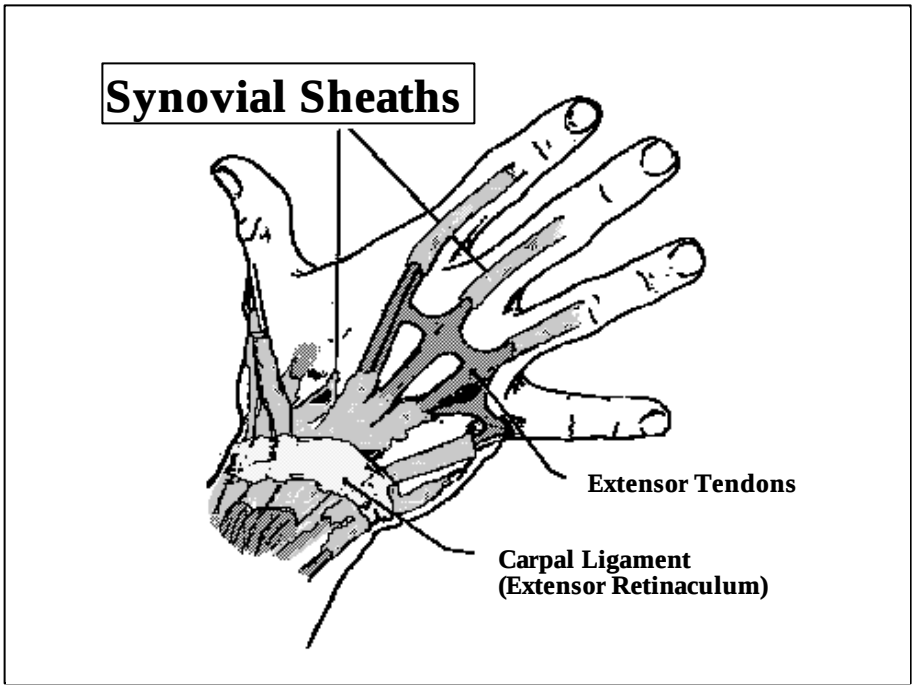
- Environmental

- Cold temperatures decrease the circulation and can increase the effects of an existing nerve disorders.

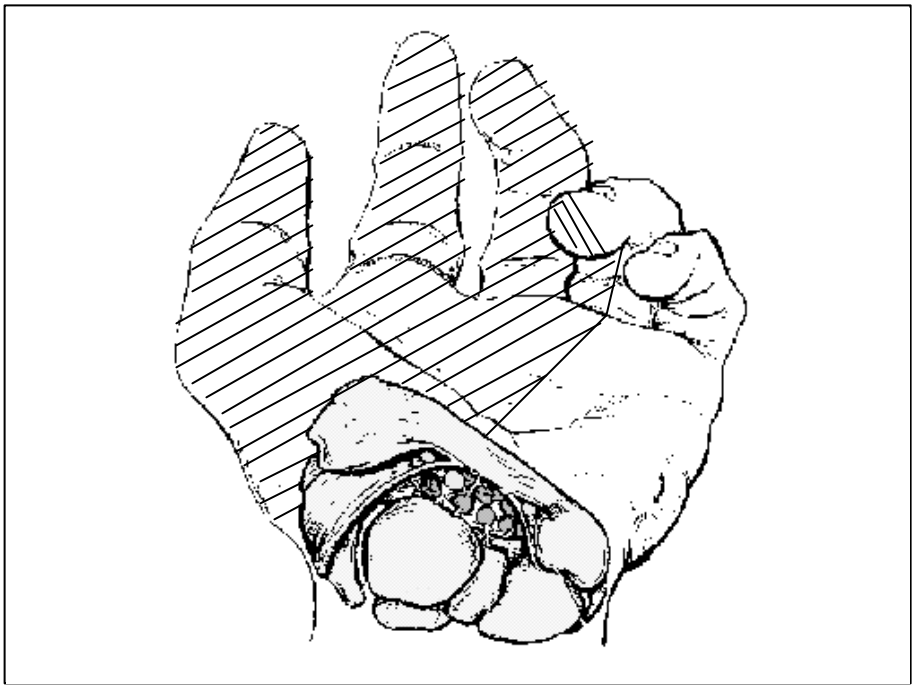
- Hot temperatures tax the circulation system and increase the amount of recovery time for each task.

- Vibration (hand/arm and whole body) aggravates both nerve and tendon disorders, increases required grip exertion with tools, interrupts blood flow, and can cause some damage to the internal organs.

All of these risk factors can cause or promote injuries by themselves, however, when they are combined the risk of injury is multiplied



The Synovial Sheaths surround the tendons in areas of the body, such as the hands, where they are packed tightly together. This sheath can become irritated and swell causing problems such as Tenosynovitis or Ganglion Cysts.

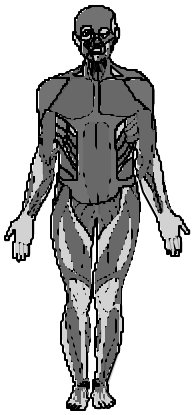


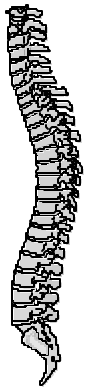
The Carpal Tunnel is made up of the bones of the wrist and a ligament which circles the wrist. Nine tendons and the Median nerve travel through this area.

The various risk factors cause either the tendons or the protective synovial sheaths to swell. This is either called Tendonitis or Tenosynovitis. The problem can be identified at this point and if the cause is determined and modifications made the injury ends here, never reaching Carpal Tunnel Syndrome (CTS).

The injury becomes CTS when the swelling fills this confined space and begins to apply pressure to the nerve. This pressure decreases the transmission of the nerve impulses down the hand. If the pressure is not relieved, permanent damage and loss of function can result.

TWO KINDS OF BACK INJURIES





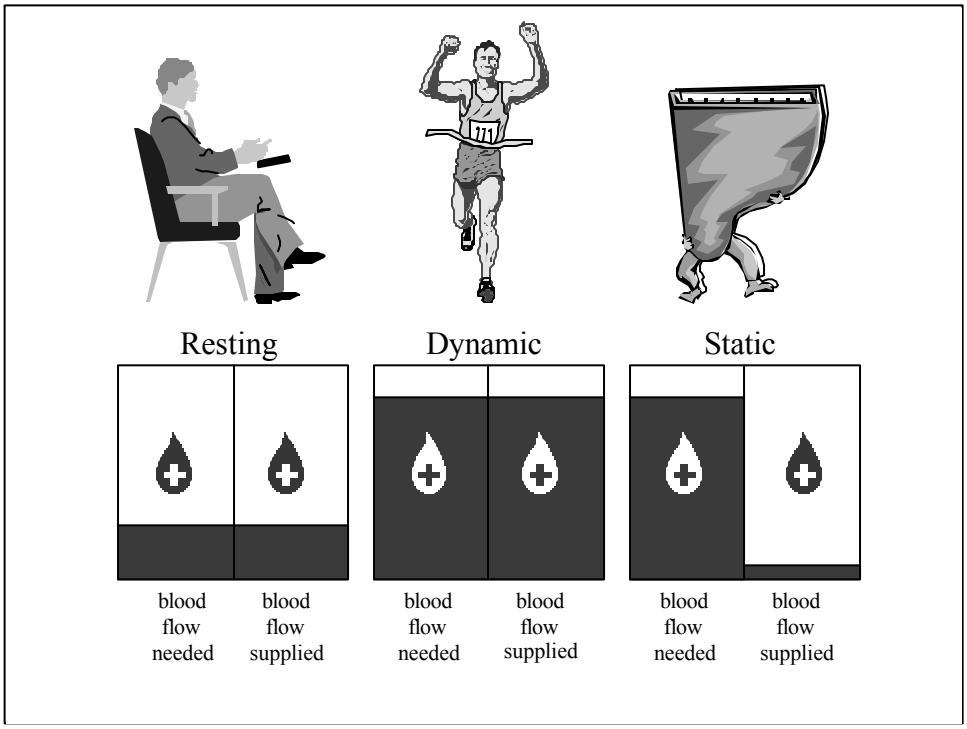
MUSCULAR SPINAL

Work related back injuries fall into two primary categories:

1 Muscular injuries
2 Spinal Column injuries

Of the two we can recover best from muscle injuries. Muscle tissue heals very fast, with the worst normal muscle pull healing within 10 days.

We must understand that a pulled muscle, if the individual is injured while doing the normal duties of his or her job, it is a warning that their back is not strong enough to do the work. This should be taken as a clue by the worker to get some exercise and strengthen the back back up. Proper exercises should be obtained from a doctor, physical therapist, or occupational therapist that knows the individuals back history.

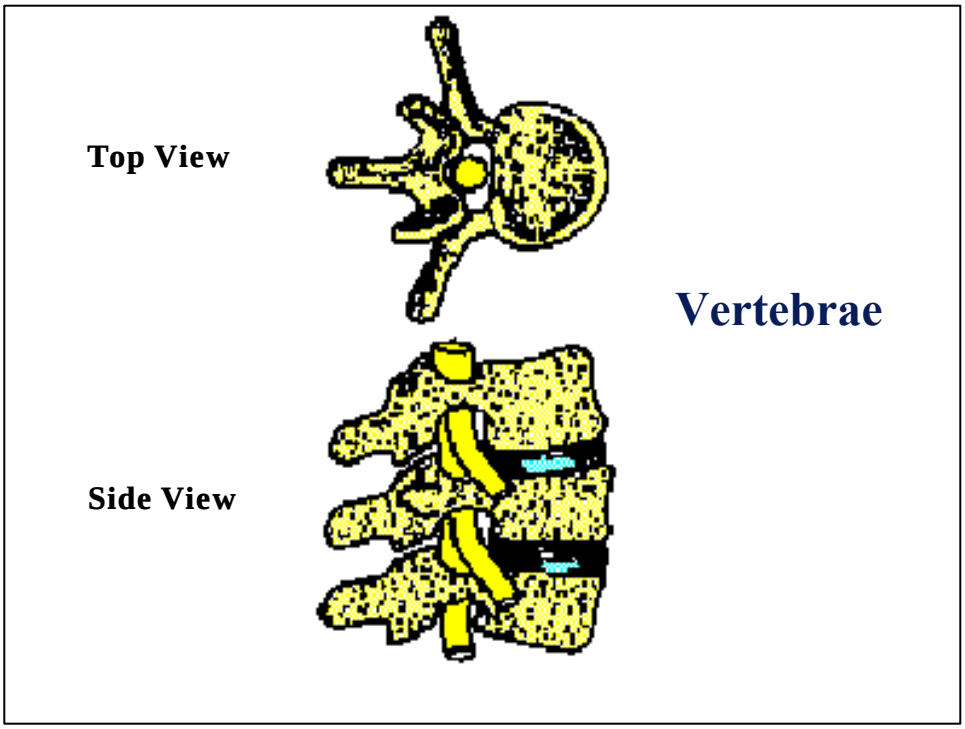


Other than being in good physical shape, the best precaution that an employee can take to reduce the chance of pulling a muscle is to warm-up before performing lifts. When the individual is sitting, driving, on break, or any other activity not demanding a lot of back effort, the muscles are in a resting state of minimal blood flow. The muscles have only enough blood flow to maintain health, not enough to perform heavy lifting.

If the person jumps right into lifting from this state then there is a delay before the blood flow catch up to the demand of dynamic work (work where the muscle is flexing and relaxing repeatedly). During this time the muscle must use reserve energy in the cells to perform the lifting.

The problem with this is that the cells only have a minor amount of reserve power (only enough for 2 or 3 good exertions). The problem develops later when the individual is required to do some period of static work (where the person is made to hold a weight for an extended period of time). With static work the muscle remains flexed, cutting off all blood flow. This is what the muscle was saving that reserve for and if it is not there the muscle quits. It is when the first muscle quits (there are over 200 muscles in the back and torso) that a muscle is pulled.

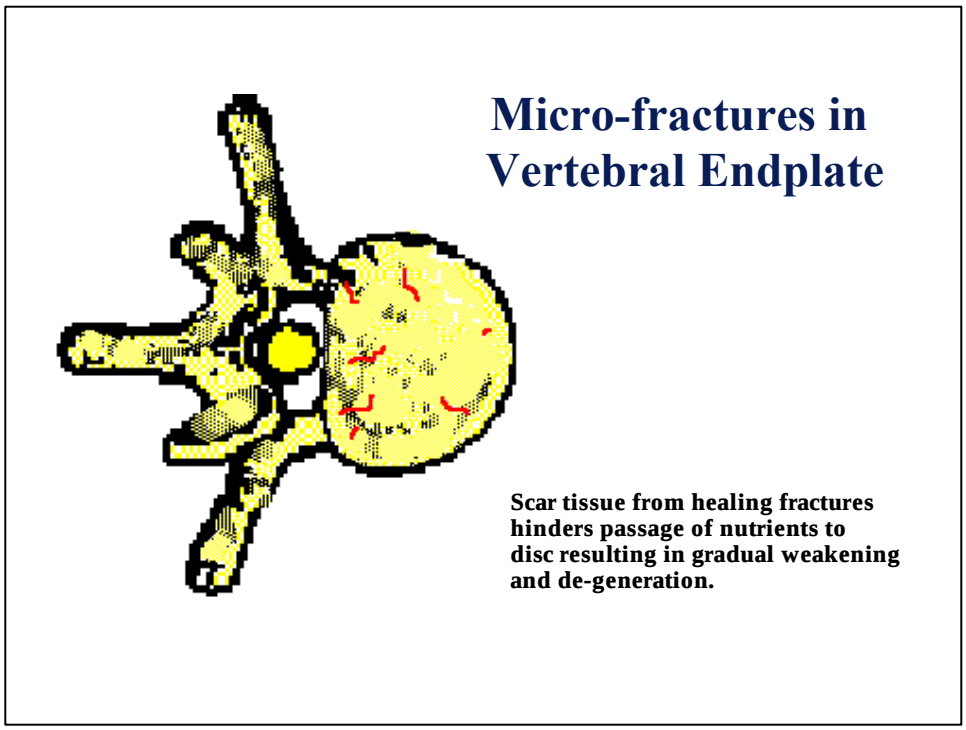
Therefore, stretching of even the most minor kinds, before the individual goes from a resting condition to lifting, will go a long way in preventing the early depletion of the energy. This will mean the energy is there for the unexpected static lifts.



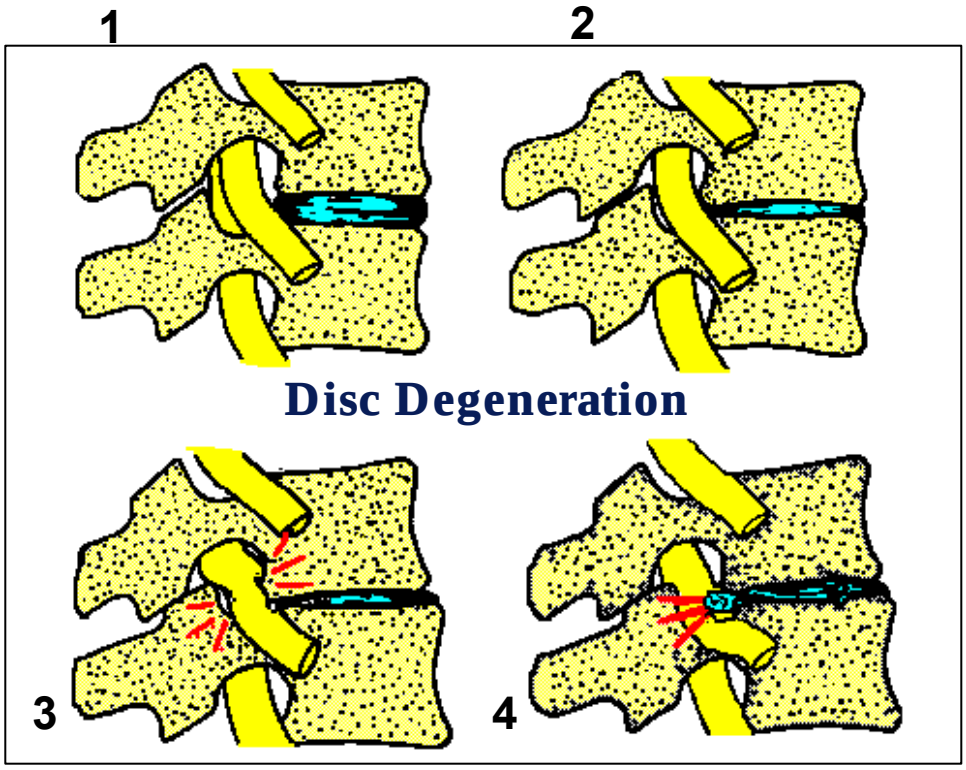
- The three main components of the spine are the vertebrae, spinal cord, and the discs. The weak links in this system are the discs.

- There are two important factors which must be considered when dealing with the spine. The discs have no direct blood supply which means that all nutrients must be transmitted from the surface of the vertebra. Therefore, the discs actually take longer to heal than bones.

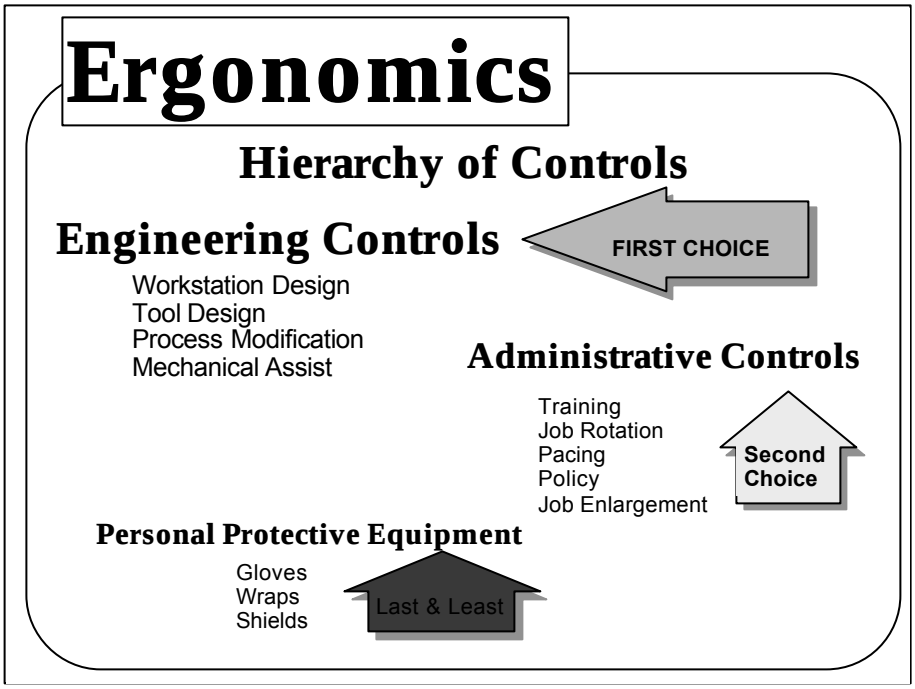
- The second factor is that there are no nerve connections to the discs. This means that when the disc is injured you don't know it. Because you don't know of the injury, you do not make any changes and keep doing what you normally do, making the healing process even slower.



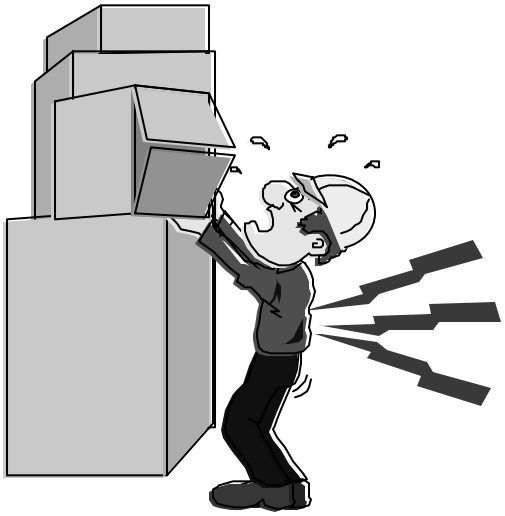
- Because the discs and surrounding bone heal slowly, and are aggravated by sustained activity, scar tissue is formed. This scar tissue impedes the flow of nutrients to the disc. This process causes increasing effects as time progresses.



- 1 A young healthy back
- 2 An older back, say a 90 yr. old who leads a relatively stress free life.
- 3 A “slipped disc”
- 4 A ruptured or herniated disc


Ergonomics
Hierarchy of Controls
Engineering Controls
FIRST CHOICE
Workstation Design
Tool Design
Process Modification
Mechanical Assist
Administrative Controls
Training
Job Rotation
Pacing
Policy
Job Enlargement
Second Choice
Personal Protective Equipment
Gloves
Wraps
Shields
Last & Least

BACK INJURIES

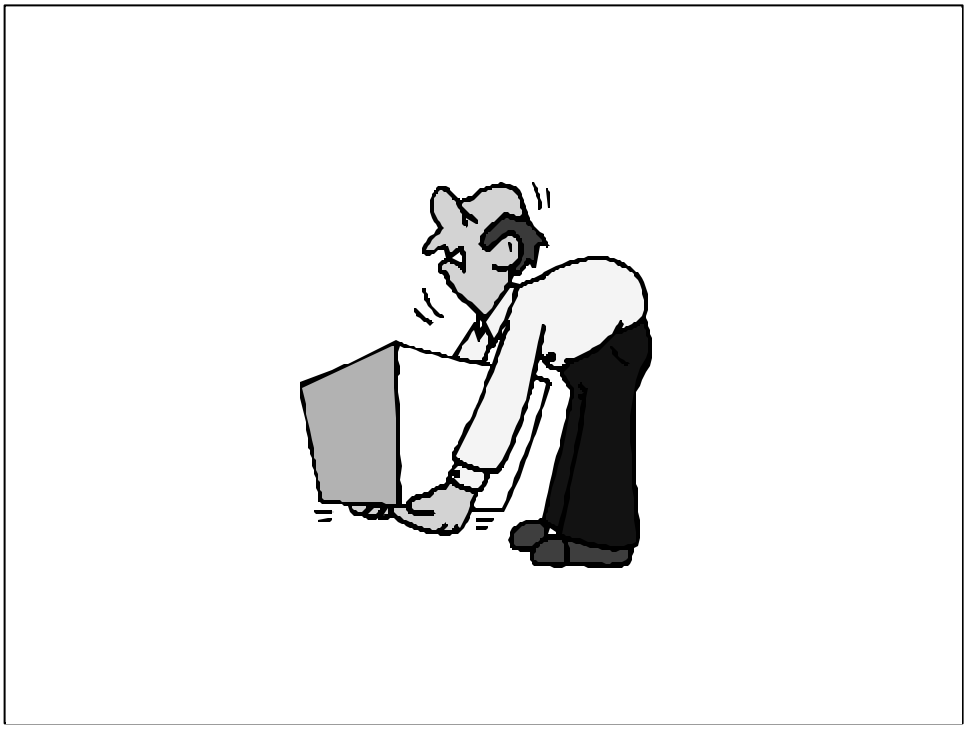


WHAT YOU CAN DO

Now, what can you do to protect yourself. Everyone has heard of the "Proper Way To Lift" right?

!! Bend the knees, Keep your back straight, and Lift with the legs !!

The problem is that it is very difficult to find a situation or job where the worker can consistently do that. That is why we are not going to talk about that. What I am going to do is to give you four elements of lifting or types of actions to avoid. If you cannot do the Proper Lift (which incorporates all four elements) than you can avoid some of the actions that will do the most damage to your back.



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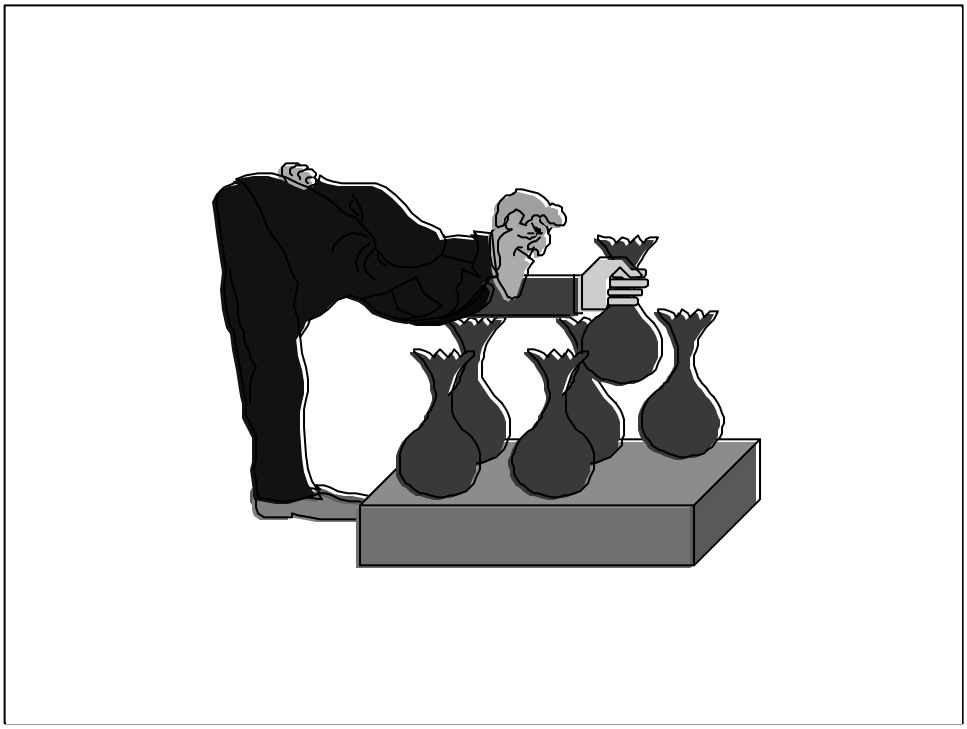


LIFTING RISK #2

Reaching away from the body to lift an item puts tremendous strain on your back. Not only does it get the spine out of alignment like bending, it also magnifies the pressure on the disks in the back by a factor of ten! That means that a little ten pound object feels like a 100 pound box!

Walk around objects, get close to whatever it is you are lifting. This is the easiest risk to avoid if you take your time and pay attention.

LIFTING RISK #3

Twisting the back puts torque on the spine doing localized damage to the disks. It also makes your back use the small muscles on the side of your back to do the lifting. These muscles are very weak and are the most commonly pulled muscles.

You want to use the muscles in the center of the back. To do this you only need to remember to point you toes at whatever it is you are lifting. This will make it so that you will use the best muscles for the job.

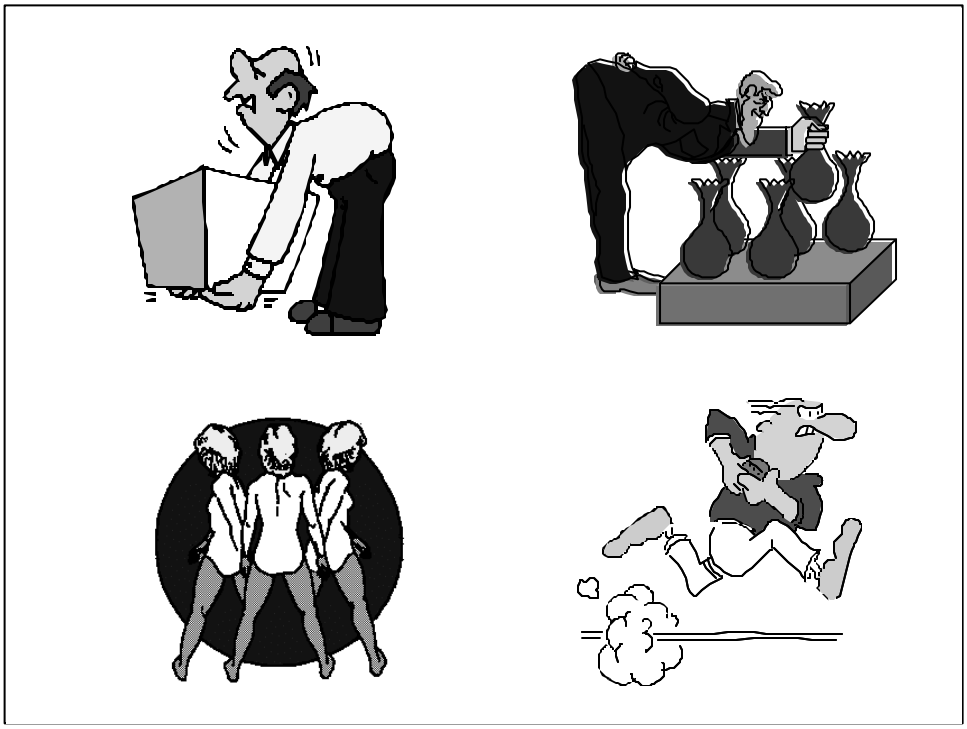
LIFTING RISK #4

High speed or acceleration will also do a lot of damage. The faster you load the weight on the the body the less time the tissue has to react properly. In this case the body reacts like any material.

If you have nylon cord and you are measuring how much force it will take to break it you can load weight on in two ways. You can attach the weight and drop it or you can gently apply the weight so that the cord does not snap taunt quickly. What you will find is that it takes a lot less weight to break the cord when you drop the weight on quickly. Your body is going to react the same way.

If you lift items very quickly (either by catching something or grabbing it and tossing it quickly) you greatly increase your chances of causing an injury.

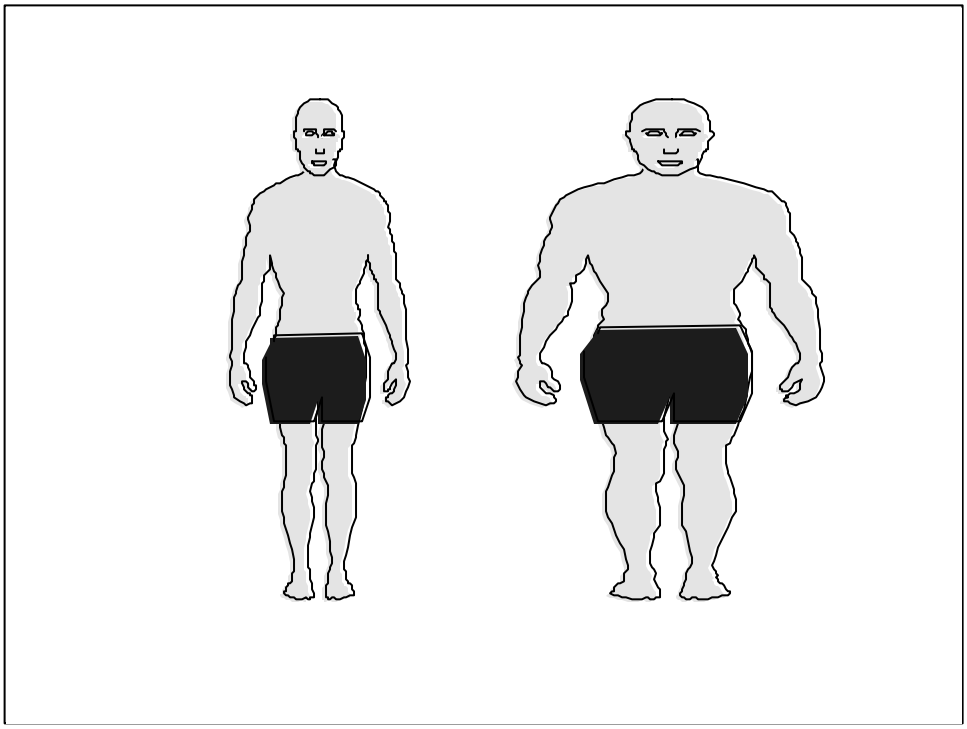
So, slow down and make sure you are in complete control of the move. If it is something that is so heavy you need to get it moving fast to sling it onto a pile or some high point that is a good clue that two people should be performing the lift.



REMEMBER

You don't have to avoid all of these risk factors all of the time to reduce your chances of getting hurt. If you can avoid just 3 or 2 or even only 1 of these factors you will greatly extent the life of your back and reduce the chances of hurting yourself.

It only takes a few seconds before starting a lifting job to look and see if you are going to need to do any of these elements and find a way to avoid them.



These are two twin brothers.

The on e on the left is absolutely not athletic, in fact he has never done anything physical in his life. He's the guy who always gets sand kicked in his face at the beach and can't do anything about it.

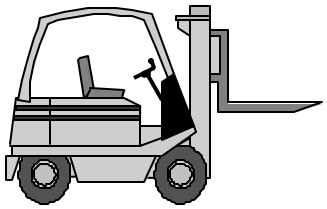
His brother on the right is the complete opposite. He is very athletic, lifts weights, lifts small cars to impress the girls, and is the one usually kicking the sand on the beach.

Of these two, which do you think is more likely to suffer from a serious, debilitating spinal injury in his lifetime?

My money is on the brother on the right. Remember they are twins. If you look at an x-ray of their backs they are identical. Therefore, he is going to wear it down much much faster, not feeling any of the damage until it is two late.

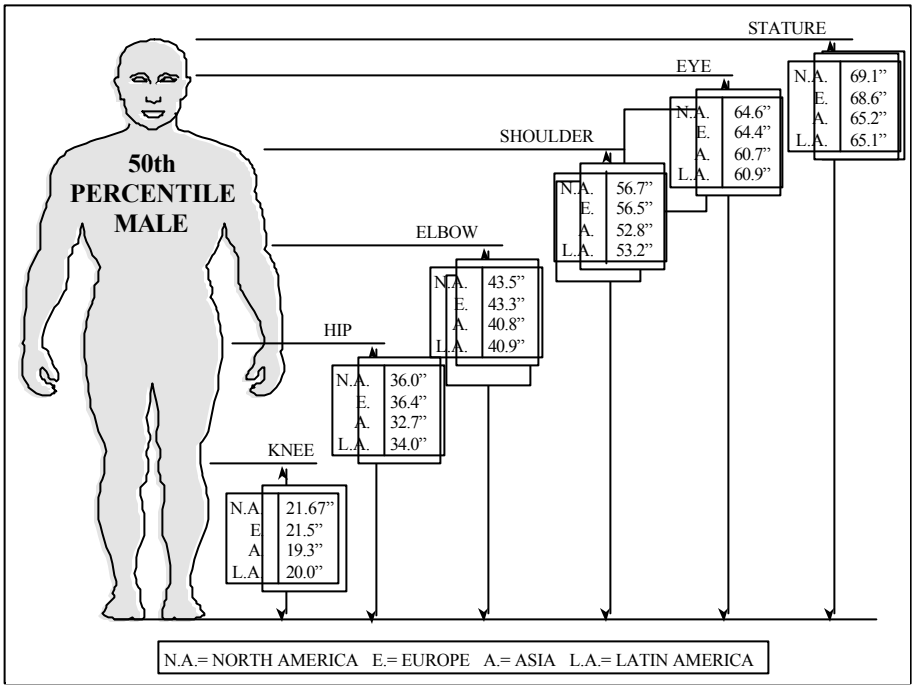
It is important to be strong and fit and be capable of lifting what you need. But, you have to play it smart. Just because you can lift something in a certain way and not feel any pain does not mean you are not hurting your back. That is why it will pay in the long run to lift smart and avoid those risk factors.

MAN VS. MACHINE

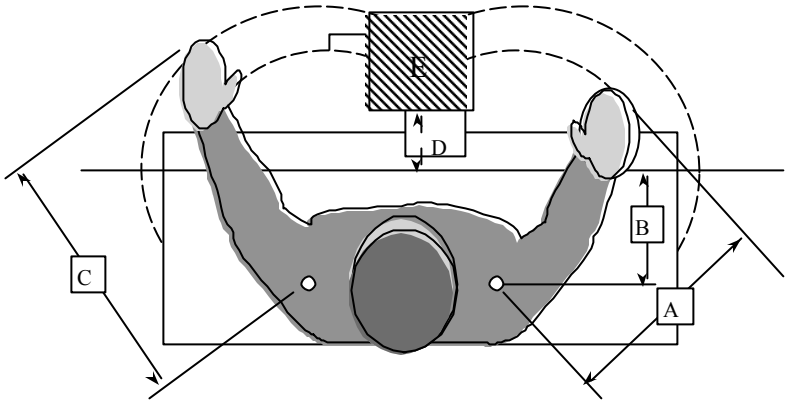


- DECISION MAKING
- LOW REPETITION ACTIVITIES
- LOW FORCE APPLICATION
- DELICATE FORCE APPLICATION

- TAKING INSTRUCTION
- HIGH REPETITION ACTIVITIES
- HIGH FORCE APPLICATION
- HAZARDOUS ENVIRONMENTS


50th
PERCENTILE
MALE
STATURE
N.A. 69.1”
E. 68.6”
A. 65.2”
L.A. 65.1”
EYE
N.A. 64.6”
E. 64.4”
A. 60.7”
L.A. 60.9”
SHOULDER
N.A. 56.7”
E. 56.5”
A. 52.8”
L.A. 53.2”
ELBOW
N.A. 43.5”
E. 43.3”
A. 40.8”
L.A. 40.9”
HIP
N.A. 36.0”
E. 36.4”
A. 32.7”
L.A. 34.0”
KNEE
N.A 21.67”
E 21.5”
A 19.3”
L.A 20.0”
N.A.= NORTH AMERICA E.= EUROPE A.= ASIA L.A.= LATIN AMERICA

Horizontal Work Envelope



A-Normal reach radius	Max = 15”
B-Sitting/Standing distance	Max = 9”
C-Extended reach radius	Max = 22”
D-Beginning work distance	Ideal = 4”
E-Optimum work area	10” x 10”

SIT OR STAND?

Type of Task	First Choice	Second Choice
Lifting more than 11lbs	Standing	Sit-Standing
Work below elbow height (e.g. packaging or assembly)	Standing	Sit-Standing
Extended horizontal reaching	Standing	Sit-Standing
Light assembly with repetitive movements	Sitting	Sit-Standing
Fine manipulation and precision tasks	Sitting	Sit-Standing
visual inspection and monitoring	Sitting	Sit-Standing
Frequent moving around	Sit-Standing	Standing

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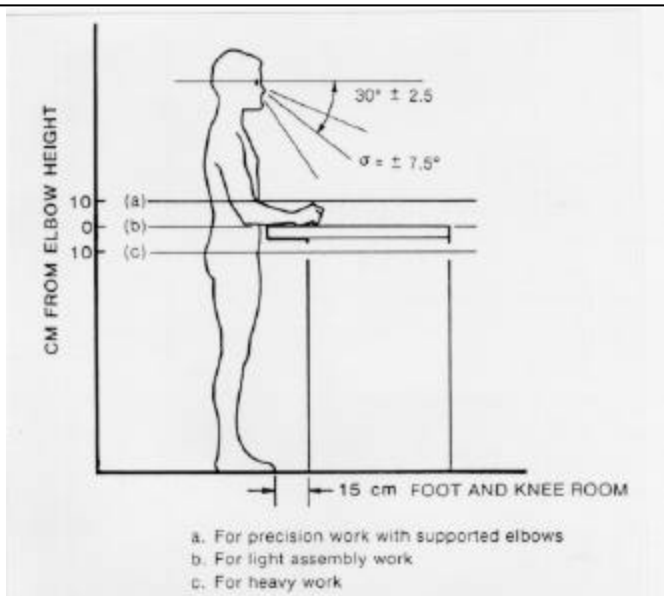
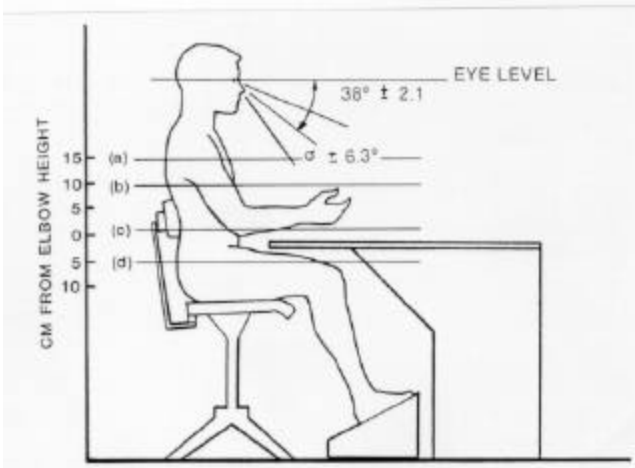
#WS-4010 X



a. For precision work with supported elbows
b. For light assembly work
c. For heavy work

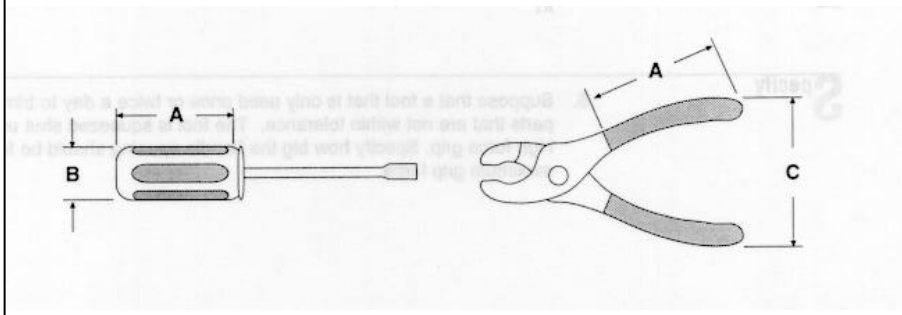
Figure 31b. Design specifications for correct height of work surface for standing operator (adapted from Ayoub, 1973).[4]



a. For fine work, exacting visual tasks
b. For precision work, e.g., mechanical assembly work
c. For writing or light assembly work
d. Coarse or medium manual work such as packaging

Figure 31a. Design specifications for correct height of work surface for seated operator (adapted from Ayoub, 1973).[4]

Manual Tool Dimensions



A ⩾4” B = (for power grips) 1.5” C = 3” to 3.5”
(for precision operations) .45”

Industrial Hygiene for Power Presses

HAZARD COMMUNICATION (HAZCOM)

- **Purpose:** To insure all employees are aware of the hazards from the chemicals they are in contact with. Examples of jobs requiring a HAZCOM program include manufacturing, warehouse operations, janitorial, laboratory, etc.

- **OSHA Standard:**
  - 29 CFR 1910.1200 (Industrial)
  - 29 CFR 1926.59 (Construction)

- **Written Program**

  - Identify responsibilities
    - Who is responsible for training
    - Who is responsible for ordering/maintaining MSDSs

  - Container labeling
    - Legible
    - Chemical name
    - Target organs
    - Manufacturer's name and address

  - Material Safety Data Sheets (MSDSs)
    - Where located
    - How to obtain

  - Employee training
    - Frequency
    - Who conducts training
    - Who needs to be trained

  - Non-routine tasks
    - Unusual operations
    - Once-a-year operations

  - Piping systems
    - Diagrams
    - Contents
    - Shut-off valves

HAZARD COMMUNICATION (HAZCOM)

(continued)

- Contractors
  - Notification procedures
  - Training contractors of company hazards
  - Training company employees of contractor hazards

- Chemical inventory
  - What company has on hand/quantity
  - Where located

- **Training**

  - Who needs to be trained
    - New hire orientation
    - Transfers
    - Temporary hires
    - New operations
    - New products
    - After accidents/incidents

  - Overview of HAZCOM requirements

  - Chemicals present in workplace

  - Location/availability of written program

  - Health effects of chemicals

  - Identification of chemicals in workplace

  - How to lessen or prevent exposures
    (PPE, work practices)

  - Engineering controls the company is using

  - Emergency procedures if exposed to chemicals

  - MSDSs
    - Location
    - How to read
    - Labeling requirements

HAZARD COMMUNICATION (HAZCOM)

(continued)

Related OCOSH Courses

- IHY 212: "Hazard Communication"
- IHY 317: "Hazardous Waste Operations and Emergency Response - Awareness"
- IHY 335: "Hazardous Waste Operations and Emergency Response- Operations"
- IHY 318: "Hazardous Waste Operations and Emergency Response - Technician"
- IHY 319: "Hazardous Waste Operations and Emergency Response - Refresher"

CONFINED SPACES

- **Purpose:** To identify locations within a facility that may pose a hazard to any employee entering them and to develop a formalized plan to address how employees will enter these areas

- **OSHA Standard:** 29 CFR 1910.146

- Difference between confined space and permit-required confined space

    - **Confined Space**
        - Is large enough so an employee can bodily enter and perform work
        - Has limited or restricted means of entry or exit
        - Is not designed for continuous human occupancy

    - **Permit-Required Confined Space**
        - Contains, or has the potential to contain, hazardous atmosphere
        - Contains material that has the potential to engulf entrant (i.e., grain silo)
        - Has internal configuration such that an entrant could become trapped or asphyxiated
        - Contains any other recognized serious health or safety hazard (noise, moving parts, electrical, poor visibility)

- **Workplace Evaluation:** Employer shall evaluate facility to determine if any spaces are permit-required. If so, employer shall:
    - Inform employees by posting signs, or other methods, of the existence, location and danger
    - If employees ARE NOT to enter permit-confined spaces, then employer shall take effective measures to prevent entry
    - If employees are to enter, then employer shall develop a written confined space entry program

- **Written Program**
    - Permit
    - Measures to prevent unauthorized entry
    - Means to identify and evaluate hazards before entry
    - Procedures for safe operations
    - Provision of equipment (testing and monitoring, communication, PPE, rescue)
    - Designate employees by role (i.e., entrants, attendants, entry supervisors, atmosphere monitoring) and describe training for each
    - Procedures for summoning rescue personnel

CONFINED SPACES

(continued)

- **Contractor requirements:** Employer must:
  - Inform contractor that space is a permit-required confined space and contractor must comply with the permit-required entry program
  - Tell the contractor why the space is permit-required
  - Apprise the contractor of procedures that the employer has implemented
  - Contractor must inform employer of procedures contractor will use

- **Training**
  - Training shall establish employee efficiency
  - Certification must be available for inspection

    - **Authorized entrants**
      - Know hazards
      - Use equipment
      - Communication with attendant
      - Entry/exit procedures

    - **Attendants**
      - Know hazards
      - Know effects of exposures
      - Know who is authorized to enter
      - Communication procedures
      - Emergency rescue procedures

    - **Entry Supervisor**
      - Know hazards
      - Use of the permit system
      - Know when to terminate entry
      - Verify rescue procedures

    - **Rescue and Emergency Services (if on-site)**
      - Rescue procedures/equipment
      - One member must be certified in CPR/First Aid
      - Practice once every 12 months

Related OCOSH Courses

IHY 214: "Confined Space Assessment and Work"

HEARING CONSERVATION

- **Purpose:** To protect employees from effects of hazardous noise.

- **OSHA Standard:** 29 CFR 1910.95

- **Program Elements**

  - Employee monitoring (Need to know what the sound levels are)

  - Audiometric monitoring
    - Baseline
    - Annual
    - Threshold shifts

  - Hearing protectors
    - Identify where/when to wear
    - Should be used as last resort

  - Recordkeeping
    - Noise measurements: 2 years
    - Audiometric records: duration of employment (note: OSHA requires employer to keep medical records for duration of employment plus 30 years)

- **Training**
  - Conducted annually
  - Effects of hazardous noise
  - Purpose of hearing protectors, advantages and disadvantages of various types
  - Instructions of selection, fitting, use, and care

  Purpose of audiometric testing and explanation of results

Related OCOSH Courses

- IHY 204: "Basic Industrial Noise and Hearing Conservation"

Metalworking/Machining Fluids

Millions of workers engaged in the manufacture of automobiles, farm equipment, aircraft, heavy machinery, and other hardware are exposed to machining fluids. Occupational exposure to these fluids has resulted in various cancers, respiratory diseases, and skin problems. There is evidence of impaired health at levels well below the Permissible Exposure Limit (PEL) for oil mists (5 mg/m3 time weighted average (TWA)) and the "nuisance dust" exposure limits applicable to all other machining fluids (15 mg/m3 TWA for total particulate). In order to improve worker protection, OSHA is designating metalworking/machining fluid exposure as a priority for comprehensive rulemaking. OSHA intends to work together with business, labor and the professional community to develop this rule in a consensual manner.

Hazard Description

Machining or metalworking fluids are in widespread, high volume use throughout the manufacturing industries for their coolant, lubricant, and corrosion resistant properties during operations such as metal grinding, boring, drilling, and turning. These fluids are complex mixtures of oils, detergents, surfactants, biocides, lubricants, anti-corrosive agents, and other potentially toxic ingredients.

There is an extensive body of scientific literature which demonstrates that worker exposure to machining fluids of all types is strongly associated with cancer (several respiratory and digestive sites) and non-malignant respiratory effects (occupational asthma). Because the usage patterns, chemistry and toxicology of these materials is very complicated, it has been difficult to determine precise links between specific fluid formulations or specific ingredients with specific health effects in exposed workers. The risks for various cancers are dose-related to all major types of machining fluids, but the evidence about cancer excesses is based on information about past exposures which may differ qualitatively and quantitatively from current exposures. It is clear, however, that the risk of occupational asthma and related respiratory conditions is related to current exposure levels and current materials.

Cancer

More than a dozen recent epidemiological studies have reported statistically significant increases in one or more cancer sites, such as esophagus (1), stomach (2-4), pancreas (4-8), larynx (9, 10), colon (1), rectum (8, 9) and other cancers (1-13). In these studies, for many groups of workers, the risk has been two to ten times the expected rate.

There is strong epidemiologic evidence that exposures to all types of machining fluids cause substantially elevated risk of cancer. The most comprehensive cohort mortality study published provides strong evidence that exposure to soluble or synthetic fluids in grinding operations is associated with esophageal and pancreatic cancer; that straight fluids are associated with rectal cancer; and that synthetic fluids are associated with pancreatic and possibly colon cancer. (5, 8) For each cancer site the risk increases as the duration of exposure increases. For example, the risk of esophageal cancer reaches 12-fold with more than one year exposure to grinding. The risk for colon and pancreatic cancer reach 2- to 3-fold after three years of exposure to synthetic machining fluids. The risk for rectal cancer is 3-fold after one year of exposure to straight machining fluids.

Respiratory Effects

Occupational respiratory illnesses due to exposure to machining fluids include respiratory irritation, bronchitis, lipoid pneumonia, hypersensitivity pneumonitis, and extrinsic asthma. (12, 13, 15, 16) In particular, evidence from clinical studies and medical surveillance in both the U.S. and U.K. document that occupational asthma is caused by exposure to several different types of machining fluids (17-20). Epidemiologic evidence also suggests that exposure to machining fluids is related to both asthma incidence (21, 22) and asthma mortality (6). Overall the evidence indicates that risk of asthma exists in several different settings with different types of fluids.

Acute loss of forced expiratory lung volume (FEV1) of greater than 5% across the workshift has been associated with exposure to each of the major types of machining fluids in three independent cross-sectional studies (15, 23, 24). These lung function changes are correlated with occupational asthma. Loss of lung function became worse as exposures increased, supporting the conclusion that exposures below 1.0 mg/m3 total particulate (and possibly below 0.5 mg/m3) cause increased risk.

Workers experience skin contact with machining fluids as a result of splashing, dripping or leaking. Skin problems include irritation and allergic contact dermatitis (16). They also inhale mists and aerosols of these fluids generated during high speed, high friction, metalworking operations. There are many well known effective techniques available to reduce worker exposure, including protective clothing, mechanical splash guards and enclosures, local exhaust ventilation, preventive maintenance programs, and others.

Current Status

OSHA has permissible exposure limits (PEL) of 5 mg/m3 as an 8-hour TWA for mineral oil mists, and 15 mg/m3 TWA (total particulate) and 5 mg/m3 TWA (respirable fraction) for "nuisance dusts" (also called "particulates not otherwise regulated"), but there are no specific standards for machining fluids and most of their ingredients. Toxic effects have been reported among workers exposed to mineral oil mists below the current PELs, as noted above. The OSHA inspection data system (IMIS) contains more than 1,400 samples for airborne oil mist collected over the past two decades. In over 500 samples collected from 1990-1994 approximately 60% were below or equal to 0.5 mg/m3 and approximately 25% were greater than 1.0 mg/m3. The trend has been downward. For example, from 1980-1984 more than 50% of the samples were greater than 1.0 mg/m3.

The International Union, United Automobile, Aerospace and Agricultural Implement Workers of America (UAW) petitioned OSHA in December 1993 for an Emergency Temporary Standard (ETS) to lower the PEL for oil mists to 0.5 mg/m3 of total particulate. The UAW also petitioned the Environmental Protection Agency (EPA) for a S4 Test Rule under the Toxic Substances Control Act (TSCA). OSHA denied the UAW's request for an emergency standard but indicated that it would continue to consider a permanent standard.

There have been private sector recommendations, as well, to lower the permissible exposure limits. For example, the authors of the largest ongoing epidemiologic study of workers exposed to machining fluids, recommended to the UAW/General Motors Occupational Health Advisory Board that machining fluid exposures be kept below 0.5 mg/m3 total particulate: "Results from both the respiratory morbidity study and the mortality study suggest associations between machining fluid exposure and respiratory disease or cancer that are consistent with an interpretation of causality. Our initial dose-response analyses suggest that an exposure level of 0.5 mg/m3 would minimize any adverse health effect of worker exposure to machining fluids." (1)

The National Institute for Occupational Safety and Health (NIOSH) issued a draft NIOSH Special Hazard Review of the Metalworking Industry in May 1994; work is currently underway to complete the document. OSHA, NIOSH, and EPA are working on a joint Hazard Alert on machining fluids, planned for completion after the NIOSH Special Hazard Review.

In November 1994, NIOSH sponsored a 2-day information gathering meeting with representatives of government, labor, fluid manufacturers, and fluid users. In November 1995 over 700 representatives of business, labor and academia participated in a four day symposium on The Industrial Metalworking Environment: Assessment and Control, sponsored by the American Automobile Manufacturers

Association (AAMA) in cooperation with the Independent Lubricant Manufacturers Association, the United Automobile Workers, OSHA, NIOSH and EPA. There was substantial evidence and viewpoints presented which supported the conclusion that existing standards are inadequate to protect worker health, that substantially lower exposures are feasible, and that the private sector is interested in working cooperatively with government on strategies to achieve lower exposures.

EPA is screening 95 metalworking fluid chemicals referred to EPA by NIOSH for the selection of possible testing candidates under Section 4 of TSCA.

Rationale

Machining fluids meet the criteria for designation as an OSHA priority. There is a very large number of workers exposed to machining fluids; the health effects are serious; there is extensive scientific evidence of risk; and there are available control methods for reducing exposure. There is substantial evidence of serious health effects at exposure levels below existing relevant standards. There is also considerable interest within both business and labor in working with government agencies to find ways to reduce worker exposure. OSHA is designating metalworking/machining fluid exposure as a priority for comprehensive rulemaking. OSHA intends to work together with business, labor and the professional community to develop this rule in a consensual manner.

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Operator Safety–Dermatitis

Cutting and grinding fluids designed with the operator in mind will be nontoxic and pleasant to use in addition to being effective coolants and lubricants. This means fluids that are clean to work with, have a mild, nonoffensive odor and are gentle to the skin. In discussing operator safety and satisfaction, dermatitis is often the first concern that comes to mind.

Occupational dermatoses is a term used to describe any abnormality of the skin induced or aggravated by the work environment. Dermatitis is somewhat more specific in that it refers only to inflammation or irritation of the skin. Occupational dermatitis is further categorized by type as listed below:

Primary irritation is a result of a direct action on the skin at the site of contact, at the time of contact or shortly thereafter.

Sensitization is the result of an allergic reaction (immune system response) to a given substance. Initial contact with the material may cause no irritation but will trigger a buildup of sensitivity to the material over a period of time. Once sensitized, even the smallest amount of the substance can result in a severe reaction which is not necessarily limited to the site of contact.

Photosensitization is similar to sensitization except that the presence of light is required to activate the sensitizer.

The pH of the human skin varies from one area to another, but in general, is slightly on the acid side of the scale at approximately 6.8. The skin also has a protective layer of natural oils which retards moisture evaporation and acts as a mechanical shield. Consequently, anything that tends to remove the natural oils from the skin or alter its pH balance may produce dermatitis. There are four possible mechanisms by which dermatitis may be induced:

1. Mechanical injury; i.e., friction, pressure or trauma, including abrasion.
2. Chemical attack; i.e., precipitation of protein by acid.
3. Physical agents; i.e., excessive heat or cold, radiation or electricity.
4. Biological agents; i.e., insect bites or plants such as poison ivy, oak and sumac.

The following discussion highlights some of the more common causes of dermatitis in the metalworking environment. By no means does this discussion represent an exhaustive study of every possible cause of skin irritation to machine tool operators; but, based on years of actual field experience, does review those most often encountered.

PREDISPOSING FACTORS

Firstly, we should consider certain elements that tend to increase the chances for the development of dermatitis. These indirect or predisposing factors include race, age, sex, skin texture, perspiration characteristics, season of the year, cleanliness, allergy, general health and diet.

RACIAL CHARACTERISTICS

In general, light complexioned people such as blondes and redheads tend to have more sensitive skin than darker skinned individuals. This is due mainly to the amount and type of pigmentation in the skin.

AGE

Young workers seem to develop dermatitis more frequently than veteran workers. This is sometimes due to the skin of young workers not yet having adjusted to the new work environment, whereas veteran workers may have become acclimated to the workplace and thus may have skin that is more tolerant. Additionally, the frequency of dermatitis in young workers may be attributed in part to their frequent disregard for exercising caution when handling potentially injurious materials.

SEX

Women tend to have drier, less oily skin than men. This can translate into a higher sensitivity to many irritants, particularly solvents and detergents. Despite this fact women tend to have fewer skin problems. This may be due, in part, to their being more conscientious in their cleaning habits or to their willingness to report and obtain treatment for irritations when they first occur.

SKIN TEXTURE

Individuals with naturally dry skin may be more susceptible to the action of solvents and detergents than those with oily skin. On the other hand, those with oily skin may be more susceptible to folliculitis or acne-type conditions caused by oils and similar materials.

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PERSPIRATION

Although perspiration is one of the body's natural defense mechanisms, it may actually serve to initiate or intensify the effect of an irritant on the skin. For example, perspiration on the hands may draw a material out of the lining of gloves that will irritate the skin. Some materials may be irritants only when in solution, such as soda ash. Therefore, those individuals who perspire excessively could be more susceptible to skin irritation of this nature.

SEASONAL

Hot, humid weather usually results in increased perspiration with the associated problems noted above. Also, as the temperature increases, operators tend to wear less clothing, thus exposing more skin area to potential irritants. Warm weather also allows for increased exposure to sunlight, poison plants, insects, etc., all with potential effects on the skin.

Alternately, winter introduces cold, dry air which can cause chaffing of the skin. In addition, the use of heated air which is low in relative humidity causes the skin to lose moisture.

CLEANLINESS

Both personal hygiene and cleanliness of the work environment can have significant impacts on the condition of the skin. Keeping the skin free of potentially harmful materials is the most effective way of preventing dermatitis.

ALLERGY

For genetic reasons, some people develop allergies or sensitivities to some substances. This can occur with any material and quite frequently manifests itself partly or wholly as a skin rash or irritation. The potential for developing allergies to metalworking fluids is comparable to that of the cosmetic industry; very small.

HEALTH

General ill health can render the skin more susceptible to the causes of dermatitis. In addition, many medications being taken to correct various illnesses can have side effects including skin reactions.

DIET

A faulty or deficient diet may lead to extreme sensitivity in some individuals. Also, the consumption of certain foods can, themselves, elicit skin reactions.

The factors discussed above are generalizations and are not universally applicable in every instance of occupational dermatitis. However, it is important to have a knowledge of these items and to keep them in mind when investigating such problems.

THE SPECIFIC CAUSES

As you can imagine from the foregoing discussion, there are an almost limitless number of materials or situations that can contribute to the development of dermatitis. We will now concentrate on some specifics associated with dermatitis and the use of water miscible cutting and grinding fluids.

ALKALINITY

Alkaline materials injure the skin by actively removing water from the skin tissues and damaging the keratin layer. The skin has limited protection from such substances by virtue of the buffering action of various compounds deposited on the surface by eccrine (sweat) and sebaceous (oil) glands. However, repeated or prolonged contact with highly alkaline materials can neutralize this barrier allowing the materials to penetrate and act directly on the skin resulting in irritation.

Two major sources of alkalinity in the metalworking environment are machine tool and parts cleaning compounds and the cutting fluid itself. Most cleaning compounds are alkaline in nature. These materials are essential but must be used properly and completely rinsed from the machine tool before recharging with coolant.

Water miscible cutting and grinding fluids must be alkaline in order to achieve certain essential properties such as corrosion control on ferrous metals. On the other hand, the fluid must be gentle enough for prolonged operator contact. In general a pH greater than 9.0 in water miscible cutting and grinding fluids should be avoided if prolonged skin contact is expected.

ACIDITY

Acids attack the skin by reacting with and precipitating or coagulating proteins from the tissues. Probably the major source of acidity encountered by machine tool operators working in water miscible cutting and grinding fluids is from contaminant oils containing active sulfur or chlorine components. These are normally straight cutting oils with sulfur or chlorine additives that break down in the presence of water to form weak acids.

SOLVENTS

Low boiling organic liquids such as trichloroethane, trichloroethylene, carbon tetrachloride, kerosene, xylene, benzene, naphtha, mineral spirits and the like pose a serious threat to the skin. These solvents, used as degreasers or cleaning agents for parts and the machine tool, are extremely effective at removing the natural oils from the skin. Loss of this oil barrier allows moisture to evaporate from skin tissues resulting in a very dry condition. As the skin loses moisture, it also loses flexibility, thus cracking may occur, particularly between the fingers. Removal of the protective oil screen also leaves the skin open to attack by other irritants.

METALS

Certain metals in and of themselves can be a cause of dermatitis. For example, zinc, cadmium, chromates and nickel are all primary irritants. In addition, nickel can be a sensitizing agent in some individuals resulting in an extremely uncomfortable condition referred to as "nickel itch."

STRAIGHT CUTTING OILS

The use of straight cutting oils can create a number of conditions unfavorable to the skin. As discussed previously, if these oils contain an active sulfur or chlorine and contaminate a water based product, weak acids will form. Such contamination may occur in several ways. First, the oil may be carried in on parts that are machined in the primary operation with a cutting oil, but then go to a secondary operation where a water product is in use. Second, straight oils may be introduced into water based fluids in situations where the machine sump is running the water based fluid, but the operator is brushing on a straight oil for reaming, tapping, threading or similar operations where extra lubricity is required. Third, there may be oils left over in the sump, pumps, and pipes of machines previously run on straight oils and recently switched over to a water based fluid if the machine has not been properly cleaned. Fourth, the operator's skin may be the carrier of the oil. Operators who have worked with straight oils for an extended period may find their skin has been saturated with the oil. When they begin work in the water based fluid, there may be sufficient oil in the skin to cause a reaction when combined with water.

Another potential problem with straight oil is its potential for plugging the hair follicles resulting in folliculitis or oil acne.

CONCENTRATION CONTROL

Running water miscible fluids within the recommended concentration range is quite important. In addition to the alkalinity considerations discussed earlier, many products have surface active or detergent-like materials that can wash away the natural oil barrier of the skin. Reactions from this source are generally more prevalent in chemical fluids than soluble oil types.

HANDLING EQUIPMENT

Galvanized (zinc coated) piping and mixing vessels should be avoided for use with water miscible products, particularly with chemical fluids. As mentioned earlier, zinc is a primary irritant. Because of the alkaline nature of water based fluids, zinc may be drawn into the solution.

PROTECTIVE CREAMS

Although protective creams can be useful in alleviating skin irritation, they must be used properly, or they can make the situation worse. The skin must be cleaned and dried thoroughly before each application, otherwise the fluid, chips and fines or other irritants may be trapped against the skin underneath the cream.

Also care should be taken to ensure that a nonmedicated, water-barrier type cream is used. Medicated creams containing benzocaine or antibiotics such as neomycin may themselves be sensitizers in some individuals. Such creams should be used only under the direction of a qualified health professional (i.e., physician, nurse, industrial hygienist, etc.).

GERMICIDES

Misapplication of biocides can be extremely injurious to the skin. These materials usually have a very low or a very high pH and have effective ranges at the ppm level. Biocides should be used only as directed by the fluid manufacturer.

FILTHY COOLANT

Garbage such as beverage cans, food, paper, cigarette butts, saliva, tobacco juice, etc., can be irritants in themselves. Also, if operators wash hands and arms with the coolant, which may have suspended metallic fines due to inadequate filtration, the skin may be cut or abraded.

OFF-THE-JOB ACTIVITIES

Hobbies, second jobs, leisure activities, work around the house, can all allow for exposure to materials irritating to the skin.

Gardening/yard work: sunlight, herbicides and pesticides, just working in the soil can dry out the skin.

Home mechanic: oils and greases, gasoline is an excellent solvent, physical abrasion from mechanical work.

Hiking/picnicking/camping: insect bites, poison plants, physical abrasions from trees and brush.

Household jobs: detergents for cleaning dishes, floors and furniture, caustics such as drain openers and oven cleaning compounds.

CONTAMINATION

A large percentage of dermatitis problems occur as a direct result of contamination from external sources. Many times, since a sump is such a convenient place to dump liquids, things like floor cleaning compounds, soaps, detergents, etc., end up mixed with the fluid. Another source of contamination is the use of germicides, as mentioned earlier.

SOLUTIONS

Now that we have looked at potential causes of dermatitis, let us turn our attention to what can be done to prevent or remedy dermatitis. Without a doubt, the single most effective method of preventing dermatitis is keeping clean. Good personal hygiene is a key ingredient in minimizing skin contact with harmful agents.

This entails washing up as frequently as needed with a mild soap in warm

water and drying thoroughly, particularly in cold weather to prevent chaffing.

Although keeping clean is essential, it is important that it be done with appropriate materials. The use of solvents such as alcohol, gasoline, turpentine, paint remover, or degreasing agents should be completely avoided. As mentioned earlier, such materials not only remove dirt from the skin but also the protective oil layer.

Water alone is not sufficient either. Soap is needed to remove water insoluble irritants from the skin. However, it is important that the correct type of skin cleanser be used. Abrasive soaps and some of the powdered or granular soaps clean by physical abrasion. Use of this type of soap for four, six, ten times a day or more can easily result in irritated skin. Waterless hand cleaners often contain materials harsh to the skin also. A mild bar or lotion soap is recommended for general use. For those individuals already affected by skin irritation, the use of mineral oil or oatmeal type soaps may be helpful.

Environmental cleanliness or good housekeeping is also an important element in the prevention of dermatitis. Contamination of the working solution by tramp oils, solvents, garbage, etc., should be reduced as much as possible.

Proper use of barrier creams can be useful in controlling dermatitis. Protective clothing, such as gloves, sleeves, aprons, etc., may be helpful in some instances, but care must be taken that the clothing does not pose a hazard itself. For example, the use of gloves where open moving machine parts might snag the glove and pull fingers and hands into pinch points should be avoided. Also, such protective clothing can pose problems similar to those caused by misapplication of protective creams where perspiration or irritants may be trapped against the skin for extended periods.

Any skin irritation should be reported at once. The earlier such situations are reported, the better it is for everyone. The person experiencing the problem catches it before it develops into a serious irritation, and hopefully before co-workers also develop the problem.

CONCLUSION

If nothing else is garnered from this presentation, it is hoped that the reader will acquire an appreciation for the complexity of the occupational dermatitis issue and recognition of some of its many variables. By observing the details of the situation, you can help prevent dermatitis by setting up proper procedures and controls. Remember, what may cause dermatitis to one operator won't necessarily do it to another and vice versa.

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Lockout/Tagout Standard

Sample Program

Hazardous Energy Control Procedures
Lockout

I. Purpose and Scope

Effective hazardous energy control procedures will protect employees during machine and equipment servicing and maintenance where the unexpected energization, start up or release of stored energy could occur and cause injury, as well as while working on or near exposed deenergized electrical conductors and parts of electrical equipment. Hazards being guard against include being caught in, being crushed by, being struck by, being thrown from, or contacting live electrical circuits/parts.

The procedure herein established (III - VIII) will insure that machines and equipment are properly isolated from hazardous or potentially hazardous energy sources during servicing and maintenance and properly protect against reenergization as required by 29 CFR 1910.147.

While any employee is exposed to contact with parts of fixed electrical equipment or circuits which have been deenergized, the circuits energizing the parts shall be locked out and tagged in accordance with the requirements of 29 CFR 1910.333 (b) (2). SEE THIS OSHA STANDARD.

Only when disconnecting means or other devices are incapable of being locked out, and until lockout capability is provided, will a tagout procedure (without lockout), be utilized. SEE APPENDIX A.

II. Enforcement

Any employee who fails to follow these procedures will face disciplinary action in accordance with those listed in the company handbook.

III. Definitions

Authorized employee - a person who locks out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance which exposes him/her to potentially hazardous energy.

Affected employee - an employee whose job requires him/her to operate /use a machine or equipment or work in an area in which servicing or maintenance is being performed under lockout.

Energy isolating device - a mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and in addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or isolate energy. Push buttons, selectors switches, and other control circuit type devices are not energy isolating devices.

Other employee - an employee whose work operations are or may be in an area where energy control procedures may be utilized.

For additional definitions see 29 CFR 1910.147 (b).

IV. Authorization / Responsibility

Appropriate employees will be instructed in the safety significance of the lockout procedures. Appendix B is a list of employees authorized to lockout. Appendices C and D are a list of job titles for affected and other employees.

V. Rules

A. Locks, chains, wedges, or other hardware which meet the requirements defined in 1910.147 (c) (5) (ii) shall be provided by the company.

B. Lockout devices shall be singularly identified. They shall be the only devices used for controlling energy and shall not be used for other purposes.

C. The lockout devices shall indicate the identity of the employee applying the devices.

D. All machines/equipment shall be locked out to protect against accidental or inadvertent operation when such operation could cause injury to personnel. Lockout will also apply when working on or near exposed deenergized electrical circuits / parts.

E. No employee shall attempt to operate any switch, valve, or other energy isolating device which is locked out.

F. Each lockout device shall only be removed by the employee who applied the device. *(Exception: see VII. B. 2.)*

VI. Lockout Procedures and Techniques

A. Preparation for Shutdown.

1. In preparation for lockout, an initial survey must be made to locate and identify all energy isolating devices to be certain which switch, valve, or other energy isolating devices apply to the machine / equipment to be locked out. (See Appendix E for Energy Source Evaluation) More than one energy source (electrical, hydraulic, pneumatic, chemical, thermal, or others) may be involved.

2. Before an authorized or affected employee turns off a machine or piece of equipment, the authorized employee must have knowledge of the type and magnitude of the energy to be controlled, and the methods or means to control the energy (see Appendix F for Specific Energy Control Procedures).

Note: If work to be performed involves employees working on or near exposed deenergized electrical parts. *(See 29 CFR 1910.333).*

B. Machine or Equipment Shutdown.

1. All affected employees shall be notified that a lockout system is going to be utilized and the reason for it, before the controls are applied.

2. If the machine or equipment is operating, shut it down by normal stopping procedure. (Depress stop button, open toggle switch, etc.)

C. Machine or Equipment Isolation.

Physically locate and operate the switch, valve, or other energy isolating devices so that the equipment is isolated from its energy sources and apply adequate hardware.

D. Lockout Device Application.

1. Authorized employees shall lockout the energy isolating devices with assigned individual locks.

2. Lockout devices shall be applied so that they will hold the energy isolating devices in a “Neutral” or “Off” position.

E. Stored Energy.

All stored or residual energy in rams, flywheels, springs, pneumatic, or hydraulic systems, etc. shall be blocked or dissipated. If there is a possibility of reaccumulation of stored energy, verification of isolation must be continued until servicing or maintenance is completed.

F. Verification Of Isolation.

Prior to starting work on machines or equipment that have been locked and after ensuring that no personnel are exposed, the authorized employee shall operate the push button or normal operating controls to verify that the appropriate equipment or machine has been deenergized and make certain itl will not operate.

CAUTION: Return Operating Controls to the “Neutral” or “Off” Position After the Test.

The machine / equipment is now locked out. Servicing or maintenance may now occur.

VII. Removal Of Lockout Devices

A. After the servicing and / or maintenance is completed and before the lockout devices are removed and energy is restored, the sequence of activities in Appendix F shall be completed by the authorized employee(s).

B. If the authorized employee who applied the lock is not available, the supervisor shall take the following steps:

* Clear the machine or equipment of tools and materials.
* Remove employees from the machine or equipment.
* Remove the lockout device.
* Energize and proceed with testing or positioning.
* Deenergize all systems and reapply energy control measures in accordance with procedures set forth under SECTION VI.

VIII. Additional Requirements

A. In the preceding steps, if more than one individual is required to lockout machines / equipment (group lockout), the following procedures shall be implemented to provide protection to all employees.

1. A primary authorized employee will be designated and responsible for the number of people working under the protection of the group lockout device. The primary authorized employee will ascertain the exposure status of the individual member participating in the group lockout to ensure continuity of protection for each individual. In addition, this primary authorized employee will be responsible for notifying affected employees before and after lockout procedures are performed.

2. Each authorized employee will place his/her own personal lockout device on the energy isolating device(s).

3. When an energy isolating device cannot accept multiple locks, a multiple lockout system must be used. Specific group lockout procedures are outline in Appendix F.

B. *Shift or Personnel Changes* - If a lockout procedure will extend into the following shift, the authorized employee who originally placed the lock will remove it and it will immediately be replaced with the lock of the authorized employee who is to continue the repair or maintenance on that equipment or machine for the following shift.

C. *Cord and Plug Connected Equipment* - If servicing or maintenance is performed on cord and plug connected equipment the following procedure shall be performed to protect employees.

1. Unplug equipment from its electrical socket.

2. Place a lockable cover over the plug and a lock on the plug cover during machine / equipment servicing or maintenance.

D. *Outside Contractors* - If outside contractors perform servicing or maintenance that requires lockout, the Safety Director shall take the following steps.

1. Inform the outside contractor of out company's lockout procedures and supply them with a copy.

2. Obtain and review a copy of the outside contractor's lockout procedures.

3. Ensure that our employees understand and comply with the responsibilities and prohibitions of the outside contractor's lockout procedure.

E. *Training*

1. Authorized employees shall receive training covering:

* Recognition of hazardous energy sources.
* Types and magnitude of hazardous energy in the workplace.
* Methods, devices, and procedures used to lockout, verify lockout, and otherwise control hazardous energy on all pieces or types of equipment (including cord and plug connected equipment).
* Procedures for removing locks and returning a machine or piece of equipment to operation.
* Transfer of lockout responsibilities.
* Group lockout procedures.

2. Affected and all "other" employees shall receive training so that they are able to:

* Recognize when energy control procedures are being implemented, and
* Understanding the purpose of the procedures and the importance of not attempting to start up or use the machine / equipment that has been locked out.

Note: *All training will be certified (See Appendix G).*

F. *Retraining* - Authorized and affected employees shall receive retraining in proper application of lockout procedures when there is a change in:

* Job assignment(s) that expose an authorized employee to new hazards or lockout procedures.
* Machines, equipment, or processes that present a new hazard or require modified lockout procedures.
* Energy control procedures for a piece or type of equipment.
* Or when it becomes known that an employee incorrectly performs lockout procedures.

Retraining will re-establish employee proficiency in lockout, and ensure that employees are knowledgeable of new or revised procedures. All retraining will be certified (see Appendix G).

G. *Periodic Inspections*

1. An inspection of the energy control procedures will be conducted annually and will be certified (see Appendix H).

2. Energy control procedures for each machine or type of machine must be inspected.

3. The inspection shall include a review of lockout responsibilities with each individual authorized to lockout the machine / equipment.

4. The person who performs the inspection must be authorized to perform the lockout procedures being inspected. The inspector cannot, however, review his/her own use of lockout procedures.

5. Any deviations or inadequacies identified shall be immediately addressed.

APPENDIX A

TAGOUT PROCEDURES

A. When a disconnecting means or other energy isolating device is incapable of being locked out, a tagout system shall be utilized. A tag used without a lock, shall be supplemented by at least on additional safety measure that provides a level of safety equivalent to that obtained by use of a lock such as opening an additional disconnecting device, removal of an isolating circuit element, blocking of a controlling switch or the removal of a valve handle to reduce the likelihood of inadvertent energization.

B. Only tags furnished by the company which meet the requirements of 1910.147 (c) (5) (ii) and (iii) shall be used.

C. All employees shall be trained in the use and limitations of tags as described in 1910.147 (c) (7) (ii) and (d) (4) (iii).

D. ~~**All**~~ employees must be able to understand the hazard warning written on the tags such as: **DO NOT START, DO NOT OPEN, DO NOT CLOSE, DO NOT ENERGIZE, DO NOT OPERATE.**

E. On machines and equipment where tagout is used in lieu of lockout, the Periodic Inspection required by 1910.147 (c) (6) shall include the affected as well as the authorized employee(s). The periodic inspection shall be certified on appendix H.

F. If tagout is used all other lockout rules and procedures apply.

NOTE: Should the machine / equipment required upgrade or modification, it will have lockable switches, fittings, valves, etc. added so that it becomes possible to lockout.

APPENDIX B

LIST OF AUTHORIZED LOCKOUT INDIVIDUALS

NAME	JOB TITLE	MEANS USED TO I.D. LOCKS

APPENDIX C

LIST OF AFFECTED EMPLOYEES BY JOB TITLES

JOB TITLES	MACHINERY, EQUIPMENT, OR PROCESS

APPENDIX D

LIST OF "OTHER" EMPLOYEES BY JOB TITLES

JOB TITLES	MACHINERY, EQUIPMENT, OR PROCESS

APPENDIX E

ENERGY SOURCE EVALUATION

DATE: _____/____/_____ **CONDUCTED BY: _____**

In order to determine all energy sources for each piece or type of machine or equipment, fill in the following table.

Location: _____ Work Center: _____

Equipment Name: _____

Model: _____ Serial #: _____

Lockout Procedure Number: _____

ENERGY SOURCE \ * MAGNITUDE	**LOCATION OF ISOLATING DEVICE**	**MEANS OF ISOLATION**
ELECTRICAL		
ENGINE		
SPRING		
COUNTER WEIGHT		
FLYWHEEL		
HYDRAULIC		
PNEUMATIC		
CHEMICAL		
THERMAL		
OTHER		

*** MAGNITUDE EXAMPLE - Electrical = 480v three phase**
Pneumatic = 125 p.s.i.

APPENDIX F

SPECIFIC ENERGY CONTROL PROCEDURES FOR EACH PIECE OR TYPE OF MACHINE OR EQUIPMENT

PROCEDURE NUMBER: _____

DATE: _____/_____/_____ **COMPLETED BY:** _____
MACHINES OR EQUIPMENT UTILIZING THIS PROCEDURE:

_____ _____

_____ _____

PROCEDURE FOR CONTROLLING HAZARDOUS ENERGY

1. Be familiar with the sources of hazardous energy for the machine or equipment that will be serviced. **See Appendix F (Energy Source Evaluation)**

SOURCES OF HAZARDOUS ENERGY

___ Electrical ___ Engine ___ Spring
___ Counter Weight ___ Flywheel ___ Hydraulic
___ Pneumatic ___ Chemical ___ Thermal
___ Other _____

2. Notify affected employees that the machine is about to be shut down and locked out.

Specific Instructions: _____
_____
_____

3. Shut down the machine using normal stopping procedures.

Specific Instructions: _____
_____
_____

4. Isolate all energy sources listed above.

Specific Instructions: _____
_____
_____

APPENDIX F

5.A. Apply locks to all isolation devices operated in step four.
Specific Instructions: _____
_____
_____

B. If a tag is used in lieu of a lock when the energy isolating device is incapable of lockout (see Appendix A), the following additional safety precaution(s) shall be taken:
_____
_____
_____

6. Block or dissipate all stored energy in rams, flywheels, springs, pneumatic or hydraulic systems, etc.
Specific Instructions: _____
_____
_____

7. Verify that the machine is locked out by testing the machine operating controls. RETURN ALL CONTROLS TO THE "**NEUTRAL" OR "OFF" POSITION AFTER TESTING.**
Specific Instructions: _____
_____
_____

PROCEDURES FOR REMOVING LOCKS / TAGS

1. Check the machine to be sure it is operationally intact, tools have been removed, and guards have been replaced.
Specific Instructions: _____
_____
_____

2. Check to be sure all employees are safely positioned.
Specific Instructions: _____
_____
_____

3. Notify all affected employees that locks / tags are going to be removed and the machine is ready for operation.
Specific Instructions: _____
_____
_____

4. Remove all locks, blocks, or other energy restraints.
Specific Instructions: _____
_____
_____

APPENDIX F

5. Restore all energy to the machine.

Specific Instructions: _____

_____

_____

OTHER COMMENTS : _____

_____

_____

_____

_____

_____

_____

_____

APPENDIX G-1

“Authorized” Employee Training Certification

DATE OF TRAINING: _____/_____/_____

INSTRUCTOR: _____

SIGNATURE: _____

The following employees have received “Authorized” employee training on lockout / tagout procedures.

EMPLOYEE NAME (Please Print)	**EMPLOYEE SIGNATURE**

APPENDIX G-2

“Affected” Employee Training Certification

DATE OF TRAINING: _____/_____/_____

INSTRUCTOR: _____

SIGNATURE: _____

The following employees have received “Affected” employee training on lockout / tagout procedures.

EMPLOYEE NAME (Please Print)	**EMPLOYEE SIGNATURE**

APPENDIX G-3

“Other” Employee Training Certification

DATE OF TRAINING: _____/_____/_____

INSTRUCTOR: _____

SIGNATURE: _____

The following employees have received “Other” employee training on lockout / tagout procedures.

EMPLOYEE NAME (Please Print)	**EMPLOYEE SIGNATURE**

APPENDIX H

Periodic Inspection Certification

DATE OF TRAINING: _____/_____/_____

INSTRUCTOR: _____

SIGNATURE: _____

Machine or equipment on which lockout / tagout procedures were performed;

Employee(s) performing the lockout / tagout procedures:

Employee Name(Please Print)	**Employee Signature**
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Were all the lockout / tagout procedures performed correctly? YES NO

Comments on improper Lockout / Tagout Procedures being used (ex. List of improper procedures being used which require retraining for the employee or modification of procedures.) :

HAZARDOUS ENERGY CONTROL PROCEDURES

Name of employee exposed to the hazard: _____

Machine / Equipment on which the task is being performed:

_____

Servicing / Maintenance task being performed:

_____

Frequency in which the employee performs the task: _____ times per _____

Duration for which the employee has performed the task: _____ hour/day/week

Hazard to which the employee is exposed when performing this task:

_____ caught in _____

_____ crushed by _____

_____ struck by _____

_____ thrown from _____

_____ contact with _____

_____ other _____

Energy source which exposes the employee to a hazard:

___ Electrical ___ Engine ___ Spring ___ Counter Weight
___ Flywheel ___ Hydraulic ___ Pneumatic ___ Chemical
___ Thermal ___ Other _____

Magnitude of the energy source:

____ Volts ____ Phase ____ PSI ____ Degree F ____ Tons

Potential Injury associated with the improper isolation of energy:

Crushed _____ Fractured _____
Amputated _____ Lacerated _____
Punctured _____ Burns _____
____ Air Embolism ____ Death ____ Electric Shock
Other _____

Means of Isolating the Energy Source (Procedures Used):
[If tagout is used see 1910.147 (c) (3) (ii)]

Location: _____ Method: _____

If machine / equipment is not capable of lockout when was it installed, renovated, modified, or repaired (major)? After 1/02/90 ____/____/____

If Electrical, cord / plug (circle one); YES NO

Hazards discussed with exposed employee Mr. / Ms. _____
Remarks/Signed Statement (if documenting past exposure)
Hazard reviewed with employer Mr. / Ms. _____
Remarks:_____

THE CONTROL OF HAZARDOUS ENERGY (LOCKOUT / TAGOUT) 1910.147 WRITTEN PROCEDURES EVALUATION

YES	NO	
		Do the written procedures contain the following elements:
___	___	**A definition of the purpose and scope of lockout and/or tagout procedures.**
___	___	**Basic lockout / tagout rules and authorization.**
___	___	**Means of enforcing compliance.**
		Specific procedures for:
___	___	**Shutting down machines and/or equipment.**
___	___	**Isolating, blocking, and securing machines and/or equipment.**
___	___	**Placement of lockout / tagout devices.**
___	___	**Releasing stored energy.**
___	___	**Testing a machine and/or equipment to verify the effectiveness of the lockout / tagout devices.**
___	___	**Removal of lockout / tagout devices.**
___	___	**Transfer of lockout/tagout devices during group lockout/tagout [If Applicable].**
___	___	**Responsibility for lockout/tagout devices during group lockout/tagout [If Applicable].**
___	___	**Group Lockout/Tagout [If Applicable].**
___	___	**Additional measures taken if a tag is used in lieu of a lock.**

The employer must comply with the following items, however they do not have to be included in the written procedures:

___	___	**Provide energy control devices which meet the requirements defined in 1910.147 (c) (5).**
___	___	**Inform outside contractors of your lockout/tagout program and notify your employees of the contractor's energy control program.**
___	___	**Certification of a periodic inspection conducted at least annually.**
___	___	**Certification of training and retraining for authorized, affected, and other employees.**
___	___	**Handling cord and plug connected equipment 1910.147 (a)(2)(iii) (A).**

U.S. Department of Labor

Occupational Safety and Health Administration
230 South Dearborn Street, Room 3244
Chicago, Illinois 60604
(312) 353-2220

DATE: March 23, 1995

TO: George Kunz
BWC - Safety & Hygiene

FROM: Bill
Bill Wiehrdt, ARA
Technical Support

SUBJECT: 1910.147 Lockout/Tagout Regulation,
Your Questions, and Our Comments

This letter is in response to your facsimile sent to the Chicago Regional Office of Technical Support on March 20, 1995. Your questions, along with our responses, are being be faxed to you.

QUESTION #1:
When an employee (operator or set-up person) changes a bit on a drill press, or a cutting head on a milling machine, are these activities minor tool changes? It appears that employers in the Ohio area are getting different answers to this question, and we need to address this issue for changes in our training programs that we provide to them.

QUESTION #2:
With 1910.147 being a performance standard, it appears employers are getting a lot of different answers on the subject of group lockout/tagout procedures.

If a company has a primary authorized employee designated and he/she has the only lock, working with a crew of three, is this acceptable if they have a check-in, check-out system in place to account for each, or is each employee required to have an individual lock affixed to the equipment?

RESPONSE:
The OSHA regulation 1910.147(a)(2)(ii) application says:

Normal production, as shown in the attachment, recognizes that normal operator tasks, such as drill bit changes and/or changing milling cutters, can be expected to occur many times per day. There is an exception noted for minor tool changes to the lockout/tagout regulation.

It is the Region's position that minor tool changes can be characterized in many cases by considering the size and weight of the tool. It is also our position that, if the tool weighs ten pounds or less and can be held by one hand, then it is one of those likely to be involved in minor tool changes, servicing, and /or adjustments performed by the operator.

As we are both aware, the 1910.147 lockout/tagout regulation applies only to maintenance work. Single locks, protecting multiple affected workers, are allowed. OSHA Instruction STD 1-7.3, Section L.7, describes group lockout/tagout of more complex systems. Appendix C, Section B.1.b, defines a principal authorized employee. The appendix describes progressively more complex lockout situations involving multiple locks, teams, and shifts of workers. The key is, of course:

a) Is the protection of workers assured?

b) Is the lockout/tagout program efficient? and

c) Is the program cost effective?

Thank you for your interest in occupational safety and health. I hope this is responsive to your needs. If you need further information or clarifications, you may contact Al Conley of my staff at 312-886-3076.

Attachment

U.S. Department of Labor

Occupational Safety and Health Administration
230 South Dearborn Street, Room 3244
Chicago, Illinois 60604
(312) 353-2220

March 25, 1996

Bureau of Workers Compensation (B.W.C.)
6929 Americana Parkway
Reynoldsburg, Ohio 43068

RE: Lockout/Tagout

Gentlemen:

In response to your letter, dated March 11, 1996 referring to 29 CFR 1910.333(b)(2)(ii)(B), this paragraph clearly states that the main power supply switch must be turned off and locked. Any secondary switches will not satisfy this requirement because energy will still be in the console and the danger of shorting, jumping, etc., is ever present.

The second question asked was whether or not electrical safe work practices apply where non-electrical work is being done on the press. The answer to this is "yes." The electrical energy must stop and be locked. The only exclusion from the lockout/tagout standard is the set-up man because he needs the energy to set-up the die.

Thank you for your interest in occupational safety and health. I hope this is responsive to your needs. If you need further information or clarifications, you may contact James Kontos of my staff at 312-353-5105.

Sincerely,

William Q. Wiehrdt
Assistant Regional Administrator
Technical Support

Regulations (Standards - 29 CFR)

The control of hazardous energy (lockout/tagout). - 1910.147

OSHA Regulations (Standards - 29 CFR) - Table of Contents

- **Standard Number:** 1910.147
- **Standard Title:** The control of hazardous energy (lockout/tagout).
- **SubPart Number:** J
- **SubPart Title:** General Environmental Controls

Interpretation(s)

(a)

Scope, application and purpose -

(a)(1)

Scope

(a)(1)(i)

This standard covers the servicing and maintenance of machines and equipment in which the ***unexpected*** energization or start up of the machines or equipment, or release of stored energy could cause injury to employees. This standard establishes minimum performance requirements for the control of such hazardous energy.

(a)(1)(ii)

This standard does not cover the following:

(a)(1)(ii)(A)

Construction, agriculture and maritime employment;

(a)(1)(ii)(B)

Installations under the exclusive control of electric utilities for the purpose of power generation, transmission and distribution, including related equipment for communication or metering; and

(a)(1)(ii)(C)

Exposure to electrical hazards from work on, near, or with conductors or equipment in electric utilization installations, which is covered by Subpart S of this part; and

..1910.147(a)(1)(ii)(D)

(a)(1)(ii)(D)

Oil and gas well drilling and servicing.

(a)(2)

Application.

(a)(2)(i)

This standard applies to the control of energy during servicing and/or maintenance of machines and equipment.

(a)(2)(ii)

Normal production operations are not covered by this standard (See Subpart O of this Part). Servicing and/or maintenance which takes place during normal production operations is covered by this standard only if:

(a)(2)(ii)(A)

An employee is required to remove or bypass a guard or other safety device; or

(a)(2)(ii)(B)

An employee is required to place any part of his or her body into an area on a machine or piece of equipment where work is actually performed upon the material being processed (point of operation) or where an associated danger zone exists during a machine operating cycle.

Note: ***Exception to paragraph (a)(2)(ii):*** Minor tool changes and adjustments, and other minor servicing activities, which take place during normal production operations, are not covered by this standard if they are routine, repetitive, and integral to the use of the equipment for production, provided that the work is performed using alternative measures which provide effective protection (See Subpart O of this Part).

(a)(2)(iii)

This standard does not apply to the following:

..1910.147(a)(2)(iii)(A)

(a)(2)(iii)(A)

Work on cord and plug connected electric equipment for which exposure to the hazards of unexpected energization or start up of the equipment is controlled by the unplugging of the equipment from the energy source and by the plug being under the exclusive control of the employee performing the servicing or maintenance.

(a)(2)(iii)(B)

Hot tap operations involving transmission and distribution systems for substances such as gas, steam, water or petroleum products when they are performed on pressurized pipelines, provided that the employer demonstrates that-

(a)(2)(iii)(B)(1)

continuity of service is essential;

(a)(2)(iii)(B)(2)

shutdown of the system is impractical; and

(a)(2)(iii)(B)(3)

documented procedures are followed, and special equipment is used which will provide proven effective protection for employees.

(a)(3)

Purpose.

(a)(3)(i)

This section requires employers to establish a program and utilize procedures for affixing appropriate lockout devices or tagout devices to energy isolating devices, and to otherwise disable machines or equipment to prevent unexpected energization, start up or release of stored energy in order to prevent injury to employees.

(a)(3)(ii)

When other standards in this part require the use of lockout or tagout, they shall be used and supplemented by the procedural and training requirements of this section.

(b)

Definitions applicable to this section.

Affected employee. An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

Authorized employee. A person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this section.

Capable of being locked out. An energy isolating device is capable of being locked out if it has a hasp or other means of attachment to which, or through which, a lock can be affixed, or it has a locking mechanism built into it. Other energy isolating devices are capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy isolating device or permanently alter its energy control capability.

Energized. Connected to an energy source or containing residual or stored energy.

Energy isolating device. A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and, in addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or isolate energy. Push buttons, selector switches and other control circuit type devices are not energy isolating devices.

Energy source. Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.

Hot tap. A procedure used in the repair, maintenance and services activities which involves welding on a piece of equipment (pipelines, vessels or tanks) under pressure, in order to install connections or appurtenances. it is commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.

Lockout. The placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled

cannot be operated until the lockout device is removed.

Lockout device. A device that utilizes a positive means such as a lock, either key or combination type, to hold an energy isolating device in the safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.

Normal production operations. The utilization of a machine or equipment to perform its intended production function.

Servicing and/or maintenance. Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to the ***unexpected*** energization or startup of the equipment or release of hazardous energy.

Setting up. Any work performed to prepare a machine or equipment to perform its normal production operation.

Tagout. The placement of a tagout device on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

Tagout device. A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

..1910.147(c)

(c)

General -

(c)(1)

Energy control program. The employer shall establish a program consisting of energy control procedures, employee training and periodic inspections to ensure that before any employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, startup or release of stored energy could occur and cause injury, the machine or equipment shall be isolated from the energy source and rendered inoperative.

(c)(2)

Lockout/tagout.

(c)(2)(i)

If an energy isolating device is not capable of being locked out, the employer's energy control program under paragraph (c)(1) of this section shall utilize a tagout system.

(c)(2)(ii)

If an energy isolating device is capable of being locked out, the employer's energy control program under paragraph (c)(1) of this section shall utilize lockout, unless the employer can demonstrate that the utilization of a tagout system will provide full employee protection as set forth in paragraph (c)(3) of this section.

(c)(2)(iii)

After January 2, 1990, whenever replacement or major repair, renovation or modification of a machine or equipment is performed, and whenever new machines or equipment are installed, energy isolating devices for such machine or equipment shall be designed to accept a lockout device.

(c)(3)

Full employee protection.

(c)(3)(i)

When a tagout device is used on an energy isolating device which is capable of being locked out, the tagout device shall be attached at the same location that the lockout device would have been attached, and the employer shall demonstrate that the tagout program will provide a level of safety equivalent to that obtained by using a lockout program.

..1910.147(c)(3)(ii)

(c)(3)(ii)

In demonstrating that a level of safety is achieved in the tagout program which is equivalent to the level of safety obtained by using a lockout program, the employer shall demonstrate full compliance with all tagout-related provisions of this standard together with such additional elements as are necessary to provide the equivalent safety available from the use of a lockout device. Additional means to be considered as part of the demonstration of full employee protection shall include the implementation of additional safety measures such as the removal of an isolating circuit element, blocking of a controlling switch, opening of an extra disconnecting device, or the removal of a valve handle to reduce the likelihood of inadvertent energization.

(c)(4)

Energy control procedure.

(c)(4)(i)

Procedures shall be developed, documented and utilized for the control of potentially hazardous energy when employees are engaged in the activities covered by this section.

Note: ***Exception:*** The employer need not document the required procedure for a particular machine or equipment, when all of the following elements exist: (1) The machine or equipment has no potential for stored or residual energy or reaccumulation of stored energy after shut down which could endanger employees; (2) the machine or equipment has a single energy source which can be readily identified and isolated; (3) the isolation and locking out of that energy source will completely deenergize and deactivate the machine or equipment; (4) the machine or equipment is isolated from that energy source and locked out during servicing or maintenance; (5) a single lockout device will achieve a locker-out condition; (6) the lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance; (7) the servicing or maintenance does not create hazards for other employees; and (8) the employer, in utilizing this exception, has had no accidents involving the unexpected activation or reenergization of the machine or equipment during servicing or maintenance.

(c)(4)(ii)

The procedures shall clearly and specifically outline the scope, purpose, authorization, rules, and techniques to be utilized for the control of hazardous energy, and the means to enforce compliance including, but not limited to, the following:

(c)(4)(ii)(A)

A specific statement of the intended use of the procedure;

(c)(4)(ii)(B)

Specific procedural steps for shutting down, isolating, blocking and securing machines or equipment to control hazardous energy;

(c)(4)(ii)(C)

Specific procedural steps for the placement, removal and transfer of lockout devices or tagout devices and the responsibility for them; and

..1910.147(c)(4)(ii)(D)

(c)(4)(ii)(D)

Specific requirements for testing a machine or equipment to determine and verify the effectiveness of lockout devices, tagout devices, and other energy control measures.

(c)(5)

Protective materials and hardware.

(c)(5)(i)

Locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware shall be provided by the employer for isolating, securing or blocking of machines or equipment from energy sources.

(c)(5)(ii)

Lockout devices and tagout devices shall be singularly identified; shall be the only devices(s) used for controlling energy; shall not be used for other purposes; and shall meet the following requirements:

(c)(5)(ii)(A)

Durable.

(c)(5)(ii)(A)(1)

Lockout and tagout devices shall be capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected.

(c)(5)(ii)(A)(2)

Tagout devices shall be constructed and printed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or the message on the tag to become illegible.

(c)(5)(ii)(A)(3)

Tags shall not deteriorate when used in corrosive environments such as areas where acid and alkali chemicals are handled and stored.

..1910.147(c)(5)(ii)(B)

(c)(5)(ii)(B)

Standardized. Lockout and tagout devices shall be standardized within the facility in at least one of the following criteria: Color; shape; or size; and additionally, in the case of tagout devices, print

and format shall be standardized.

(c)(5)(ii)(C)

Substantial -

(c)(5)(ii)(C)(1)

Lockout devices. Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools.

(c)(5)(ii)(C)(2)

Tagout devices. Tagout devices, including their means of attachment, shall be substantial enough to prevent inadvertent or accidental removal. Tagout device attachment means shall be of a non-reusable type, attachable by hand, self-locking, and non-releasable with a minimum unlocking strength of no less than 50 pounds and having the general design and basic characteristics of being at least equivalent to a one-piece, all environment-tolerant nylon cable tie.

(c)(5)(ii)(D)

Identifiable. Lockout devices and tagout devices shall indicate the identity of the employee applying the device(s).

(c)(5)(iii)

Tagout devices shall warn against hazardous conditions if the machine or equipment is energized and shall include a legend such as the following: ***Do Not Start. Do Not Open. Do Not Close. Do Not Energize. Do Not Operate.***

..1910.147(c)(6)

(c)(6)

Periodic inspection.

(c)(6)(i)

The employer shall conduct a periodic inspection of the energy control procedure at least annually to ensure that the procedure and the requirements of this standard are being followed.

(c)(6)(i)(A)

The periodic inspection shall be performed by an authorized employee other than the ones(s) utilizing the energy control procedure being inspected.

(c)(6)(i)(B)

The periodic inspection shall be conducted to correct any deviations or inadequacies identified.

(c)(6)(i)(C)

Where lockout is used for energy control, the periodic inspection shall include a review, between the inspector and each authorized employee, of that employee's responsibilities under the energy control procedure being inspected.

(c)(6)(i)(D)

Where tagout is used for energy control, the periodic inspection shall include a review, between the inspector and each authorized and affected employee, of that employee's responsibilities under the energy control procedure being inspected, and the elements set forth in paragraph (c)(7)(ii) of this section.

..1910.147(c)(6)(ii)

(c)(6)(ii)

The employer shall certify that the periodic inspections have been performed. The certification shall identify the machine or equipment on which the energy control procedure was being utilized, the date of the inspection, the employees included in the inspection, and the person performing the inspection.

(c)(7)

Training and communication.

(c)(7)(i)

The employer shall provide training to ensure that the purpose and function of the energy control program are understood by employees and that the knowledge and skills required for the safe application, usage, and removal of the energy controls are acquired by employees. The training shall include the following:

(c)(7)(i)(A)

Each authorized employee shall receive training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control.

(c)(7)(i)(B)

Each affected employee shall be instructed in the purpose and use of the energy control procedure.

(c)(7)(i)(C)

All other employees whose work operations are or may be in an area where energy control procedures may be utilized, shall be instructed about the procedure, and about the prohibition relating to attempts to restart or reenergize machines or equipment which are locked out or tagged out.

(c)(7)(ii)

When tagout systems are used, employees shall also be trained in the following limitations of tags:

..1910.147(c)(7)(ii)(A)

(c)(7)(ii)(A)

Tags are essentially warning devices affixed to energy isolating devices, and do not provide the physical restraint on those devices that is provided by a lock.

(c)(7)(ii)(B)

When a tag is attached to an energy isolating means, it is not to be removed without authorization of the authorized person responsible for it, and it is never to be bypassed, ignored, or otherwise defeated.

(c)(7)(ii)(C)

Tags must be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area, in order to be effective.

(c)(7)(ii)(D)

Tags and their means of attachment must be made of materials which will withstand the environmental conditions encountered in the workplace.

(c)(7)(ii)(E)

Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control program.

(c)(7)(ii)(F)

Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.

(c)(7)(iii)

Employee retraining.

..1910.147(c)(7)(iii)(A)

(c)(7)(iii)(A)

Retraining shall be provided for all authorized and affected employees whenever there is a change in their job assignments, a change in machines, equipment or processes that present a new hazard, or when there is a change in the energy control procedures.

(c)(7)(iii)(B)

Additional retraining shall also be conducted whenever a periodic inspection under paragraph (c)(6) of this section reveals, or whenever the employer has reason to believe that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures.

(c)(7)(iii)(C)

The retraining shall reestablish employee proficiency and introduce new or revised control methods and procedures, as necessary.

(c)(7)(iv)

The employer shall certify that employee training has been accomplished and is being kept up to date. The certification shall contain each employee's name and dates of training.

(c)(8)

Energy isolation. Lockout or tagout shall be performed only by the authorized employees who are performing the servicing or maintenance.

(c)(9)

Notification of employees. Affected employees shall be notified by the employer or authorized employee of the application and removal of lockout devices or tagout devices. Notification shall be given before the controls are applied, and after they are removed from the machine or equipment.

..1910.147(d)

(d)

Application of control. The established procedures for the application of energy control (the lockout or tagout procedures) shall cover the following elements and actions and shall be done in the following sequence:

(d)(1)

Preparation for shutdown. Before an authorized or affected employee turns off a machine or equipment, the authorized employee shall have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy.

(d)(2)

Machine or equipment shutdown. The machine or equipment shall be turned off or shut down using the procedures established for the machine or equipment. An orderly shutdown must be utilized to avoid any additional or increased hazard(s) to employees as a result of the equipment stoppage.

(d)(3)

Machine or equipment isolation. All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s).

(d)(4)

Lockout or tagout device application.

(d)(4)(i)

Lockout or tagout devices shall be affixed to each energy isolating device by authorized employees.

..1910.147(d)(4)(ii)

(d)(4)(ii)

Lockout devices, where used, shall be affixed in a manner to that will hold the energy isolating devices in a "safe" or "off" position.

(d)(4)(iii)

Tagout devices, where used, shall be affixed in such a manner as will clearly indicate that the operation or movement of energy isolating devices from the "safe" or "off" position is prohibited.

(d)(4)(iii)(A)

Where tagout devices are used with energy isolating devices designed with the capability of being locked, the tag attachment shall be fastened at the same point at which the lock would have been attached.

(d)(4)(iii)(B)

Where a tag cannot be affixed directly to the energy isolating device, the tag shall be located as close as safely possible to the device, in a position that will be immediately obvious to anyone attempting to operate the device.

(d)(5)

Stored energy.

(d)(5)(i)

Following the application of lockout or tagout devices to energy isolating devices, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, and otherwise rendered safe.

..1910.147(d)(5)(ii)

(d)(5)(ii)

If there is a possibility of reaccumulation of stored energy to a hazardous level, verification of isolation shall be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.

(d)(6)

Verification of isolation. Prior to starting work on machines or equipment that have been locked out or tagged out, the authorized employee shall verify that isolation and deenergization of the machine or equipment have been accomplished.

(e)

Release from lockout or tagout. Before lockout or tagout devices are removed and energy is restored to the machine or equipment, procedures shall be followed and actions taken by the authorized employee(s) to ensure the following:

(e)(1)

The machine or equipment. The work area shall be inspected to ensure that nonessential items have been removed and to ensure that machine or equipment components are operationally intact.

(e)(2)

Employees.

(e)(2)(i)

The work area shall be checked to ensure that all employees have been safely positioned or removed.

(e)(2)(ii)

After lockout or tagout devices have been removed and before a machine or equipment is started, affected employees shall be notified that the lockout or tagout device(s) have been removed.

(e)(3)

Lockout or tagout devices removal. Each lockout or tagout device shall be removed from each energy isolating device by the employee who applied the device. ***Exception to paragraph (e)(3):*** When the authorized employee who applied the lockout or tagout device is not available to remove it, that device may be removed under the direction of the employer, provided that specific procedures and training for such removal have been developed, documented and incorporated into the employer's energy control program. The employer shall demonstrate that the specific procedure provides equivalent safety to the removal of the device by the authorized employee who applied it. The specific procedure shall include at least the following elements:

(e)(3)(i)

Verification by the employer that the authorized employee who applied the device is not at the facility:

(e)(3)(ii)

Making all reasonable efforts to contact the authorized employee to inform him/her that his/her lockout or tagout device has been removed; and

(e)(3)(iii)

Ensuring that the authorized employee has this knowledge before he/she resumes work at that facility.

..1910.147(f)

(f)

Additional requirements.

(f)(1)

Testing or positioning of machines, equipment or components thereof. In situations in which lockout or tagout devices must be temporarily removed from the energy isolating device and the machine or equipment energized to test or position the machine, equipment or component thereof, the following sequence of actions shall be followed:

(f)(1)(i)

Clear the machine or equipment of tools and materials in accordance with paragraph (e)(1) of this section;

(f)(1)(ii)

Remove employees from the machine or equipment area in accordance with paragraph (e)(2) of this section;

(f)(1)(iii)

Remove the lockout or tagout devices as specified in paragraph (e)(3) of this section;

(f)(1)(iv)

Energize and proceed with testing or positioning;

(f)(1)(v)

Deenergize all systems and reapply energy control measures in accordance with paragraph (d) of this section to continue the servicing and/or maintenance.

(f)(2)

Outside personnel (contractors, etc.).

(f)(2)(i)

Whenever outside servicing personnel are to be engaged in activities covered by the scope and application of this standard, the on-site employer and the outside employer shall inform each other of their respective lockout or tagout procedures.

..1910.147(f)(2)(ii)

(f)(2)(ii)

The on-site employer shall ensure that his/her employees understand and comply with the restrictions and prohibitions of the outside employer's energy control program.

(f)(3)

Group lockout or tagout.

(f)(3)(i)

When servicing and/or maintenance is performed by a crew, craft, department or other group, they shall utilize a procedure which affords the employees a level of protection equivalent to that

provided by the implementation of a personal lockout or tagout device.

(f)(3)(ii)

Group lockout or tagout devices shall be used in accordance with the procedures required by paragraph (c)(4) of this section including, but not necessarily limited to, the following specific requirements:

(f)(3)(ii)(A)

Primary responsibility is vested in an authorized employee for a set number of employees working under the protection of a group lockout or tagout device (such as an operations lock);

(f)(3)(ii)(B)

Provision for the authorized employee to ascertain the exposure status of individual group members with regard to the lockout or tagout of the machine or equipment and

(f)(3)(ii)(C)

When more than one crew, craft, department, etc. is involved, assignment of overall job-associated lockout or tagout control responsibility to an authorized employee designated to coordinate affected work forces and ensure continuity of protection; and

..1910.147(f)(3)(ii)(D)

(f)(3)(ii)(D)

Each authorized employee shall affix a personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism when he or she begins work, and shall remove those devices when he or she stops working on the machine or equipment being serviced or maintained.

(f)(4)

Shift or personnel changes. Specific procedures shall be utilized during shift or personnel changes to ensure the continuity of lockout or tagout protection, including provision for the orderly transfer of lockout or tagout device protection between off-going and oncoming employees, to minimize exposure to hazards from the unexpected energization or start-up of the machine or equipment, or the release of stored energy.

Note: The following appendix to §1910.147 services as a non-mandatory guideline to assist employers and employees in complying with the requirements of this section, as well as to

provide other helpful information. Nothing in the appendix adds to or detracts from any of the requirements of this section.

[54 FR 36687, Sept. 1, 1989, as amended at 54 FR 42498, Oct. 17, 1989; 55 FR 38685, 38686, Sept. 20, 1990; 61 FR 5507, Feb. 13, 1996]

OSHA Regulations (Standards - 29 CFR) - Table of Contents

Regulations (Standards - 29 CFR)

Typical minimal lockout procedures - 1910.147AppA

OSHA Regulations (Standards - 29 CFR) - Table of Contents

- **Standard Number:** 1910.147AppA
- **Standard Title:** Typical minimal lockout procedures
- **SubPart Number:** J
- **SubPart Title:** None

General

The following simple lockout procedure is provided to assist employers in developing their procedures so they meet the requirements of this standard. When the energy isolating devices are not lockable, tagout may be used, provided the employer complies with the provisions of the standard which require additional training and more rigorous periodic inspections. When tagout is used and the energy isolating devices are lockable, the employer must provide full employee protection (see paragraph (c)(3)) and additional training and more rigorous periodic inspections are required. For more complex systems, more comprehensive procedures may need to be developed, documented, and utilized.

Lockout Procedure

Lockout Procedure for

_____

(Name of Company for single procedure or identification of equipment if multiple procedures are used).

Purpose

This procedure establishes the minimum requirements for the

lockout of energy isolating devices whenever maintenance or servicing is done on machines or equipment. It shall be used to ensure that the machine or equipment is stopped, isolated from all potentially hazardous energy sources and locked out before employees perform any servicing or maintenance where the unexpected energization or start-up of the machine or equipment or release of stored energy could cause injury.

Compliance With This Program

All employees are required to comply with the restrictions and limitations imposed upon them during the use of lockout. The authorized employees are required to perform the lockout in accordance with this procedure. All employees, upon observing a machine or piece of equipment which is locked out to perform servicing or maintenance shall not attempt to start, energize, or use that machine or equipment.

_____

Type of compliance enforcement to be taken for violation of the above.

Sequence of Lockout

(1) Notify all affected employees that servicing or maintenance is required on a machine or equipment and that the machine or equipment must be shut down and locked out to perform the servicing or maintenance.

_____

Name(s)/Job Title(s) of affected employees and how to notify.

(2) The authorized employee shall refer to the company procedure to identify the type and magnitude of the energy that the machine or equipment utilizes, shall understand the hazards of the energy, and shall know the methods to control the energy.

_____

Type(s) and magnitude(s) of energy, its hazards and the methods to control the energy.

(3) If the machine or equipment is operating, shut it down by the normal stopping procedure (depress the stop button, open switch, close valve, etc.).

_____

Type(s) and location(s) of machine or equipment operating controls.

(4) De-activate the energy isolating device(s) so that the machine or equipment is isolated from the energy source(s).

_____

Type(s) and location(s) of energy isolating devices.

(5) Lock out the energy isolating device(s) with assigned individual lock(s).

(6) Stored or residual energy (such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc.) must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc.

_____

Type(s) of stored energy - methods to dissipate or restrain.

(7) Ensure that the equipment is disconnected from the energy source(s) by first checking that no personnel are exposed, then verify the isolation of the equipment by operating the push button or other normal operating control(s) or by testing to make certain the equipment will not operate.

Caution: Return operating control(s) to neutral or "off" position after verifying the isolation of the equipment.

_____

Method of verifying the isolation of the equipment.

(8) The machine or equipment is now locked out.

"Restoring Equipment to Service." When the servicing or maintenance is completed and the machine or equipment is ready to return to normal operating condition, the following steps shall be taken.

(1) Check the machine or equipment and the immediate area around the machine to ensure that nonessential items have been

removed and that the machine or equipment components are operationally intact.

(2) Check the work area to ensure that all employees have been safely positioned or removed from the area.

(3) Verify that the controls are in neutral.

(4) Remove the lockout devices and reenergize the machine or equipment. Note: The removal of some forms of blocking may require reenergization of of the machine before safe removal.

(5) Notify affected employees that the servicing or maintenance is completed and the machine or equipment is ready for used.

[54 FR 36687, Sept. 1, 1989 as amended at 54 FR 42498, Oct. 17, 1989; 55 FR 38685, Sept. 20, 1990; 61 FR 5507, Feb. 13, 1996]

OSHA Regulations (Standards - 29 CFR) - Table of Contents

Die Setting

Die setting

Setting Up and Removing Power Press Dies

1. Power Press Dies vary in weight from a few pounds to several thousand pounds. Handling, setting up, and removing these dies can be hazardous unless proper equipment and methods are used. These operations should be entrusted only to experienced personnel who have been instructed in detail about safe procedures used in setting and removing power press dies safely.

Hazards

2. The following are some injuries that may result when setting or removing power press dies:
    - Strains and hernias can result from excessive lifting and pushing or pulling using improper handling techniques;
    - Foot injuries can occur when dies slip off trucks, benches bolster plates, or storage shelves and strike the foot;
    - Crushing injuries can result when parts of the body are placed between the dies and press or pinch points and intended movement of the slide or die occurs;
    - Lacerations can be caused by wrenches slipping off worn nuts or stud bolts and also from using improper tools;
    - Eye injuries can be caused by flying pieces of shattered dies or material due to improper die setting.

Transferring dies safely

3. All upper and lower die shoes should be fastened together to prevent them from separating unexpectedly.

4. Light-weight dies can generally be handled without mechanical lifting apparatus.

5. Safe handling of medium-size dies requires the use of eyebolts in addition to the die trucks. Regular or plain eyebolts should not be used because of the likelihood of eyebolt failure due to bending. The fully threaded, shoulder type is recommended because of its ability to carry a greater load safely and must be properly seated (see Figure 1).

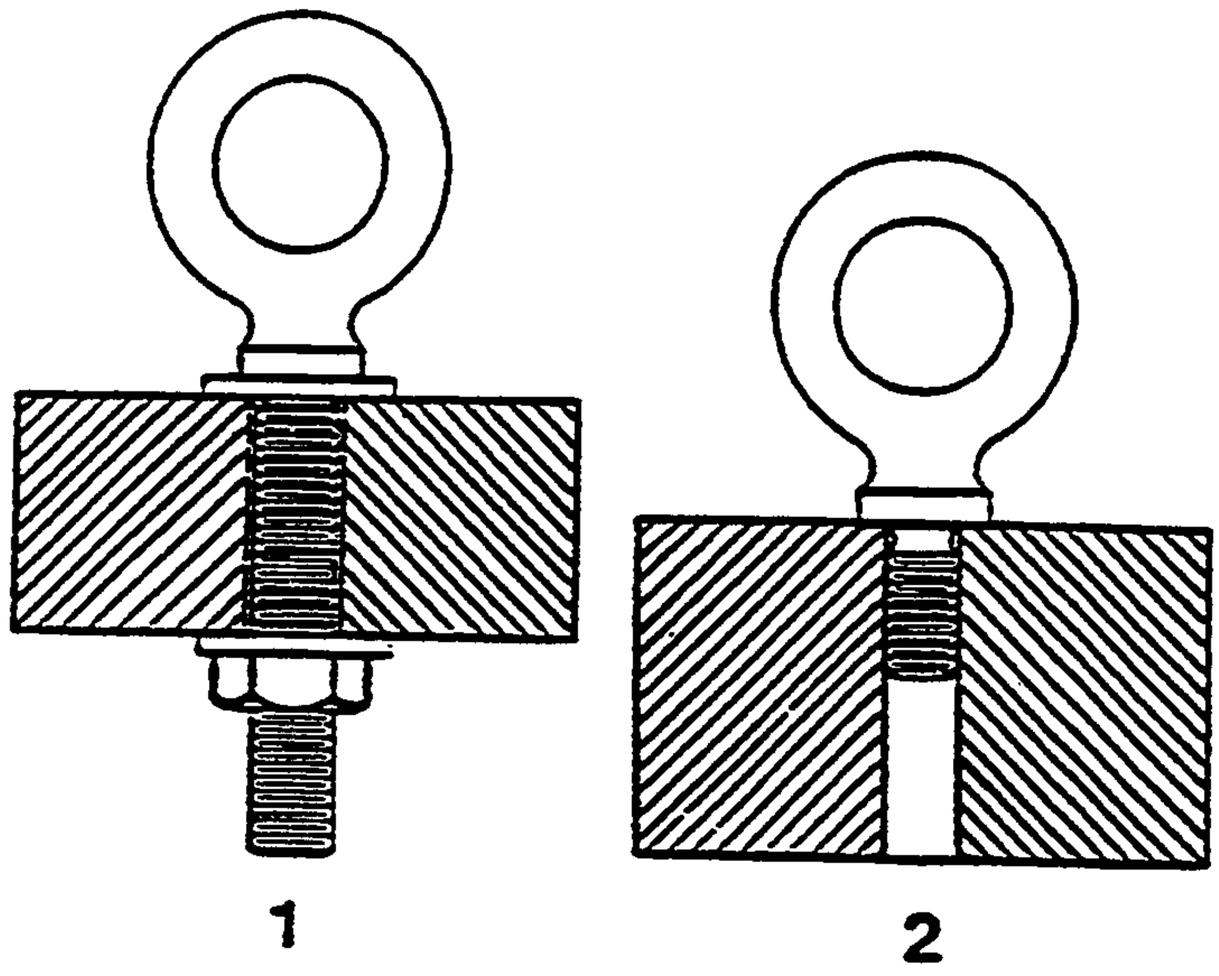


Figure 1. Shows the recommended shoulder-type eyebolts: 1) Special eyebolts can be used to lift plates where holes are unthreaded; 2) The safe way is to sent the shoulder of the eyebolt firmly against the part with full thread engagement.

6. Dies with tapped holes for eyebolt in size increments of 1/4-inch should be used.

7. Universal swivel eyebolts, when affixed to a die, should have proper clearance milled to allow 360 degrees rotation (see Figure 2).

Figure 2. Shows a die fitted with universal swivel eyebolts.

8. For moving heavy-weight dies, special die-handling power trucks are recommended. These trucks should be equipped with special equipment for pushing or pulling the die, such as power winches, roller tables and hydraulic or pneumatic clamps. When transferring dies, place the die truck close to the shelf or press and then adjust the table to the same height as the shelf or bolster plate. Secure the truck by chocking the wheels or locking the brake or some other method to prevent truck movement. Then move the die off the die table onto the bolster plate or shelf. It is recommended that die stops or other means be used to prevent losing control of the die being used when setting or removing dies in inclined presses. To bring a die onto a truck , engage a hook in the die so it cannot slip and exert a steady pull, do not jerk or tug on the hook. Where listing is necessary to make the transfer, use a hoist; never lift the die higher than is necessary for minimum clearance. At no time should an employee have his/her hands, feet or other part of his body underneath a suspended load.

Setting up dies

9. The following safe method for setting up and removing power press dies should be followed for all presses. Check die specifications against the following requirements:

    a. Clear away all stock, containers, tools and other tripping hazards from the work area. Bring the slide down to its lowest position.

    b. Disconnect or shut off the power and lock the electrical disconnect switch.

    c. Measure the clearance height between the bottom of the slide and bolster plate; this distance (shut height) should be slightly greater than, or at least equal to, the height of the closed die; if not, adjust as required.

    d. Raise the slide and insert the safety blocks and leave the slide at the top of stroke. Follow normal procedure to re-engage power is necessary. Safety blocks must be used whenever dies are being adjusted or repaired. Blocks on part-revolution presses should be equipped with an electric interlocking plug, which must be removed from its circuit receptacle before the block can be placed in the die area. On full revolution presses, lock out the drive motor and insert the safety block.

10. Clean the bolster plate and check the die to make sure it does not contain any chips, tools, or finished parts. Then transfer the die to the press.

11. Line up the die in the correct operating position, and remove the die safety block from under the slide. Then, carefully lower the slide until it fits firmly against the top die. Tighten all bolts and clamps necessary to secure the top half of the die to the slide.

12. Position the lower half of the die and bolt and clamp it to the bolster plate. Thread the bolt into the bolster plate to a depth of 1 1/2 time the diameter of the bolt used to provide the proper holding power. Bolting the die shoe to the bolster produces the most secure die setup. If clamps must be used, their outer ends should be blocked up slightly higher than the die surface on which their inner ends will rest. Clamps should be on minimum length and should not interfere with the safe operation of the press. Clamp-fastening bolts should be closer to the die than to the block end of the clamp.

13. For forming or drawing operations, adjust the slide down the almost its proper depth. For a piece or trim die, raise the slide slightly, so that the punch will not shear when the slide is cycled.

    a. Raise the slide to its highest point and block it in this position.
    b. Make sure the die is free of all foreign material.
    c. Install point-of-operation safeguarding, and check for adjustment and operation.
    d. Check guide posts and engagement points, and if separated by more than 1/4 inch, must be protected and treated as a point-of-operation hazard.
    e. Reconnect the power. Be sure to check that operating controls and the point-of-operation safeguarding are in proper working order. Operate the press several times, using the proper material. Make any necessary adjustments only after shutting off the power and blocking up the slide with safety blocks.
    f. After completing the adjustments, remove the safety blocks, turn on the power and again try several operations on the press. If satisfactory, the operator should be given instructions by an authorized person who should observe his methods for a sufficient period of time to insure that the operator is thoroughly familiar with the operation to be performed.

Removing dies

14. The removal of dies from a press should be done with the same care used in setting them up, although modifications may be necessary in special cases. The following is a recommended procedure:

    a. Clear away all stock, containers, tools, and other tripping hazards from the work area.
    b. Close the die by lowering slide to bottom of stroke. Shut off power and block out disconnect switch. Full-revolution clutch presses may require the use of a turnover bar to close the die manually. Before inching or jogging the press, be sure no one is in a hazardous area.
    c. **CAUTION**: Hazards can be encountered if die cushions are not de-energized properly. Care must be taken to make sure that all air pressure is

removed from cushions. The large cylinder area common in die cushions creates great forces with relatively low air pressures. Because of the location of die cushions it is common that chips, flashings, etc., can cause them to appear inoperative, thus creating a serious hazard if the situation is not properly assessed. If the die is operated with an air cushion, shut off the air supply and open the release valve to permit the pins to go down. Also shut off the air supply to the air ejection system used on the die if one was in use.

d. Loosen and remove all bolts and clamps bolting the die to the slide and bolster plate. Plate all bolts, nuts, and clamps on a bench or special place on the die truck as soon as they are removed.

e. Make certain that the die is loose and that all bolts, nuts, clamps, and other

f. Slowly raise the slide (manually on small press, and by jogging or inching under power on large presses), making sure that the die does not hand onto the slide. Close the die by lowering slide to bottom of stroke. Shut off and lock out disconnect switch.

g. Full revolution clutch presses may require the use of a turnover bar to close die manually. Raise the slide to top to stroke, shut off the power, and lock the electrical disconnect switch, and insert safety blocks.

h. Fasten both halves of dies together for handling.

I. Transfer the die from the press to storage

Use of the dump valve is recommended with clutches which are applied to high speed equipment; however, it can only be installed on clutches which are ordered with this feature originally. Normally, no adjustment or periodic maintenance is required for this device.

CLUTCH AIR CONSUMPTION

As an aid in determining the amount of compressed air required to operate the CFC clutch, a chart showing volumetric capacity for each clutch size is included below. Amounts shown include the clutch, shaft porting and usual hose length from shaft to the clutch solenoid valve. Actual volume may vary slightly from the listed amount due to variations in clutch adjustment and hose length. Volume shown is for one engagement.

CLUTCH SIZE	VOLUME—COMPRESSED AIR	
20 CFC	20.7 cu. in.	339.2 cu. cm.
22 CFC	32.2 cu. in.	527.7 cu. cm.
24 CFC	43.3 cu in.	709.6 cu. cm.
26 CFC	60.2 cu in.	986.5 cu. cm.
28 CFC	121.9 cu. in.	997.6 cu. cm.
29 CFC	135.1 cu. in.	2213.9 cu. cm.
30 CFC	160.2 cu. in.	2625.2 cu. cm.

Clutch Air Consumption Chart

Make certain that reference is made to the proper clutch size. Clutch size and type is usually shown on the specification sheet of the press service manual.

CLUTCH TORQUE AND PRESS OVERLOAD

Amount of torque transmitted by the CFC clutch can be varied by changing the air pressure applied to the clutch. This feature can be quite useful in protecting dies and presses from damage due to overloading. However, it should be pointed out that most damage to press equipment is the result of pressure overload, whereas a friction clutch will slip as a result of torque overload. The relationship between the amount of pressure applied by the press slide with regard to clutch torque and distance from bottom of stroke should be explained.

The effective moment arm, or lever arm, of the crankshaft is greatest near mid-stroke; therefore, maximum clutch torque is required to produce a given pressure by the slide at that point. As the slide moves down towards bottom of stroke, the effective moment arm becomes progressively shorter with the result that progressively less clutch torque is required to produce the same given tonnage. Or, more practically stated (since clutch torque is normally held constant through the stroke), with clutch torque held constant, increasingly higher pressures will be produced by the slide as it descends from the mid-stroke position.

Considering the above factors, it can be concluded that, even though clutch torque is set to protect against pressure overload at a certain part of the stroke, it will still be possible for the press to pressure overload at a point further down on the stroke. Overload at the lower point can occur because of the increase in mechanical advantage as the crank approaches bottom of stroke. In fact, as the crank nears bottom of stroke, the effective moment arm will approach zero, and, at this point, no friction clutch can provide absolute protection against overload.

ADJUSTING CLUTCH FOR TORQUE LOAD

Die damage and die failure can be reduced when the clutch torque is sufficient for the job and, at the same time, low enough to allow the clutch to slip if an obstruction or overload occurs in the die area. Clutch torque can be controlled by the amount of air pressure applied to it.

For jobs requiring less than rated tonnage, experiment by reducing air pressure until the clutch is barely completing the cycle without slipping or stalling; then raise air pressure 5 to 10 p.s.i. (.35 to .70 kg/cm^2) to allow for fluctuations in the air supply. Clutch air pressure for production runs should not be set higher than 60 p.s.i. (4.218 kg/cm^2). Should a greater air pressure be required, it is an indication that the equipment is being overloaded.

When an operating pressure for a new die has been established, mark the pressure on the die to eliminate the need for determining pressure each time the die is installed. As the die becomes dull, or improper clearance occurs, these changes will be noticed because they will demand an increase in clutch air pressure.

It would be well to note that this stall feature will not apply if the job is light enough for the work to be done by the inertia of the slide and crank without the clutch actually supplying power. And also, because of the intervening gear ratio, the stall feature will not be effective if the clutch is applied to the backshaft of a geared machine. The mechanical advantage offered by a very short effective moment arm, which is the condition when the crank is near bottom of the stroke, also makes it possible to exert high pressures at this part of the stroke even though clutch air pressure is quite low.

The stall or slip feature of the friction clutch cannot necessarily be expected to guarantee elimination of crankshaft or frame breakage since the clutch will have no control over fatigue factor.

TO RELIEVE SLIDE FROM STALLED POSITION

Release by Inching:

When the press stalls, as a result of two pieces being fed into the die, or for some other reason, the following procedure for relieving stall should be followed:

1. Depress Motor Stop Switch to turn off main drive motor.
2. Determine position of the slide in relation to bottom dead center of the stroke. This can be done by checking the stroke position indicator, if furnished, or by noting position of keyway on the end of the crankshaft. A check of the position of crank cheeks may also be helpful. Determining whether slide is stalled before or after bottom dead center is necessary in order to select the direction for rotating the crankshaft for easiest release.
3. If slide was stalled on the down stroke, or ahead of bottom dead center, start main drive motor in the reverse direction. Increase press speed, if possible. If slide has passed bottom center, start motor in the forward direction.

4. Raise regulated clutch air pressure; however, do not exceed 100 p.s.i.

5. Set clutch control selector to "Inch". Then inch the clutch quickly at intervals of approximately 15 seconds.

6. If slide is not released after 10 or 15 attempts at using the above "inching" method, then follow procedure outlined for bumping pins.

To Release Slide with Manual Bumping Pin:
(Flywheel type machines)

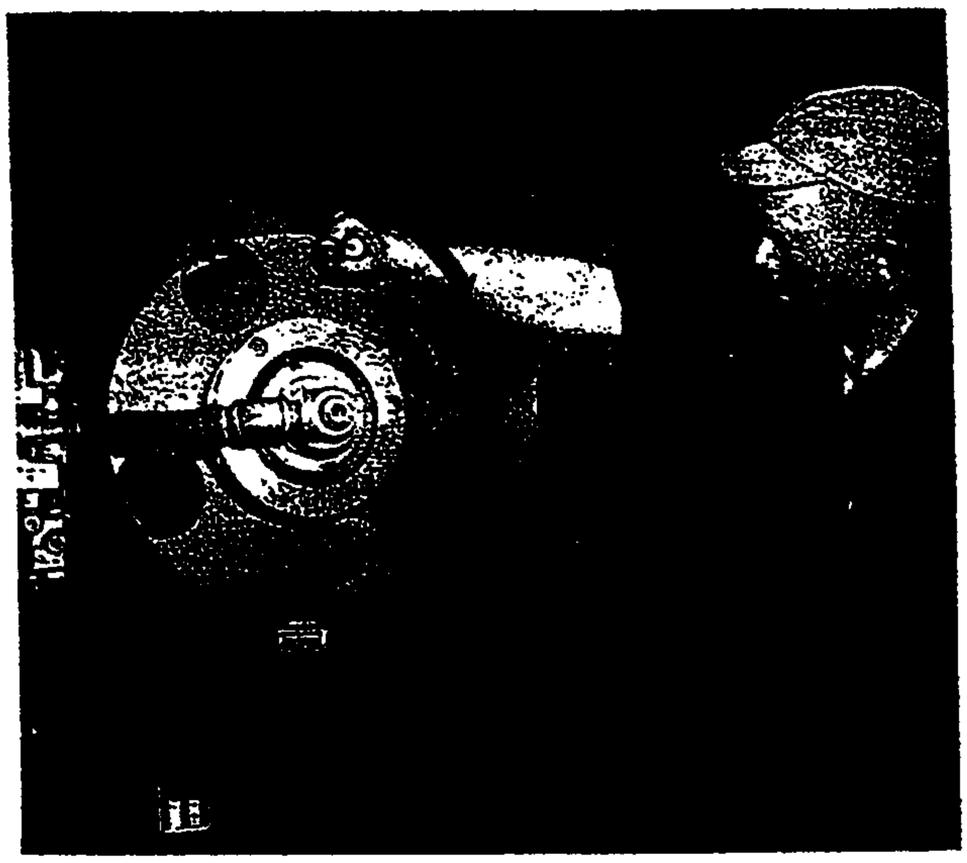


Figure 4. Using Bumping Pin

Bumping is a manual method of relieving stall on a flywheel type machine. The following procedure describes how to relieve slide stall by bumping.

WARNING

DISCONNECT POWER TO THE PRESS AND LOCK THE SWITCH TO PREVENT ACCIDENTAL STARTING OF THE DRIVE MOTOR WHILE BUMPING.

1. Be sure flywheel is stopped and swing open or remove the flywheel cover plate (A) Figure 4. (On most presses, only the section closest to the flywheel hub need be removed.)

2. Check to see if the stroke is before or after bottom dead center to determine direction flywheel should be rotated for easiest release of stall.

3. Insert a hardened steel bumping pin into hole (B) in flywheel web (C). The pin should be a few thousandths of an inch smaller than the hole in the flywheel to make it easier to remove in case it becomes burred from hitting the striking lugs (D).

WARNING

KEEP FINGERS CLEAR OF BUMPING HOLE IN THE FLYWHEEL.

4. Rotate flywheel until pin can be inserted into slotted portion of the end driven disc. Then pull forcefully on the bumping pin (in the predetermined direction) letting the pin slam hard against striking lug (D) on the clutch. Continue manual bumping until slide is free.

5. Clear the die, remove bumping pin, check die and press for possible damage. If repairs are necessary, do not operate press until all damage has been repaired. Replace flywheel cover section or entire protective cover, if removed.

Make certain that the WARNING tag which cautions personnel to keep their fingers clear of the Bumping Pin Hole is not defaced or removed from the vicinity of the clutch. New WARNING tags are available from Minster's Service and Repair Department.

BUMPING PIN RECEPTACLE

As a safety precaution, the bumping pin may be stored in a special receptacle which contains a clutch control interlock switch. Removing bumping pin from the receptacle automatically allows the switch to open — electrical control becomes inoperative and main drive motor cannot be started. The MINSTER Bul. 010-6025 Bumping Pin Switch Assembly, shown in Figure 5, may be ordered for this purpose. The interlock switch should be wired into the control circuit as shown in Figure 6.

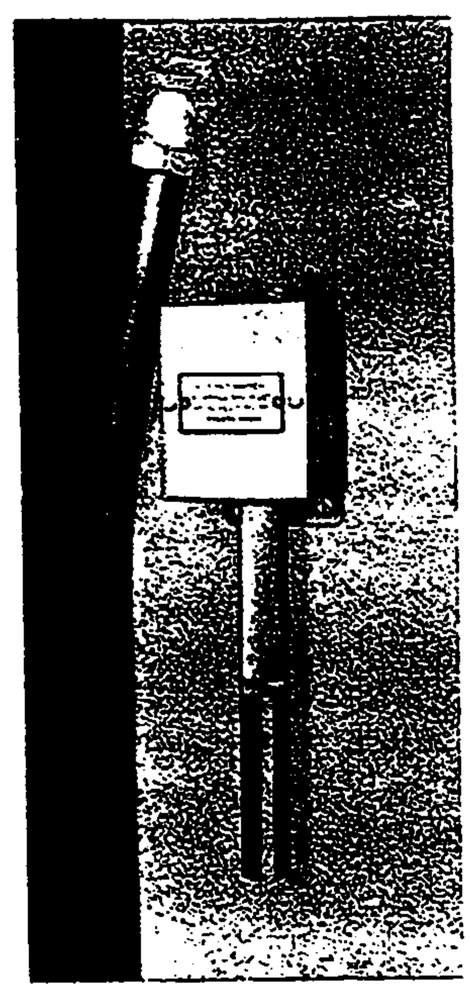


Figure 5. Bumping Pin Switch Assembly. Bumping Pin shown installed in receptacle.

Bumping Pin removed from receptacle. Control interlock switch automatically opened.

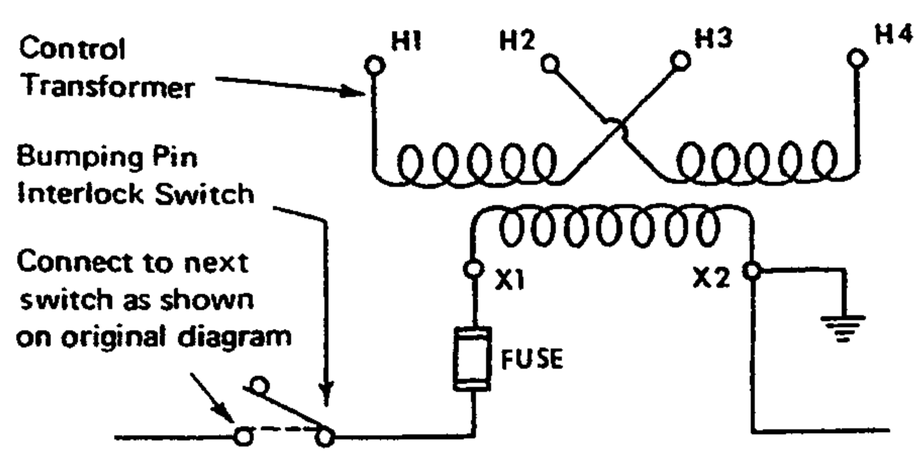


Figure 6. Location of Bumping Pin Interlock Switch in the Clutch Control Circuit.

BARRING OPERATION (Figure 7)

MINSTER CFC clutches, which are applied to the smaller size flywheel type presses, may be arranged for barring operation. This is a method of manually moving the slide only several thousandths of an inch, although it can also be used to move the slide through an entire controlled cycle. It is very convenient when setting and checking dies or when syncronizing feeding mechanism with slide position.

The barring process is a method of engaging the clutch while the flywheel is being turned slowly with a turnover bar. The turnover bar (A) is inserted into one of a series of holes near the flywheel hub and used as a lever to turn the flywheel. As the flywheel is being turned with the bar, the slide will move slowly whenever the BAR push button (B) is depressed. Electrical controls must be arranged (OSHA regulation) so that placing the clutch control selector switch to "BAR" operation will automatically disconnect power to the main drive motor.

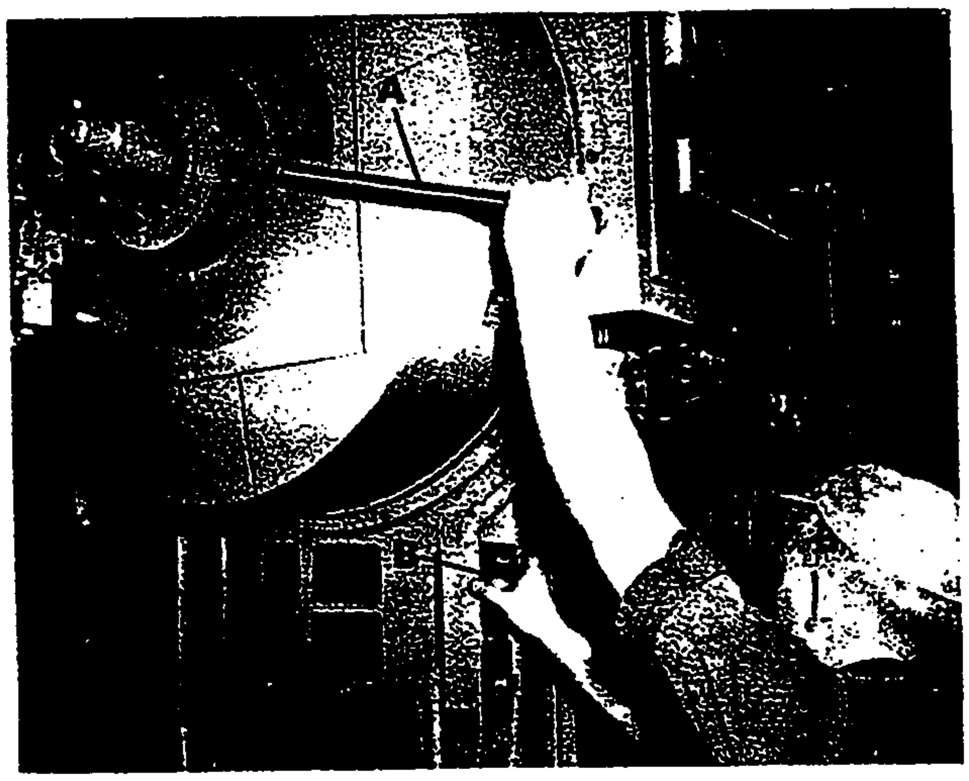


Figure 7. Barring Operation

To BAR the press:

1. Turn off power to the main drive motor and wait for the flywheel to stop turning completely.
2. Set press stroking selector switch to "BAR" position.
3. Insert end of turnover bar (A) into one of the barring holes in the flywheel end bearing cover.

Note: **Federal regulations (OSHA) specify that spring loaded turnover bars shall be provided by the employer for presses designed to accept such turnover bars. A spring-loaded collar, attached near the end of the bar, is used to eject the bar from its barring hole in case the person using that bar releases his hold on it.**

Examples of spring-loaded turnover bars are illustrated in the ANSI B11. 1 Standard.

4. Turn flywheel slowly using the turnover bar as a lever. At the same time, hold the "BAR" palm button (B) depressed. Slide will move slowly and its motion will be controlled precisely by manual movement of the flywheel and coordinated engagement of the clutch. The press clutch will engage when BAR button is depressed.

WARNING

NEVER ACTUATE THE CLUTCH "BAR" SWITCH UNLESS YOU PERSONALLY ARE CONTROLLING MOTION OF THE FLYWHEEL WITH A TURNOVER BAR.

5. It will not be necessary to move the turnover bar from one hub hole to another when turning the flywheel. Merely release the "BAR" push button and use turnover bar in a manner simulating a ratchet wrench.
6. After barring operation is completed, make certain that turnover bar is removed from barring hole and returned to its proper storage area away from the press.

WARNING

STARTING THE MAIN DRIVE MOTOR WHILE TURNOVER BAR IS INSERTED IN THE BARRING HOLE IS EXTREMELY DANGEROUS AND COULD CAUSE SERIOUS OR FATAL INJURY. PRESS COMPONENTS MAY ALSO BE DAMAGED.

CHECK VISUALLY TO MAKE CERTAIN TURNOVER BAR IS REMOVED FROM BARRING HOLE BEFORE STARTING DRIVE MOTOR.

Mechanical Power Presses - Die Setting Safety Procedures

MACHINE # _____DEPARTMENT _____ DATE _____

The Die Setter Must Be Properly Trained in Die Setting Techniques and Safety.

1. Lock off the main power to the press with a lock. The die setter should retain the key until the press is again ready to be operated. If more than one person is working on the press; then that number of locks should be used to lock off power to the press and each person working on the press should have separate and different keys.

2. Safeguards should be clear of any danger that may arise during the die setting procedure, i.e., forklift trucks, etc.

3. Insert safety blocks. Make sure the flywheel has come to a complete rest.

4. Clean the bolster plate, dies and press surfaces before installing dies. Misalignment caused by dirt, chips of metal or other foreign materials could result in injury to operator or damage to press and dies.

5. Make sure the floor and general press area are clean and free of material to allow for free movement.

6. Clamp bolster plate firmly to press. Be sure bolts are in good condition so that constant vibration will not allow plate to move out of position.

7. Do not install worn or damaged dies. Use the proper die to the press size to prevent overloading, which could cause damage to press, dies or injury to operator.

8. All dies must be securely fastened to truck before moving.

9. When a new die set is being placed in a press, the crank should be straight down, the drive motor shut off and the slide adjustment high enough to properly clear the die set.

10. Clamp dies to bolster plate and slide with enough clamps and the proper size clamps to hold dies firmly in position.

11. Before inching or cycling the slide , make a visual press inspection of the press area to make certain the press is ready to run and employees or visitors are free from danger.

12. Before cycling the press, perform all necessary adjustments during and after die installation. Be sure slide height adjusting shaft clamps are tight. If optional slide height lock assembly is furnished, make certain lock nut is up tight and locking clamp crews are secured.

13. Reset counterbalance air pressure to compensate for weight of upper die.

14. Reposition the safeguard(s) and make certain it is properly secured to press, is properly adjusted to OSHA's safe-distance requirements or Table 0.10, or both, if appropriate. Make sure interlocks, if provided, are operating and the safeguard is properly operating.

15. Before turning the press over to the operator, make certain the operator has been properly trained to operate the press and is aware of safety procedures for the press operator.

16. Observe press operation for a sufficient length of time to determine that the press is working properly.

17. Before leaving the press area, make sure all tools, bolts or other obstructions in or near the press are taken or removed.

NOTE: Use extra care in setting, coining, embossing or forming dies. These dies are of the closed type and do not provide relief for flow or displacement of excess material. Setting these dies too close or bottoming a die will cause a rapid increase in pressure required to carry the crankshaft beyond bottom dead center and will increase the possibility of seriously damaging the press and dies or injury to the operator.

I, the undersigned, certify that I have followed the above procedures when setting dies in the machine described above. I further certify to the best of my ability, the safeguard is in proper working order, as is the press and the safeguard is adjusted to the OSHA 1910.217 standards.

Signature _____ Date _____ Time: _____
(Name)

DIE SETTING

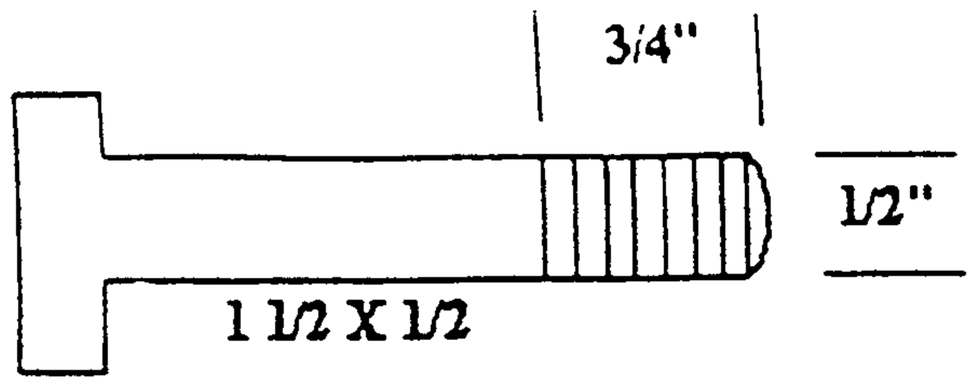
Name of Press _____ Stroke _____

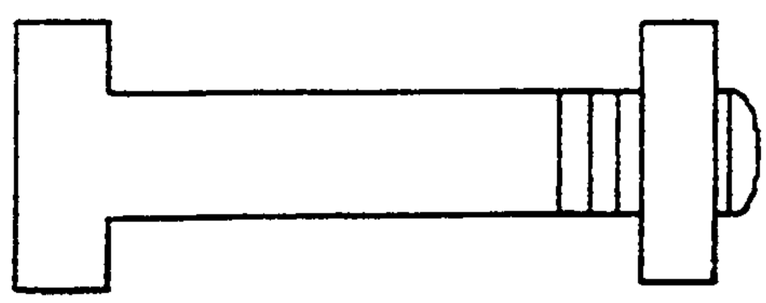
Serial # _____ Press # _____

Tonnage _____

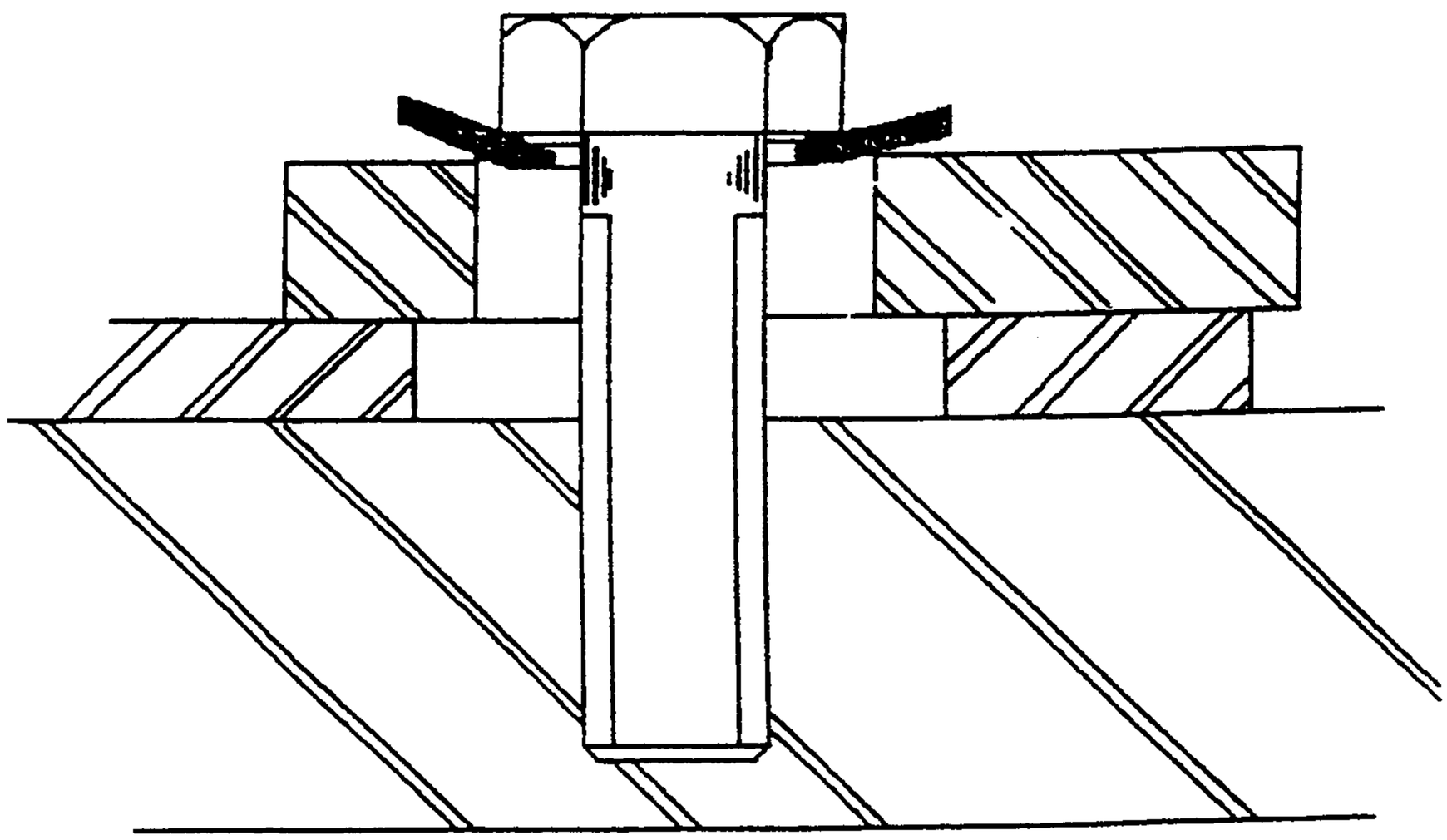
YES NO

_____ _____ 1. Die storage rack
_____ _____ 2. Die markings-tonnage _____ Total Weight _____ Upper weight _____
_____ _____ 3. Forklift
_____ _____ 4. Cranes
_____ _____ 5. Slings
_____ _____ 6. Cart
_____ _____ 7. Removing stuck hand tool
_____ _____ 8. Scrap hand tool
_____ _____ 9. Roll feed
_____ _____ 10. Die fastening: Bolts size _____ Nuts _____
_____ _____ 11. Tools for set-up
_____ _____ 12. Turnover bar
_____ _____ 13. Die stops
_____ _____ 14. Safety blocks
_____ _____ 15. Lubricating hand brushes _____ Swabs _____ Automatic _____
_____ _____ 16. Hand spray _____
_____ _____ 17. Bolster plate cleaned
_____ _____ 18. Measuring the die _____
_____ _____ 19. Inch, turnover bar or job ram to bottom of stroke (more than one set up person)
_____ _____ 20. Measuring the opening _____
_____ _____ 21. Look out set die in press
_____ _____ 22. Secure upper and lower die
_____ _____ 23. Kiss blocks, die stop blocks, thickness
_____ _____ 24. Air counterbalance
_____ _____ 25. Air switches
_____ _____ 26. Counterbalance data plate
_____ _____ 27. Regulators
_____ _____ 28. Tonnage Meter
_____ _____ 29. Return all guard





SEE 1 THREAD OR CHAMPER AT MINIMUM STRENGTH



WASHER TOO THIN, PRESSURE WILL BEND

<u>THE IDEAL WASHER THICKNESS FOR A 1/2" BOLT SHOULD BE 3/26": FOR A 5/8" BOLT, 7/32"; AND FOR A 3/4" BOLT, 1/4"</u>

DIE SETTING QUIZ

		(CIRCLE ONE)	
1.	A PART REVOLUTION CLUTCH PRESS CANNOT BE STOPPED DURING THE CYCLE.	**T**	**F**
2.	A FULL REVOLUTION CLUTCH PRESS CAN BE STOPPED AT ANY POINT DURING THE CYCLE.	**T**	**F**
3.	DISCONNECT SWITCHES CAPABLE OF BEING LOCKED ONLY IN THE "OFF" POSITION AND LOCKOUT/TAGOUT ONLY APPLIES TO PART REVOLUTION PRESS.	**T**	**F**
4.	CONTROL RELIABILITY AND BRAKE MONITORING IS REQUIRED WHEN THE OPERATOR IS PLACING HIS/HER HAND(S) INTO THE POINT OF OPERATION ON A PART REVOLUTION CLUTCH PRESS.	**T**	**F**
5.	WHEN SETTING UP A PRESS AND THE SELECTION IS IN INCH MODE, THE SET-UP PERSON CAN PUT HIS/HER HANDS IN THE DIE AS LONG AS THE PRESS IS LOCKED OUT.	**T**	**F**
6.	SET-UP PERSONNEL ARE NOT RESPONSIBLE FOR ADJUSTING GUARDS OR DEVICES.	**T**	**F**
7.	HAND TOOLS MUST BE USED TO REMOVE SCRAP OR FREE STUCK PARTS.	**T**	**F**
8.	IT IS A FEDERAL REQUIREMENT FOR EMPLOYERS TO INSPECT AND MAINTAIN A CERTIFICATION FOR ALL PRESSES, ONLY IF THERE HAS BEEN AN ACCIDENT ON THAT PRESS.	**T**	**F**
9.	PROPER RELINING OF ASBESTOS BRAKES AND CLUTCHES INVOLVES WET METHODS FOR DUST REMOVAL AND VACUUMING WITH HEPA VACUUM RATHER THAN BLOWING OUT THE DUST WITH COMPRESSED AIR.	**T**	**F**
10.	DIE BLOCKS SHALL BE PROVIDED AND USED WHENEVER DIES ARE BEING MAINTAINED OR REPAIRED AND LOCKOUT TAGOUT DOES NOT APPLY.	**T**	**F**
11.	WILL THE DIE FIT IN THE PRESS IF THE RAM IS AT TOP STROKE, AND THE DIE IS 23.25" IN HEIGHT AND THE OPENING IS 33" WITH A 10" STROKE?	**T**	**F**
12.	WOULD THE DIE FIT IF THE RAM IS AT THE TOP OF THE STROKE, THE DIE IS 23" IN HEIGHT, AND THE STROKE IS 7" WITH A SHUT HEIGHT OPENING OF 31" ?	**T**	**F**
13.	IF YOU HAVE NO STOP BLOCKS, YOU CAN JUST GUESS AT THE THICKNESS OF THE STOCK TO ADJUST THE RAM	**T**	**F**

14. IN GENERAL, THE BEST WAY TO PROTECT WORKERS USING POWER PRESSES IS:

A. A PERMANENT FIXED GUARD

B. USING HAND TOOLS

C. USING THE PROPER SAFETY DISTANCE

15. THE AREA OF THE PRESS, WHERE MATERIAL IS POSITIONED AND WORK IS PERFORMED, IS CALLED:

A. THE BOLSTER PLATE

B. THE DIE

C. THE POINT OF OPERATION

16. AUTOMATIC DEACTIVATION OF THE CLUTCH/BRAKE CONTROL, IN THE EVENT OF AIR PRESSURE FAILURE, IS INITIATED BY:

A. AN AIR PRESSURE SWITCH

B. A LARGER AIR LINE

C. A BRAKE MONITOR

17. A SIGNIFICANT INCREASE IN STOPPING TIME, MEASURED IN MILLISECONDS OR EXCESSIVE TOP STOP OVER RUN, SHOULD BE DETECTED BY:

A. CONTROL RELIABILITY MECHANISMS

B. AIR COUNTERBALANCE SYSTEMS

C. BRAKE MONITOR

18. IF YOU HAVE KISS BLOCKS (SAFETY BLOCKS) AND YOU HAVE THE TOOL.ROOM GRIND OFF THIRTY THOUSANDTHS OF AN INCH OFF OF A PUNCH. HOW MUCH WOULD YOU HAVE TO GRIND OFF OF THE KISS BLOCK?

A. .030”

B. .0035”

C. .0040”

19. THE SHUT HEIGHT IS MEASURED FROM:

A. TOP STROKE

B. BOTTOM STROKE

C. MID STROKE

20. WHERE WOULD YOU FIND THE INFORMATION FOR THE DIE, I.E. TONNAGE, WEIGHT OF DIE SET AND UPPER DIE?

A. SUPERVISOR

B. DIE RECORDS

C. STAMPED ON DIE

21. IF THE DIE IS 13" TALL AND THE RAM IS AT THE BOTTOM OF THE STROKE AND THE OPENING IS 23", HOW FAR WOULD YOU HAVE TO ADJUST THE SHUT HEIGHT?

A. 10"

B. 13"

22. IF YOU HAVE A SHUT HEIGHT OF 30 INCHES AT THE BOTTOM OF THE STROKE, AND YOU HAVE A DIE THAT IS 23 INCHES. HOW MUCH ADJUSTMENT ON THE PITMAN IS NEEDED TO CLOSE DOWN ON THE DIE ?

A. 9"

B. 7"

C. 5.5"

23. SET-UP PERSON SHOULD ALWAYS CHECK THE SHUT HEIGHT AT THE

A. BOTTOM OF THE STROKE

B. MIDDLE OF THE STROKE

C. ON THE UP STROKE

Inspections

MECHANICAL PRESSES

Preventive Press Maintenance, By: Robert Soman

Previous installments in this article on mechanical press maintenance focused on specific areas including tie rods, clutches, etc. This final installment discusses things such as belt tension and the importance of counterbalance adjustment. Too often, these "little" matters are a source of downtime and damage simply because they are taken for granted.

Torsional Overload

When a press equipped with a friction clutch is overloaded torsionally, normally the clutch will slip. Sometimes this occurs near the bottom of the stroke, especially during the die setting. If this happens the press will "stick-on-bottom" and it will be difficult to engage the clutch (without slipping) to get the press off bottom. This condition results because the press frame is strained, usually beyond the rated capacity of the press.

If this condition occurs it is important to establish whether the press is on the downstroke, upstroke, or on bottom dead center, so that the proper direction of slide movement to clear the jam can be determined. If the press is not equipped with a slide position indicator, observation of the crankshaft keyway may help, as this keyway is usually located down when the stroke is down.

If it is not possible to determine the position of the slide visually, it may be possible to do so by observing the motion of a dial indicator when the press id instantaneously jogged.

Having determined the direction the slide must move, the press should be jogged in this direction under elevated clutch pressure, usually not to exceed 100 psi. If the press is to be reversed, and it is not equipped with a reversing starter, the motor leads must be reversed temporarily.

If the press cannot be "unstuck" using this method and if it fortuitously is of tie rod construction, the tie rods can be relaxed. If the press is of solid frame or gap frame construction, the problem is more serious. Dry ice can be used on the dies. And as a last resort, some part of the die may have to be sacrificed by burning to relieve the press.

Capacity Overload

A press can also be overloaded by exceeding its energy capacity. This results in the flywheel slowing down either during one press stroke, or progressively. If the flywheel slows down too much during a single press stroke, the only remedy is to increase the flywheel energy. This means either using a larger flywheel or speeding up the existing flywheel. A larger motor will be of a little help.

Sometimes the press configuration will allow for a ring to be shrunk on the O.D. of the flywheel to increase its energy. This is especially true of overhung flywheels such as those found on non-geared presses, and also on presses having quill-mounted flywheels. In either case, the motor must be checked to be sure that it has sufficient torque to bring the larger flywheel back to synchronous speed in the available time.

It is not often practical to increased flywheel energy by increasing press speed with a pulley change, although a small increase in speed is significant because energy available is a function of the square of its speed. In the first place, work requiring high energy capacity generally limits the press speed or the speed with which the dies contact the work. In the second place, increasing press speed often exceed the recommended speed for the clutch and brake. However, this is an expedient to be considered.

If the press slows down gradually over a series of press strokes, this is an indication that the motor is too small. That motor should then be replaced with another motor having sufficient torque to restore the flywheel to its synchronous speed within one press cycle.

The "servicing" section of your owner's manual contains valuable and specific information on the various adjustments required to keep the press running in optimum condition. This article will cover several of the important ones.

Drive Belts

It is important that belts be kept at their proper tension. It is easy to diagnose a press as not having sufficient energy, when all that is wrong is that belts are slipping. This can easily be determined by using a tachometer on the motor shaft. Slipping belts can also create quite a racket when starting the press from rest.

V-belt tension is correct when the belts can be depressed 1/2 inch with normal thumb pressure applied midway in the belt span. It is important that V-belts be purchased in matched sets. If some of the belts sag or flop while the others seem to run smoothly, the belts are not matched.

A somewhat more modern practice is use the poly-"V" belt. These belts are available in the standard A, B, C and D sizes, but are molded with 3, 4, or 5 belts having a solid or one-piece back. If more than one set is required, these belts must also be matched.

Clutch and Brake Wear

Besides operating the pneumatic and brake at the recommended air pressure, it is essential that they be kept in proper adjustment.

Most combines clutch and brake units have an adjustment to take up wear of the friction surfaces. Recommended travel of the piston is usually between 1/16 and 1/8 inch. Excessive

travel effects the response time of the unit and consequently the brake monitor. It is possible that grossly excessive travel could cause the piston to bottom with consequent loss of either clutch or brake.

Clutch and brake friction discs will wear, and in time must be replaced. The amount of wear that is permissible varies with the type of lining and its thickness. Recommended limits on lining wear, if not specified in the service manual, should be obtained from the manufacturer because structural failure of the lining could result from excessive wear. As an example, allowing the lining to wear to half its original thickness is entirely too much.

Separate clutch and brake arrangements, whether or not they are of the low inertia types, have the same wear limitations. In addition, they must be checked to make sure that the clutch and brake do not overlap. Some high-speed operations require that the brake be deliberately set to overlap the clutch and brake arrangements cannot tolerate overlap as excessive heat and wear will result.

When the press is new it is no doubt properly set up to prevent overlap. However, an change in clutch-valve location, size of piping, or malfunction of any "quick-relief" valves could upset the balance. The best way to check the set-up is by the use of wither linear or pressure transducers and a brush recorder.

Counterbalance Cylinders

Most modern presses are equipped with air counterbalance cylinders. Air counterbalance cylinders perform the following function:

- Take up backlash. Backlash comes from bearing clearance, clearance in adjusting screw threads, and from clearance between gear teeth. Uncounterbalanced backlash can adversely affect die setting accuracy as the actual bottom of stroke will vary under load. Air counterbalances provide an adjustable force to properly counterbalance varying die weights, thus assuring an accurate bottom of stroke or shut-height position.

- Assist in make slide adjustment. Properly adjusted air counterbalances will remove practically all of the weight required to be moved during slide adjustment. If the slide adjustment is manual, less force is required. If the slide adjustment is motorized, less load will be carried by the slide adjusting mechanism, thus increasing its life.

- Relieve some of the load on the press drive. Uncounterbalanced backlash can cause considerable load on drive gears when starting and stopping the press. Properly regulated counterbalances will reduce this load and thereby increase the life of the drive gears.

- Improve safety. The use of air counterbalances is a significant safety measure as their use will prevent the press slide from falling inadvertently due to failure of the service brake, ,or any component, or the stripping of load carrying members. These include pitman cap studs, adjusting nut retainers, etc.

- Reduce noise level. Properly adjusted air counterbalances will reduce the noise level of the press gearing.

Pressure Adjustments

Setting the adjustment of the counterbalance air pressure is usually a simple matter of knowing the die weight, and referring to the counterbalance air pressure chart conventionally mounted on the left hand upright. Die weights should be prominently marked on each die set. Air pressure to balance the empty slide is usually about 50 psi.

If this value is not available, it can be determined by running the press without dies, and using an ammeter on one of the main motor leads. The ammeter needle will vary least at the proper pressure. The die weight capable of being counterbalanced is a function of the diameter of the air cylinders. The amount of die weight counterbalanced is a function of the diameter of the air cylinders. The amount of die weight counterbalanced for each 5 psi above the weight required to balance the empty slide is determined by the formula:

$$W = N \times \frac{D^2}{4} \times 5$$

"N" is the number of air cylinders and "D" is their diameter. A chart can then be made and attached to the press for reference.

Some presses are equipped with permanently mounted ammeters so that the proper counterbalance setting can be checked for each die installation. While it is not possible to cover all maintenance problems associated with mechanical power presses a few additional tips might prove helpful.

Gear Wear

Main gears, except for crank presses whose clutch is crankshaft mounted, experience wear on only one segment of their teeth . This is so because the affected segment is presented in the load area repetitively. If, due to lack of lubrication or improper heat treatment, the wear becomes excessive it is possible to re-locate the keyways in the gear hub, and rotate the gear with respect to the crank thus presenting a new segment of teeth to the load.

Incidentally, gear sets should be designed so that the number of teeth in the pinion and gear have no common denominator. If they do, the same pinion teeth will be presented cyclically to the same gear teeth, and accelerated wear will result.

Crankshafts

Broken crankshafts are truly an indication of overload. However, chronic breakage may be caused more by poor main bearing support in rigid bearings. If the bearing housing gives under load, the point of support is thrown away from the center of the crank, thereby increasing the bending moment in the crank. The complete load reversal inherent in any rotating shaft subject to bending causes the shaft to be sensitive to cyclic loading of this nature and may result n failure.

If a problem of this type exists, look for broken welds, cracked support ribs, and bell-mounted bushings. If this condition is not remedied, broken crankshafts will continue to be a problem.

SAMPLE FORM

MECHANICAL POWER PRESS MONTHLY INSPECTION RECORD FULL REVOLUTION

MACHINE # _____ **DEPARTMENT** _____ **DATE** _____

OK	NOT OK	PARTS INSPECTED	IF NOT OK, CONDITIONS	DATE OF CORRECTION
		Floor Condition Clean		
		Piping to Press (air power)		
		Lighting at Press		
		Operator Properly Trained		
		Bolster Plate Secure		
		Inclining Screw, Ratchet, Screw Pin, Cotters for Screw Pin		
		Lower & Upper Treadle		
		Tie Rods		
		Leg Clamps & Pivot Bolt		
		Brake-Collar		
		Collar Key Strap, Fixed Half, Hinged Half, Hinge Pin, Adjustment Spring, Band Nut Adjustment Stud		
		Latch Bracket, Latch Spring		
		Flywheel End Collar Pin		
		Anti-Repeat		
		Single Stroke Mechanism		
		All Parts & Screws Secure		
		Frame & Base for Cracks		
		Bearing Clearances Bolt		

SAMPLE FORM

MECHANICAL POWER PRESS MONTHLY INSPECTION RECORD FULL REVOLUTION

MACHINE # _____ **DEPARTMENT** _____ **DATE** _____

OK	NOT OK	PARTS INSPECTED	IF NOT OK, CONDITIONS	DATE OF CORRECTION
		Slide-Jib Clearances		
		Main-Drive (belts, gears)		
		Air Gauge (condition, accuracy)		
		Push-Palm Buttons & Wiring		
		Ground Fault Potential		
		Rotary Limit Switch Secure & Cams, Relays Secure & Adjusted		
		Operator's Station Secure		
		Main Control Cabinet Secure & Closed After Inspection for Oil, Grease, etc., and Proper Functioning of all Components, Devices Contained Therein		
		Main Motor Controls Operating		
		Slide Adjust Motor Controls		
		Designated Wiring Secure at Proper Terminal Points		
		Foot Switch, Spring & Wiring		
		Lubrication Operating at all Designated Points		
		Main Clutch Valves Operating		

SAMPLE FORM

MECHANICAL POWER PRESS MONTHLY INSPECTION RECORD FULL REVOLUTION

MACHINE # _____ **DEPARTMENT** _____ **DATE** _____

OK	NOT OK	PARTS INSPECTED	IF NOT OK, CONDITIONS	DATE OF CORRECTION
_____	_____	Brake Operating, Clean Adjusted	_____	_____
_____	_____	Stopping Time at 90 degree _____Milliseconds	_____	_____
_____	_____	Safe Distance of Safeguarding OK	_____	_____
_____	_____	Anti-Repeat	_____	_____
_____	_____	Barrier Guard Adjusted to Table 0-10	_____	_____

COMMENTS:_____

_____

_____

INSPECTED BY: _____
(Name and Job Title)

PRESS APPROVED FOR OPERATION_____RED TAGGED_____

SAMPLE FORM

MECHANICAL POWER PRESS WEEKLY INSPECTION RECORD
FULL REVOLUTION

MACHINE # _____ **DEPARTMENT** _____ **DATE** _____

OK	NOT OK	PARTS INSPECTED	IF NOT OK, CONDITIONS	DATE OF CORRECTION
_____	_____	Slide-Jib Clearance	_____	_____
_____	_____	Main-Drive (belts, gears)	_____	_____
_____	_____	Air Gauge (condition-accuracy)	_____	_____
_____	_____	Air Cylinder/Valves	_____	_____
_____	_____	Push-Palm Buttons & Wiring	_____	_____
_____	_____	Ground Fault Potential	_____	_____
_____	_____	Lubrication System	_____	_____
_____	_____	Two-Hand Trips at Safe Distance	_____	_____
_____	_____	Safeguard Adjusted to Table 0-10	_____	_____
_____	_____	Safeguard Interlocks	_____	_____
_____	_____	Motor Controls	_____	_____
_____	_____	Relays, Switches, etc.	_____	_____

COMMENTS: _____

_____

_____

INSPECTED BY: _____
(Name and Job Title)

PRESS APPROVED FOR OPERATION_____RED TAGGED_____

SAMPLE FORM

MECHANICAL POWER PRESS WEEKLY INSPECTION RECORD
PARTIAL REVOLUTION

MACHINE # _____ **DEPARTMENT** _____ **DATE** _____

OK	NOT OK	PARTS INSPECTED	IF NOT OK, CONDITIONS	DATE OF CORRECTION
		Floor Condition Clean		
		Lighting at Press		
		Operator Properly Trained		
		Brake-Collar		
		Collar, Key Strap, Fixed Half, Air Cylinder Operating, Hinged Half, Hinge Pin, Adjustment Spring, Band Nut Adjustment		
		Push-Palm Buttons & Writing		
		Ground Fault Potential		
		Rotary Limit Switch Secure & Cams,. Relays Secure & Adjusted		
		Main Control Cabinet Secure & Closed After Inspection for Oil, Grease, etc., and Proper Functioning of all Components, Devices Contained Therein		
		Main Motor Controls Operating		
		Slide Adjust Motor Control		
		Designated Wiring Secure at Proper Terminal Points		

SAMPLE FORM
MECHANICAL POWER PRESS WEEKLY INSPECTION RECORD
PARTIAL REVOLUTION

MACHINE # _____ **DEPARTMENT** _____ **DATE** _____

OK	NOT OK	PART INSPECTED	IF NOT OK, CONDITIONS	DATE OF CORRECTION
_____	_____	Foot Switch, Spring & Wiring	_____	_____
_____	_____	Main Clutch Valves Operating	_____	_____
_____	_____	Brake Operating, Clean & Adjusted	_____	_____
_____	_____	Stopping Time at 90 degree _____Milliseconds	_____	_____
_____	_____	Safe Distance of Safeguard OK	_____	_____
_____	_____	Anti-repeat	_____	_____
_____	_____	Barrier Guard Adjusted to Table 0-10	_____	_____

COMMENTS: _____

_____

_____

INSPECTED BY: _____
(Name and Job Title)

PRESS APPROVED FOR OPERTION_____RED TAGGED_____

SAMPLE FORM

MECHANICAL POWER PRESS MONTHLY INSPECTION RECORD PARTIAL REVOLUTION

MACHINE # _____ **DEPARTMENT** _____ **DATE** _____

OK	NOT OK	PART INSPECTED	IF NOT OK, CONDITIONS	DATE OF CORRECTION
		Floor Condition Clean		
		Piping to Press (air, power)		
		Lighting at Press		
		Operator Properly Trained		
		Bolster Plate Secure		
		Inclining Screw, Ratchet, Screw Pin, Cotters for Screw Pin		
		Tie Rods		
		Leg Clamp & Pivot Bolt		
		Brake Collar		
		Collar Key Strap, Fixed Half, Air Cylinder Operating Hinged Half, Hinge Pin, Adjustment Spring, Band Nut Adjustment		
		Fly Wheel End Collar Pin		
		All Parts & Screws Secure		
		Frame & Base for Cracks		
		Bearing Clearances		

PULL OUT RESTRAINT INSPECTION

Each pull-out device or restraint in use shall be visually inspected and checked for a proper adjustment at the start of each operator shift, following a new die set-up, and when operators are changed. Necessary maintenance or repair or both shall be performed and completed before the press is operated.

MACHINE #_____DEPARTMENT_____NUMBER OF OPERATOR_____

DATE_____SHIFT CHANGE_____DIE CHANGE_____

OPERATOR CHANGE_____TIME_____

A SEPARATE DEVICE SHALL BE PROVIDED FOR EACH OPERATOR IF MORE THAN ONE OPERATOR IS USED ON A PRESS. PART INSPECTED APPLIED TO EACH DEVICE.

YES	NO	PART INSPECTED	CORRECTION	DATE OF CORRECTION
_____	_____	All parts, nuts, bolts, etc. secure	_____	_____
_____	_____	Attachments connected to and being operated only by the press slide or upper die	_____	_____
_____	_____	Attachments adjusted to prevent each operator from reaching into the point of operation or to withdraw the operator's hands from the point of operation before the die closes	_____	_____
_____	_____	Horizontal support secure	_____	_____
_____	_____	Vertical support secure	_____	_____

YES	NO	PART INSPECTED	CORRECTION	DATE OF CORRECTION
_____	_____	Cables must not be bent, frayed or twisted	_____	_____
_____	_____	Brackets secure and in good condition	_____	_____
_____	_____	Check multiplier cam (gear) for wear	_____	_____
	_____	Visual inspection of total system	_____	_____

I, understand, certify that this date and time, I followed the above inspection procedure on the indicated machine and find the device/devices in good operating condition, properly adjusted to insure safe operation of the press by the operator/operators.

Signature_____
(Name and Job Title)

Pull outs approved for operation_____

Red Tagged_____

Personal Protective Equipment

OHIO WORKERS COMPENSATION

Bulletin

Published by Sewart R. Jaffy Co. L.P.A.
Vol 4 No. 12 December 1985

Safety Violations

Decision

Ineffective Eye Protection Leads To VSSR

State, ex rel. Moore, v. Ind. Comm., Franklin App. No. 85AP-194 (9'17'85)

SITUATION: Moore suffered an eye injury when a wood chisel used by a co-worker splintered and sent metal fragments into his left eye. Moore was wearing safety glasses at the time, but the glasses had no side shields.
The eye was later removed. Moore filed an application for a safety violation award (VSSR): He claimed the safety codes: Ohio Administrative Code 4121:1-5-17 (C)(1) and 1-5-17(D)(1), (2), (3), and (4) were violated. The Industrial Commission denied the VSSR. Moore filed a mandamus action in Common Pleas., which ruled in Moor's favor. The employer appealed.

STATUS: Court of Appeals affirms the granting of mandamus for Moore. Court rejects employer's argument that a chisel which splinters is an un-foreseeable event, outside the safety code. Court notes that (D)(1) requires eye protection "for any other employee required to work in the immediate area." Further , court says the injury is foreseeable . It notes that (D)(2) requires eye protection for employees in the area of ... "chipping where there is a danger of flying particles" Court says company is unreasonable on its argument that only frontal eye protection is necessary. Common Pleas ruled that 4121:1--5-17 (C) requires equipment which will effectively protect against the hazard involved. It said that safety glasses without side shields do not effectively protect. Court also rejects company argument that the safety code does not contain a specific provision that safety glasses have side shields. Court says it is supposed to be "effective protection." Court points to an Industrial Commission "eye protection" booklet which displays eleven varieties of eye and face protection, ten of which have side shields and the booklet labels the style without the side shields an "not recommended"

Editor's Comment: Court also rejects employer's argument that it is not a guarantor that a safety device will not fail. It says the single failure exception to the safety equipment does not apply because the proper safety device was not supplied.

Demand for Additional Award

Safety Violation: OH

Giles, an employee of Jeep Corporation, worked with a mechanical power press. The press was operated by a treadle which was protected, for safety reasons, by a cover. However , the front cover was missing.

While Giles had his arm inside the press, some falling stock or his foot hit the treadle, causing the press to cut off his arm.

Giles applied for and received worker's compensation benefits.

He later filed for an additional award, available under Ohio law for the violation by jeep of a specific safety requirement.

At a hearing , the industrial commission cited its requirement that foot treadles used to activate power presses be guarded. It found the foot treadle of the press that injured Giles was not covered, and that the press was activated when the treadle was accidentally hit. Concluding that the treadle guard requirement was violated, the commission awarded Giles an additional 15 percent in benefits. Both parties moved for review by an appellate court. Jeep argued that the commission improperly granted the additional award. Giles argued the amount of the award should have been higher.

The appellate court upheld the commission. Both parties appealed. Jeep argued the treadle requirement was not specific enough to justify an award; that there was no evidence to support the commission's conclusion that the treadle was not guarded; and the lack of a front cover caused Gile's injury. Giles argued that the commission improperly failed to state the factors which went into 15 percent award.

DECISION: Affirmed.

When looked at with common sense, the treadle requirement was specific enough. There was evidence to support the commission's findings. The fact that other evidence was conflicting did not matter. there was no evidence that the commission did not consider all relevant factors in making the award of 15 percent.

State ex rel. Jeep Corporation v. Industrial Commission, 537 N.E. 2d 215 (1989) OH.
See also: State ex rel. Harris, v. Industrial Commission, 465 N.E. 2d 1286 (1984).

FOOT PROTECTION

PARAGRAPH (E) OF RULE 4121:1-5-17 :

Foot protection shall be made available by the employer and shall be worn by the employee where an employee is exposed to machinery or equipment that represents a foot hazard or where an employee is handling materials which presents a foot hazard .

Foot protection denotes some five types of shoes:

(1). "Safety Toe," toe box usually steel which in incorporated into the shoe when it is built ;
(2). "Conductive," designed to dissipate static electricity;
(3). "Explosive Operations," (non-sparking) used in the manufacture of certain explosives ;
(4). "Electric Hazard," designed to minimize hazards due to electric current ;
(5). "Foundry of Molder's," specially designed for protection while pouring metal of from splashing metal.

Foot protection may be provided by boots, rubber or plastic, with or without safety toes ; rubbers ; sandals with wooden sole worn over regular shoes and used by pavers, chemical workers, etc. Metal or plastic guards which fit over regular shoes are used extensively in forge shops, foundries, paper mills, quarries, packing plants, lumber mills, ice plants and other operations. Combination foot and shin guards are also available.

"Foot protection," as expressed in paragraph (E) of rule 4121:1-5-17 of the Administrative Code, was intended to denote the great variety of protective items that might be issued from a "stores" situation and would remain in the possession of the employer to be reissued as needed, where the employee would be exposed to a foot hazard.

There was no intent on the part of the Safety Codes Steering Committee to indicate in any way an employer should purchase and item as personal as safety shoes. Many companies have as a condition of hire a requirement that "safety shoes" will be worn while the employee is on company property. The employee then provides his own shoes.

The Codes Committee also relied on a ruling issued March 24, 1975 by the United States Court of Appeals for the Third Circuit in The Budd Company v. O.S.H.A. Review Commission which held in part that the requirement that protective footwear be worn whenever necessary "impose no duty on the employer to provide or pay for ," such footwear.

The words, "shall be made available," were adopted from regulations issued by the Secretary of Labor under the Longshoremen's Act (29 CFR, Section 1915.83 (d), 1916.83 (d) and 1917.83 (d)) which stipulated that sole duty of the employer was to make such equipment available for purchase. This could be accomplished by a "shoemobile given access to company property , company shoe store, arrangement with local shoe outlets and other methods of having shoes available."

It is recognized that safety shoes due to size difference, styles which are comparable to street footwear, etc., are uniquely personal items, but , unlike other forms of personal protective equipment , cannot readily be sanitized and reissued.

Descriptions of Claims Involving Jewelry *

RINGS

A 54 year old, male **mechanic** had his left ring finger degloved when his ring got caught on a machine while indexing during repair. The finger had to be amputated.

A 47 year old, **maintenance** man was working on a machine while standing on top of its motor. When he attempted to get off the motor, his ring on his left ring finger got caught on a screw. The finger was amputated.

A 46 year old, female **school bus driver** was washing the windshield of her bus, hanging on the mirror for support. When she jumped down, the ring on her left ring finger got caught on the protruding bolts. Her finger was amputated.

A 31 year old, male **key account representative** was removing a case of antacid from a shelf. When he jumped abut 3 feet to the floor, his wedding ring got caught on the shelving, amputating his left ring finger below the middle knuckle.

A 56 year old, male **custodian** was removing some plaster off a gym wall when a ring on his left ring finger got caught on some grill work above a window. When he jumped to the floor , his ring was still caught and his finger was pulled off.

A 22 year old, male **warehouse employee** was getting a part from a shelf. As he was coming down to the floor , a ring on one of his ring fingers got caught on a shelf. That finger was amputated.

A 23 year old, male **waterman** for a landscaping company was jumping off a tractor trailer to the ground (approximately 4 feet), when the ring on his right ring finger became caught on a tractor parked next to him, and his finger was pulled off.

A 57 year old, male **plant manager** climbed on top of a crate to count bales of rags. When he jumped down, the ring on his left ring finger was caught on the top of the crate, and his finger required amputation.

A 31 year old, male **operator and laborer** for an excavating company was helping to carry manhole forms. When he went to get down from the loader, his wedding ring got caught on the handle of the steps. He slipped on the wet steps and pulled his finger off.

A 17 year old, male **busser/ dishwasher** put his right hand on a running mixer. The class ring on his ring finger became caught on a bolt, and he felt a pull on it. The finger was amputated.

A 33 year old, male **salesman** was on a truck. When he jumped off, his wedding band became caught on top of a rail or the truck, and his ring lacerated his left ring finger. He lost 6 days from work.

A 28 year old, male **roofer** jumped off the back of his truck and his ring became caught on a bolt on the tailgate. The ring lacerated his left ring finger, and he lost 3 days from work.

A 19 year old, female **shipping clerk** dropped a pair of scissors off of a loading dock. When she jumped off the dock to get them, a ring on her right ring finger became caught on one of the boards. The ring lacerated her finger, and she lost 11 days from work.

A 49 year old, **nurse's assistant** caught her wedding band on a door latch. The ring lacerated her left ring finger. She also pulled her arm. She lost an estimated 21 days from work.

A 53 year old, male **truck driver** was climbing down from the back of his trailer when a ring became caught on a piece of metal on top of the tailgate. The ring severely lacerated his left ring finger, which required stitches. He lost 17 days for work.

A 44 year old, male **machine operator** was closing a sliding door, when his ring became caught in the handle. The ring lacerated his left ring finger, which required stitches. He lost 18 days from work.

A 36 year old, **manufacturing salesman** was climbing down from a trailer. When he stepped off the tires, his wedding ring became caught on some steps. The ring lacerated his left first finger, requiring surgery. He lost 4 days from work.

A 25 year old , male **mechanic** was jumping down from a dumpster, when his ring became caught on top of it. The ring lacerated his left ring finger, removing some skin. He lost an estimated 8 days from work.

A 49 year old, male **truck driver** caught a ring on a door jam while leaving his truck. He cut his left ring finger to the knuckle, losing an estimated 12 days from work.

A 40 year old**,** male **equipment operator** was cleaning windows on a front end loader. When he was stepping down, his ring caught on a door hinge, lacerating his ring finger. He lost an estimated 21 days from work.

A 30 year old**, male laborer** for an asphalt company jumped off the side of a paver. A ring he was wearing caught on the truck that was dumping asphalt into the paver, and his left ring finger was degloved. He lost an estimated 15 days from work.

A 49 year old, female **cafeteria worker** was leaving work. Her right hand ring finger caught in a lock on the door, burying a ring in that finger and cutting her right hand. She lost 9 days from work.

A 31 year old, male **communications technician** was reaching for a tool when his watchband came into contact with a high current transistor. He suffered burns to his left wrist and arms. losing an estimated 8 days from work.

A 43 year old, male **mechanic's** watch came into contact with the positive post of an alternator and the alternator housing. The suffered electrical burns to his left wrist , losing 2 days from work.

A 41 year old, female **data processor's** watch became caught on a door. She twisted and sprained her left wrist , the second finger of her left hand, and bruised nerves and tendons in her left hand. She lost 18 days from work.

MISCELLANEOUS

An 18 year old, female **polisher** for a jeweler caught a bracelet on a polishing wheel. The bracelet cut into the little finger of her right hand. She lost 2 days from work.

A 31 year old, male **hospital aide** was helping to secure a patient for an injection. While doing so, he lacerated his right thumb of the patient's "star badge". the aide lost an estimated 10 days from work.

* Based on lost-time Ohio Workers' Compensation claims of one or more days lost and all Occupational Disease claims, regarding of lost time, filed in 1988.

Prepared by
Research and Statistics Section
Division of Safety & Hygiene

HAZARD ASSESSMENT FORM

INSTRUCTIONS: Photocopy this form (front and back) and keep the original for future hazard assessments. Use the copy as a guide for your walk-through survey. It will help you identify the hazard in each work area. Once you've completed the form, review the Guidelines for Selecting Personal Protective Equipment on the back of this form.

Area Examined: _____ Job Classification: _____

Assessor's Name: _____ Date: _____

Head Hazard: Task that can cause head hazards include, but are not restricted to: Working below other workers who are using tools and materials which could fall., working on energized electrical equipment, working with chemicals, and working under machinery of processes which might cause materials or objects to fall.

Check the appropriate box for each hazard:

Burn	Yes	No	Description of Hazards : _____
Chemical Splash	Yes	No	_____
Electrical Shock	Yes	No	_____
Impact	Yes	No	_____

EYE HAZARDS: Tasks that can cause eye hazards include, but are not restricted to : Working with acids and chemicals, chipping, grinding, furnace operations, sanding, welding , welding, and woodworking.

Check the appropriate box for each hazard:

Chemicals	Yes	No	Description of Hazards: _____
Dust	Yes	No	_____
Heat	Yes	No	_____
Impact	Yes	No	_____
Light / Radiation	Yes	No	_____

HAND HAZARDS: Task that can cause hand hazards include, but are not restricted to : Cutting material, working with chemical, and working with hot objects.

Check the appropriate box for each hazard:

Burns	Yes	No	Description of Hazards: _____
Chemical Exposure	Yes	No	_____
Cuts / Abrasions	Yes	No	_____
Puncture	Yes	No	_____

FOOT HAZARDS: Task that can cause foot hazards include, but are not restricted to: Carrying or handling materials that could be dropped, performing manual material handling and working with chemicals.

Check the appropriate box for each hazard:

Chemical Exposure	Yes	No	Description of Hazards: _____
Compression	Yes	No	_____
Impact	Yes	No	_____
Puncture	Yes	No	_____

Guidelines for Selecting Personal Protective Equipment (PPE)

Note: *Personal Protective Equipment alone should not be relied on to provide protection against hazards, but should be used in combinations with guards, engineering controls and sound manufacturing practices.*

1. Familiarize yourself with the potential hazards in the area and the types of PPE that are available.

2. Consider the hazards associated with the environment (impact velocities, masses, projectable shape, radiation intensities, etc.)

3. Select PPE that ensures a greater level of protection than the minimum required to protect workers from the hazard.

4. Fit the worker with the PPE and give instruction on its use and care. It is very important the workers be made aware of all warning labels for and limitations of their PPE.

Bases on the hazard assessment for _____, the following PPE is required:
(Job Classification)

Head Hazard	Job	PPE
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Eye Hazard	Job	PPE
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Hand Hazard	Job	PPE
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Foot Hazard	Job	PPE
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Other	Job	PPE
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Safety TechLine Technical Support
If you have any questions about hazard assessment, personal protective equipment or current OSHA regualtions.
Call our technical experts toll-free
1-800-356-2501
6 a.m. - 9 p.m. CT. Monday - Friday

LAB SAFETY SUPPLY

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Miscellaneous

MECHANICAL POWER PRESSES

QUESTIONS AND ANSWERS

MECHANICAL POWER PRESSES

QUESTIONS AND ANSWERS

INDEX

		Page
I.	Scope of the Standard	7
II.	Control Systems and Brake Monitor	7
III.	Presence Sensing	9
IV.	Pull-outs and Sweeps	9
V.	Two-Hand Trips and Control	10
VI.	Type A & B Gates	11
VII.	Barrier Guards and Other Safeguarding	12
VIII.	Safety Distance	14
IX.	Record Keeping	15

NOTE:

Under no circumstances shall the following be used in lieu of the specific language of the law, and final determination of the requirements shall be checked with OSHA.

Several questions and answers are referenced according to specific sections of the law.

I. Scope of the Standard

1. **Q** Does the standard for mechanical power presses cover these presses when other materials are being worked, such as non-ferrous metals, plastic, etc.?

A The Section 1910.217 requirements do not contain a statement of scope and application at present. The intent of OSHA is to honor the scope as stated in ANSI B11.1-1971 which was adopted under Section 6 (a) of the Act. B11.1-1971 scope statement covers presses used to cut, form, ..."other materials" when the die is attached to the slide. ~~B11.1 also covers the use of unitized tooling~~. The use of the mechanical power press to work on aluminum, tile or non-ferrous metals hardly changes the need for operator safeguarding based on the material being processed.

2. **Q** Are press brakes covered by the standard for mechanical power presses?

A No.

3. **Q** What types of presses or other metal working machines are exempt from Section 1910.217?

A Some types of presses not covered by 1910.217 are envelope making (window cutters, etc.) machines, dinkers and clickers used for cutting leather and other materials, brick presses, broaching machines, abrasive wheel presses, platen presses, powdered metal presses, hot bending and forming machines, and forging presses.

4. **Q** If a press brake is fitted with dies and functions as a mechanical power press, is safeguarding required?

A Yes.

5. **Q** Are hot bending operations covered by Section 1910.217? 1910.217(a)(5)?

A No.

II. Control System and Brake Monitor

1. **Q** For ungrounded circuits, is the first ground considered a failure?

A No.

2. **Q** When operating on continuous run, is a single failure in the ~~press control system~~ required to stop the press?

A No, it prevents a successive continuous run from being initiated.

3. **Q** If a press is only operated on continuous, must a single stroke mechanism be provided?

1910.217(b)(3)
1910.217(b)(7)(xi)

A No.

4. **Q** If a press stroke cannot be initiated because of the brake monitor action, how is this indicated to the operator?

A The control system may have an indicator light or alarm. The visual inspection of markings on the crankshaft will show that the press slide has not stopped within the safe range previously established and the press won't run.

5. **Q** If the brake monitor is actuated by top-stop overrun, can the brake initiation point be set earlier in the cycle, if the safety distance is recalculated and two-hand controls moved?

A Yes, this practice is allowed as long as the brake is deemed to be functioning within its stopping time limit before overhaul and repairs are required.

6. **Q** If a press tops at some point of the cycle due to the ~~brake monitor~~, how is the press slide returned to the top of the stroke?

A The inch controls or other bypass circuit are used to return press slide to the top of the stroke.

7. **Q** Must brake monitors detect brake deterioration when the brake is applied at other than the top of the stroke?

A No, but some types of brake monitors will give an indication of stopping time on each brake application at any point in the stroke.

8. **Q** Can a press be operated ~~on-the-hop~~ with a brake monitor?

A No, the press slide must stop on each stroke for the brake monitor to be effective.

9. **Q** Is a brake monitor necessary on a ~~full revolution clutch press~~?

A A brake monitor is not required on a full revolution clutch press. Brake monitor manufacturers and users are claiming that they are feasible and useful on a full revolution clutch press.

III. Presence Sensing

1. **Q** Do presence sensing devices require some form of supplemental additional guarding to protect press operators?

A Yes, unless the sensing field covers all paths of access to the point of operation; therefore, some additional safeguarding is required such as fixed barrier guard, Type A or B Gate or movable barrier device or another presence sensing device.

2. **Q** What are the limits of muting a presence sensing device to enable parts ejection, feeding or circuit checking

A The top of the stroke is the point at which muting shall cease as it is not possible to set a point on the downstroke at the exact position where the hazard of die closing starts.

IV. Pull-Outs and Sweeps

1. **Q** Are pull-outs acceptable for safeguarding the press operator when the press stroke is actuated by a foot pedal or a two-hand trip not meeting the required safety distance?

A Yes, the pull-outs by themselves are recognized as an acceptable safeguard.

2. **Q** Why are detailed requirements given for checking and adjusting of pull-outs?
1910.217(c)(3)(iv)(d)

A Pull-outs are a more personal form of safeguard whose proper functioning can be affected when operators are changed or a new die set for operation. Visual inspection of pull-outs can detect wear of parts, as well as, proper action when press is stroking.

3. **Q** Can a restraint be used for "hands in dies" feeding?

A No. By definition the restraint does not permit entry of the hand into the die or point-of-operation.

4. **Q** Can a restraint used for one hand be used in conjunction with a single trip or control button for the second hand, when the second hand is used for feeding into the point-of-operation?

A Yes, if a safety distance is established for the one-hand trip or control button.

5. **Q** What is the difference between a restraint and a pull-out device?

A A restraint prevents the entry of hands or fingers into the point-of-operation at all times. A pull-out device allows hands in dies for feeding.

6. **Q** Are restraints or hold-outs a recognized form of safeguarding from the hazard of the point-of-operation?

A Yes, the restraints that keep operators' hands out of the point-of-operation at all times are acceptable safeguards.

7. **Q** Must an operational sweep device be physically removed from a press after December 31, 1976?

1910.217(c)(3)(v)

A No, the sweep device may be left operational as a back-up safeguard, if desired.

8. **Q** Are two-hand trips recognized as an acceptable means of safeguarding the operator from the hazard of the point-of-operation?

A Yes, providing the safety distance between the point-of-operation and the two-hand trips is determined by the appropriate formula.

V. Two-Hand Trips and Controls

1. **Q** What are some of the methods or means used to fix the position of two-hand trips or controls at the safety distance?

A Articulating or extendible bars or control mounts, clearly established floor position for portable control stands or other administrative controls may be used when it is not possible to mechanically or electrically fix the portable stand or station in position.

2. **Q** Can a two-hand trip be used as a safeguard on a part revolution clutch press?

A Yes, providing the safety distance for locating the trips is adequate.

3. **Q** What methods are used to fix the position of two-hand trips or controls?

A Key-locked control stations, key-locked portable control stands, removable plug-in control stations, portable stand floor location fittings, portable stand bases which establish a safety distance or moveable control bars or buttons fixed by fasteners which require the use of special tools to remove.

4. **Q** Can a two-hand control be used as a trip on a part revolution clutch press?

A Yes, the holding time is adjustable and could be set to perform like a two-hand trip.

5. **Q** On a two-hand control, what “holding time” is required?

A None, but to qualify as a "control" rather than a "trip" it must be possible to set a "holding time."

6. **Q** Must "holding time" cover the entire period of die closing or until the hazard of die closing ceases at 1/4 inch opening?

A No, holding time can be set for any period of time during the cycle. ~~Press stopping time is the critical factor in establishing the safety distance for safeguarding means.~~

VI. Type A and B Gates

1. **Q** Is a ~~Type A Gate an acceptable safeguard with a two-hand trip or two-hand control~~ without adequate safety distance determined by the appropriate formula?

1910.217(c)(3)(i)(~~e~~)

A Yes, the Type A Gate alone will satisfy the requirements for safeguarding with any form of press actuation such as foot pedal or control, two-hand trip or control without safety distances or others such as one-hand trip.

2. **Q** Can a Type A Gate be opened during the downstroke of the slide?

1910.217(c)(3)(i)(g)

A Yes, on a part revolution clutch press until slide motion ceases.

3. **Q** When manual feeding with hands in dies, can a ~~Type B Gate~~ or moveable barrier device be used for safeguarding on a full revolution clutch press?

A Yes, the Type B Gate or moveable barrier device which permits manual feeding on the upstroke is an acceptable safeguard.

4. **Q** If a Type B Gate is used as a means of safeguarding, can a presence sensing light curtain be used to actuate the Type B Gate which subsequently initiates the press to work?

A Yes, the presence sensing light curtain is then only actuating the Type B Gate (the operator safeguard).

5. **Q** If a Type B Gate can be opened during the closing stroke (on a part revolution clutch press) what safety distance is required to be sure slide motion stops before hands reach the point-of-operation?

1910.217(c)(3)(i)(g)
1910.217(c)(3)(ii)(b)

A A safety distance must be used to insure that the operator's hands cannot reach the point of operation prior to die closing or reaching a point (1/4 inch die opening where no hazard of die closing exists.

VII. Barrier Guards and Other Safeguarding

1. **Q** Can an interlocked barrier guard be installed on a press for protection of an operator manually feeding strip stock through openings in the side or through the moveable section of the interlocked barrier guard?

1910.217(c)(2)(iv)
1910.217(c)(2)(v)
1910.217(c)(2)(vi)

A Yes, this form of guard may be used; however, the hinged or moveable section must be interlocked and can only b opened for clearing a jam or piece of scrap or die changing when the machine has stopped.

2. **Q** Can "redundant" or "alternative safeguarding" prescribed by the latest draft B11.1 revised standard be used in lieu of the OSHA 1910.217(c)(5) "Additional Safeguarding" requirements for part revolution clutch presses (using two-hand control, presence moving or Type B Gate of moveable barrier device)?

A Yes, providing a variance has been granted by OSHA under Part 1905 regulations. The approval of the revised ANSI B11.1-1975 standard may warrant a future proposed amendment to grant acceptance to the option of "alternative safeguarding" under OSHA standards. All new or improved means of safeguarding will be subject to future OSHA proposals to bring new technology on stream as soon as proven.

3. **Q** Does the use of hand tools for feeding qualify as a "hands out of dies" operation?

A Yes.

4. **Q** Is compliance with (b)(13) and (b)(14) required when hand tools are used for feeding?

1910.217(c)(4)
1910.217(c)(5)

A No.

5. **Q** If presses are operated with "hands out of dies" feeding methods, must safeguarding be provided?

A Yes.

6. **Q** Why?

A The "hands out of dies" requirement can only be achieved when some form of operator safeguarding is utilized. Hand tool feeding, while qualifying as a "hands out of dies" procedure, along with the sliding bolster feeding method, in and of the themselves, do not insure that the operator cannot get his hands in the die. These approaches should be used in conjunction with other safety devices; e.g. two-hand trip, Type A and B Gates, presence sensing, etc.

7. **Q** On presses operated as a "hands out of dies: for feeding must the applicable construction requirements of Section (b) be met?

A Yes.

8. **Q** For controls, foot pedals and controls, brakes and safeguard devices?

A Yes, the standard as promulgated makes no distinction for presses used for "hands out of die" feeding. It is conceivable that a claim can be made that no operator hazard is present on "hands out of dies" operations; therefore, construction requirements need not be met to insure employee protection from "recognized hazards." The argument, of course, falls on a change to "hands in dies" for a subsequent run. How can a press be reserved exclusively for "hands out of dies" operation and possibly receive a variance?

9. **Q** Why are tools required for removal of scrap or stuck work pieces when ~~hand feeding~~ is allowed?

10. **A** Removal and clearing operations are not considered to be as technically difficult as the feeding of dies. The requirement will reduce the number of times that the operator's hands are in the dies and represents a compromise with the former rule for no hands in dies at all times.

11. **Q** Can the ~~press control reliability~~ requirement of 1910.217(b)(13) be met on a ~~full revolution clutch press~~?

A It is not required on a full revolution clutch press. Claims are being made that such a control criteria can be met on a full revolution clutch press.

12. **Q** The new requirements for testing of clutch/brake mechanism, anti-repeat feature, and single stroke mechanisms appears to apply to those presses operated on single stroke with "hands in dies" feeding only?

1910.217(c)(5) - Additional requirements for safeguarding.

A The only presses excepted from the rule are those that comply with Section (c)(5) covering control systems (b)(13) and brake monitoring (b)(14).

13. **Q** Is a sliding bolster by itself recognized a an acceptable safeguard?

A No.

14. **Q** If a sliding bolster is used to feed parts, are two-hand controls required to meet the safety distance requirements?

A Yes.

VIII. Safety Distance

1. **Q** From where is the safety distance measurement taken? The die or the edge of the bolster or slide?

A The safety distance is measured from the point-of-operation of the die (a recognized hazard). The die dimensions may be less than or greater than the size of the slide or bolster.

2. **Q** There are different formulas for calculating the safety distance on part revolution clutch machines using two-hand control and full revolution clutch machines using two-hand trips. What is the significance of the sub letters: D_s, D_m, T_s, and T_m?

A Different sub letters were used to aid users in recognizing that two separate formulas are used for calculating safety distance depending on the type of clutch.

3. **Q** When the safety distance is calculated using the formula what amount of supplemental distance (margin) is required to determine the point at which controls or trips are located?

A None; however, it is expected that an additional (margin) distance will be added to allow for some brake stopping time deterioration or slide stopping point tolerance.

4. **Q** What is "separation distance?" What is "safety distance?" Are they the same?

A "Separation distance" is the term used in ANSI B11.1-1975 draft revision of January 24, 1973, which compares with the term "safety distance" used in OSHA.

5. **Q** What is meant by separation when describing the position or arrangement of two-hand trips and two-hand controls?

A OSHA recognized the use of "separation distance' when applied to locating two-hand control buttons remote from each other to discourage attempts at one-hand actuation.

6. **Q** What is the source of the 63" hand speed constant?

A European studies by Dr. O. Lobl of Sweden which determined a safety distance for use in the regulations of foreign countries.

7. **Q** Which formula is proper for finding the safety distance on a part revolution clutch press with two-hand controls?
1910.217(c)(3)(vii)(c)

A No formula for calculating safety distance on a part revolution clutch press actuated by a two-hand trip is provided. The time recommended would be that for the die closing stroke.

8. **Q** Why is the position of approximately 90^0 of crankshaft rotation chosen for determining brake stopping time?

A The longest possible stopping time should be used when calculating the safety distance. The point in the stroke near point of maximum speed or half way down was considered to be the best place to measure the longest time for stopping the slide. This conclusion is currently being challenged based on testing by several people.

IX. Record Keeping

1. **Q** How long must the record required by Section 1910.217(e) be kept?

A Section 1910.217(e) makes no provision for a record retention period.

2. **Q** Are Federal agencies required to report injuries to press operators?

A No.

3. **Q** Must a written record be kept of pull-out adjustment and testing for each shift change, operator change or new die set-up?
1910.217(c)(3)(iv)(d)

A The record keeping requirements of 1910.217(e) are applicable.

4. **Q** If an employee is injured by a broken piece/part thrown from the die, must a report be sent to the OSHA Office of Standards?

A No, only injuries to employees that occur within the point-of-operation are to be reported.

5. **Q** From where did the weekly period for inspections come?
.

A ANSI B11.1-1971 explanatory column accompanying requirements for inspections

6. **Q** What periods are recommended by the ANSI B11.1-1971 for press inspections?

A B11.1-1971 recommended weekly, monthly or possibly longer periods for press and safeguarding inspections, testing and maintenance.

7. **Q** Are records required to be kept?

A Yes, B11.1 requires records of inspection.

8. **Q** For how long?

A No definite retention periods are prescribed by OSHA for power press records.

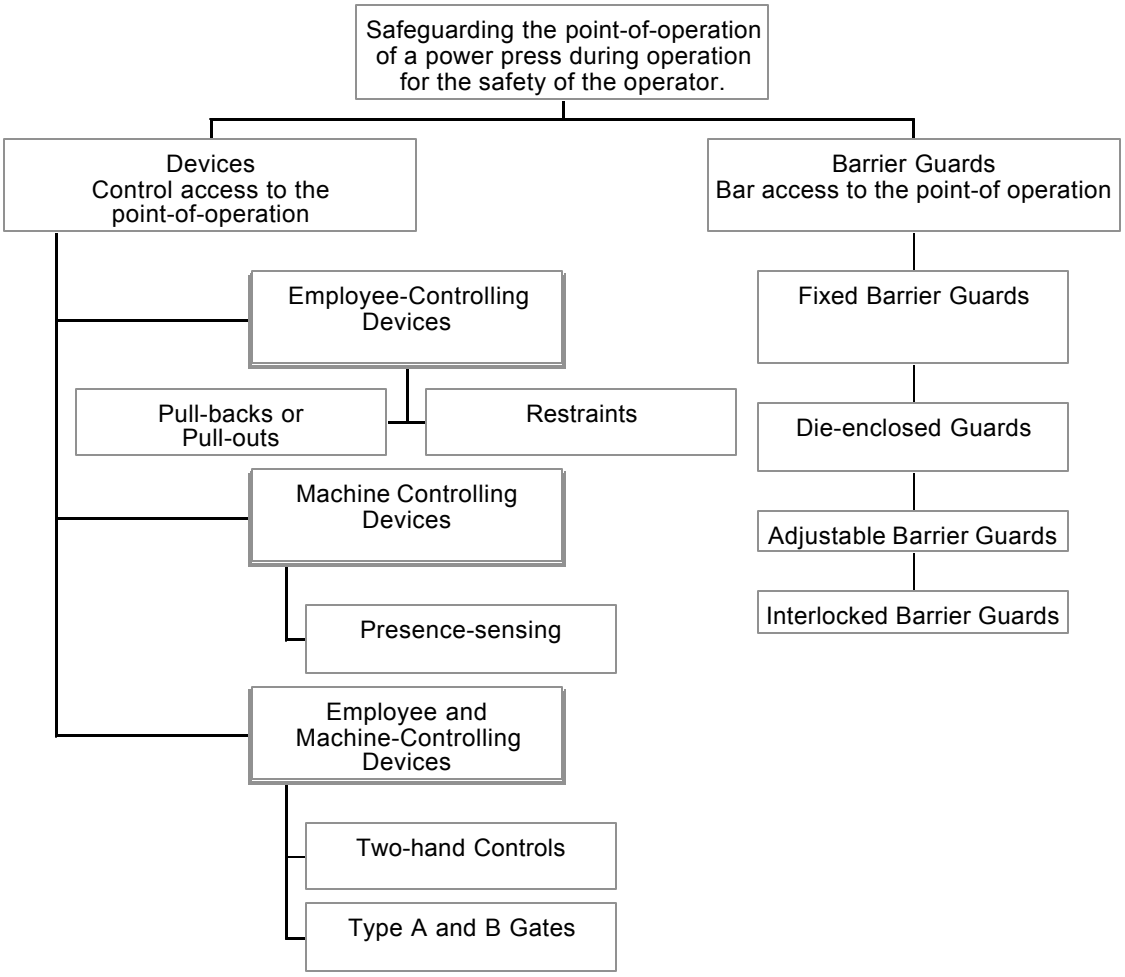
9. **Q** Are periodic inspections and records required for all presses even when operated on continuous or with no hands in dies?

A Yes, every press is required to be inspected and maintained to protect the safety of operators, die setters and others.

10. **Q** Is it necessary to report minor injuries such as a scratch or pinched finger when feeding a die?

A No, only report those injuries which qualify for listing on the OSHA Form 200.

PRINCIPLES OF GUARDING



CPL 2-1.24 Change Memo - National Emphasis Program on Mechanical Power Presses, 29 C.F.R. 1910.217

- **Record Type:** Instruction
- **Directive Number:** CPL 2-1.24 Change Memo
- **Standard Number:** 1910.217
- **Subject:** National Emphasis Program on Mechanical Power Presses, 29 C.F.R. 1910.217
- **Information Date:** 05/06/1997

May 6, 1997

MEMORANDUM TO: ALL REGIONAL ADMINISTRATORS

ATTENTION: MECHANICAL POWER PRESS NEP COORDINATORS

FROM: JOHN B. MILES, JR., DIRECTOR
DIRECTORATE OF COMPLIANCE PROGRAMS

SUBJECT: Correction for OSHA Instruction CPL 2-1.24, National Emphasis Program on Mechanical Power Presses, 29 CFR 1910.217

The purpose of this memorandum is to provide the field with interim change pages for the recently released Directive on the National Emphasis Program for Mechanical Power Presses. Page G-16 of the Directive inadvertently included a paragraph describing an 8-hour training requirement for press operators. No such requirement exists in the standard at 1910.217, and the error has been corrected in the attached pages. Please ensure that all Area Office, State Plan and appropriate Regional personnel receive a copy of this correction notice.

We will be at some point in the future publish a formal Change 1 to this Directive. This memorandum is meant to avoid any further confusion and provide clarification to the regulated community.

OSHA Directives
CPL 2-1.24 - National Emphasis Program on Mechanical Power Presses, 29 C.F.R. 1910.217.

OSHA Directives - Table of Contents

- **Record Type:** Instruction
- **Directive Number:** CPL 2-1.24
- **Subject:** National Emphasis Program on Mechanical Power Presses, 29 C.F.R. 1910.217.
- **Information Date:** 02/28/1997

May 6, 1997

MEMORANDUM TO:	ALL REGIONAL ADMINISTRATORS
ATTENTION:	MECHANICAL POWER PRESS NEP COORDINATORS
FROM:	JOHN B. MILES, JR., DIRECTOR DIRECTORATE OF COMPLIANCE PROGRAMS
SUBJECT:	Correction for OSHA Instruction CPL 2-1.24, National Emphasis Program on Mechanical Power Presses, 29 CFR 1910.217

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OSHA Instruction CPL 2-1.24
February 28, 1997
Directorate of Compliance Programs

SUBJECT: National Emphasis Program on Mechanical Power Presses, 29 C.F.R. §1910.217.

A. Purpose. This directive describes policies and procedures for implementing a National Emphasis Program (NEP) to reduce and eliminate the workplace incidence of hazards associated with mechanical power presses.

B. Scope. This instruction applies OSHA-wide. The OSHA program is delivered in 40% of the nation's workplaces by the 25 states that operate OSHA approved state plans. These states are encouraged to adopt similar policies but may choose to develop and implement alternatives. See paragraph F.

C. References.

1. OSHA Instruction CPL 2.102, March 28, 1994, Procedures for Approval of Local Emphasis Programs and Experimental Programs.

2. OSHA Standard 29 CFR §1910.217.

3. OSHA's Safety and Health Management Guidelines, 54 FR 3904, January 26, 1989.

4. OSHA Instruction CPL 2.25I, January 4, 1995, Scheduling System for Programmed Inspections.

5. Executive Order 12196, Section 1-201.

6. OSHA Standard 29 CFR 1960.16.

7. OSHA Instruction STP 2.22A, CH-2, January 29, 1990, State Plan Policies and Procedures Manual(SPM).

8. OSHA Instruction CPL 2.103, September 26, 1994, Field Inspection Reference Manual (FIRM).

D. Action. The policies and procedures set forth in this directive are effective immediately. OSHA Regional Administrators, Area Directors and National Office Directors shall ensure that the policies and procedures set forth in this directive are followed.

Regional Administrators shall also ensure that the State Consultation Program Managers and the State Plan State Designees in their Regions are apprised of the contents of this NEP and its required Area Office Outreach initiatives. Regional Administrators are to encourage the Consultation Programs' involvement in this Agency-wide effort.

E. Application. This instruction applies to inspections of general industry employers whose workplaces include mechanical power presses.

F. Federal Program Change. This instruction impacts State programs. Each Regional Administrator shall:

1. Ensure that this change is promptly forwarded to each State designee, using a format consistent with the Plan Change Two-Way Memorandum in Appendix P, OSHA Instruction STP 2.22A, CH-2, SPM.

2. Explain the content of this change to the State designee.

3. Ensure that States are encouraged, but not required, to adopt an identical or alternative policy. States shall be asked to provide preliminary notification to the Regional Administrator within 30 days from the date of this introduction of their intent to adopt or not to adopt the procedures in this directive. The State shall formally respond to this change with an indication of their intent within 70 days in accordance with paragraph I.1.a.(2)(a) and (b), Chapter III or Part I of the SPM. If the State adopts identical procedures, no further plan change supplement need be submitted. If the State adopts different compliance procedures, a copy of the procedures shall be provided to the Regional Administrator within six months from the date of this directive for review.

4. Review policies, procedures, and instructions issued by the State and monitor their implementation as provided in a Performance Agreement or through routine monitoring focussing on impact and results.

G. Background. OSHA has determined that a National Emphasis Program is needed because of the continuing incidence of injuries that have resulted from the operation of mechanical power presses. The hallmark of OSHA's enforcement policy is achieving optimal worker protection. Under The New OSHA, National Performance Review, May 1995, enforcement policies consider both an employer's efforts at adopting protective measures and its efforts toward the abatement of hazards.

The operation of a mechanical power press can be extremely dangerous and compliance with OSHA's mechanical power press standard is frequently overlooked. Injuries involving mechanical power presses often result in death or permanent disability and OSHA's inspection history indicates that employee exposures to these hazards are prevalent in many workplaces. Section 1910.217 provides for safety measures that need to be undertaken regarding the safe operation of mechanical power presses. This NEP provides additional information on how to identify and guard against these hazards.

H. Program Procedures. This NEP includes three major field activities: outreach, targeting/selection, and inspection. The outreach phase of the Program is to begin 30 days from the effective date of this directive. Inspections are to begin 90 days after the outreach period is initiated.

1. Outreach. Each Regional and Area Office shall concurrently develop outreach programs that support the purpose of this NEP, to reduce and eliminate workplace hazards associated with mechanical power presses. Programs may include letters to employers, professional associations, and local unions or other activities designed to involve labor and management stakeholders in the elimination of power press hazards. The Office of Information and Consumer Affairs will provide support to the Regional and Area Offices.

At the discretion of the Regional and Area Offices, outreach materials may either be mailed directly or made available upon request to employers, professional associations, and local unions. The attached appendices provide useful information which may be used, in whole or in part, by the Regional and Area Offices.

2. Site Selection. Inspections conducted under this NEP shall be scheduled and conducted pursuant to the following priorities. Inspections shall concentrate on particular establishments where work-related injuries are likely or where there have been known injuries involving mechanical power presses. The following is a list of sources for obtaining information to develop a roster from which inspections will be conducted.

a. Standard Industrial Classification (SIC) Codes. The table below represents national data on the ten SICs with the highest number of 29 CFR §1910.217 violations for the period September, 1990 through February,1996. Each Area Office shall either use these SICs, or prepare its own list of establishments for the top ten (10) SIC codes in the Area Office's jurisdiction, based on IMIS data from the previous three years. Establishments with fewer than ten employees are to be included in this Program. Consult the current appropriation riders for exempt employers in any given SIC (see the current version of OSHA Instruction CPL 2.51 for exempt SICs for any given fiscal year).

Rank	**All federal states** (10/1/90-2/23/96)
1.	3469(204) stamping
2.	3444(135) sheet metal
3.	3442(92) metal doors
4.	3441(68) fab. steel
5.	3429(60) hardware

6.	2542(60) manuf. furniture
7.	3714(56) motor vehicles
8.	3499(48) misc. metal
9.	3443(44) boiler shops
10.	3496(39) wire

b. Additions to list based on local data. Area Offices shall attempt to obtain and use additional data to further identify and add establishments where serious injuries or fatalities related to power presses have occurred in the last three years. Local information could include, where available, workers' compensation data, OSHA 200 data, and hospital discharge data. The basis for addition of an establishment shall be documented.

c. Each establishment on the list shall be given a sequential number. Establishments that are added based on paragraph (b) above may be added to the bottom of the list or inserted elsewhere in the list within a similar SIC category. Administratively neutral criteria shall be applied when selecting from the list of establishments developed from the SIC Codes and local data. The random numbers table (see OSHA Instruction CPL 2.25I) shall be used to identify individual establishments to be inspected. Area Offices may delete facilities that are not likely to have hazards associated with mechanical power presses or firms which are known to be out of business, documenting the basis for such determination. Further, in accordance with the FIRM, any establishment having had a safety inspection in the last three years shall be deleted from the list.

d. Program approval. Each Area Office's inspection program must be approved by the Regional Administrator and the Regional Solicitor. This is most easily accomplished by setting out the targeting and selection system in a Regional Program Directive, as for a Local Emphasis Program. Other forms of documentation may, however, be used at the discretion of the Regional Administrator.

3. Inspection Procedures. Inspections initiated under this NEP shall be scheduled and conducted in accordance with provisions of the FIRM, except as noted below.

a. Inspections will be limited to hazards associated with mechanical power presses, but the CSHO may expand the scope of the inspection beyond mechanical power presses if other hazards or violations are observed. Inspections shall be scheduled beginning the current fiscal year, and will continue until further notice.

b. Because the nature of this program may yield a number of significant cases, Area Directors, Supervisors, and CSHOs should ensure that the requirements for case development are being met.

I. Scheduling and Resource Allocation.

1. This is a National initiative, which affects existing inspection scheduling priorities, as indicated below. Area Offices shall develop and implement targeting systems which are suited to the Region's resources and the needs of workers in their jurisdictions.

a. Resources. Regional Administrators shall ensure that adequate resources are designated for this NEP.

b. Planning. Each Regional Administrator shall report, to the Director of

Compliance Programs, the number of NEP inspections that are planned for each quarter of the fiscal year, and shall report, 30 days after the end of each quarter, the number of such inspections actually conducted.

c. Priority. Inspections conducted under this NEP have a lower priority than inspections conducted under Cooperative Consultation Programs (CCP), but have a higher priority than other programmed inspections. Where possible, mechanical power presses can be inspected during CCP inspections.

d. Conflicts. Other National, Regional or local Programs, including redesigned Area Office activities/problem solving initiatives, may compete with this NEP for available staff resources. Nonetheless, conflicts must be resolved to ensure that the NEP is implemented in each Area Office. Thus, this NEP may be combined with other initiatives which identify targets on a different basis. For example, a Local Emphasis Program (LEP) which targets specific industries, rather than hazards, may be combined with this NEP by addressing the relevant hazards as part of a combination NEP/LEP inspection.

J. Coordination.

1. National Office. This NEP will be coordinated in the Office of Safety Compliance Assistance, Directorate of Compliance Programs. Questions and comments should be directed to the National Coordinator in that Office.

2. Field. Each Regional Administrator shall name a coordinator for this National Emphasis Program.

K. Consultation Programs. The National Office has involved the State Consultation Program with the development of this NEP. Activities are underway to incorporate state consultative services concurrently into the outreach/enforcement approach of this program. Special efforts will be made at the National Office level to ensure that consultation staff is offered training courses and outreach materials. Similarly, Area Offices within the same state jurisdiction are strongly encouraged to include their state 7(c)(1) program contacts in the development and implementation of their local program. The State Consultation Program will also be encouraged to develop their own strategic approaches to address the need to reduce injuries and accidents related to power presses.

L. Training. Because of the technical nature of mechanical power presses, CSHOs who conduct inspections under this NEP and consultation staff must have had adequate training or experience with mechanical power presses.

1. The OSHA Training Institute (OTI). The OTI provides training materials to CSHOs, consultation staff, and, employers. Also, additional sessions of the OTI's mechanical power press course can be made available. Technical training at the OTI can be expanded to include the use of a time-stop measuring device to measure the safety distance on a power press, should it be determined that such training is needed.

2. Additional Training.

a. On-the-Job Training. Area Directors and supervisors shall ensure that inexperienced CSHOs also receive on-the-job training by accompanying experienced compliance officers during power press inspections.

b. Enforcement and Compliance Issues. Continuing guidance regarding enforcement and compliance issues will be provided as new issues arise.

M. Federal Agencies. This instruction describes a change that affects Federal agencies. Executive Order 12196, Section 1-201, and 29 CFR §1960.16, maintains that Federal agencies must also follow the enforcement policy and procedures contained in this Directive.

N. Program Evaluation. Area Offices shall collect data relevant to the effectiveness of this NEP and submit it to the Regional Office. The Regional Office, after summarizing the information, will forward it to the National Office at the end of the year. At a minimum the evaluation should respond to the requirements of CPL 2.102 G.4. Evaluations.

O. IMIS Coding.

1. Current instruction for completing enforcement forms OSHA-1, OSHA-7, OSHA-36, and OSHA-90 and Consultation Request Form-20 and Visit Form-30 shall be applied when recording inspections conducted under this NEP as follows:

a. The OSHA-1 Form for any programmed inspection covered under this national emphasis program for mechanical power presses in all industries shall be marked "PLANNED" (Item 24h) and "NATIONAL EMPHASIS PROGRAM" (Item 25d). Record PWRPRESS in the space in item 25d.

b. The OSHA-1 Form for any unprogrammed inspection shall be marked as unprogrammed (Item 24a through gas appropriate). In addition, it shall be marked "NATIONAL EMPHASIS PROGRAM" (Item 25d). Record PWRPRESS in the space item 25d.

c. Whenever an OSHA-7 is completed by a Federal office and the applicable complaint alleges the presence of power press-related hazards, complete the OSHA-7 in the usual manner, but include the code for power presses in "Optional Information" Item No. 46. The following format should be used:

TYPE	ID	VALUE
N	16	PWRPRESS

d. Whenever an OSHA-36 is completed by a Federal office and the inspecting CSHO is able to identify at the site of the fatality / catastrophe the existence of power press-related hazards, complete the OSHA-36 in the usual manner, but include the code for Power presses in "Optional Information" Item No. 35. The following format should be used:

TYPE	ID	VALUE
N	16	PWRPRESS

e. Complete the OSHA-90 in the usual manner and enter the code for power presses in "Optional Information" Item No. 26, when an OSHA-90 is completed by a Federal office and the applicable referral case has power presses as one of the subjects of the file. The following format should be used:

TYPE	ID	VALUE
N	16	PWRPRESS

2. Consultation.

a. Whenever a visit is made in response to this NEP, a Consultation Request Form and / or Visit Form is to be completed as follows:

(1) Complete the Consultation Request Form-20 in the usual manner and enter the code for power press in "Optional Information" Item No. 26, when a visit has been made in response to the NEP. The following information should be used:

TYPE	ID	VALUE
N	16	PWRPRESS

(2) Complete the Visit Form-30 in the usual manner and enter the code for power presses in "Optional Information" Item No. 34, when a visit has been made in response to the NEP. The following in formation should be used:

TYPE	ID	VALUE
N	16	PWRPRESS

P. Appendices. The Appendices contain a variety of information developed to assist employers, employees, and compliance officers in the implementation, training and outreach requirements of this Program. The Area Office may use its discretion in selecting whatever materials deemed appropriate and feasible for outreach purposes.

Appendix A: Useful Formulas: Safety Distances and Table 0-10

Appendix B: Full Revolution Clutch Presses support materials

-- Summary of applicable 217 provisions

-- Safety distance formula and graph

-- A partial list of engagement points

-- Weekly inspection report -- sample

-- Monthly inspection report -- sample

Appendix C: Part Revolution Clutch Presses support materials

-- Summary of applicable Section 1910.217 provisions

-- Safety distance formula and graph

-- Weekly inspection report -- sample

-- Periodic inspection report -- sample

Appendix D: Sample pullout/restraint inspection checklist

Appendix E: Safeguards and other hazards

Appendix F: Point of Operation injury sample report

Appendix G: Mechanical Power Presses -- Questions and Answers

Greg Watchman
Acting Assistant Secretary

DISTRIBUTION:
National, Regional, and Area Offices
All Compliance Officers
State Designees
NIOSH Regional Program Directors
7(c)(1) Project Manager

Appendix A: Press Safety Distances

A. Use of Table. It shall be the responsibility of the employer to provide and insure the usage of Point of Operation guards or properly applied and adjusted Point of Operation devices on every operation performed on a mechanical power press except when the Point of Operation opening is one-fourth inch or less. When the opening exceeds one-fourth inch, then Table A.1 must be followed.

TABLE A.1

Distance of Opening from Point of Operation Hazard (inches)	Maximum width of opening (inches)
1/2 to 1-1/2	1/4
1-1/2 to 2-1/2	3/8
2-1/2 to 3-1/2	1/2
3-1/2 to 5-1/2	5/8
5-1/2 to 6-1/2	3/4
6-1/2 to 7-1/2	7/8
7-1/2 to 12-1/2	1-1/4
12-1/2 to 15-1/2	1-1/2
15-1/2 to 17-1/2	1-7/8
17-1/2 to 31-1/2	2-1/

B. Safe Distance, Part Revolution Press. Stopping time is measured in hundredths of a second, multiplied by 63 inches. The easiest way to calculate safe distance is to move the decimal over like this. If stopping time was measured at ½ second or 500 milliseconds, the minimum safe distance is ½ of 63 inches or approximately 2 ½ feet from the forward most Point of Operation. Remember 63 inches is approximately 5 feet. If stopping time was measured to be 100 milliseconds, then the minimum safe distance would be 6.3 inches. Always determine from examining all dies used in a particular press what the forward most Point of Operation is and then measure forward of it to locate your safety device. It's always a good idea once safe distance is calculated to note this right at the press with the following information:

1. Date of measurement

2. Stopping Time

3. Safe Distance Calculation

4. Added distance to allow for normal deterioration so that position of your safeguard does not have to be relocated after a short period of time.

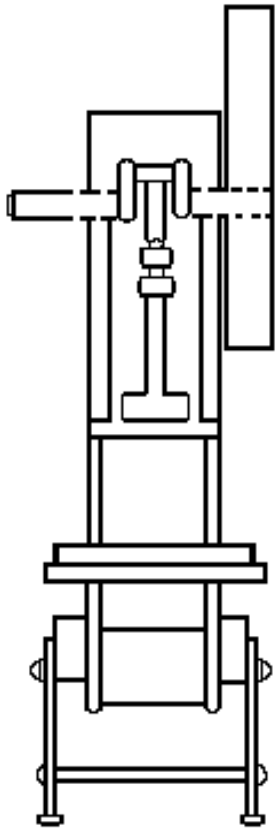
5. Your forward most Point of Operation die location.

6. Your fixed location of your safety device or safe guard.

C. Safe Distance, Full Revolution Press. Safe distance on full revolution presses is directly related to continuous press speed and the number of engagement points in the clutch. The two hand trips become impractical as a primary safe guard, since in most cases, they would have to be relocated at such a distance from the Point of Operation that production would be reduced below an acceptable level. If the press had a multiple pin engagement clutch (14 points or more) and the press operated at a continuous speed of over 15 inches from the Point of Operation, then the two hand trip is practical. If the press has fewer engagement points or is slower, the consideration of another safe guard would be most practical.

Appendix B: Support Materials - Full Revolution Clutch Presses

A. Summary of Applicable Provisions of Section 1910.217 for Full Revolution Positive Clutch Presses.



1. Safeguarding:

a. Guards: Prevent entry of hands - (c)(2)(I)(a)

Conform to Table A-1 - (c)(2)(I)(b)

Use fasteners - (c)(2)(I)(c)

b. Pull-outs: (c)(3)(iv)(a, b, c, d)

c. Two Hand Trips: Protected, Both Hands, Concurrent Pressure - (b)(6)(I)

Anti-repeat - (b)(6)(ii)

Safe distance - (c)(3)(viii)(c).

You must:

(1) Obtain time for one revolution

(2) Obtain the number of engaging points

(3) Use Table A-1 to obtain safe distance

2. Inspections:

Weekly - (e)(1)(ii)

Periodic - (e)(1)(I)

Pull-outs - (c)(3)(iv)(d), only when used as the primary safeguard

3. Training:

Operator - (f)(2)

Maintenance - (e)(3)

4. Motor Controls:

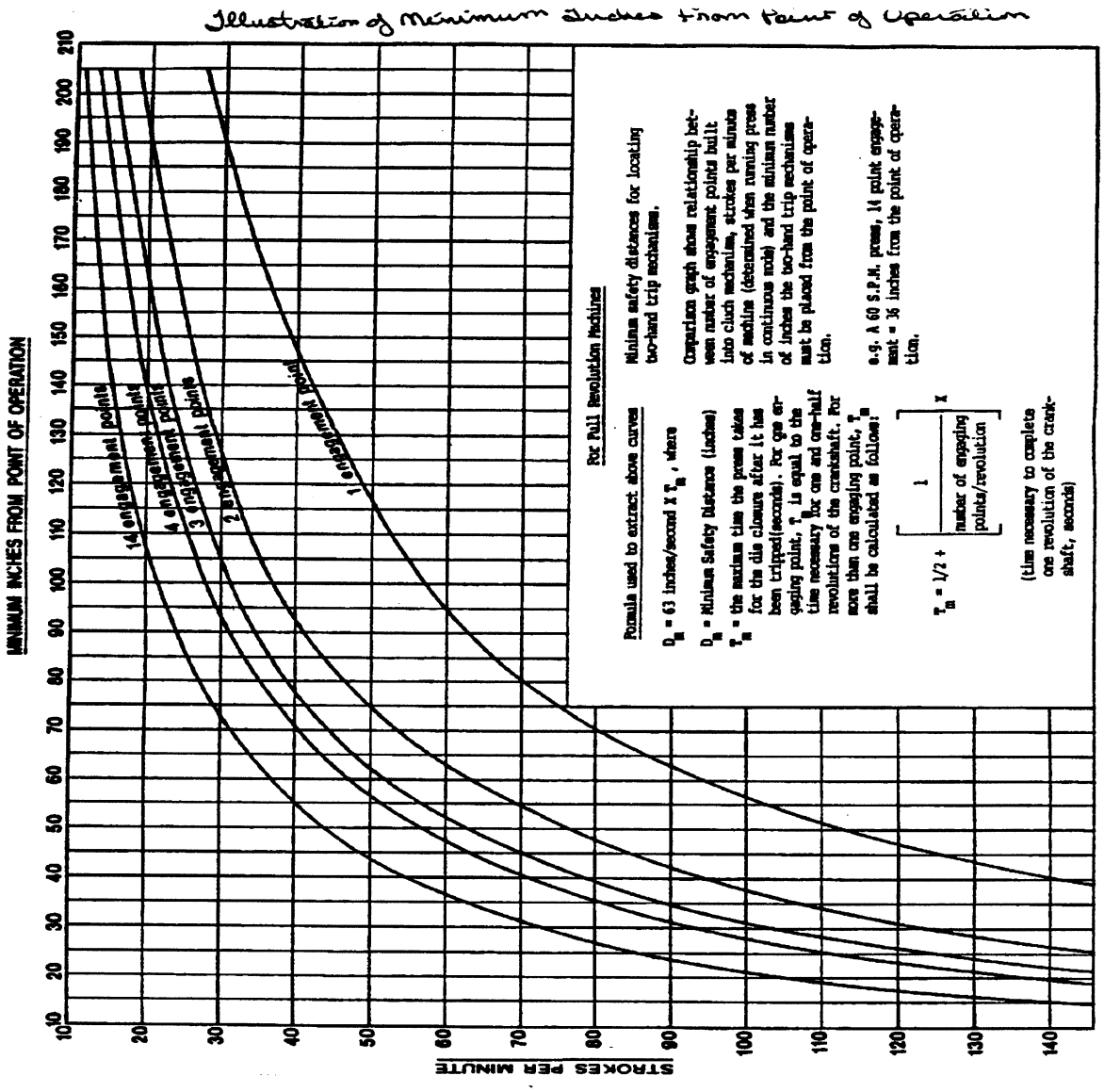
Disconnect - (b)(8)(I)

Buttons - (b)(8)(ii)

Magnetic - (b)(8)(iii)

5. Single-stroke mechanism: (b)(3)(I), (ii)

B. Comparison Graph of minimum safety distances.



C. Partial List of Engagement Points - Full Revolution Presses.

# OF ENGAGEMENT POINTS	PRESS MFG
14	NIAGARA ONLY
4	* BLISS * MINISTER * PRESS RITE
3	ALVA ALLEN JOHNSON VERSON * BLISS CLEARING CLEVELAND CONSOLIDATED DANLY DIAMONT FEDERAL MINISTER FERRACUTE L & J TOLEDO * PERKINS ROBINSON * ROBINSON ROCKFORD ROUSELLE

	V & O WALSH WILLIAM/WHITE
2	ALVA ALLEN KENCO * BENCHMASTER * PERKINS * GILRO * PRESSRITE
1	* BENCHMASTER FAMCO * GILRO
	* NOTES SOME OVERLAP

D. **SAMPLE FORM - Mechanical Power Press Weekly Inspection Record for Full Revolution Power**

(The purpose of this form is to provide compliance assistance information to interested parties required to comply with Subpart O, 1910.217(e) regulations for mechanical power presses. This non-mandatory format has been developed to list components of machines common to most power presses, although it is not an exhaustive listing. The employer is responsible for consulting the manufacturer's recommendations on each power press in operation and fully complying with the letter and intent of 1910.217(e).

MACHINE NO._____ DEPARTMENT_____

DATE_____

OK	NOT OK	PART INSPECTED	DATE OF IF NOT OK, CONDITIONS	CORRECTION
____	____	Floor Condition Clean	_____	_____
____	____	Lighting at Press	_____	_____
____	____	Operator Properly Trained	_____	_____
____	____	Lower & Upper Treadle	_____	_____
____	____	Brake-Collar	_____	_____
____	____	Collar Key Strap, Fixed Half,Hinged Half, Hinge Pin, Adjustment Spring, Band Nut Adjustment Stud	_____	_____
____	____	Latch Bracket, Latch Spring	_____	_____
____	____	Anti-Repeat	_____	_____
____	____	Single Stroke Mechanism	_____	_____
____	____	Air Gauge (condition-accuracy)	_____	_____
____	____	Air Cylinder/Valves	_____	_____
____	____	Push-Palm Buttons & Wiring	_____	_____
____	____	Two Hand Trips at Safe Distance	_____	_____
____	____	Safeguard Adjusted to Table 0-10	_____	_____
____	____	Relays, Switches, etc.	_____	_____

COMMENTS:_____

_____
_____

INSPECTED BY:_____
_____
(Name and Job Title)

PRESS APPROVED FOR OPERATION _____
RED TAGGED

E. **SAMPLE FORM - Mechanical Power Press Periodic Inspection Record for Full Revolution Power Presses.**

(The purpose of this form is to provide compliance assistance information to interested parties required to comply with Subpart O, 1910.217(e) regulations for mechanical power presses. This non-mandatory format has been developed to list components of machines common to most power presses, although it is not an exhaustive listing. The employer is responsible for consulting the manufacturers recommendations on each power press in operation and fully complying with the letter and intent of 1910.217(e).

MACHINE NO._____ DEPARTMENT_____

DATE_____

OK	NOT OK	PART INSPECTED	DATE OF IF NOT OK, CONDITIONS	CORRECTION
____	____	Floor Condition Clean	_____	_____
____	____	Piping to Press (air power)	_____	_____
____	____	Lighting at Press	_____	_____
____	____	Operator Properly Trained	_____	_____
____	____	Bolster Plate Secure	_____	_____
____	____	Inclining Screw, Ratchet,Screw Pin, Cotters for Screw Pin	_____	_____
____	____	Lower & Upper Treadle	_____	_____
____	____	Tie Rods	_____	_____
____	____	Leg Clamp & Pivot Bolt	_____	_____
____	____	Brake-Collar	_____	_____
____	____	Collar Key Strap, Fixed Half, Hinged Half, Hinge Pin, Adjustment Spring, Band Nut Adjustment Stud	_____	_____
____	____	Latch Bracket, Latch Spring	_____	_____
____	____	Flywheel End Collar Pin	_____	_____
____	____	Anti-Repeat	_____	_____
____	____	Single Stroke Mechanism	_____	_____
____	____	All Parts & Screws Secure	_____	_____
____	____	Frame & Base for Cracks	_____	_____

____ ____ Bearing Clearances _____ _____

____ ____ Slide-Jib Clearance _____ _____

____ ____ Main-Drive (belts, gears) _____ _____

____ ____ Air Gauge
(condition-accuracy) _____ _____

____ ____ Air Cylinder/Valves _____ _____

____ ____ Push-Palm Buttons
& Wiring _____ _____

____ ____ Ground Fault Potential _____ _____

____ ____ Lubrication System _____ _____

____ ____ Two-Hand Trips at Safe
Distance _____ _____

____ ____ Safeguard Adjusted to
Table 0-10 _____ _____

____ ____ Safeguard Interlocks _____ _____

____ ____ Motor Controls _____ _____

____ ____ Relays, Switches, etc. _____ _____

COMMENTS:_____
_____
_____

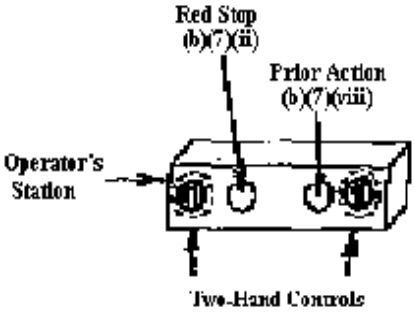
INSPECTED BY:_____
_____
(Name and Job Title)

PRESS APPROVED FOR OPERATION _____
RED TAGGED

Appendix C: Support Materials - Part Revolution Clutch Presses

A. Summary of Applicable Provisions of Section 1910.217 for Part Revolution Positive Clutch Presses.

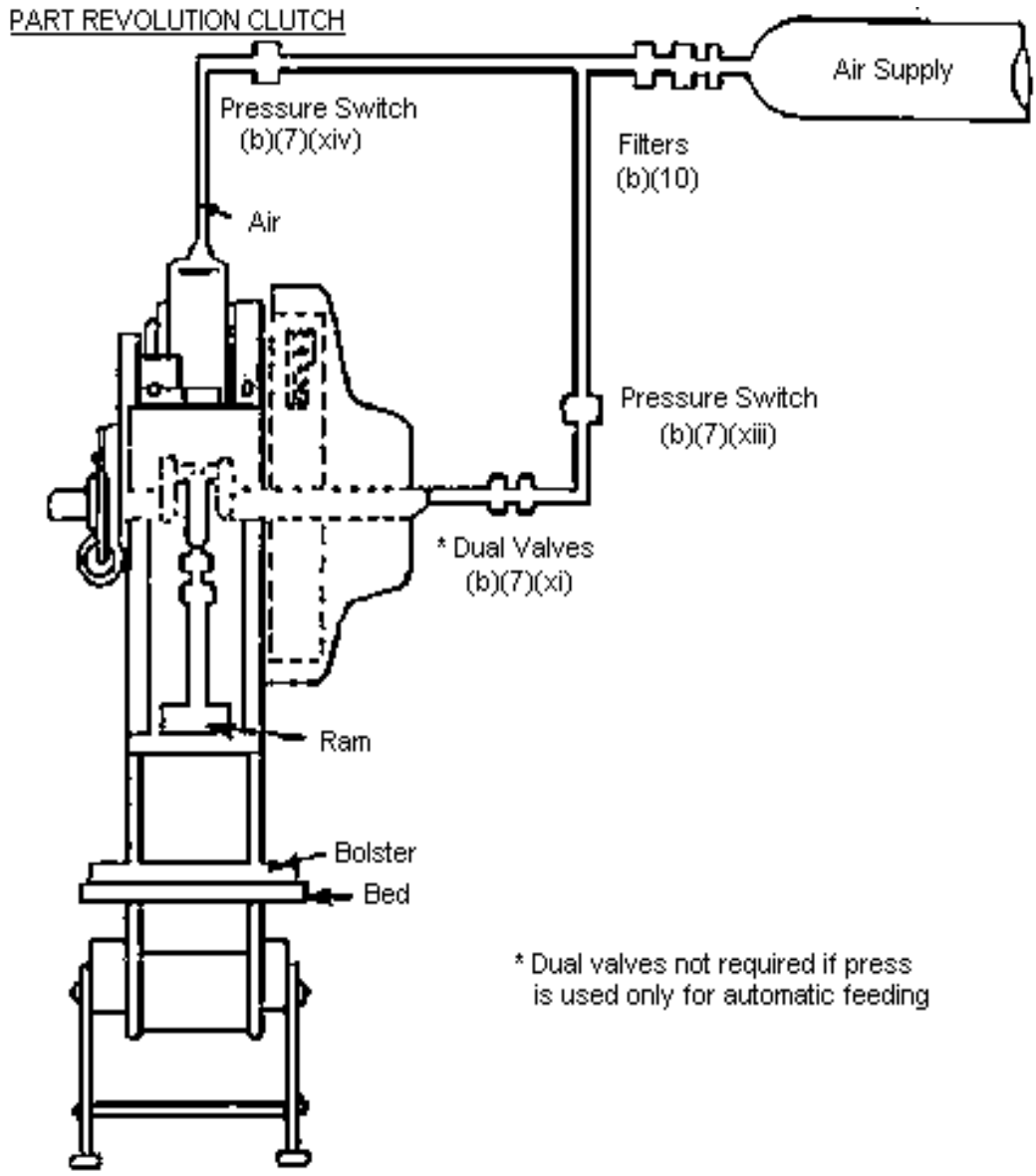
RECORDS:	Weekly	(e)(1)(ii)
	Periodic	(e)(1)(i)
	Pull Outs	(c)(3)(iv)(d)
TRAINING:	Operator	(f)(2)
	Maintenance	(e)(3)
MOTOR:	Disconnect	(b)(8)(i)
	Protected	(b)(8)(ii)
	Magnetic	(b)(8)(i)



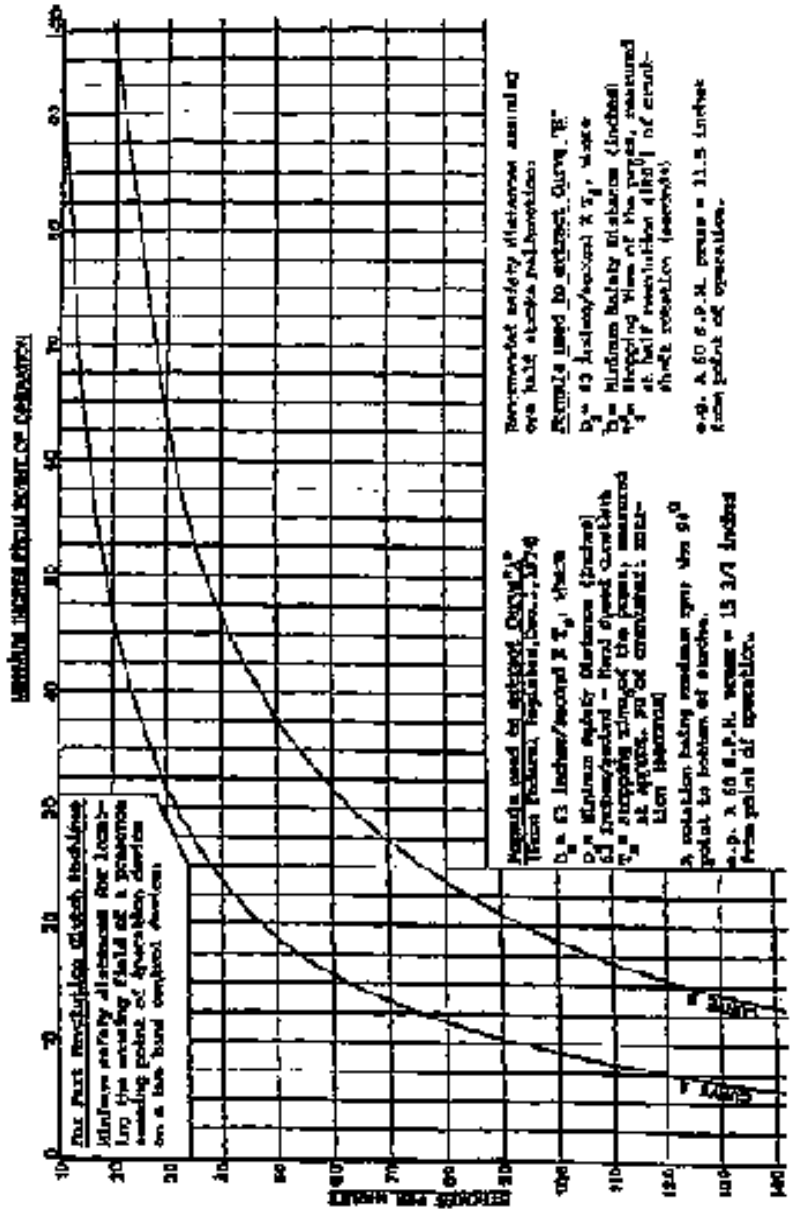
Protected	(b)(7)(v)(a)
Pressure, die closing	(b)
Antirepeat	(c)
Release pressure	(d)
** Safe distance	(c)(3)(i)(e)
All operators	(vii)(a)
** Safe distance	(vii)(c)
Fixed	(vii)(d)

**Use table for safe distance only for reference

Summary of Applicable Provisions of Section 1910.217 for Part Revolution Positive Clutch Presses (continued).



B. Comparison Graph of minimum safety distances.



C. **SAMPLE FORM - Mechanical Power Press Weekly Inspection Record for Partial Revolution Power Presses.**

(The purpose of this form is to provide compliance assistance information to interested parties required to comply with Subpart O, 1910.217(e) regulations for mechanical power presses. This non-mandatory format has been developed to list components of machines common to most power presses, although it is not an exhaustive listing. The employer is responsible for consulting the manufacturers recommendations on each power press in operation and fully complying with the letter and intent of 1910.217(e).

MACHINE NO._____ DEPARTMENT_____

DATE_____

OK	NOT OK	PART INSPECTED	IF NOT OK, CONDITIONS	DATE OF CORRECTION
____	____	Floor Condition Clean	_____	_____

____ ____ Lighting at Press _____ _____

____ ____ Operator Properly Trained _____ _____

____ ____ Brake-Collar _____ _____

____ ____ Collar Key Strap, Fixed Half, Air Cylinder Operating, Hinged Half, Hinge Pin, Adjustment Spring, Band Nut Adjustment _____ _____

____ ____ Push-Palm Buttons & Wiring _____ _____

____ ____ Ground Fault Potential _____ _____

____ ____ Rotary Limit Switch Secure & Cams, Relays Secure & Adjusted _____ _____

____ ____ Main Control Cabinet Secure & Closed After Inspection for Oil, Grease, etc., and Proper Functioning of all Components, Devices Contained Therein _____ _____

____ ____ Main Motor Controls Operating _____ _____

____ ____ Slide Adjust Motor Controls _____ _____

____ ____ Designated Wiring Secure at Proper Terminal Points _____ _____

____ ____ Foot Switch, Spring & Wiring _____ _____

____ ____ Main Clutch Valves Operating _____ _____

____ ____ Brake Operating, Clean & Adjusted _____ _____

____ ____ Stopping Time at 90° Milliseconds _____ _____

____ ____ Safe Distance of Safeguard OK _____ _____

____ ____ Anti-repeat _____ _____

____ ____ Barrier Guard Adjusted to Table 0-10 _____ _____

COMMENTS:_____
_____
_____

INSPECTED BY:_____
_____
(Name and Job Title)

PRESS APPROVED FOR OPERATION _____
RED TAGGED _____

C. <u>SAMPLE FORM - Mechanical Power Press Periodic Inspection Record for Partial Revolution Power Presses</u>.

(The purpose of this form is to provide compliance assistance information to interested parties required to comply with Subpart O, 1910.217(e) regulations for mechanical power presses. This non-mandatory format has been developed to list components of machines common to most power presses, although it is not an exhaustive listing. The employer is responsible for consulting the manufacturers recommendations on each power press in operation and fully complying with the

letter and intent of 1910.217(e).

MACHINE NO._____ DEPARTMENT_____

DATE_____

OK	NOT OK	PART INSPECTED	DATE OF IF NOT OK, CONDITIONS	CORRECTION
____	____	Floor Condition Clean	_____	_____
____	____	Piping to Press (air, power)	_____	_____
____	____	Lighting at Press	_____	_____
____	____	Operator Properly Trained	_____	_____
____	____	Bolster Plate Secure	_____	_____
____	____	Inclining Screw, Ratchet, Screw Pin, Cotters for Screw Pin	_____	_____
____	____	Tie Rods	_____	_____
____	____	Leg Clamp & Pivot Bolt	_____	_____
____	____	Brake-Collar	_____	_____
____	____	Collar Key Strap, Fixed Half, Air Cylinder Operating, Hinged Half, Hinge Pin, Adjustment Spring, Band Nut Adjustment	_____	_____
____	____	Fly Wheel End Collar Pin	_____	_____
____	____	All Parts & Screws Secure	_____	_____
____	____	Frame & Base for cracks	_____	_____
____	____	Bearing Clearances	_____	_____
____	____	Slide-Jib Clearances	_____	_____
____	____	Main-Drive (belts, gears)	_____	_____
____	____	Air Gauge (condition-accuracy)	_____	_____
____	____	Push-Palm Buttons & Wiring	_____	_____
____	____	Ground Fault Potential	_____	_____
____	____	Rotary Limit Switch Secure & Cams, Relays Secure & Adjusted	_____	
____	____	Operator's Station Secure	_____	_____
____	____	Main Control Cabinet Secure & Closed After Inspection for Oil, Grease, etc., and Proper Functioning of all Components, Devices Contained Therein	_____	_____
____	____	Main Motor Controls Operating	_____	_____
____	____	Slide Adjust Motor Controls	_____	_____
____	____	Designated Wiring Secure at Proper Terminal Points	_____	_____
____	____	Foot Switch, Spring & Wiring	_____	_____

____ ____ Lubrication Operating at all Designated Points _____ _____

____ ____ Main Clutch Valves Operating _____ _____

____ ____ Brake Operating, Clean, Adjusted _____ _____

____ ____ Stopping Time at 90° Milliseconds _____ _____

____ ____ Safe Distance of Safeguard OK _____ _____

____ ____ Anti-Repeat _____ _____

____ ____ Barrier Guard Adjusted to Table 0-10 _____ _____

COMMENTS:_____
_____
_____

INSPECTED BY:_____
_____
(Name and Job Title)

PRESS APPROVED FOR OPERATION _____
RED TAGGED _____

Appendix D: Sample Pullout/Restraint Inspection Checklist

Each pull-out device or restraint in use shall be visually inspected and checked for proper adjustment at the start of each operator shift, following a new die set-up, and when operators are changed. Necessary maintenance, repair, or both shall be performed and completed before the press is operated.

MACHINE NO. _____ DEPARTMENT _____

OPERATOR I.D._____

DATE _____ TIME _____ SHIFT CHANGE _____

DIE CHANGE _____ OPERATOR CHANGE _____

A SEPARATE DEVICE SHALL BE PROVIDED FOR EACH OPERATOR IF MORE THAN ONE OPERATOR IS USED ON A PRESS. PART INSPECTED APPLIED TO EACH DEVICE.

OK	NOT OK	PART INSPECTED	DATE OF IF NOT OK, CONDITIONS	CORRECTION
____	____	All parts, nuts, bolts,etc. secure	_____	_____
____	____	Attachments connected to and being operated only by the press slide or upper die	_____	_____
____	____	Attachments adjusted to prevent each operator from reaching into the point of operation or to withdraw the operator's hands from the point of operation before the die closes	_____	_____
____	____	Horizontal support Secure	_____	_____
____	____	Vertical support		

```
             secure _____________________________________   ____________

____  ____   Cables must not be
             bent,frayed or twisted _____________________   ____________

____  ____   Brackets secure and in good
             condition _________________________________   ____________

____  ____   Visual inspection
             of total system ____________________________   ____________

I, the undersigned, certify that on this date and time, I followed the
above inspection procedure on the indicated machine and found the
device/devices in good operating condition and properly  adjusted to
ensure the safe operation of the press by the operator/operators.

Signature ____________________________________________________________
                       (Name and Job Title)

PULL-OUTS APPROVED FOR OPERATION ______________________________________
RED TAGGED _____________________
```

Appendix E: Sample employer self-inspection checklist safeguards and other hazards

Answers to the following questions should help the interested reader to determine the safeguarding needs of his or her own workplace, by drawing attention to hazardous conditions or practices requiring corrections.

Requirements for All Safeguards

1. Do the safeguards provided meet the minimum OSHA requirements?

2. Do the safeguards prevent workers' hands, arms, and other body parts from making contact with dangerous moving parts?

3. Are the safeguards firmly secured and not easily removable?

4. Do the safeguards ensure that no objects will fall into the moving parts?

5. Do the safeguards permit safe, comfortable, and relatively easy operation of the machine?

6. Can the machine be oiled without removing the safeguard?

7. Is there a system for shutting down the machinery before safeguards are removed?

8. Can the existing safeguards be improved?

Mechanical Hazards

The Point of operation:

1. Is there a point-of-operation safeguard provided for the machine?

2. Does it keep the operator's hands, fingers, body out of the danger area?

3. Is there evidence that the safeguards have been tampered with or removed?

4. Could you suggest a more practical, effective safeguard

5. Could changes be made on the machine to eliminate the point-of operation hazard entirely?

Power transmission apparatus:

1. Are there any unguarded gears, sprockets, pulleys, or flywheels on the apparatus?

2. Are there any exposed belts or chain drives?

3. Are there any exposed set screws, key ways, collars, etc.?

4. Are starting and stopping controls within easy reach of the operator?

5. If there is more than one operator, are separate controls provided?

Other moving parts:

1. Are safeguards provided for all hazardous moving parts of the machine, including auxiliary parts?

Nonmechanical Hazards

1. Have appropriate measures been taken to safeguard workers against noise hazards?

2. Have special guards, enclosures, or personal protective equipment been provided, where necessary, to protect workers from exposure to harmful substances used in machine operation?

Electrical Hazards

1. Is the machine installed in accordance with National Fire Protection Association and National Electrical Code requirements?

2. Are there loose conduit fittings?

3. Is the machine properly grounded?

4. Is the power supply correctly fused and protected?

5. Do workers occasionally receive minor shocks while operating any of the machines?

Appendix F: Sample Report - MECHANICAL POWER PRESS POINT OF OPERATION INJURY REPORT (1910.217(g))

OSHA RECORDABLE CASES

EMPLOYER

Name _____
_____

Address_____
_____ Zip_____

Injured Employee

Name_____

Description of Injury_____
_____

Date of Injury_____
_____

Task Being Performed_____
_____
(Operation, Set-Up, Maintenance or Others-Be Specific)

PRESS DESCRIPTION

Type of Press Clutch_____
_____
(Full Revolution, Part Revolution or Direct Drive)

Type of Safeguards Being Used_____
_____
(2-Hand Control, 2-Hand Trip, Fixed Barrier Guard, Adjustable Barrier Guard, Type "A" Gate or Movable Barrier Guard, Type "B" Gate or Movable Barrier Guard, Presence Sensing Device, "Radio or Light Wave", Pull Outs, Restraints, Hold Outs, etc.)

ACCIDENT CAUSE

Cause of Accident_____
_____
(Repeat of Press, Safeguard Failure, Removing Stock Part of Scrap, No Safeguard Provided, Safeguard Provided but not Being Used, Incorrect Control Mode Used or Other, Improper Usage or Adjustment-Be Specific)

MACHINE LOADING

Type of Feeding_____
_____
(Manual With Hands in Die or With Hands Out of Dies, With Hand Tools, Semi-Automatic or Others-Be Specified)

PRESS ACTUATION

Means Used to Actuate Press Stroke_____
_____
(Foot Trip, Foot Control, Hand Trip, Hand Control or Other-Be Specific)

OPERATORS

Number of Personnel Required for Operation_____

Number of Operators Provided with Controls and Safeguards_____

DATE OF REPORT_____

PREPARED BY_____

OFFICIAL POSITION_____
_____

APPENDIX G: MECHANICAL POWER PRESSES QUESTIONS AND ANSWERS

		Page
I.	Scope of the Standard	2
II.	Control Systems & Brake Monitor	3
III.	Presence Sensing	4
IV.	Pull-outs and Sweeps	5
V.	Two Hand Trips & Controls	6

VI.	Type A & B Gates	8
VII.	Barrier Guards & Other Safeguarding	9
VIII.	Safety Distance	12
IX.	Record Keeping	14
X.	Minimum training requirements for power press operators	15
XI.	Minimum training requirements for power pressroom supervisors	16

NOTE:

Under no circumstances shall the following be used in lieu of the specific language of the law, and final determination of the requirements shall be checked with OSHA. Several questions and answers are referenced according to specific sections of the law in an attempt to provide compliance assistance to interested parties.

(I) **SCOPE OF THE STANDARD**

1. Q. Does the standard for mechanical power presses cover these presses when other materials are being worked such as nonferrous metals, plastic materials, or other materials?

A. The Section 1910.217 requirements do not contain a statement of scope and application at present. The intent of OSHA is to honor the scope as stated in ANSI B11.1-1971 which was adopted under Section 6 (a) of the Act. B11.1-1971 scope statement covers presses used to cut, form, ... "other materials" when the die is attached to the slide. B11.1 also covers the use of unitized tooling. The use of the mechanical power press to work on aluminum, tile, or non-ferrous metals hardly changes the need for operator safeguarding based on the material being processed.

2. Q. Are press brakes covered by the standard for mechanical power presses?

A. No.

3. Q. If a press brake is fitted with dies and functions as a mechanical power press, is safeguarding required?

A. Yes.

4. Q. What type of presses or other metal working machines are exempt from Section 1910.217?

A. Some types of presses not covered by 1910.217 are envelope making (window cutters, etc.) machines, dinkers and clickers used for cutting leather and other materials, brick presses, broaching machines, abrasive wheel presses, platen presses, powdered metal presses, hot bending and forming machines, forging presses.

5. Q. Are hot bending operations covered by Section 1910.217(a)(5)?

A. No.

(II) **CONTROL SYSTEM & BRAKE MONITOR**

6. Q. For ungrounded circuits, is the first ground considered a failure?

A. No.

7. Q. When operating on continuous run, is a single failure in the press control system required to stop the press?

A. No, it prevents a successive continuous run being initiated.

8. Q. If a press is only operated on continuous, must a single stroke mechanism be provided?

1910.217(b)(3)

1910.217(b)(7)(xi)

A. No.

9. Q. If a press stroke cannot be initiated because of the brake monitor action, how is this indicated to the operator?

A. The control system may have an indicator light or alarm. The visual inspection of markings on the crankshaft will show that press slide has not stopped within the safe range previously established. The press won't run.

10. Q. If the brake monitor is actuated by top stop overrun, can the brake initiation point be set earlier in the cycle if the safety distance is recalculated and two-hand controls moved?

A. Yes, this practice is allowed as long as the brake is deemed to be functioning within its stopping time limit before overhaul and repairs are required.

11. Q. If a press stops at some point of the cycle due to the brake monitor, how is the press slide returned to top of stroke?

A. The inch controls or other bypass circuit are used to return press slide to top of stroke.

12. Q. Must brake monitors detect brake deterioration when the brake is applied at other than top of stroke?

A. No, but some types of brake monitor will give an indication of stopping time on each brake application at any point in the stroke.

13. Q. Can a press be operated on-the-hop with a brake monitor?

A. No, the press slide must stop on each stroke for the brake monitor to be effective.

14. Q. Is a brake monitor necessary on a full revolution clutch press?

A. A brake monitor is not required on a full revolution clutch press. Brake monitor manufactures and users are claiming that they are feasible and useful on a full revolution clutch press.

(III) **PRESENCE SENSING**

15. Q. Do presence sensing devices require some form of additional guarding to protect press operators?

A. Yes, unless the sensing field covers all paths of access to the point of operations; therefore, some additional safeguarding is required such as fixed barrier guard, Type A or B gate or movable barrier device, or another presence sensing device.

16. Q. What are the limits of muting of a presence sensing device to enable parts ejection, feeding,

or circuit checking?

A. Top of stroke is the point at which muting shall cease as it is not possible to set a point on the downstroke at the exact position where the hazard of die closing starts.

IV. **PULL-OUTS & SWEEPS**

17. Q. Are pull-outs acceptable for safeguarding the press operator when press stroke is actuated by a foot pedal or a two-hand trip not meeting the required safety distance?

A. Yes, the pull-outs by themselves are recognized as an acceptable safeguard.

18. Q. Why are detailed requirements given for checking and adjusting of pull-outs?

1910.217(c)(3)(iv)(d)

A. Pull-outs are a more personal form of safeguard whose proper functioning can be affected when operators are changed, or a new die set for operation. Visual inspection of pull-outs can detect wear of parts as well as proper action when press is stroking.

19. Q. Can a restraint be used for "hands in dies" feeding?

A. No. By definition the restraint does not permit entry of the hand into the die or point of operation.

20. Q. Can a restraint used for one hand be used in conjunction with a single trip or control button for the second hand, where the second hand is used for feeding into the point of operation?

A. Yes, if a safety distance is established for the one-hand trip or control button.

21. Q. What is the difference between a restraint and a pull-out device?

A. The restraint prevents entry of hands or fingers to the point of operation at all times, while the pull-out device will allow hands in dies for feeding.

22. Q. Are restraints or hold-outs a recognized form of safeguarding from the hazard of the point of operation?

A. Yes, the restraints which keep operators' hands out of the point of operation at all times are an acceptable safeguard.

23. Q. Are two-hand trips recognized as an acceptable means of safeguarding the operator from the hazard of the point of operation?

A. Yes, providing the safety distance between the point of operation and the two-hand trips is determined by the appropriate formula.

V. **TWO HAND TRIPS & CONTROLS**

24. Q. What are some of the methods or means used to fix the position of two-hand trips or controls at the safety distance?

A. Articulating or extendable bars or control mounts, clearly established floor position for portable control stands, or other administrative controls may be used when it is not possible to mechanically or electrically fix the portable stand or station in position.

25. Q. Can a two-hand trip be used as a safeguard on a part revolution clutch press?

A. Yes, providing the safety distance for locating the trips is adequate.

26. Q. What methods are used to fix the position of two-hand trips or controls?

A. Key-locked control stations, key-locked portable control stands, removable plug-in control stations, portable stand floor location fittings, portable stand bases which establish a safety distance, movable control bars or buttons fixed by fasteners which require the use of special tools to remove.

27. Q. Can a two-hand control be used as a trip on a part revolution clutch press?

A. Yes, the holding time is adjustable and could be set to perform like a two-hand trip.

28. Q. On a two-hand control, what "holding time" is required?

A. None, but to qualify as a "control" rather than a "trip" it must be possible to set a "holding time".

29. Q. Must "holding time" cover the entire period of die closing or until the hazard of die closing ceases at 1/4 inch opening?

a. No, holding time can be set for any period of time during the cycle. Press stopping time is the critical factor in establishing the safety distance for safeguarding means.

(VI) **TYPE A&B GATES**

30. Q. Is a Type A gate an acceptable safeguard with a two-hand trip or two-hand control without adequate safety distance determined by the appropriate formula?

1910.217(c)(3)(I)(e)

A. Yes, the Type A gate alone will satisfy the requirements for safeguarding with any form of press actuation such as foot pedal or control, two-hand trip or control without safety distances, or others such as one-hand trip.

31. Q. Can a Type A gate be opened during the downstroke of the slide?

1910.217(c)(3)(ii)(a)

A. No, a Type A gate remains closed.

32. Q. Can a Type B gate be opened during the downstroke of the slide?

1910.217(c)(3)(I)(g)

A. Yes, on a part revolution clutch press until slide motion ceases.

33. Q. When manual feeding with hands in dies, can a Type B gate or movable barrier device be used for safeguarding on a full revolution clutch press?

A. Yes, the type B gate or movable barrier device which permits manual feeding on the upstroke is an acceptable safeguard.

34. Q. If a Type B gate is used as a means of safeguarding, can a presence sensing light curtain be

used to actuate the Type B gate which subsequently initiates the press to work?

A. Yes, the presence sensing light curtain is then only actuating the Type B gate (the operator safeguard).

35. Q. If a Type B gate can be opened during the closing stroke (on a part revolution clutch press), what safety distance is required to be sure slide motion stops before hands reach the point of operation?

1910.217(c)(3)(I)(g) & (c)(3)(ii)(b)

A. A safety distance must be used to insure that the operator's hands cannot reach the point of operation prior to die closing or reaching a point (1/4 inch die opening) where no hazard of die closing exists.

(VII) **BARRIER GUARDS & OTHER SAFEGUARDS**

36. Q. Can an interlocked barrier guard be installed on a press for protection of an operator manually feeding strip stock through openings in the side or through the movable section of the interlocked barrier guard?

1910.217(c)(2)(iv) / 1910.217(c)(2)(v) / 1910.217(c)(2)(vi)

A. Yes, this form of guard may be used; however, the hinged or movable section must be interlocked and can only be opened for clearing a jam or piece of scrap or die changing when the machine has stopped.

37. Q. Can "redundant" or "alternative safeguarding" prescribed by the latest draft ANSI B11.1 revised standard be used in lieu of the OSHA 1910.217(c)(5) "Additional Safeguarding" requirements for part revolution clutch presses (using two-hand control, presence moving or Type B gate of movable barrier device)?

A. Yes, providing a variance has been granted by OSHA under Part 1905 regulations. The approval of the revised ANSI B11.1-1975 standard may warrant a future proposed amendment to grant acceptance to the option of "alternative safeguarding" under OSHA standards. All new or improved means of safeguarding will be subject to future OSHA proposals to bring new technology on stream as soon as proven.

38. Q. Does the use of handtools for feeding qualify as a "hands out of dies" operation?

A. Yes.

39. Q. Is compliance with paragraphs (b)(13) and (b)(14) required when handtools are used for feeding?

1910.217(c)(4) / 1910.217(c)(5)

A. No.

40. Q. If presses are operated with "hands out of dies" feeding methods, must safeguarding be provided?

A. Yes.

41. Q. Why?

A. The "hands out of dies" requirement can only be achieved when some form of operator safeguarding is utilized. Handtool feeding, while qualifying as a "hands out of dies" procedure, along with the sliding bolster feeding method, in and of themselves, do not insure that the operator cannot get his hands in the die. These approaches should be used in conjunction with other safety devices; e.g. two-hand trip, Type A and B gates, presence sensing, etc.

42. Q. On presses operated as a "hands out of dies" for feeding must the applicable construction requirements of paragraph (b) be met?

A. Yes.

43. Q. For controls, foot pedals and controls, brakes and safeguard devices?

A. Yes, the standard as promulgated makes no distinction for presses used for "hands out of die" feeding. It is conceivable that a claim can be made that no operator hazard is present on "hands out of dies" operations; therefore, construction requirements need not to be met to insure employer protection from "recognized hazards". The argument, of course, fails on a change to "hands in dies" for a subsequent run. How can a press be reserved exclusively for "hands out of dies" operation and possibly receive a variance?

44. Q. Why are tools required for removal of scrap or stuck work pieces when hand feeding is allowed?

A. Removal and clearing operations are not considered to be as technically difficult as the feeding of dies. The requirement will reduce the number of times that the operator's hands are in the dies and represents a compromise with the former rule for no hands in dies at all times.

45. Q. Can the press control reliability requirement of 1910.217(b)(13) be met on a full revolution clutch press?

A. It is not required on a full revolution clutch press. Claims are being made that such a control criterion can be met on a full revolution clutch press.

46. Q. The new requirements for testing of clutch/brake mechanism, anti-repeat feature, and single stroke mechanism appear to apply to those presses operated on single stroke with "hands in dies" feeding only?

1910.217(c)(5)-Additional requirements for safeguarding

A. The only presses excepted from the rule are those that comply with paragraph (c)(5)covering control systems in paragraph (b)(13) and brake monitoring in paragraph (b)(14).

47. Q. Is a sliding bolster by itself recognized as an acceptable safeguard?

A. No.

48. Q. If a sliding bolster is used to feed parts, are two-hand controls required to meet the safety distance requirements?

A. Yes.

(VIII) **SAFETY DISTANCE**

49. Q. Where is the safety distance measurement taken from? The die or the edge of the bolster or slide?

A. The safety distance is measured from the point of operation of the die (a recognized hazard). The

die dimensions may be less than or greater than the size of the slide or bolster.

50. Q. There are different formulas for calculating the safety distance on part revolution clutch machines using two hand control and full revolution clutch machines using two hand trips. What is the significance of the sub letters D_s, D_m, T_s, and T_m?

A. Different sub letters are used to aid users in recognizing that two separate formulas are used for calculating safety distance depending on the type of clutch.

51. Q. When the safety distance is calculated using the formula, what amount of supplemental distance (margin) is required to determine the point at which controls or trips are located?

A. None; however, it is expected that an additional (margin) distance will be added to allow for some brake stopping time deterioration or slide stopping point tolerance.

52. Q. What is "separation"? What is "safety distance"? Are they the same?

A. "Safety distance" is the proper distance from the controls to the point of operation, as defined in ANSI B11.1-1982, -1988, and the 1994 ANSI draft proposal of April 24, 1994. "Separation" is the term used in ANSI B11.1-1982, -1988, and the April 24, 1994 draft revision, which compares with the term "separation" OSHA uses to refer to the distance between an operator's hand controls to require the use of both hands to operate the press.

53. Q. What is meant by separation when describing the position or arrangement of two hand trips and two-hand controls?

OSHA recognizes the use of "separation distance" when applied to locating two-hand control buttons remote from each other to discourage attempts at one-hand actuation.

54. Q. What is the source of the 63" hand speed constant?

A. European studies by Dr. O. Lobl of Sweden which determined a safety distance for use in the regulations of foreign countries.

55. Q. Which formula is proper for finding the safety distance on a part revolution clutch press with two-hand controls?

1910.217(c)(3)(vii)(c)

No formula for calculating safety distance on a part revolution clutch press actuated by a two-hand trip is provided. The time recommended would be that for the die closing stroke.

56. Q. Why is the position of approximately 90^0 of crankshaft rotation chosen for determining brake stopping time?

The longest possible stopping time should be used when calculating the safety distance. The point in the stroke near point of maximum speed or half way down was considered to be the best place to measure the longest time for stopping the slide. This conclusion is currently being challenged based on testing by several people.

(IX) **RECORD KEEPING**

57. Q. How long must the records required by Section 1910.217(e) be kept?

A. Section 1910.217(e) makes no provision for record retention period.

58. Q. Are Federal agencies required to report injuries to press operators?

A. No.

59. Q. Must a written record be kept of pull-out adjustment and testing for each shift change, operator change, or new die set-up?

1910.217 (c)(3)(iv)(d)

A. The record keeping requirements of 1910.217(e) are applicable.

60. Q. If an employee is injured by a broken piece/part thrown from the die, must a report be sent to the OSHA Directorate of Safety Standards?

A. No, only injuries to employees which occur within the point of operation are to be reported.

61. Q. Where did the weekly period for inspections come from?

A. ANSI B11.1-1971 explanatory column accompanying requirements for inspections.

62. Q. What periods are recommended by the ANSI B11.1-1971 for press inspections?

A. B11.1-1971 recommended weekly, monthly, or possibly longer periods for press and safeguarding inspections, testing, and maintenance.

63. Q. Are records required to be kept?

A. Yes, B11.1 requires records of inspections.

64. Q. For how long?

A. No definite retention periods are prescribed by OSHA for power press records.

65. Q. Are periodic inspections and records required for all presses even when operated on continuous or with no hands in dies?

A. Yes, every press is required to be inspected and maintained to protect the safety of operators, die setters, and others.

66. Q. Is it necessary to report minor injuries such as a scratch or pinched finger when feeding a die?

A. No, only report those injuries which qualify for listing on the OSHA Form 200.

(X) **MINIMUM REQUIREMENTS FOR POWER PRESS OPERATORS TRAINING**

The operators of mechanical power presses must be trained in all phases of the operation of the equipment and its capabilities and limitations, and:

A. All press controls and how to use them.

B. The operator must be informed of the safety guards and devices incorporated on the machine and the correct use of each.

C. Each operator must be instructed in the use of tools for removing stuck work and the use of

swabs, brushes, or oil cans for lubricating dies and stock.

D. Press operators will need to understand why, when, and how to use personal protective equipment, such as safety glasses, gloves, safety shoes, and hearing protection.

E. The storage of parts, tools, or other objects on dies, die sets, bolster plates, or press components not designed to retain them; present hazards of falling on operators; and possible pinch points with moving components. Operators must be aware of these hazards, as well as the basic housekeeping around the press areas.

F. Press operators must be instructed not to operate the press until the press has been checked and tested several times prior to production operations. He/she should report any problems which he/she observes to the proper person.

G. Employees who are going to operate presses must receive a minimum of 8 hours* on the job training under supervision prior to being assigned to operate the presses. *this could be up to 2 weeks or more, depending on the complexities of the operation.

(XI) **MINIMUM TRAINING REQUIREMENTS FOR PRESSROOM SUPERVISORS**

A. The foreperson must be informed of his responsibilities to the employer and the employees who work with him/her.

B. He/she must know the hazards of power press operations and their set-up and maintenance.

C. The pressroom foreperson must be knowledgeable of what the safety guards and devices are intended to do and the correct adjustments and use of each.

D. He/she must check each set-up and be sure that all operators are instructed in safe power press operations before they start work.

E. It is his/her responsibility to insure that correct operating procedures are being followed.

F. The foreperson must see that all maintenance is performed and that presses are in safe repair prior to their operation. As the employer's representative, the pressroom supervisor is responsible for the training and operations of the employees under his/her control.

Revision Date: Feb 26 1999

OSHA Directives - Table of Contents

OSHA Occupational Safety & Health Administration U.S. Department of Labor

Industry Profile for OSHA Standard 19100217; All sizes; Federal

Establishment Size: All sizes
Standard: 19100217 Mechanical Power Presses

Listed below are the industry groups in which the specified standard has been cited by **Federal OSHA** during the period October 1999 through September 2000. Penalties shown reflect current rather than initial amounts. For more information, see definitions.

| SIC Division | 2-digit SIC | 3-digit SIC | 4-digit SIC|

SIC Division

#Cited	#Insp	$Penalty	Industry Classification
1973	537	1833098.00	All Industry Divisions
1943	525	1814441.80	Division D/Manufacturing
18	7	12371.20	Division F/Wholesale Trade
10	3	6285.00	Division I/Services
1	1	0.00	Division E/Transportation, Communications, Electric, Ga
1	1	0.00	Division K/Non-Classifiable

Top of Page

SIC Major Group - 2 digit

#Cited	#Insp	$Penalty	Industry Classification
1223	315	1044014.60	3400/Fabricated Metal Products, Except Machinery And Tr
212	60	130483.75	3500/Industrial And Commercial Machinery And Computer E
105	20	165304.50	3900/Miscellaneous Manufacturing Industries
103	28	69922.25	2500/Furniture And Fixtures
99	34	137980.70	3600/Electronic And Other Electrical Equipment And Comp
90	28	101784.00	3700/Transportation Equipment
43	16	34092.50	3300/Primary Metal Industries
25	9	76237.50	3000/Rubber And Miscellaneous Plastics Products
15	5	25625.00	3800/Measuring, Analyzing, And Controlling Instruments;
14	6	11921.20	5000/Wholesale Trade-durable Goods
11	3	16560.00	2400/Lumber And Wood Products, Except Furniture
9	2	3285.00	7600/Miscellaneous Repair Services
8	2	5100.00	3200/Stone, Clay, Glass, And Concrete Products
5	2	2000.00	2600/Paper And Allied Products
4	1	450.00	5100/Wholesale Trade-non-durable Goods
2	1	500.00	2700/Printing, Publishing, And Allied Industries
1	1	4500.00	2000/- Food And Kindred Products
1	1	337.00	2800/Chemicals And Allied Products
1	1	0.00	4500/Transportation By Air
1	1	3000.00	7300/Business Services

1	1	0.00	9900/Nonclassifiable Establishments

Top of Page

SIC Industry Group - 3 digit

#Cited	*#Insp*	*$Penalty*	*Industry Classification*
412	107	365954.30	3460/Metal Forgings And Stampings
342	85	263325.20	3490/Miscellaneous Fabricated Metal Products
336	87	265954.40	3440/Fabricated Structural Metal Products
85	19	43352.50	3540/Metalworking Machinery And Equipment
77	14	73595.00	3990/Miscellaneous Manufacturing Industries
65	20	42884.00	3710/Motor Vehicles And Motor Vehicle Equipment
59	14	29421.25	2540/Partitions, Shelving, Lockers, And Office And
55	17	26285.00	3420/Cutlery, Handtools, And General Hardware
31	6	12095.00	3450/Screw Machine Products, And Bolts, Nuts, Screws, R
31	12	10110.70	3640/Electric Lighting And Wiring Equipment
29	11	13780.00	3590/Miscellaneous Industrial And Commercial
27	11	17316.25	3530/Construction, Mining, And Materials Handling
25	7	97650.00	3620/Electrical Industrial Apparatus
24	5	24030.00	3560/General Industrial Machinery And Equipment
21	3	92535.00	3410/Metal Cans And Shipping Containers
20	4	23243.50	2520/Office Furniture
20	7	74912.50	3080/Miscellaneous Plastics Products
19	6	21800.00	3310/Steel Works, Blast Furnaces, And Rolling And
19	5	11235.00	3580/Refrigeration And Service Industry Machinery
18	3	88410.00	3940/Dolls, Toys, Games And Sporting And Athletic
15	6	18680.00	3520/Farm And Garden Machinery And Equipment
15	6	7640.00	3670/Electronic Components And Accessories
15	3	8080.00	3690/Miscellaneous Electrical Machinery, Equipment,
13	3	2090.00	3550/Special Industry Machinery, Except Metalworking
12	4	6000.00	3790/Miscellaneous Transportation Equipment
11	5	8530.00	3350/Rolling, Drawing, And Extruding Of Nonferrous
11	5	11016.00	3430/Heating Equipment, Except Electric And Warm Air;
10	3	5612.20	3470/Coating, Engraving, And Allied Services
9	6	7407.50	2510/Household Furniture
9	3	2950.00	2590/Miscellaneous Furniture And Fixtures
9	3	4750.00	3660/Communications Equipment
9	2	3000.00	3840/Surgical, Medical, And Dental Instruments And
8	3	1737.50	3360/Nonferrous Foundries (castings)
7	1	5100.00	3230/Glass Products, Made Of Purchased Glass
7	1	1837.50	3750/Motorcycles, Bicycles, And Parts
6	1	6900.00	2530/Public Building And Related Furniture
6	3	22625.00	3820/Laboratory Apparatus And Analytical, Optical,
6	2	1581.20	5050/Metals And Minerals, Except Petroleum
6	1	1500.00	7640/Reupholstery And Furniture Repair
5	2	1325.00	3050/Gaskets, Packing, And Sealing Devices And Rubber
5	2	2025.00	3390/Miscellaneous Primary Metal Products
5	2	1237.50	3480/Ordnance And Accessories, Except Vehicles And
5	1	2250.00	3910/Jewelry, Silverware, And Plated Ware
5	2	1049.50	3960/Costume Jewelry, Costume Novelties, Buttons, And
4	1	7000.00	2430/Millwork, Veneer, Plywood, And Structural Wood
4	1	2000.00	2440/Wood Containers
4	1	2000.00	2650/Paperboard Containers And Boxes
4	2	50000.00	3740/Railroad Equipment
4	2	4687.50	5010/Motor Vehicles And Motor Vehicle Parts And
4	1	450.00	5190/Miscellaneous Non-durable Goods

3	1	7560.00	2490/Miscellaneous Wood Products
3	2	9750.00	3610/Electric Transmission And Distribution Equipment
3	1	1785.00	7690/Miscellaneous Repair Shops And Related Services
2	1	500.00	2750/Commercial Printing
2	1	1062.50	3720/Aircraft And Parts
2	1	1102.50	5070/Hardware, And Plumbing And Heating Equipment
2	1	4550.00	5090/Miscellaneous Durable Goods
1	1	4500.00	2060/Sugar And Confectionery Products
1	1	0.00	2670/Converted Paper And Paperboard Products, Except
1	1	337.00	2820/Plastics Materials And Synthetic Resins, Synthetic
1	1	0.00	3290/Abrasive, Asbestos, And Miscellaneous
1	1	0.00	3630/Household Appliances
1	1	0.00	4580/Airports, Flying Fields, And Airport Terminal
1	1	3000.00	7360/Personnel Supply Services
1	1	0.00	9990/Nonclassifiable Establishments

Top of Page

SIC Industry Nr - 4 digit

#Cited	*#Insp*	*$Penalty*	*Industry Classification*
375	94	329234.60	3469/Metal Stampings, Not Elsewhere Classified
197	50	176803.70	3499/Fabricated Metal Products, Not Elsewhere Classifie
128	32	91847.50	3444/Sheet Metal Work
109	21	60391.50	3496/Miscellaneous Fabricated Wire Products
70	13	25752.50	3544/Special Dies And Tools, Die Sets, Jigs And Fixture
57	16	25915.00	3441/Fabricated Structural Metal
56	13	35677.50	3443/Fabricated Plate Work (boiler Shops)
51	4	44147.50	3993/Signs And Advertising Specialties
50	13	23935.00	3429/Hardware, Not Elsewhere Classified
50	15	23464.00	3714/Motor Vehicle Parts And Accessories
48	11	23121.25	2542/Office And Store Fixtures, Partitions, Shelving, A
40	15	83624.50	3442/Metal Doors, Sash, Frames, Molding, And Trim
38	7	18214.90	3446/Architectural And Ornamental Metal Work
26	9	24305.50	3465/Automotive Stampings
23	2	8200.00	3451/Screw Machine Products
22	9	9730.00	3599/Industrial And Commercial Machinery And Equipment,
20	4	23243.50	2522/Office Furniture, Except Wood
20	7	74912.50	3089/Plastics Products, Not Elsewhere Classified
19	4	48650.00	3621/Motors And Generators
15	3	21030.00	3564/Industrial And Commercial Fans And Blowers And Air
14	1	87000.00	3412/Metal Shipping Barrels, Drums, Kegs, And Pails
14	2	84000.00	3949/Sporting And Athletic Goods, Not Elsewhere Classif
13	4	8675.00	3498/Fabricated Pipe And Pipe Fittings
13	3	2090.00	3559/Special Industry Machinery, Not Elsewhere Classifi
13	7	25422.50	3999/Manufacturing Industries, Not Elsewhere Classified
12	3	10350.00	3449/Miscellaneous Structural Metal Work
12	7	7375.00	3535/Conveyors And Conveying Equipment
12	4	6000.00	3799/Transportation Equipment, Not Elsewhere Classified
11	3	6300.00	2541/Wood Office And Store Fixtures, Partitions, Shelvi
11	3	16750.00	3312/Steel Works, Blast Furnaces (including Coke Ovens)
11	4	12414.20	3462/Iron And Steel Forgings
11	5	4322.50	3495/Wire Springs
11	1	2850.00	3533/Oil And Gas Field Machinery And Equipment
10	3	5612.20	3479/Coating, Engraving, And Allied Services, Not Elsew
10	3	8000.00	3585/Air-conditioning And Warm Air Heating Equipment An
9	3	2950.00	2599/Furniture And Fixtures, Not Elsewhere Classified

9	4	6330.00	3354/Aluminum Extruded Products
9	5	4430.00	3523/Farm Machinery And Equipment
9	2	3235.00	3589/Service Industry Machinery, Not Elsewhere Classifi
9	3	2000.00	3643/Current-carrying Wiring Devices
8	4	3895.00	3452/Bolts, Nuts, Screws, Rivets, And Washers
8	1	3000.00	3569/General Industrial Machinery And Equipment, Not El
8	3	3320.00	3646/Commercial, Industrial, And Institutional Electric
8	2	4500.00	3694/Electrical Equipment For Internal Combustion Engin
8	3	16220.00	3713/Truck And Bus Bodies
7	4	6045.00	2514/Metal Household Furniture
7	1	5100.00	3231/Glass Products, Made Of Purchased Glass
7	2	4000.00	3317/Steel Pipe And Tubes
7	2	5535.00	3411/Metal Cans
7	3	9225.00	3433/Heating Equipment, Except Electric And Warm Air Fu
7	2	10750.00	3541/Machine Tools, Metal Cutting Types
7	1	4375.00	3669/Communications Equipment, Not Elsewhere Classified
7	1	3580.00	3691/Storage Batteries
7	1	1837.50	3751/Motorcycles, Bicycles, And Parts
6	1	6900.00	2531/Public Building And Related Furniture
6	1	14250.00	3524/Lawn And Garden Tractors And Home Lawn And Garden
6	1	3000.00	3711/Motor Vehicles And Passenger Car Bodies
6	2	1581.20	5051/Metals Service Centers And Offices
6	1	1500.00	7641/Reupholstery And Furniture Repair
5	2	1325.00	3053/Gaskets, Packing, And Sealing Devices
5	2	337.50	3365/Aluminum Foundries
5	2	2025.00	3399/Primary Metal Products, Not Elsewhere Classified
5	1	325.00	3448/Prefabricated Metal Buildings And Components
5	2	8507.50	3494/Valves And Pipe Fittings, Not Elsewhere Classified
5	2	49000.00	3625/Relays And Industrial Controls
5	1	1650.00	3645/Residential Electric Lighting Fixtures
5	3	577.50	3648/Lighting Equipment, Not Elsewhere Classified
5	2	3415.00	3672/Printed Circuit Boards
5	2	750.00	3678/Electronic Connectors
5	2	3475.00	3679/Electronic Components, Not Elsewhere Classified
5	1	1500.00	3841/Surgical And Medical Instruments And Apparatus
5	1	2250.00	3915/Jewelers' Findings And Materials, And Lapidary Wor
5	2	1049.50	3961/Costume Jewelry And Costume Novelties, Except Prec
4	1	7000.00	2431/Millwork
4	1	2000.00	2448/Wood Pallets And Skids
4	1	2000.00	2655/Fiber Cans, Tubes, Drums, And Similar Products
4	1	550.00	3482/Small Arms Ammunition
4	1	2400.00	3491/Industrial Valves
4	1	2000.00	3593/Fluid Power Cylinders And Actuators
4	2	50000.00	3743/Railroad Equipment
4	1	1500.00	3842/Orthopedic, Prosthetic, And Surgical Appliances An
4	1	4410.00	3944/Games, Toys, And Children's Vehicles, Except Dolls
4	2	4687.50	5013/Motor Vehicle Supplies And New Parts
4	1	450.00	5199/Nondurable Goods, Not Elsewhere Classified
3	1	7560.00	2499/Wood Products, Not Elsewhere Classified
3	1	1400.00	3363/Aluminum Die-castings
3	2	1850.00	3423/Hand And Edge Tools, Except Machine Tools And Hand
3	1	1000.00	3432/Plumbing Fixture Fittings And Trim
3	2	6750.00	3531/Construction Machinery And Equipment
3	2	2437.50	3542/Machine Tools, Metal Forming Types
3	1	1787.50	3545/Cutting Tools, Machine Tool Accessories, And Machi
3	1	2050.00	3592/Carburetors, Pistons, Piston Rings, And Valves
3	2	9750.00	3613/Switchgear And Switchboard Apparatus
3	1	1063.20	3647/Vehicular Lighting Equipment
3	2	20000.00	3825/Instruments For Measuring And Testing Of Electrici
3	1	2625.00	3829/Measuring And Controlling Devices, Not Elsewhere C

3	1	1225.00	3995/Burial Caskets
3	1	1785.00	7692/Welding Repair
2	1	500.00	2752/Commercial Printing, Lithographic
2	1	2200.00	3356/Rolling, Drawing, And Extruding Of Nonferrous Meta
2	2	500.00	3421/Cutlery
2	1	1225.00	3493/Steel Springs, Except Wire
2	1	2625.00	3548/Electric And Gas Welding And Soldering Equipment
2	2	375.00	3661/Telephone And Telegraph Apparatus
2	1	1062.50	3728/Aircraft Parts And Auxiliary Equipment, Not Elsewh
2	1	1102.50	5072/Hardware
2	1	4550.00	5094/Jewelry, Watches, Precious Stones, And Precious Me
1	1	4500.00	2064/Candy And Other Confectionery Products
1	1	750.00	2511/Wood Household Furniture, Except Upholstered
1	1	612.50	2515/Mattresses, Foundations, And Convertible Beds
1	1	0.00	2671/Packaging Paper And Plastics Film, Coated And Lami
1	1	337.00	2821/Plastics Materials, Synthetic Resins, And Nonvulca
1	1	0.00	3296/Mineral Wool
1	1	1050.00	3316/Cold-rolled Steel Sheet, Strip, And Bars
1	1	791.00	3431/Enameled Iron And Metal Sanitary Ware
1	1	687.50	3484/Small Arms
1	1	1000.00	3492/Fluid Power Valves And Hose Fittings
1	1	341.25	3534/Elevators And Moving Stairways
1	1	0.00	3563/Air And Gas Compressors
1	1	0.00	3624/Carbon And Graphite Products
1	1	0.00	3634/Electric Housewares And Fans
1	1	1500.00	3641/Electric Lamp Bulbs And Tubes
1	1	200.00	3715/Truck Trailers
1	1	0.00	4581/Airports, Flying Fields, And Airport Terminal Serv
1	1	3000.00	7363/Help Supply Services
1	1	0.00	9999/Nonclassifiable Establishments

Top of Page

Last updated on 010411

[Industry Profile for Standard | Query Standards Cited | SIC Search | SIC Division Structure]

[Comments & Info | OSHA Home Page | OSHA-OCIS | US DOL Web Site | Disclaimer]

Citations Issued from the Columbus Area OSHA Office
Since the Power Press Emphasis Program Started

Total # from 2/28/97 to 5/30/98	OSHA Section 29 CFR 1910.	Description	Proposed Fine Amounts from data	Average cost per citation from data
1	217 A 4	Reconstruction / Modifications	$4200.00	$4200.00
5	217 B 1	Hazard- Broken Falling Parts	$3850.00	$770.00
9	217 B 3 I	Single Stroke Mec.	$11775.00	$1308.33
10	217 B 4 I	Pedal / Protect unintended use	$12300.00	$1230.00
1- 0 - $ ciat	217 B 4 II	Pedal Non-slip	$ 0.00	$ 0.00
4-1w /$ciat	217 B 4 III	Pedal Return Spring / compressed on rod type	$1500.00	$1500.00
4-3 w/$ciat	217 B 6 I	Two Hand Trips unintended use	$6500.00	$2166.67
3	217 B 6 II	Full Rev. Anti Repeat	$5225.00	$1741.67
1	217 B 7 II	Red Color Stop Control	$1500.00	$1500.00
2	217 B 7 IV	Inch - Designed to protect from exposure	$22475.00	$1233.50
5-3w/$ciat	217 B 7 V A	Hand control , protect unintended use	$3275.00	$1091.67
1	217 B 7 V B	Concurrent Pressure both hands	$1500.00	$1500.00
1	217 B 7 V I	Control Reliability / normal stopping	$ 0.00	$ 0.00
4-3w/$ciat	217 B 8 I	Main Power Disconnect	$2225.00	$741.67
6	217 B 8 III	Drive Motor Starter	$10400.00	$1733.33
1	217 B 14 II	Brake Monitor Indicator	$750.00	$750.00
26-24w/$ciat	217 C 1 I	Properly adjusted point of operation guards	$27900.00	$1162.50
24 - 18w/$ciat	217 C 2 I A	Prevent entry - point of operation - In, Under, Around, Through	$34050.00	$1891.67
3	217 C 2 I D	Fasteners Readily Removable	$4625.00	$1541.67
1	217 C 3 I V B	Pullbacks - adjusted	$1500.00	$1500.00
2	217 C 3 I V D	Pullbacks - visually inspect	$2550.00	$1275.00
1	217 C 3 V III D	Two Hand Trips - Fixed position	$1300.00	$1300.00
1	217 C 3 V II D	Two Hand Control - Fixed position	$ 0.00	$ 0.00
1	217 C 4	Hand Tools	$3500.00	$3500.00
2	217 C 5 I	Control system and Brake Monitor	$7000.00	$3500.00
1	217 D 4	Guide Post Hazard	$1650.00	$1650.00
6 - 5w/$ciat	217 D 6 I	Inf. available to Die Setter, Stroke / tonnage etc.	$12700.00	$2540.00
2	217 D 6 II	Upper Die Weight - Counterbalance adj.	$ 0.00	$ 0.00
2-1w/$ciat	217 D 6 III	Complete Die Weight / Handling Equip	$875.00	$875.00
11-10w/$ciat	217 D 9 I	Die Setting	$20300.00	$2030.00
1	217 D 9 II	Spring loaded Turn over Bar	$4200.00	$4200.00
4	217 D 9 IV	Safety Blocks	$9425.00	$2356.00
22-17w/$ciat	217 E 1 I	Periodic / Regular Inspection	$28200.00	$1658.83
2	217 E 1 II	Weekly Inspection	$3000.00	$1500.00
11-1w/$ciat	217 E 3	Training Maintenance Personnel	$6000.00	$6000.00
10 -2w/$ciat	217 F 2	Training Operators	$6450.00	$3225.00
2-1w/$ciat	217 F 3	Work Area / Clearance between machines	$1500.00	$1500.00
1	217 G	Reports of injuries to employees	$750.00	$750.00

Guard Type or Device	Full Revolution Hands In	 Hands Out	Part `Revolution Hands In	 Hands Out
Guards				
Barrier Guards Fixed, Adjustable, Die Enclosures	NO Impossible by Definition See .217 (c) (2) (i) (a)	YES Inspect Weekly See .217 (e) (1) (i) & (ii)	NO Impossible by Definition See .217 (c) (2) (i) (a)	YES Inspect Weekly .217 (e) (1) (i) & (ii) Or Brake Monitor & Control Reliability .217 (b) (13) & (14)
Interlocked Barrier Guard	NO Impossible by Definition See .217 (c) (2) (v)	YES Inspect Weekly See .217 (e) (1) (i) & (ii)	NO Impossible by Definition See .217 (c) (2) (v)	YES Inspect Weekly .217 (e) (1) (i) & (ii) Or Brake Monitor & Control Reliability .217 (b) (13) & (14)
Moveable Barrier Guards				
Type A Gate	YES Inspect Weekly See .217 (e) (1) (i) & (ii)	YES Inspect Weekly See .217 (e) (1) (i) & (ii)	YES Inspect Weekly .217 (e) (1) (i) & (ii) Or Brake Monitor & Control Reliability .217 (b) (13) & (14)	YES Inspect Weekly .217 (e) (1) (i) & (ii) Or Brake Monitor & Control Reliability .217 (b) (13) & (14)
Type B Gate	NO FORBIDDEN See .217 (c) (3) (ii) & .217 (c) (3) (iii) (a)	NO FORBIDDEN See .217 (c) (3) (ii) & .217 (c) (3) (iii) (a)	YES Brake Monitor & Control Reliability System .217 (c) (5) Must detect top - stop overrun beyond limits .217 (b) (14) (i)	YES Inspect Weekly .217 (e) (1) (i) & (ii) Or Brake Monitor & Control Reliability .217 (b) (13) & (14)
Devices				
Presence Sensing	NO FORBIDDED See .217 (c) (3) (iii) (a)	NO FORBIDDEN See .217 (c) (3) (iii) (a)	YES Safety Distance .217 (c) (3) (iii) (e) & Brake Monitor & Control Reliability .217 (c) (5)	YES Safety Distance .217 (c) (3) (iii) (e) & Inspect Weekly .217 (e) (1) (i) & (ii) Or Brake Monitor & Control Reliability .217 (b) (13) & (14)
See Other Side				

Devices - Continued	Full Revolution		Part Revolution	
	Hands In	Hands Out	Hands In	Hands Out
Pull - Out	YES Inspect Each Shift, Each Set - Up Each Operator See .217 (c) (3) (iv) (d)	YES Inspect Each Shift, Each Set - Up Each Operator See .217 (c) (3) (iv) (d)	YES Inspect Each Shift, Each Set - Up Each Operator See .217 (c) (3) (iv) (d)	YES Inspect Each Shift, Each Set - Up Each Operator See .217 (c) (3) (iv) (d)
Sweep	NO Unacceptable Safeguard After Dec. 31, 1976 See .217 (c) (3) (v) Also See .217 (e) (1) (i) & (ii)	NO Unacceptable Safeguard After Dec. 31, 1976 See .217 (c) (3) (v) Also See .217 (e) (1) (i) & (ii)	NO Unacceptable Safeguard After Dec. 31, 1976 See .217 (c) (3) (v) Also See .217 (e) (1) (i) & (ii)	NO Unacceptable Safeguard After Dec. 31, 1976 See .217 (c) (3) (v) Also See .217 (e) (1) (i) & (ii)
Hold - Out (Restraint)	NO Impossible by Definition See .217 (c) (3) (vi)	YES Inspect Weekly See .217 (e) (1) (i) & (ii)	NO Impossible by Definition See .217 (c) (3) (vi)	YES Inspect Weekly .217 (e) (1) (i) & (ii) Or Brake Monitor & Control Reliability .217 (b) (13) & (14)
Two - Hand Control	NO Impossible by Definition See .217 (b) (7) (v) & .217 (c) (3) (vii)	NO Impossible by Definition See .217 (b) (7) (v) & .217 (c) (3) (vii)	YES Safety Distance .217 (c) (3) (vii) (c) & Fixed Control Position .217 (c) (3) (vii) (d) & Brake Monitor & Control Reliability .217 (c) (5)	YES Safety Distance .217 (c) (3) (vii) (c) & Fixed Control Position .217 (c) (3) (vii) (d) And also see .217 (e) (1) (i) & (ii)
Two - Hand Trip	YES Safety Distance .217 (c) (3) (viii) (c) & Fixed Trip Position .217 (c) (3) (viii) (d) & Inspect Weekly .217 (e) (1) (i) & (ii)	YES Safety Distance .217 (c) (3) (viii) (c) & Fixed Trip Position .217 (c) (3) (viii) (d) & Inspect Weekly .217 (e) (1) (i) & (ii)	YES Safety Distance .217 (c) (3) (viii) (c) & Fixed Trip Position .217 (c) (3) (viii) (d) & Inspect Weekly .217 (e) (1) (i) & (ii) Or Brake Monitor & Control Reliability .217 (b) (13) & (14)	YES Safety Distance .217 (c) (3) (viii) (c) & Fixed Trip Position .217 (c) (3) (viii) (d) & Inspect Weekly .217 (e) (1) (i) & (ii) Or Brake Monitor & Control Reliability .217 (b) (13) & (14)

Waverly couple awarded $4.5 million in civil suit

By Don Baird
Dispatch Staff Reporter

WAVERLY, Ohio — A jury of five men and three women awarded $4.5 million Friday to a Waverly couple in one of the largest civil verdicts in Pike County history.

In a unanimous decision at the end of a 10-day trial, the jury gave Raymond E. Pullins $2.5 million and his wife, Tracey, $500,000 in compensatory damages for injuries Mr. Pullins suffered in an industrial accident May 6, 1994. The jury also awarded $1.5 million in punitive damages to them as a couple.

Common Pleas Judge Gordon E. Bevens said it was the largest civil verdict he could recall being delivered by a Pike County jury since he began practicing law in Waverly in 1971.

The last jury verdict in a civil damage case in Pike County awarded $100,000 to $200,000 in damages, which was considered a large verdict for the county, Bevens said.

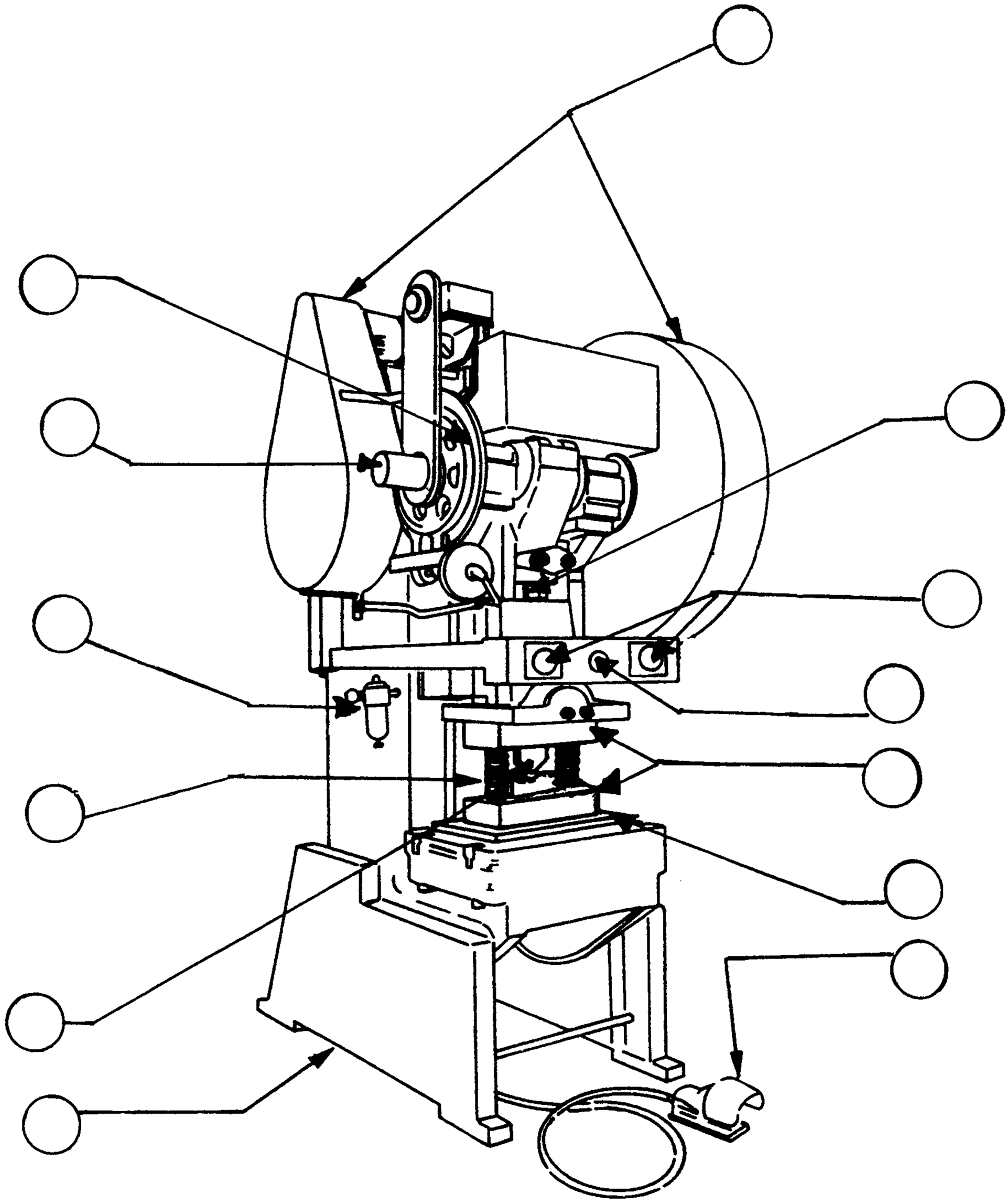
Mr. Pullins lost three fingers of his left hand, his entire right hand and most of his right forearm in the accident at the Waverly plant of the Michigan-based Brown Corp.

The accident occurred when he was loading material into a 400-ton mechanical power press at the plant, which manufactures components for the auto industry.

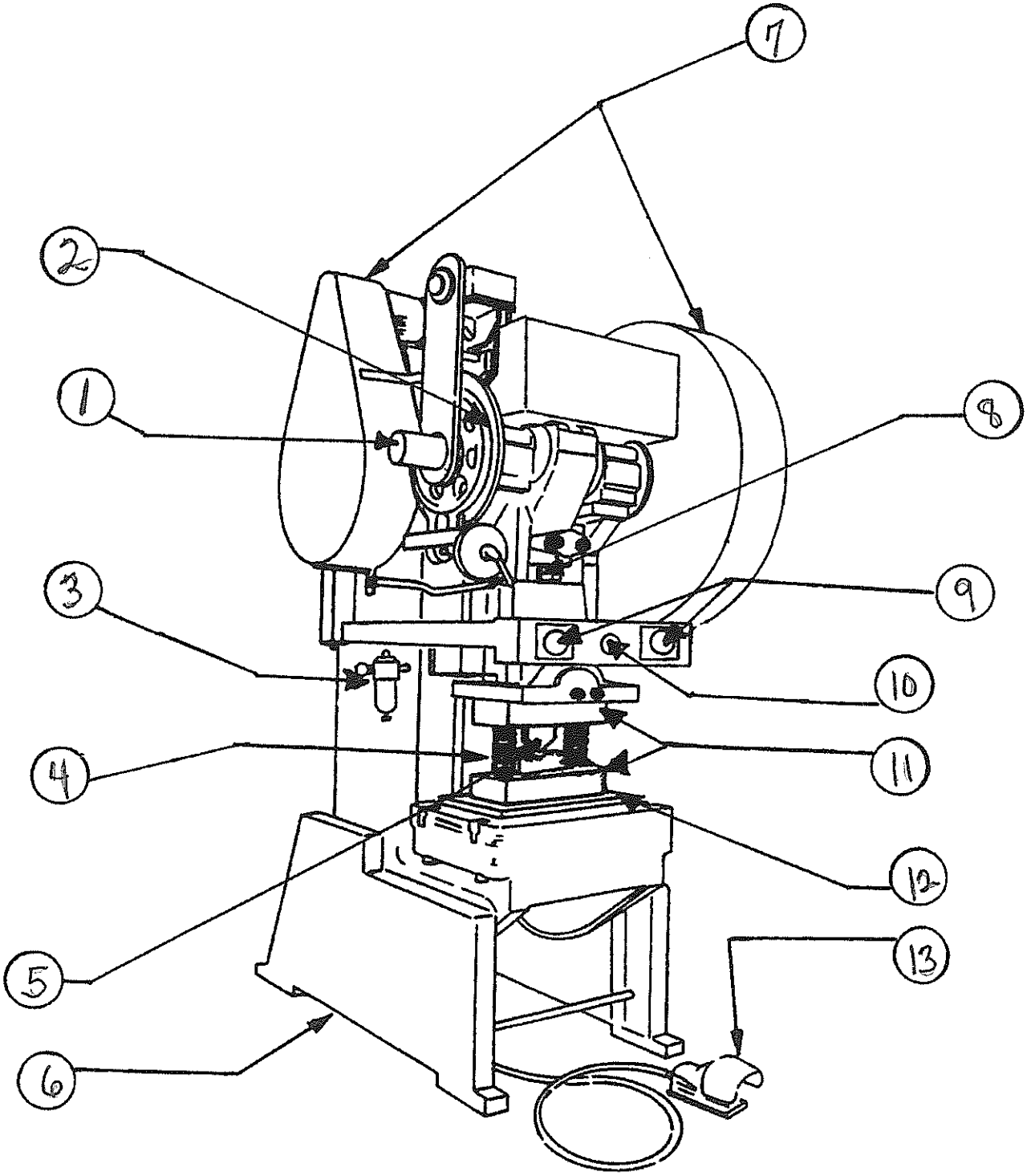
In order to speed production, plant supervisors had deactivated a central safety device designed to prevent the press from cycling with someone's hands inside it, said Michael J. Rourke, Pullins' attorney.

They also had ordered two employees to operate the machine instead of one, with one person feeding the material into the press and another punching the buttons that activated it.

Another employee activated the machine while Mr. Pullins had his hands inside, and the deactivated safety device allowed the machine to operate.



1. Crank Shaft
2. Air Brake
3. Air Manifold
4. Guide Post
5. Point of Operation
6. Base
7. Power Transmission
8. Pitman Screw
9. Dual Palm Buttons
10. E-Stop
11. Die Set
12. Bolster Plate
13. Foot Pedal



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