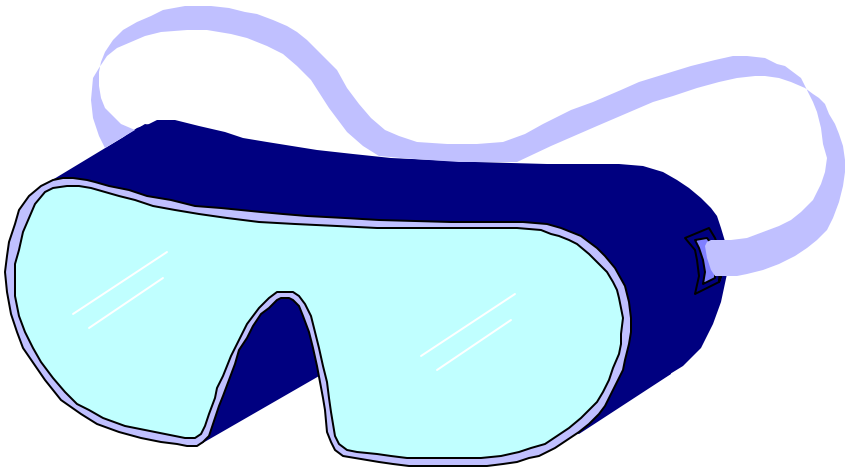
Safety for Plastics
Supplementary Handout



Ohio Bureau of Workers' Compensation
Division of Safety & Hygiene
Training Center

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Introduction

Objectives

What students will learn:

- Processes to support safe & healthy work environments
- Importance of a safety culture in the workplace
- Hazard recognition tools to identify problems and promote self-sufficiency
- Recognition of ergonomic issues, options for solving ergonomic problems in the Plastics industry
- Strategies and solutions for solving health & safety problems
- Resources to support safe & healthy workplaces in the Plastics industry

Agenda

8:30 Introduction/welcome
Introduction to safety processes
Industrial Hygiene issues in the Plastics Industry
11:30 LUNCH
12:30
Safety issues in the Plastics Industry
Ergonomics issues in the Plastics Industry Cost-benefit strategies
Summary
4:30 DISMISS

There will be one morning break and two afternoon breaks.

Instructors

Instructor	*Title*	*BWC Office*	*Phone*
Cooper, Cindy	Industrial Hygienist	Governor's Hill	(513) 670-5040
Emley, Al	Safety Consultant	Independence	(216) 573-7200
Fiorilli, Tim	Industrial Hygienist	Independence	(216) 999-9345
Giordano, Mark	Ergonomist	Governor's Hill	(513) 670-5006
Palfy, Jerry	Safety Consultant	Warren	(330) 509-8970
Patnode, Rich	Industrial Hygienist	Warren	(330) 509-8964
Peacock, Gary	Safety Consultant	Governor's Hill	(513) 660-2697
Rienerth, Mike	Ergonomist	Independence	(216) 573-7200
Rozenblad-Smith, Brenda	Ergonomist	Warren	(330) 509-8966

FY04 DSH Training Center Courses
Appropriate for Plastics Industry

		Code
	Safety culture	
	Measuring Safety Performance	GEN126
	Violence in the Workplace	GEN316
	Effective Safety Teams	GEN360
	Behavior-Based Safety Systems	GEN375
	Ergonomics	
	Ergonomics for Office Environments	ERG215
NEW	Ergonomics: Online Office Ergo Clinic "Lite" (Available 9-2-03)	WEB001
NEW	Ergonomics: Online Office Ergo Clinic Full Version (Available 9-2-03)	WEB002
	Ergonomics Applied	ERG218
	Ergonomics: Developing an Effective Process	ERG219
	Industrial hygiene	
	Basic Industrial Noise and Hearing Conservation	IHY204
	Asthma! Is your company at risk?	IHY205
	Industrial Ventilation	IHY211
	Hazard Communication	IHY212
	Confined Space Assessment & Work	IHY214
NEW	Confined Space Online (Available 1-2-04)	WEB003
	Bloodborne Pathogens	IHY220
	Hazardous Waste Operations - Awareness	IHY317
	Safety	
	Machine Guarding Basics	SAF104
	Mechanical Power Press	SAF105
	Electrical Hazard Recognition & Abatement	SAF107
	Lockout/Tagout	SAF109
	Personal Protective Equipment Selection Criteria	SAF120
	Powered Industrial Trucks Training Program	SAF307
	Safety Works for Industry - Module 1	SWI006
	Safety Works for Industry - Module 2	SWI004
	Safety Works for Industry - Module 3	SWI008
	Safety Works for Industry - Module 4	SWI010
	Safety Works for Industry - Module 5	SWI012
	Safety Works for Industry - Module 6	SWI014
	Safety Works for Industry - Module 7	SWI002
	Cost justification	
	Controlling Workers' Compensation Costs	GEN310
	Controlling Costs through Claims Management	GEN311
	General (applies to many sections)	
	Train the Trainer	GEN302
	Fundamentals of an Effective Safety & Health Program	GEN101
	Safety for Plastics	GEN123
	Accident Analysis	GEN314
	OSHA Recordkeeping	GEN320
	First Aid in the Workplace	GEN380

Safety and Health for the Plastics Industry

Instructional Team Members

- Mike Rienerth, Ergonomics Consultant
- Tim Fiorilli, Industrial Hygienist
- Al Emley, Safety Consultant Specialist

BWC – Division of Safety & Hygiene
Independence Service Office
216-573-7200

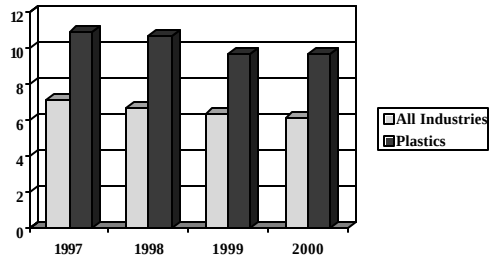
COURSE OBJECTIVES

- Gain a better appreciation of the importance of an effective safety & health (loss prevention) process
- Learn about tools and resources that can be used to enhance safety & health management systems
- Discuss common ergonomic issues and improvements in the plastics industry

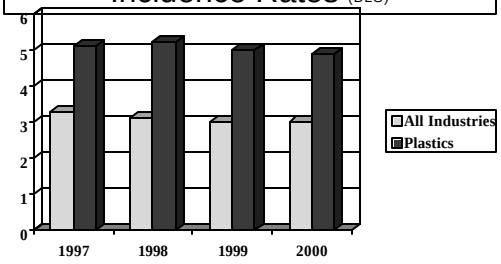
COURSE OBJECTIVES

- Discuss typical industrial hygiene concerns and control measures in plastics manufacturing
- Review common safety issues associated with plastics manufacturing machinery
- Learn about the resources available through the Division of Safety & Hygiene

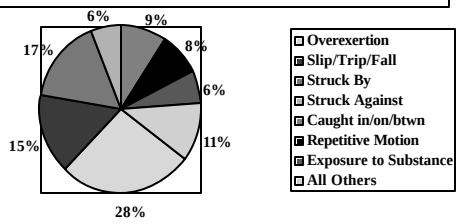
Injury/Illness Incidence Rates



Lost Workday Injury/Illness Incidence Rates (BLS)



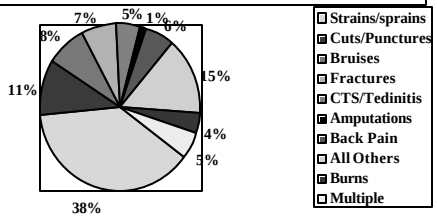
Most Common Types of Injuries in the Plastics Industry

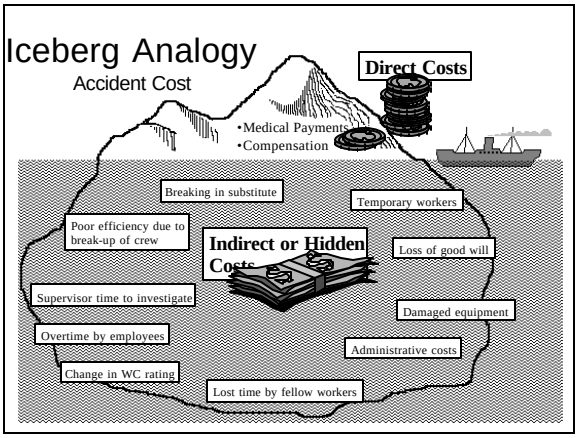


What is your experience?

Type of Injury	Average Percentage	Your Percentage	Common Causes
Overexertion	26%		
Slips/Falls	15%		
Struck By	16%		
Struck Against	6 %		
Caught in/on/btwn	9 %		
Repetitive Motion	8 %		
Exposure to Subs	6 %		

Most Common Nature of Injuries in Plastics Manufacturing





Claims Management (Loss Control)
Purpose

- Prevents delays in getting treatment
- Reduces potential for fraud and abuse
- Reduces potential for litigation
- Helps to facilitate timely payment of medical bills and indemnity benefits
- Promotes a quicker return to work and return to full duty
- Loss Control

Claims Management (Loss Control)
Implementation

- Require prompt notification of all injuries and thorough investigation/review
- Ensure accurate completion of paperwork
- Clarify responsibilities and expectations
- Build an efficient working relationship with MCO and medical providers
- Develop an aggressive return to work/ transitional work program

Claims Management (Loss Control)
Return-to-Work

- Document physical requirements of jobs
- Develop clear policies and responsibilities
- Focus on capabilities, not restrictions
- Identify/Create transitional, modified-duty tasks and assignments for each
- Document all aspects of the process
- Educate staff on benefits & expectations

Loss Prevention!
The Benefits

- Compliance and hazard prevention
- Reduced injuries and lost time
- Lower worker compensation costs
- Lower absenteeism and turnover
- Better employee relations and morale
- Higher productivity and quality

What Makes a Loss Prevention Process Effective?

-
-
-
-
-

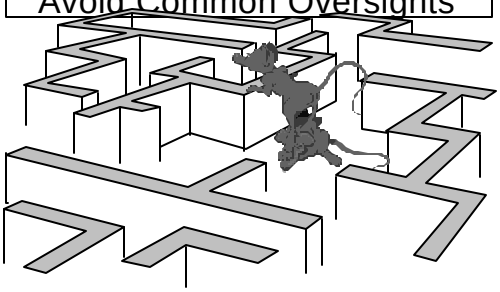
Elements of an Effective Loss Prevention Process

- Mgmt Commitment
- Employee Involvement
- Accountability
- Documentation
- Integration
- Communication
- Monitoring/Evaluation
- Flexibility
- Continuous Improvement

Common Oversights when Developing a Loss Prevention Process

- **Lack of management coordination and involvement**
- **Inadequate communication of the importance and value of an effective ergonomics and safety process**
- **Not holding people accountable for the safety of their areas or subordinates**
- **Lack of employee input, involvement, and recognition in the safety and health process**
- **Inconsistent policies and/or enforcement thereof**
- **Insufficient training for people at all levels**
- **Lack of follow-up and communication of cost/benefit**

BWC Tools and Services to Avoid Common Oversights



What types of systems do you currently have to manage safety?

-
-
-
-
-
-
-

Tools/Services to Assist Management with Coordination and Involvement

- Safety Leadership and Management Training
- Data and Other Monitoring Tools
- Safety Management Assessments & Tools
- Action Plan Templates
- Information Resources

Tools/Services to Assist Management with Communicating Importance/Value

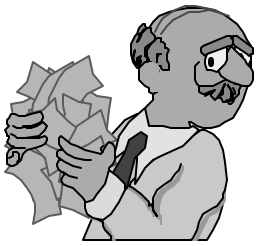
- Claims Cost Data, Premiums, and Other Costs of Injuries
- Sample Outlines for Presentations
- Case Studies and Success Stories
- Sample Safety Policy Statements

Tools/Services to Assist Management with Accountability and Recognition

- Suggested Safety Responsibilities
- Safety Performance Evaluation Criteria
- Safety Reward and Recognition Systems
- Action Plan Templates
- Accident Prevention Plan Templates

Tools/Services to Assist with Getting Employee Input and Involvement

- Safety/Ergonomics Awareness Outlines
- Employee Safety Suggestion and Follow-up Forms
- Safety Involvement Team Training
- Sample Equipment Evaluation Forms

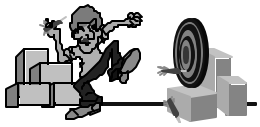


Tools/Services to Assist with Development/Enforcement of Policies

- Sample Programs, Policies & Procedures
- Technical Resources for Safety & Health Requirements
- Supervisor Skills/ BBS Training
- Sample Employee Observation Forms

Tools/Services to Assist with Training People at All Levels

- Sample Safety Orientation Forms
- Safety Management Skills Assessments
- Training Seminars, Outlines, and Videos
- Resources for Skills Development



Tools/Services to Assist with Follow-up and Communication of Cost/Benefit

- Workers' Comp Claims Cost Info
- Formulas for calculating ROI, payback period, etc.
- Documentation of Improvements
- Videotaping and Follow-up Studies

Tools/Services to Assist in Developing an On-going Improvement Process

- Safety Committee Formation Outlines
- Sample Audit Checklists and Logs
- Periodic Assessments of Facilities, Systems and Programs
- Seminars and Information Sharing

BWC Safety/IH/Ergo Consulting Process

- **Meeting with Plant or Operations Manager to establish common goals and objectives - Discovery**
- **Assessment of Safety Management Systems**
- **Meetings with Management Team to prioritize and work through safety management improvements**
- **Questionnaires and/or Walk-Through Assessments with Safety Director, Safety Team, or contact person**
- **Meetings to prioritize issues, develop action plans, and assist with implementation process**
- **Assistance with establishing an on-going safety/IH/ ergonomics improvement process**

Industrial Hygiene

PLASTICS PROCESSING CHEMISTRY

Division of Safety & Hygiene

Chemistry vs. Physics

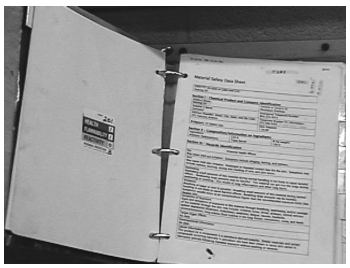
Chemistry:

- 130,000 toxic chemicals - NIOSH
- 650,000 hazardous chemicals - OSHA

Physics - only 3 physical states:

- Solid
- Liquid
- Gas

MSDS Chemical Inventory

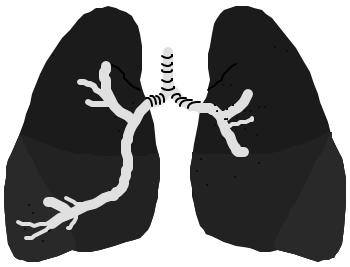


Container Labeling

Routes of Entry into the Body

- Inhalation
- Skin absorption
- Ingestion

The Respiratory System



The Lungs

Very large surface area: Approx. equal to the size of a tennis court or, about 40 times greater than surface area of external skin.

Very thin membrane required at gas exchange area: About the thickness of a soap bubble (only 1/2 to 1 micron thick in healthy persons)

Respiratory System

Function:

- Gas exchange between atmosphere & blood

Upper Respiratory System

Actions:

- Filters/traps large particles
  - Nose filters
  - Mucous traps
- Humidifies & heats air taken in
- Reacts with water-soluble chemicals

Lower Respiratory System

Actions:

- Traps & expels particles in mucous
  - (muco-ciliary escalator)

Lower Respiratory System

Actions (continued):

- In lungs, gas exchange actually occurs at clusters of 300 million air sacs (alveoli) 2 cells thick
  - particles less than 1 micron can reach alveoli

Gas Exchange

- Oxygen in (and quite a bit out)
- Carbon dioxide out
- Thin-walled (2 cells thick normally)

Physical states of matter

Gas:

- a state of matter having very low density & viscosity compared with solids & liquids
- at NTP is in the gaseous state

Carbon Monoxide

- Odorless (close to density of air)
- TWA = 25 – 50 ppm
- Ceiling = 200 ppm
- Major industrial sources:
  - Lift trucks
  - Heating systems
  - Hot water tanks

Physical states of matter

Liquid:

- **Vapor:** gaseous phase of a substance whose normal state is as a liquid (gas -like)
- **Mist:** tiny liquid droplets suspended in air (mimics a particle)
  synonyms - fog. spray

Acetone

- Solvent for plastic
- TWA = 500 – 1000 ppm
- STEL = 750 ppm
- Low odor threshold

Cyanoacrylate Adhesive

- "Super Glue"
- Methyl/ Ethyl Cyanoacrylate
  - TWA = 0.2 ppm
  - Irrit. to eyes, nose, skin
- At room temp. = generally < 0.1ppm

Physical states of matter

Aerosol - general term including both airborne liquids and solids

Solids - become airborne as dusts, fumes or fibers

Reinforced Plastics

- Fiberglass fibers
- Synthetic Vitreous fibers
- Limits from 0.2 fiber/cc Refractory Ceramic Fiber, to 1-3 fibers/ cc Fiberglass; Min/Glass Wool
- Skin irritants
- Some have Fibrosis and Carcinogenic potential

Chemical interaction with Respiratory System

- Reacts with water-soluble chemicals
- Reacts with "solvent" chemicals
- Reacts with particles

Water-Soluble Chemicals

Highly water-soluble:

- Formaldehyde
- Chlorides
- Acids

They tend to act mainly on the eyes, skin, mouth & throat.

Water-Soluble Chemicals

Low in water-solubility:

- Phosgene
- Oxides of nitrogen

Site of injury: lower respiratory tract (at alveoli)

"Solvent" Type Chemicals

- More likely to end up beyond the respiratory system -- i.e., in the blood and major organ systems
- Examples: some pesticides, amines, & alcohols

Plastic

- Built from chains of monomers
- To form high molecular weight polymers

Polymers

Natural
- Wood
- Cotton
- Wool
- Silk

Synthetic
- Thermoplastic
- Thermosetting

Thermosetting

Have strong bonds between the polymer chains.

These bonds resist breakdown from heat and pressure

Thermoplastic

The polymer chains are held together by much weaker bonds. Increased temperatures weaken, decreased temperatures strengthen the bonds.

Softening and hardening cycles can be repeated many times without damage to the material.

Types of Polymers

Thermoplastic

- Polyethylene
- Polyvinyl chloride
- Polystyrene
- ABS
- Acrylics
- Acetals
- Fluorocarbons
- Polyamides
- Polycarbonates

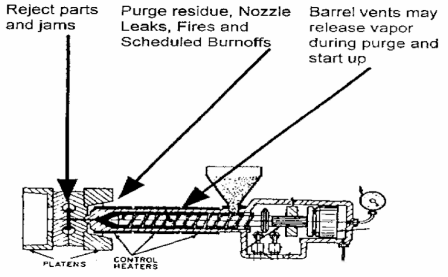
Thermosetting

- Phenolics
- Amines
- Alkyds
- Polyesters
- Allylics
- Epoxies
- Silicons (elastomer)
- Urethanes (elastomer)
- Neoprene (elastomer)

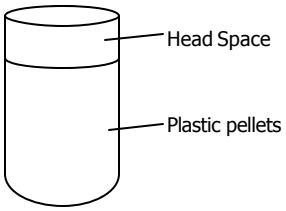
Types of molding/forming

- Injection molding (thermoplastic)
- Compression molding (thermosetting)
  - (inc. - Transfer molding)
- Rotational molding
- Blow molding
- Thermoforming
- Extrusion

Vapor and Fume Sources from Injection Molding Machines



Off Gassing (Head Space)



ODORS

- Odors are often harmless but can cause discomfort.
- Even barely perceptible odors may have an influence on the appetite
- The best remedy for odors is to add fresh air

Comparison of Odors to OSHA PEL

Substance	Odor Level Thresholds approximate ppm	OSHA PEL
Ammonia	20 ppm	50 ppm
Carbon Dioxide	none	5000 ppm
Toluene	2 ppm	200 ppm
Xylene	0.5 ppm	100 ppm
Ethyl Alcohol	5 ppm	1000 ppm
Isopropyl Alcohol	50 ppm	400 ppm

PROCESSING TEMPERATURES

POLYMER	LOW TEMP	HIGH TEMP
ABS	**160° C (320° F)**	**260° C (500° F)**
POLYPROPYLENE	**175° C (347° F)**	**285° C (545° F)**
POLYETHYLENE	**175° C (347° F)**	**285° C (545° F)**
PVC	**150° C (302° F)**	**230° C (446° F)**

Comparison of Combustion Temp. to High Processing Temp.

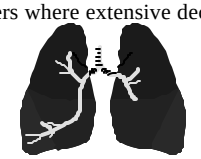
POLYMER	COMBUSTION TEMP	HIGH TEMP PROCESSING
POLYPROPYLENE	**440 °C (824 °F)**	**285° C (545° F)**
POLYETHYLENE	**500° C (932° F)**	**285° C (545° F)**
PVC	**600 °C (1112 °F)**	**230° C (446° F)**

THERMAL DECOMPOSITION PRODUCTS (TDP)

- Complex mixtures that consist of :
  - Aerosols
  - Gases
  - Vapors

THERMAL DECOMPOSITION PRODUCTS (TDP) continued

- exposure via inhalation with possible pulmonary retention
- available human data comes from fire victims and firefighters where extensive decomposition resulted

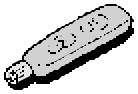


Combustion Products

Polypropylene	**Wood**
Carbon dioxide	**Carbon dioxide**
Carbon monoxide	**Ethylene**
Methane	**Ethane**
Ethane	**Water**
Propylene	**Propylene**
Propane	**Methanol**
Butane	**Propane**
Butene	**Methanol**
Pentene	**Butadiene**
hexane	**Acetaldehyde**
	Butane
	Butene
	pentadiene

Polyolefin (polyethylene/polypropylene)

- Complete decomposition near 800 to 1000 °F
  - Carbon dioxide
  - Carbon monoxide
  - Formaldehyde
  - Acetaldehyde
  - Acetone
  - Formic acid
  - Acetic acid



Employee Exposure Polyethylene

Breathing Zone for:
Aldehydes/ Aromatics/ Formic & acetic acids
Tetrahydrofuran/ Furan/ acetone/ particulates

Of 450 samples;

- 440 < detectable level
- 9 of 10 < 10% of established limits
- One particulate < 50% of limit

[Am. Ind. Hyg. Assoc. J. (56)/Aug. 1995]

Polyvinyl chloride

- Complete decomposition near 1000 °F
  - Carbon dioxide
  - Carbon monoxide
  - Vinyl Chloride
  - Hydrogen chloride

PVC Additives

Plasticizers (internal and external)
Phthalate Ester (DEHP) Bis(2-ethyl hexyl) phthalate

- Up to 40% wt. as an external plasticizer
- DOA Dioctyl Adipate may also be present
- Concern with long term effects from leaching

PVC

- Meat wrapper's asthma & reduced lung function
- Skin lesions / Liver Cancer (when compounding)
- Little effect from polymerized particulate

Polystyrene (ABS/SAN)

- Complete decomposition near 750 °F
  - Carbon dioxide
  - Carbon monoxide
  - Styrene
  - Benzaldehyde
  - Acrolein
  - Acrylonitrile

Others

Phenolic Resins
- Phenol
- Formaldehyde

Amino Resins
- Aldehydes
- Hydrogen cyanide

Mold Release Agents
- **aerosolized**

Potential Contaminants

- Acetaldehyde
- Acetic Acid
- Acetone
- Acrolein
- Acrylonitrile
- Butadiene
- Carbon Dioxide
- Carbon Monoxide
- Irrit./ Derm./ CNS/ Carc
- Irrit./ Derm./ Dental Ero.
- Irrit./ Derm./ CNS/ Vert.
- Irrit./ Resp. Disease
- Irrit./ Derm./ CNS/ Carc.
- Irrit./ CNS/ Carc.
- Asphyxiant/ CVS
- Suppr. Resp./ CNS/ CVS

Potential Contaminants

Formaldehyde	Irrit./ Bron./ Carc.
Formic Acid	Irrit./ Derm./ Dysp.
Hydrogen Chloride	Irrit./ Derm./ Pulm Edm
Hydrogen Cyanide	Asphy./Thyroid/ CNS
Isocyanates	Irrit./ Derm./ Pulm Edm
Phenol (BPA)	Irrit./Derm./Liver/Kidny
Styrene	Irrit./Derm./Narc./Repr
Vinyl Chloride	Liver/CNS/Blood/Carc.

Exposure Limits

Acetaldehyde	TWA 200 / C – 25 ppm
Acetic Acid	TWA 10 ppm
Acetone	TWA 500 ppm
Acrolein	TWA 0.1 / C- 0.1 ppm
Acrylonitrile	TWA 2 ppm Skin
Butadiene	TWA 1 ppm
Carbon Dioxide	TWA 5000 ppm
Carbon monoxide	TWA 25 / C-200 ppm

Exposure Limits

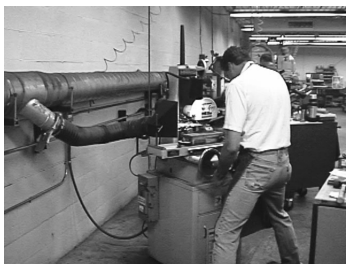
Formaldehyde	TWA 0.75/ C-0.3 ppm
Formic Acid	TWA 5 ppm
Hydrogen Chloride	C- 5 ppm
Hydrogen Cyanide	C- 5 ppm
Isocyanates	TWA 0.005/ C-0.02 ppm
Phenol	TWA 5 ppm
Styrene	TWA 20 ppm
Vinyl Chloride	TWA 1/ STEL 5 ppm

Monitoring Equipment TWA

- Personal monitoring pumps
- Collection medium
- Badges
- Real Time Monitors
- Color Detection
- Detector Tubes

Die Tooling

Die Tooling



Voluntary Respirator Usage

29CFR 1910.134

- Filtering Face piece
- Elastomeric Mask
- www.osha.gov

(Small Entity Compliance Guide)

- Appendix D
- Fit testing & medical screening

Coolant system treatment

Workers engaged in the manufacture of plastic parts using injection molding equipment may be at an increased risk for Legionnaires' Disease, a potentially life-threatening form of pneumonia. These organisms have been found in the water used to cool the metal molds and the process equipment used during the manufacture of plastic parts.

(OSHA Hazard Bulletin 1998)

Legionella

158 – Rapid kill 100%
140 – 90% kill in 2 minutes
122 – 90% kill in 2 hours
113 – 68 – Growth Range
< 68 – Dormant but viable

Use the treatment procedure below to treat all hot-water systems that have either been tested and found to contain detectable levels of Legionella or have been assumed to be contaminated.

Legionella

Disinfect the system using any effective chemical, thermal, or other treatment method. For example:

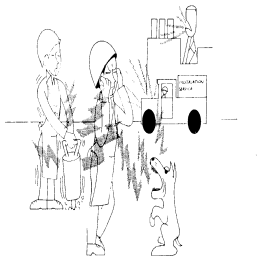
- Pasteurize the hot water system by heating the water to at least 70°C (158°F) and maintain this temperature during the flushing period. While maintaining the temperature at 70°C (158°F), continuously flush each faucet on the system with hot water for 5 - 20 minutes.
- Use an accepted chemical disinfectant such as chlorine or an acceptable biocide treatment to clean the system. Thoroughly flush the system after treatment to remove all traces of the corrosive and possibly toxic chemicals.
- Follow any other technique that has demonstrated effectiveness and safety (UV / Refill / No dead legs)

Physical Hazards

- Noise
- Heat Stress
- Non-Ionizing Radiation

Noise

- Unwanted sound
- A form of vibration conducted through liquids, solids, or gases.
- Measured in decibels (dBA)



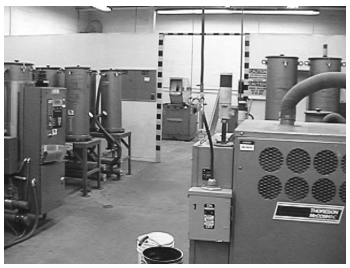
Effects of noise on humans

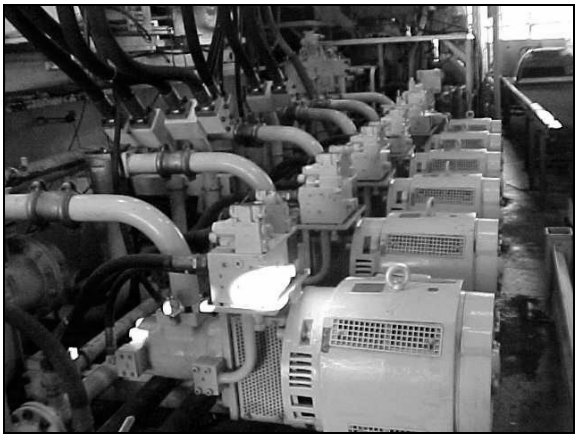
- Psychological effects
- Interference with communication by speech
- Physiological effects

29 CFR 1910.95

- Noise Monitoring
- Action Level of 85 dBA
- Permissible Exposure Limit of 90 dBA
- Hearing Conservation Program
- Hearing Protection Requirement

Regrind Noise Isolation





Extreme Temperature

- Affects quantity and quality of work
- In industry, primarily high temperatures

Heat Stress

- Workplace hazards that increase the risk of heat-related disorders
  - Furnaces
  - Presses
- Increased body temperature, heart rate, and sweating

Workplace Factors Contribute to Heat Stress

- Environmental conditions
- Work demands
- Clothing
- Heat Transfer Process

Heat Index

Fahrenheit Temp> Relative Humidity	75	85	95	105
10%	70	80	90	100
30%	73	84	96	113
50%	75	88	107	135
70%	77	93	124	
90%	79	102	150	
Sun stroke/ cramps/ exhaustion	**Possible**	**Likely**	**Imminent**	

ACGIH Heat Stress Guidelines WBGT (Acclimatized)

Work	Light	Moderate	Heavy	Very Heavy
100%	85	81	79	
75% W	87	83	81.5	
50% W	89	85	83	81.5
25% W	90.5	88	86	85
Adjustments for clothing type also considered				

Methods of Prevention

- Engineering Controls
  - General Ventilation
  - Local Exhaust Ventilation
  - Radiant Heat Shielding
  - Spot Cooling/Cool Rooms
  - Process Substitution

General ventilation (cooling)

Methods of Prevention

- Administrative Controls
  - Allow for acclimatization
  - Provide large quantities of cool drinking water
  - Distribute heavy work over the work shift
  - Schedule the hottest work for the cooler part of the day
  - Design work/rest schedules to reduce heat stress

R F Heat Sealers

Electromagnetic energy heats plastic to bond together

If faulty or outdated can emit immense EM energy leading to heating of tissue (flu like symptoms to potential cancer)

Well designed machine with good shielding will emit low levels of radiation (non-ionizing)

VDT emits 3 microwatts; RF Sealer 1500-60,000 watts (as much as a radio tower)

Control with induced current work mats and monitoring with meters measuring at 27.12 MHz

Institute of Electrical & Electronic Engineers Std. IEEE C 95.1-1991. Also adopted by ANSI

UV Curable Resins

- Ultraviolet Light
- Shielding (to protect eyes and skin)
- Glycol Ethers Exposure
  - 2-Butoxyethanol, EGMEE, EGMBE, & Acetates, etc.
- Sensitivity may develop over time

REFERENCES

1. From American Plastics Council http://americanplasticscouncil.org
2. U.S. Environmental Protection Agency (EPA) 1973 Combustion Products from the Incineration of Plastics (National Environmental Research Center PB-222 001). Cincinnati.
3. University of Chicago http://jfi.uchicago.edu
4. Pavia, D.; Lampman, G.; Kriz, G.; and Engel, R. 1990 Organic Laboratory Techniques. Chicago, Sanders College Publishing.
5. www.cdc.gov/niosh 1.800.35NIOSH
6. www.acgih.org 513.742.2020
7. www.osha.gov (Specific Plastics = / SLTC/ plastics)

Noise Control Vendor List

Acoustical Enclosures and/or Barriers

George Koch Sons, LLC
10 South Eleventh Avenue
Evansville IN 47744
888-873-5624
www.kochllc.com/

illbruck, inc. (Sonex)
3800 Washington Avenue N.
Minneapolis MN 55412
800-662-0032
www.illbruck-sonex.com

Noise Suppression Technologies Inc.
4182 Fisher Road
Columbus OH 43228
614-258-4455
www.noisesuppression.com

Singer Safety Company
2300 N. Kilbourn Ave.
Chicago, IL 60639
800-621-0089
www.singersafety.com/

Sound Seal
50 H.P. Almgren Drive
PO Box 545
Agawam MA 01001
413-789-1770
www.soundseal.com

Noise Controls

3M
3M Center Bldg.
St. Paul, MN 55144-1000
888-364-3577
www.3m.com

Allied Witan Company
13805 Progress Parkway
Cleveland OH 44133
440-237-9630
www.alwitco.com

Atlas Minerals & Chemicals, Inc.
1227 Valley Road
PO Box 38
Mertztown PA 19539
1-800-523-8269
www.atlasmin.com

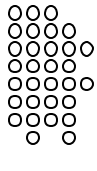
Penn Separator Corporation
21 Pickering Street
PO Box 340
Brookville PA 15825
888-736-6737
www.pennseparator.com

Silvent North American LLC
2645 Ridge Road
Highland IN 46322
800-263-5638
www.silvent.com

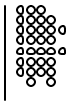
Safety

PLASTIC SAFETY

MACHINE GUARDING

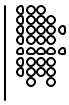


BASICS OF GUARDING



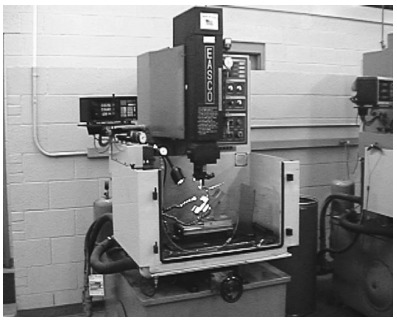
- POINT OF OPERATION
- POWER TRANSMISSION
- OTHER MOVING PARTS

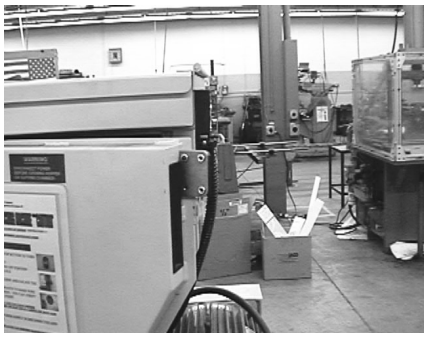
GUARD DESIGN



CANNOT REACH

- OVER
- UNDER
- AROUND
- THROUGH





FEEDING & EJECTION SAFETY

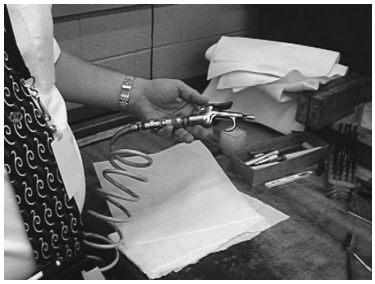
- AUTO FEED
- SEMI-AUTOMATIC FEED
- AUTO EJECTION
- SEMI AUTO EJECTION
- ROBOT

AIR LINES

- REGULATORS
- NOZZLES
- TRAINING

REGULATORS

NOZZLES



NOZZLES

TRAINING

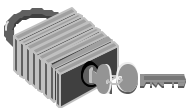
- PROVIDE PROPER NOZZLES
- EXPLAIN THE DO's AND DON'Ts
- EMPHASIZE THE HAZARDS OF IMPROPER USE
- THE IMPORTANCE OF PPE

ACTIONS

- CUTTING
- PUNCHING
- SHEARING
- BENDING

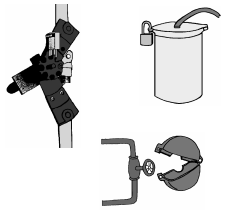
Elements of a Lockout/Tagout Program

BWC Division of Safety & Hygiene



Training Of Authorized Employees.

- Types of Energy.
- Magnitude Of Energy Sources
- Locations & How to Lockout Energy Sources.
- Types of Devices to Be Used.

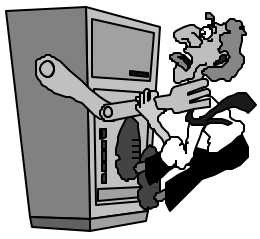


Safe Procedures for Energy Control Program

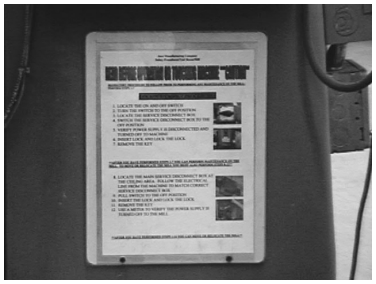
- Steps for Shutting down all energy sources.
- Steps for Placement, Removal & Transfer Of LO/TO Devices.
- Steps for testing to verify LO/TO.
- Enforcement Policy.

Procedures For Each Piece Of Equipment

- Written procedures must be documented for each piece of equipment.
- If machinery or pieces of equipment are similar, just one procedure will cover all like pieces.



LO/TO

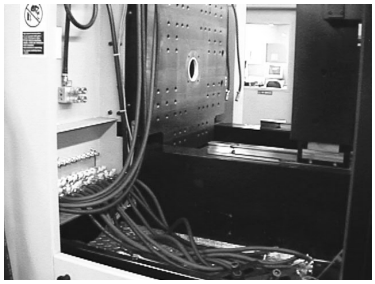


PRACTICAL SAFETY

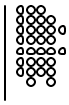
- WHAT ARE NORMAL REQUIREMENTS?
- WHAT IMPROVEMENTS CAN BE MADE?
- WHAT TRAINING IS NEEDED?

IMPROVEMENTS

IMPROVEMENTS



TRAINING



- DEVELOP TRAINING SCHEDULE
- DEVELOP RETRAINING SCHEDULE
- DOCUMENT TRAINING PROVIDED

Ergonomics

Ergonomics for the Plastics Industry

BWC
Better Workers' Compensation

What is Ergonomics?

- Designing jobs so people can do them safely and efficiently
- Minimizing potential for overexertion and cumulative trauma
- Developing a process for making on-going improvements

Typical Workplace Applications

Material Handling Tasks

Jobs Requiring Awkward Postures

Hand-Intensive Operations

Computer Operations

Types of Workplace Injuries

- Acute
  - sudden onset
  - identifiable causal event
  - e.g. fractures, lacerations, contusions
- Cumulative
  - gradual onset
  - causation not always identifiable
  - e.g. muscle sprains, carpal tunnel syndrome, tendinitis, etc.

Muscle Strain Risk Factors

- Heavy lifting, pushing, or pulling exertions
  >35 pounds below knee or above chest level
- Awkward bending, reaching or twisting when lifting, pushing, or pulling
- Lateral pushing/pulling
- Sudden/Unexpected muscle loading

CTD Risk Factors

- Frequency/Duration
- Forceful exertions
  - > 2 lbs. Pinch grip
  - >10 lbs. Power grip
- Awkward posture
  - Significant bending, twisting, reaching
- Direct pressure
- Vibration/Impact
- Cold/Constriction

Why is ergonomics important?

- 45-50% of the lost-time injuries in plastics manufacturing are strains, sprains, or CTDs
- Strains, sprains, and CTDs are some of the most costly types of lost-time claims
- The average cost of a lost-time claim is about $29,000
- Ergonomic improvements can often help to boost productivity, quality, and worker retention

Proposed OSHA Ergonomics Standard Elements

- Management Leadership & Responsibility
- Employee Input & Participation
- Hazard Identification and Awareness
- Job Hazard Analysis and Control
- Ergonomics Process Training for Managers, Supervisors, and Employees
- Medical Management Policies/Procedures

Typical Ergonomic Concerns

- Receiving Dept ⇨
- Molding Department ⇨

- Tool & Die Shop ⇨
- Assembly ⇨
- Inspection ⇨

- Packaging/Shipping ⇨

Typical Ergonomic Concerns

- Receiving Dept ⇨ Unloading trailers
- Molding Department ⇨ Loading, unloading, & operating presses
  ⇨ Parts trimming
- Tool & Die Shop ⇨ Die handling
- Assembly ⇨ Parts handling, machine operation
- Inspection ⇨ Parts handling
- Packaging/Shipping ⇨ Box/tote handling

Types of Control Measures

- Engineering Controls
  - changes in actual job requirements and or the physical attributes of the work environment
- Administrative Controls
  - changes in work practices and organizational issues
- Personal Protective Equipment

What can be done to help prevent overexertion/CTDs?

-
-
-
-
-
-

What can be done to help prevent overexertion/CTDs?

- Mechanical assists
- Better tools
- Fixtures
- Better Workstations
- Better Parts Quality
- Maintenance
- Training
- Policies/Procedures
- Communication

Ergonomic Improvement Opportunities

- Reduce repetitive, awkward, hand-intensive work
- Reduce repetitive or sustained bending, twisting or leaning at the waist
- Reduce heavy or awkward lifting, pushing, and pulling tasks

To reduce Repetitive, Hand-Intensive Tasks…

- Well-designed gate cutters
- Flash trimming presses
- Flash trimming fixtures
- Well-designed flash removal tools
- Light-touch press activation buttons
- (Semi)-Automatic parts ejectors

Gate Cutters

Important Features
- Blade angle
- Blade quality
- Blade maintenance
- Handle length
- Handle contour
- Handle span
- Spring-loaded jaws

Page 51 – Design guidelines for pliers

Parts Trimming Tools

Important Features
- Handle design
- Blade/handle contour
- Blade maintenance
- Spring-loaded or mechanical jaws
-
-

Page 49 – Design guidelines for parts trimming knives

Parts Trimming Fixtures

Important Features
- Speed and Ease of loading /unloading
- Height/Orientation
- Ease of Adjustability
- Simplicity
- Accessibility
- Adaptability/Flexibility
-

Parts Trimming Presses

Important Features
- Guarding
- Cycle Time
- Activation Buttons
- Die Quality
- Changeover Time
- Mobility
-

Light-Touch Activation Buttons

Important Features
- Appropriateness
- Height
- Orientation
- Guarding
-
-
-
-

(Semi-)Automatic Parts Ejectors

- Guarding
- Operation
- Adaptability
- Noise

To reduce repetitive or sustained, bending, leaning, or twisting…

- Parts conveyors and chutes
- Height adjustable work tables
- Container lifting/positioning devices
- Appropriate-height stools/platforms
- Anti-fatigue mats/footrests

Parts Conveyors and Chutes

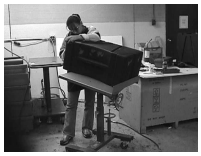
- Guarding
- Mobility
- Height
- Accessibility
-
-
-

Height-Adjustable Work Tables

Important Features

- Adjustment Range
- Ease of adjustment
- Guarding
- Mobility
- Durability

Page 45-47 – Design guidelines for workstations



Container Positioners

Important Features
- Good Accessibility
- Easy to adjust
- Adequate capacity
- Compatibility with containers and other MH devices
- Guarding and Safety
- Flexibility/Mobility

Production Stools

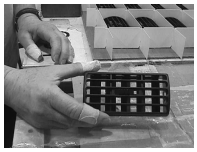
- Appropriateness
- Stability
- Height range
- Depth
- Ease of Adjustability
- Comfort
-

Pages 51-52 – Design guidelines for chairs/stools and seated work

Anti-Fatigue Mats

Important Features
- Beveled Edges
- Sufficient thickness
- Appropriate size
- Durability
- Cart traffic area
- Surface texture
-

Little things make a difference!



To reduce heavy or awkward lifting, pushing or pulling…

- Vacuum lifters
- Lift/Rotate tables
- Adjustable die carts
- Well-designed/arranged die storage racks
- Drum lifters/movers
- Automatic material loaders
- Cranes/Hoists
- Electric pallet jacks

Vacuum Lifters

- Lift Capacity/Range
- Location/Space
- Speed/Ease of use
- Handle length/design
-
-

Lift and Rotate Tables

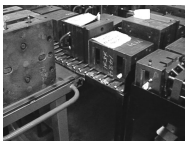
Important Features

- Compatibility with Material Handling Equipment
- Location and Space
- Size and Capacity
- Ease of Operation
-
-

Height Adjustable Die Carts

Important Features

- Easily adjustable
- Appropriate wheels and casters
- Good wheel locks
- Well-designed handle
- Stops on table surface
- Compatibility with other surfaces



Well-Designed Die Racks

- Adequate aisle width
- Adequate shelf and die spacing
- Height compatible with lifter range
- Conducive to sliding
- Good shelf loading arrangement
-

Drum Handling Assists

Important Features

- Quick and easy to load and unload
- Accessibility
- Handle height/angle
- Adaptability for various sizes
-
-

Automatic Material Loaders

Important Features

- Compatibility
- Ease of installation
- Portability
- Easy to clean
- Noise

Safety Grants in Plastics

- Approximately 17 plastics manufacturers took advantage of BWCs Safety Grants program during Phase I of the program.
  - The average risk factor score has been reduced by approximately 42%
  - The CTD incidence rate has been reduced by approximately 10%
  - Restricted Days due to CTDs have decreased by about 37%

Administrative Controls

- Training, Observation, and Coaching
- Job Enlargement, Job Rotation
- Methods, Policies, and Procedures
- Fitness, Wellness Programs
- Work Hours/Work Distribution
- Communication Systems
- Inspection/Maintenance Systems

Communication

- Safety Bulletin Boards
- List Accomplishments
- Newsletter Articles
- Suggestion Status
- Progress on Goals
- Responsibilities
- Opportunities

Indicators of Ergonomic Improvement Opportunities

-
-
-
-
-
-
-
-

Indicators of Ergonomic Improvement Opportunities

- Injuries, complaints
- Rubbing, Wringing, Stretching,
- Back/wrist supports
- Retrofitting
- Unique operator characteristics
- Turnover
- Production/quality problems

Questions to ask the Employee

-
-
-
-
-
-
-
-

Questions to ask the Employee

- Use open-ended questions
- Don't lead the person
- Focus on solutions, not problems
- Ask about unique, non-routine tasks
- Other methods, tools, equipment tried

Ergonomics Assessment Tools

- NIOSH Lifting Guide
- Snook Push/Pull Guidelines
- Strain Index
- University of Michigan 3-D Model
- State of Washington Checklists
- BWC Risk Factor Assessment Form

Ergonomic Assessment Techniques

- Assess safety management systems
- Review injury/claims statistics
- Solicit concerns and input from staff
- Observe the facilities, equipment, methods, training, policies, etc.
- Analyze the physical requirements
- Prioritize improvement opportunities

Implementation Of Ergonomic Improvements

- Develop an implementation team
- Put together an action plan with a timetable
- Develop product evaluation criteria and forms
- Get employee input in evaluation and selection
- Develop and document policies for use
- Document training and verification
- Conduct periodic follow-up assessments

Resources for Ergonomics & Safety Training and Materials

- BWC OCOSH Courses and Libraries
- Corporate and other Internal Resources
- Industry/Trade Groups
- Ergonomics Training/Consulting Firms
- Universities
- Product Vendors
- Web Sites

Websites with Plastics Safety Info

www.plasticstechnology.com

www.plasticsindustry.org

www.plasticsnews.com

www.osha.gov/SLTC/plastics

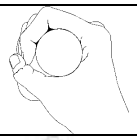
Page 85 – Web Sites and other Resources

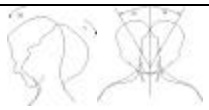
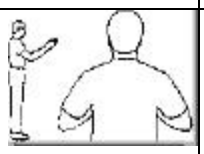
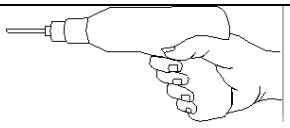
CTD Risk Factor Assessment Form

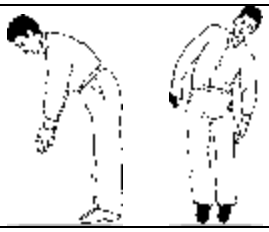
Task Title: _____ Company: _____

Name of Analyst:_____ Evaluation Date: _____

Brief Task Description: _____
_____
_____

Upper Extremity					
A	**B**	**C**	**D**	**E**	**F**
Risk Factor Category	**Risk Factors**	**2 to 4 Hours**	**4+ to 8 Hours**	**8+ Hours** *Add 0.5 per hour*	**Score**
Repetition (Finger, Wrist, Elbow, Shoulder, or Neck Motions)	1. **Identical or Similar Motions Performed Every Few Seconds** *Motions or motion patterns that are repeated every 15 seconds or less. (Keyboard use is scored below as a separate risk factor.)*	**1**	**3**		
	2. **Intensive Keying** *Scored separately from other repetitive tasks in the repetition category; includes steady pace, as in data entry.*	**1**	**3**		
	3. **Intermittent Keying** *Scored separately from other repetitive tasks. Keyboard or other input activity is regularly alternated with other activities for 50 to 75 percent of the work.*	**0**	**1**		
Hand Force (Repetitive or Static)	1. **Grip More Than 10-Pound Load** *Holding an object weighing more than 10 pounds or squeezing hard with hand in a power grip.* 	**1**	**3**		
	2. **Pinch More Than 2 Pounds** *Pinch force of 2+ pounds as in the pinch used to open a small binder clip with the tips of fingers.*	**2**	**3**		

Upper Extremity					
A	**B**	**C**	**D**	**E**	**F**
Risk Factor Category	**Risk Factors**	**2 to 4 Hours**	**4+ to 8 Hours**	**8+ Hours** *Add 0.5 per hour*	**Score**
Awkward Postures	1. **Neck: Twist / Bend**  *Twisting neck to either side more that 20°, bending neck forward more than 20° as in viewing a monitor, or bending neck backward more than 5°.*	**1**	**2**		
	2. **Shoulder: Unsupported Arm or Elbow Above Mid-Torso Height**  *Arm is unsupported if there is not an arm rest when doing precision finger work, or when the elbow is above mid-torso height.*	**2**	**3**		
	3. **Forearm: Rapid Rotation** *Rotating the forearm or resisting rotation from a tool. An example of forearm rotation is using a manual screwdriver.*	**1**	**2**		
	4. **Wrist: Bend / Deviate** *Wrist bends that involve more than 20° of flexion (bending the wrist palm down) or more than 30° of extension (bending the wrist back). Bending can occur during manual assembly and data entry.*	**2**	**3**		
	5. **Fingers** *Forceful gripping to control or hold an object, such as click-and-drag operations with a computer mouse or deboning with a knife.*	**0**	**1**		
	6. **Extended arm reaches**	**1**	**2**		
	7. **Reaching overhead (above shoulder level)**	**1**	**2**		
	8. **Reaching behind the torso**	**1**	**2**		
Contact Stress	1. **Hard/Sharp Objects Press Into Skin** *Includes contact of the palm, fingers, wrist, elbow, or armpit.*	**1**	**2**		
	2. **Using the Palm of the Hand as a Hammer**	**2**	**3**		
Vibration	1. **Localized Vibration**  *Vibration from contact between the hand and a vibrating object, such as a power tool.*	**1**	**2**		
				Total Upper Extremity Score:	

Back and Legs					
A	**B**	**C**	**D**	**E**	**F**
Risk Factor Category	**Risk Factors**	**2 to 4 Hours**	**4+ to 8 Hours**	**8+ Hours** *Add 0.5 per hour*	**Score**
Awkward Postures (Repetitive or Static)	1. **Mild Forward or Lateral Bending of Torso More Than 20° But Less Than 45°** 	**1**	**2**		
	2. **Severe Forward Bending of Torso More Than 45°**	**2**	**3**		
	3. **Backward Bending of Torso**	**1**	**2**		
	4. **Twisting Torso**	**2**	**3**		
	5. **Prolonged Sitting Without Adequate Back Support** *Back is not firmly supported by a back rest for an extended period*	**1**	**2**		
	6. **Standing Stationary or Inadequate Foot Support While Seated** *Stand in one place (an assembly line or check stand) without sit/stand option or walking, or feet are not firmly supported when sitting.*	**0**	**1**		
	7. **Kneeling / Squatting**	**2**	**3**		
	8. **Repetitive Ankle Extension / Flexion** *Using a foot pedal to start or stop a machine cycling (as in sewing machine operations).*	**1**	**2**		
Contact Stress	1. **Hard / Sharp Objects Press into Skin** *Includes contact against the leg.*	**1**	**2**		
	2. **Using the Knee as a Hammer or Kicker**	**2**	**3**		
Vibration	1. **Sitting/Standing on Vibrating Surface (Without Vibration Dampening)**	**1**	**2**		
Push/Pull	1. **Moderate Load** *Force needed to push / pull a shopping cart full of apples.*	**1**	**2**		
	2. **Heavy Load** *Force need to push / pull a two-drawer, full file cabinet across a carpeted room.*	**2**	**3**		

Back and Legs (continued)

A	B		C	D	E	F
Risk Factor Category	**Risk Factors**		**2 to 4 Hours**	**4+ to 8 Hours**	**8+ Hours** *Add 0.5 per hour*	**Score**
Manual Materials Handling - Load	1. **Weight** *Load being handled is more than 20 pounds.* ***(Write actual weight of maximum load in box to right.)***	**Actual Weight (lbs.)** _____	**2**	**3**		
	2. **Distance** *Horizontal distance from the mid-point between the ankles to center of the hand is greater than 10 inches.* ***(Write actual maximum distance in box to right.)***	**Actual Distance (in.)** _____	**2**	**3**		
Manual Materials Handling - Frequency	1. **Lifting Frequency** *Lifting frequency is between 1 and 5 times per minute*. **(Write actual lifting frequency in the box to right.)**	***Lifting Frequency*** _____	**1**	**1**		
	2. **Lifting Frequency** *Lifting frequency is 5 or more times per minute.*		**2**	**3**		
		TOTAL BACK AND LEGS SCORE:				

Environmental Worksheet

A	B	C	D	E	F
Risk Factor Category	**Risk Factors**	**2 to 4 Hours**	**4+ to 8 Hours**	**8+ Hours** *Add 0.5 per hour*	**Score**
Environ-ment	1. **Lighting (Poor Illumination / Glare)** *Inability to see clearly (e.g. glare on a computer monitor).*	**0**	**1**		
	2. **Cold Temperature** *Air temperature less than 60ºF for sedentary work, 40ºF for light work, 20ºF for moderate/heavy work; cold exhaust blowing on hands.*	**0**	**1**		
	TOTAL ENVIRONMENTAL SCORE:				
Total Score: (Upper Extremity + Back and Legs + Environmental)					

WAC 296-62-05174 Appendix B: Criteria for analyzing and reducing WMSD hazards for employers who choose the Specific Performance Approach.

Permission for the usage of this document has been provided by the State of Washington Safety and Health Administration (WISHA):

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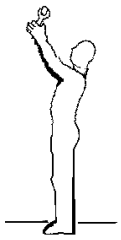
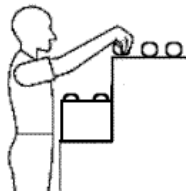
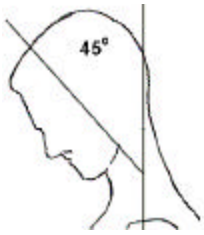
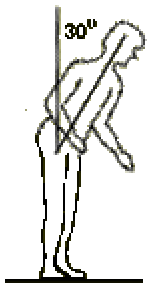
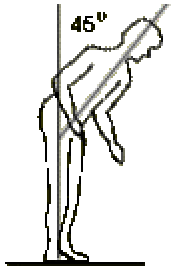
WISHA Policy & Technical Services
(360)902-6307

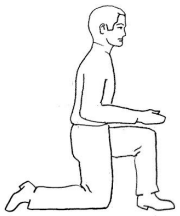
Pagination on the following pages is from the original document.

WAC 296-62-05174 Appendix B: Criteria for analyzing and reducing WMSD hazards for employers who choose the Specific Performance Approach.

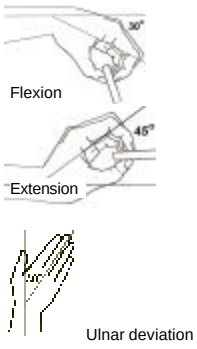
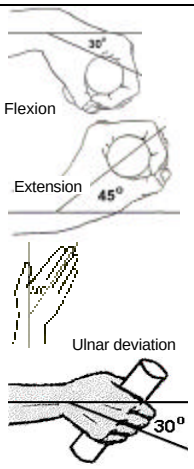
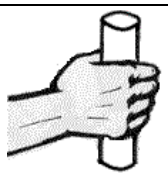
For each "caution zone job" find any physical risk factors that apply. Reading across the page, determine if all of the conditions are present in the work activities. If they are, a WMSD hazard exists and must be reduced below the hazard level or to the degree technologically and economically feasible (see WAC 296-62-05130(4), specific performance approach).

Awkward Posture				Check (✓) here if this is a WMSD hazard
Body Part	**Physical Risk Factor**	**Duration**	**Visual Aid**	
Shoulders	Working with the hand(s) above the head or the elbow(s) above the shoulder(s)	More than 4 hours total per day		❑
	Repetitively raising the hand(s) above the head or the elbow(s) above the shoulder(s) more than once per minute	More than 4 hours total per day		❑
Neck	Working with the neck bent more than 45º (without support or the ability to vary posture)	More than 4 hours total per day		❑
Back	Working with the back bent forward more than 30º (without support, or the ability to vary posture)	More than 4 hours total per day		❑
	Working with the back bent forward more than 45º (without support or the ability to vary posture)	More than 2 hours total per day		❑

WAC 296-62-05174 Appendix B: Criteria for analyzing and reducing WMSD hazards for employers who choose the Specific Performance Approach.

Awkward Posture (continued)				Check (✓) here if this is a WMSD hazard
Body Part	**Physical Risk Factor**	**Duration**	**Visual Aid**	
Knees	Squatting	More than 4 hours total per day		❑
	Kneeling	More than 4 hours total per day		❑ ❑

WAC 296-62-05174 Appendix B: Criteria for analyzing and reducing WMSD hazards for employers who choose the Specific Performance Approach.

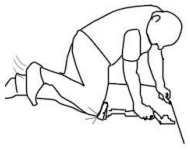
High Hand Force					
Body Part	**Physical Risk Factor**	**Combined with**	**Duration**	**Visual Aid**	Check (✓) here if this is a WMSD hazard
Arms, wrists, hands	Pinching an unsupported object(s) weighing 2 or more pounds per hand, or pinching with a force of 4 or more pounds per hand (comparable to pinching half a ream of paper)	Highly repetitive motion	More than 3 hours total per day		❑
		Wrists bent in flexion 30° or more, or in extension 45° or more, or in ulnar deviation 30° or more	More than 3 hours total per day		❑
		No other risk factors	More than 4 hours total per day		❑
Arms, wrists, hands	Gripping an unsupported object(s) weighing 10 or more pounds per hand, or gripping with a force of 10 pounds or more per hand (comparable to clamping light duty automotive jumper cables onto a battery)	Highly repetitive motion	More than 3 hours total per day		❑
		Wrists bent in flexion 30° or more, or in extension 45° or more, or in ulnar deviation 30° or more	More than 3 hours total per day		❑
		No other risk factors	More than 4 hours total per day		❑

WAC 296-62-05174 Appendix B: Criteria for analyzing and reducing WMSD hazards for employers who choose the Specific Performance Approach.

Highly Repetitive Motion

Body Part	Physical Risk Factor	Combined with	Duration	Check (✓) here if this is a WMSD hazard
Neck, shoulders, elbows, wrists, hands	Using the same motion with little or no variation every few seconds (excluding keying activities)	No other risk factors	More than 6 hours total per day	❑
	Using the same motion with little or no variation every few seconds (excluding keying activities)	Wrists bent in flexion 30° or more, or in extension 45° or more, or in ulnar deviation 30° or more **AND** High, forceful exertions with the hand(s)	More than 2 hours total per day	❑
	Intensive keying	Awkward posture, including wrists bent in flexion 30° or more, or in extension 45° or more, or in ulnar deviation 30° or more	More than 4 hours total per day	❑
		No other risk factors	More than 7 hours total per day	❑

Repeated Impact

Body Part	Physical Risk Factor	Duration	Visual Aid	Check (✓) here if this is a WMSD hazard
Hands	Using the hand (heel/base of palm) as a hammer more than once per minute	More than 2 hours total per day		❑
Knees	Using the knee as a hammer more than once per minute	More than 2 hours total per day		❑

WAC 296-62-05174 Appendix B: Criteria for analyzing and reducing WMSD hazards for employers who choose the Specific Performance Approach.

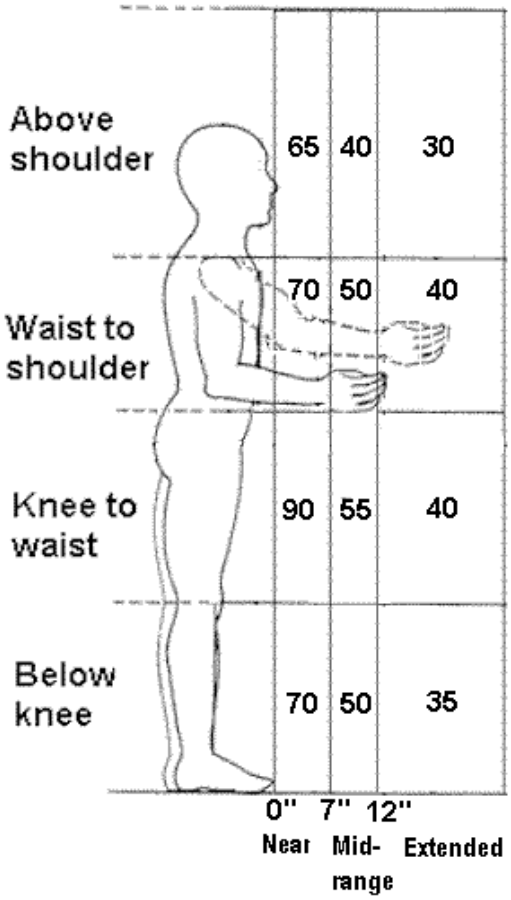
Heavy, Frequent or Awkward Lifting

This analysis only pertains if you have "caution zone jobs" where employees lift 10 lbs. or more (see WAC 296-62-05105, Heavy, Frequent, or Awkward Lifting) and you have chosen the specific performance approach.

Step 1 **Find out the actual weight of objects that the employee lifts.**

Actual Weight = _____ lbs.

Step 2 **Determine the Unadjusted Weight Limit.** Where are the employee's hands when they begin to lift or lower the object? Mark that spot on the diagram below. The number in that box is the Unadjusted Weight Limit in pounds.



Unadjusted Weight Limit: _____ lbs.

Step 3 **Find the Limit Reduction Modifier.** Find out how many times the employee lifts per minute and the total number of hours per day spent lifting. Use this information to look up the Limit Reduction Modifier in the table below.

How many lifts per minute?	For how many hours per day?		
	1 hr or less	1 hr to 2 hrs	2 hrs or more
1 lift every 2-5 mins.	1.0	0.95	0.85
1 lift every min	0.95	0.9	0.75
2-3 lifts every min	0.9	0.85	0.65
4-5 lifts every min	0.85	0.7	0.45
6-7 lifts every min	0.75	0.5	0.25
8-9 lifts every min	0.6	0.35	0.15
10+ lifts every min	0.3	0.2	0.0

Note: For lifting done less than once every five minutes, use 1.0

Limit Reduction Modifier: ____._____

Step 4 **Calculate the Weight Limit.** Start by copying the Unadjusted Weight Limit from Step 2.

Unadjusted Weight Limit: = _____ lbs.

If the employee twists more than 45 degrees while lifting, reduce the Unadjusted Weight Limit by multiplying by 0.85. Otherwise, use the Unadjusted Weight Limit

Twisting Adjustment: = _____.____

Adjusted Weight Limit: = _____ lbs.

Multiply the Adjusted Weight Limit by the Limit Reduction Modifier from Step 3 to get the Weight Limit. **X**

Limit Reduction Modifier: _____.___

Weight Limit: = _____ lbs.

Step 5 **Is this a hazard?** Compare the Weight Limit calculated in Step 4 with the Actual Weight lifted from Step 1. If the Actual Weight lifted is greater than the Weight Limit calculated, then the lifting is a WMSD hazard and must be reduced below the hazard level or to the degree technologically and economically feasible.

Note: If the job involves lifts of objects with a number of different weights and/or from a number of different locations, use Steps 1 through 5 above to:

1. Analyze the two worst case lifts -- the heaviest object lifted and the lift done in the most awkward posture.
2. Analyze the most commonly performed lift. In Step 3, use the frequency and duration for <u>all</u> of the lifting done in a typical workday.

WAC 296-62-05174 Appendix B: Criteria for analyzing and reducing WMSD hazards for employers who choose the Specific Performance Approach.

Hand-Arm Vibration

Use the instructions below to determine if a hand-arm vibration hazard exists.

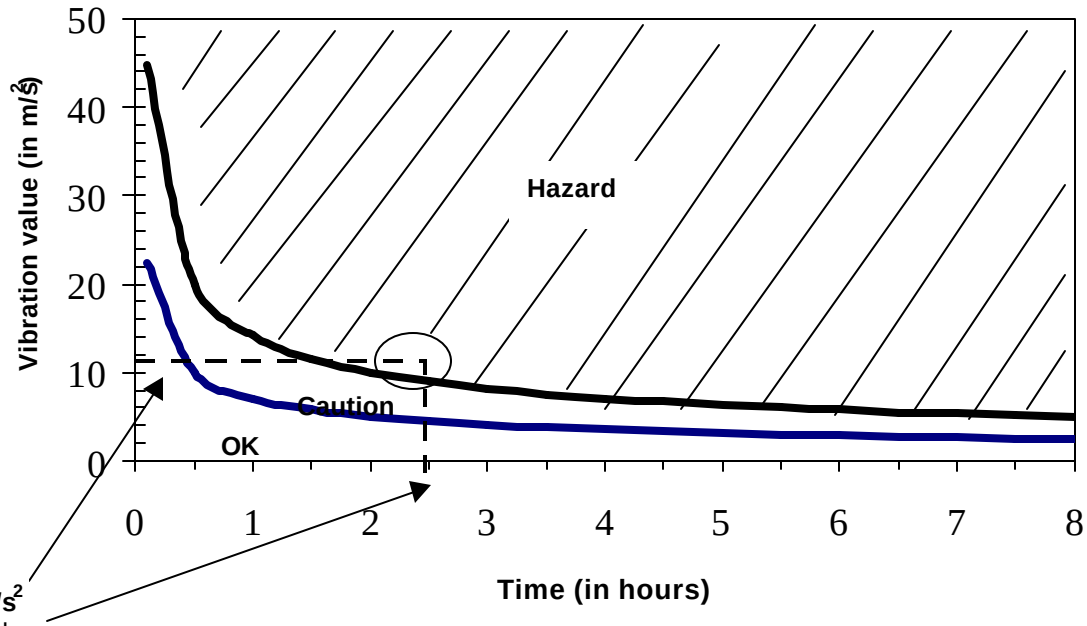
Step 1. Find the vibration value for the tool. (Get it from the manufacturer, look it up at this web site: http://umetech.niwl.se/vibration/HAVHome.html, or you may measure the vibration yourself). The vibration value will be in units of meters per second squared (m/s^2). On the graph below find the point on the left side that is equal to the vibration value.

Note: You can also link to this web site through the L&I WISHA Services Ergonomics web site: http://www.lni.wa.gov/wisha/ergo

Step 2. Find out how many total hours per day the employee is using the tool and find that point on the bottom of the graph.

Step 3. Trace a line in from each of these two points until they cross.

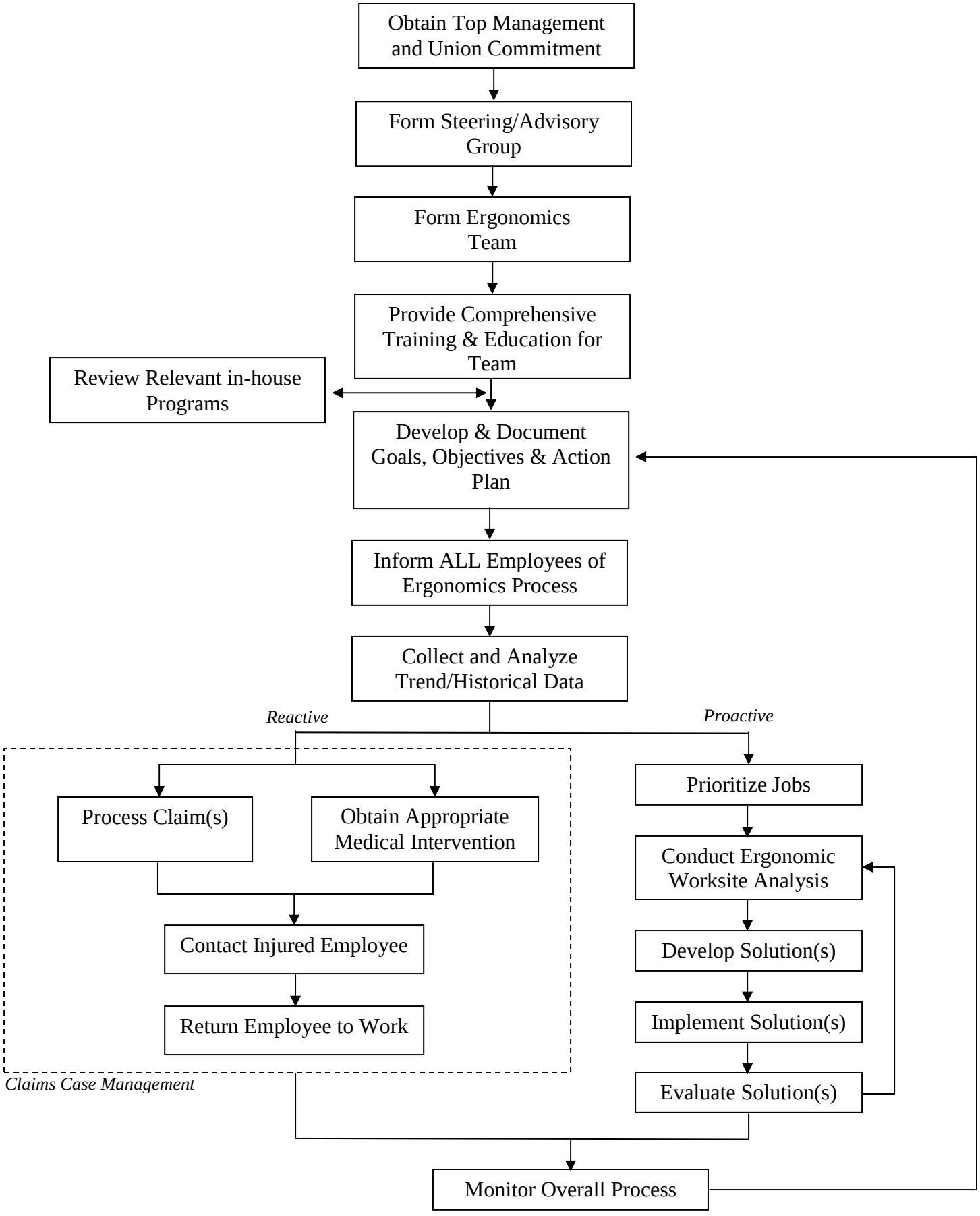
Step 4. If that point lies in the crosshatched "Hazard" area above the upper curve, then the vibration hazard must be reduced below the hazard level or to the degree technologically and economically feasible. If the point lies between the two curves in the "Caution" area, then the job remains as a "Caution Zone Job." If it falls in the "OK" area below the bottom curve, then no further steps are required.



Example:
An impact wrench with a **vibration value of 12 m/s^2** is used for **2½ hours** total per day. The exposure level is in the Hazard area. The vibration must be reduced below the hazard level or to the degree technologically and economically feasible.

Note: The caution limit curve (bottom) is based on an 8-hour energy-equivalent frequency-weighted acceleration value of 2.5 m/s^2. The hazard limit curve (top) is based on an 8-hour energy-equivalent frequency- weighted acceleration value of 5 m/s^2.

Ergonomics Process Development Flowchart



OSHA Resources

June 25, 2003

OSHA Assistance for the

Plastics Industry

Credits

Employing over 1.5 million workers in the United States, the plastics industry represents a substantial portion of the American workforce. Various safety and health concerns exist throughout the plastics industry, ranging from raw material manufacturing to plastics processing. The following commonly asked questions link to resources that provide useful safety and health information about the plastics industry.

What standards apply to the plastics industry?
OSHA Standards | ANSI Standards

Where can I find information about hazards and solutions?
Related Injury Reports | Amputations | Machine Guarding | Lockout/Tagout | Ergonomics | Legionella Protection | Isocyanates | Other

Where do I find additional resources?
Training | Trade Associations | Other Resources

Revised: 23 April 2003

Find It! in DOL
Department of Labor

Compliance Assistance
- Consultation
- eTools
- Grants
- Posters
- Recordkeeping
- Training

Laws & Regulations
- Standards
- Interpretations
- Federal Registers
- Directives
- Dockets & E-Comments

State Programs

Cooperative Programs
- Alliances
- Strategic Partnerships
- VPP

Newsroom
- News Releases
- Publications
- Speeches
- Testimonies

Safety/Health Topics
- Bloodborne Pathogens
- Construction
- Ergonomics
- Maritime

Statistics
- Inspection Data
- SIC/NAICS Search

International
- US-EU Cooperation

Contact Us | Freedom of Information Act | Customer Survey
Privacy and Security Statement | Disclaimers

Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

Plastics Industry
Standards

Plastics Industry
- Standards
- Hazards and Solutions
- Additional Resources
- Credits

OSHA Standards

Plastics industry companies under federal jurisdiction are required to comply with Federal OSHA Occupational Safety and Health Standards for general industry (29 CFR 1910).

- *Frequently Cited General Industry Standards*
  Search for the most frequently cited Federal and State OSHA standards for this industry by SIC code and jurisdiction (Federal or by individual States). Enter your own SIC code, find a SIC code of interest by accessing the online SIC Manual, or use the following pre-selected SIC codes (returns only citations issued by Federal OSHA).
  (Note: Miscellaneous Plastics Products are covered by SIC code 308, and further divided according to products manufactured. The largest group of plastics processors is represented by SIC code 3089.)
  - 308 -
    - 3081, Unsupported plastics film and sheet
    - 3082, Unsupported plastics profile shapes
    - 3083, Laminated plastics plate, sheet, and profile shapes
    - 3084, Plastics pipe
    - 3085, Plastics bottles
    - 3086, Plastics foam products
    - 3087, Custom compounding of purchased plastics resins
    - 3088, Plastics plumbing fixtures
    - 3089, Plastics Products, Not Elsewhere Classified. The 10 most frequently cited standards for the period October 2001 through September 2002 are listed below.
      - 1910.147, The control of hazardous energy (lockout/tagout).
        - See lockout/tagout safety references for the plastics industry
      - 1910.212, General requirements for all machines
        - 1910.212(a)(3)(ii)
        - See machine guarding safety references for the plastics industry
      - 1910.1200, Hazard Communication. [Topic Page]
      - 1910.305, Electrical, Wiring Methods, Components and Equipment [Topic Page]
      - 1910.134, Respiratory Protection. [Topic Page]
      - 1910.178, Powered Industrial Trucks. [Topic Page]
      - 1910.303, Electrical Systems Design, General Requirements [Topic Page]
      - 1910.219, Mechanical Power-Transmission Apparatus
      - 1910.215, Abrasive Wheel Machinery
      - 1910.95, Occupational Noise Exposure. [Topic Page]
- *State OSHA Programs*

Many states have developed approved State Occupational Safety and Health Plans. If you live in a State Plan state, you must comply with specific state requirements. Visit State Occupational Safety and Health Plans to verify your state's status and search for standards that may apply to you.

- Michigan: Plastic Molding. General Industry Safety Standards, Part 62. Michigan Department of Consumer and Industry Services (2000, January 24), 31KB PDF, 5 pages.

ANSI Standards

The following industry recognized standards provide further detail on safety and health requirements in the plastics industry.

- *Injection*
  - Plastics Machinery - Horizontal Injection Molding Machines - Safety Requirements for Manufacture, Care, and Use. ANSI/SPI B151.1-1997 (19.197). "Applies to horizontal injection molding machines that are used in the rubber and plastics industries. Safety requirements of ancillary equipment used with horizontal injection molding machines are not covered by this standard." Download available at the ANSI Electronic Standards Store.
    - HIMM: Summary of Interpretations of ANSI B151.1-1997. Machinery Division, The Society of the Plastics Industry, Inc. (2001, October 1), 20 pages.
  - Plastics Machinery - Robots Used with Horizontal Injection Molding Machines - Safety Requirements for the Integration, Care, and Use. ANSI/SPI B151.27-1994 (1994). "Definitions and requirements for robots used with horizontal injection molding machines." Download available at the ANSI Electronic Standards Store.
  - Safety Requirements for the Manufacture, Care and Use of Vertical Clamp Injection Molding Machines. ANSI/SPI B151.29-2002 (2002). "Identifies and addresses known hazards to personnel working on or with the specified machinery."
- *Extrusion*
  - Plastics Machinery - Plastics Extrusion Machines - Requirements for the Manufacture, Care and Use (revision and redesignation of ANSI B151.7-1982 (R1998)). ANSI/SPI B151.7-1996 (1996). "Applies to extrusion machines that are use[d] in the rubber and plastics industries. Safety requirements of ancillary equipment used with extrusion machines are not covered by this standard." Download available at the ANSI Electronic Standards Store.
  - American National Standard for Plastic Sheet Production Machinery - Manufacture, Care and Use. ANSI/SPI B151.20-1999 (1999). "Identifies and addresses known hazards to personnel working on or with the machinery." Download available at the ANSI Electronic Standards Store.
  - Plastic Film and Sheet Winding Machinery - Manufacture, Care, and Use. ANSI/SPI B151.5-2000 (2000). "To identify and address known hazards to personnel working on or adjacent to the Machinery." Download available at the ANSI Electronic Standards Store.
  - Blown Film Take-Off and Auxiliary Equipment - Construction, Care, and Use (revision and redesignation of ANSI B151.4-1982 (R1988)). ANSI/SPI B151.4-1999 (1999). "Identifies and addresses known hazards to personnel working on or adjacent to the machinery." Download available at the ANSI Electronic Standards Store.
  - Film Casting Machines - Construction, Care, and Use (revision and redesignation of ANSI B151.2-1982 (R1988)). ANSI/SPI B151.2-1999 (1999). "Identifies and addresses known hazards to personnel working on or adjacent to the machinery." Download available at the ANSI Electronic Standards Store.

- *Blow Molding*
  - Extrusion Blow Molding Machines, Construction, Care, and Use of (revision and redesignation of ANSI B151.15-1985). ANSI/SPI B151.15 (2000)."Identifies and addresses known hazards to personnel working on or with the machinery. This standard was originally listed for Public Review in the October 10, 1997 issue of Standards Action. It is being resubmitted due to substantive changes to the text." Download available at the ANSI Electronic Standards Store.
  - Injection Blow Molding Machines, Safety Requirements for the Construction, Care, and Use of. ANSI/SPI B151.21-2000 (2000). "Identifies and addresses known hazards to personnel working on or with the machinery. This standard was originally listed for Public Review in the October 10, 1997 issue of Standards Action. It is being resubmitted due to substantive changes to the text." Download available at the ANSI Electronic Standards Store.
- *Lockout/Tagout*
  - Safety Requirements for the Lock Out/Tag Out of Energy Sources. ANSI Z244.1 - 1982 (R1993). NOTE: A draft of the revision of Z244 has been completed and is currently under review. Download available at the ANSI Electronic Standards Store.

Other Standards

The following standard, though not enforceable in the United States, contains information that may aid industry members in providing a safer and healthier workplace.

- Rubber and plastics machines—Injection moulding machines—Safety requirements. European Standard EN 201:1997, European Committee for Standardization (1997).

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Occupational Safety & Health Administration
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Washington, DC 20210

Plastics Industry

Hazards and Solutions

Plastics Industry
- Standards
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- Credits

Related Injury Reports

- Accident Investigation Search. OSHA (2001). Enter 3089 in the text box next to the SIC label and select other search criteria to find descriptions of injuries in plastic products processing, NEC.
- FACEWeb. NIOSH Fatality Assessment and Control Evaluation (FACE) Program (2002). FACEWeb "provide[s] interested users with access to the full text of hundreds of fatality investigation reports." Reports are indexed by category or can be found through a general text search (by using terms such as "injection molding" or "plastic").

Amputations

- OSHA National Emphasis Program on Amputations. OSHA directive number CPL 2-1.35 (2002, March 26), 60 KB PDF, 22 pages. This program describes procedures to identify and reduce hazards causing or likely to cause amputations in the workplace.
- Safeguarding Equipment and Protecting Workers from Amputations. OSHA Publication 3170 (2001), 1.1 MB PDF, 79 pages. This guide is intended to help the small business employer identify and manage common amputation hazards associated with operating and using stationary equipment.
- Amputations. OSHA Fact Sheet (2002), 153 KB PDF, 2 pages.

Machine Guarding

- Machine Guarding eTool. OSHA (2002, October). This eTool focuses on recognizing and controlling common amputation hazards associated with the operation and use of certain types of machines. Note: only the Saws and Presses modules are available at this time.
- Plastics Industry Free Leaflets from the United Kingdom's Health and Safety Executive. A series of publications containing information on machine guarding and other safety and health concerns.
  - Managing Machinery Safety in Small Plastics Factories. UK Health and Safety Executive, Plastics Processing Sheet 3 (1999, June), 21 KB PDF, 3 pages.
  - Safety at Injection Moulding Machines. UK Health and Safety Executive, Plastics Processing Sheet 4 (1999, June), 27 KB PDF, 4 pages.
  - Safety at Blow Moulding Machines. UK Health and Safety Executive, Plastics Processing Sheet 5 (1999, June), 27 KB PDF, 4 pages.
  - Safety at Thermoforming Machines. UK Health and Safety Executive, Plastics Processing Sheet 6 (1999, June), 48 KB PDF, 4 pages.
  - Safety at Extruders With Caterpillar, Belt or Roller Haul-offs. UK Health and Safety Executive, Plastics Processing Sheet 7 (1999, June), 27 KB PDF, 4 pages.
  - Safety at Window Frame Manufacturing Machines. UK Health and Safety Executive, Plastics Processing Sheet 8 (1999, June), 27 KB PDF, 4 pages.
  - Safety at Compression Moulding Machines. UK Health and Safety Executive, Plastics Processing Sheet 9 (1999, June), 27 KB PDF, 4 pages.
  - Safety at Granulators. UK Health and Safety Executive, Plastics Processing Sheet

10 (1999, June), 26 KB PDF, 4 pages.
    - Safety at the Winding Zones of Winding Machines for Plastic Sheet and Film. UK Health and Safety Executive, Plastics Processing Sheet 11 (2000, August), 42 KB PDF, 6 pages.
- For more information on machine guarding, see the OSHA Machine Guarding Safety and Health Topic Page.

Lockout/Tagout

- Preventing Worker Deaths from Uncontrolled Release of Electrical, Mechanical, and Other Types of Hazardous Energy. DHHS NIOSH Publication No. 99-110, NIOSH Alert (1999, August).
- Lockout/Tagout Interactive Training Program. OSHA (1999, September). Includes a tutorial explaining the Lockout/Tagout standard in question and answer form, a list of Hot Topics discussing major issues related to the standard, and seven interactive case studies.
- Safety for Small Business - Basics 1:1;8 Policy. Oregon Occupational Safety & Health Division (OR-OSHA). 48 KB PDF, 11 pages. Worksheet for conducting a Lockout/Tagout audit and inspection.
- Safety for Small Business - Masters for copy (Forms). Oregon Occupational Safety & Health Division (OR-OSHA). 204 KB PDF, 37 pages. Paperwork for implementing a Lockout/Tagout safety program including material on hazard communication, training, safety committee, tracking, investigation, etc.
- For more information on lockout/tagout, see the OSHA Lockout/Tagout Safety and Health Topic Page.

Ergonomics

- Ergonomics FAQs for Plastics Processors. Society of the Plastics Industry (2001), 4 pages.
- NIOSH Toolbox reports of Investigations of WMSDs in Work Settings. Elements of Ergonomics Programs: A Primer Based on Workplace Evaluations of Musculoskeletal Disorders (1997).
    - Manufacturer of plastic and metal pails. Referenced from HETA 89–146–2049. NTIS order no. PB–91–115–758.
    - Operating presses and finishing parts in a plant manufacturing plastic and fibrous glass. Referenced from HETA 91–003–2232, NTIS order no. PB–93–119–360.
- For more information on ergonomics, visit the OSHA Ergonomics Safety and Health Topic Page.

Legionella Protection

- Legionnaires' Disease Risk for Workers in the Plastic Injection Molding Industry. OSHA Hazard Information Bulletin (1998, December 9), 3 pages.
- Legionnaires' Disease eTool. OSHA (2002, November). Designed to assist industrial hygienists in the assessment of worksites for potential Legionnaires' disease, this eTool provides information on disease recognition, investigation procedures to identify probable water sources, and control strategies.
- For more information on legionella protection, visit the OSHA Legionnaires' Disease Safety and Health Topic Page.

Isocyanates

- TDI User Guidelines for Protective Clothing Selection, Technical Bulletin AX179. Alliance for the Polyurethanes Industry (2001, July), 5 pages. This technical bulletin presents

guidelines for selecting the appropriate chemical protective clothing for working with toluene diisocyanate (TDI) and TDI-based foam systems.
- PMDI User Guidelines for Protective Clothing Selection, Technical Bulletin AX178. Alliance for the Polyurethanes Industry (2002, January), 245 KB PDF, 6 pages. This technical bulletin presents guidelines for selecting the appropriate personal protective clothing for working with methylene diphenyl diisocyanate (PMDI) and PMDI-based foam systems.
- For more information on icocyanates, see the OSHA Isocyanates Safety and Health Topic Page.

Other

- Sample Employer Self-inspection Checklist Safeguards and Other Hazards. Society of the Plastics Industry (2001), 2 pages. Provides a list of safeguard requirements and asks safety questions regarding mechanical hazards, nonmechanical hazards, and electrical hazards.
- Plastics Industry Free Leaflets from the United Kingdom's Health and Safety Executive.
  - Fire and explosion risks from pentane in expandable polystyrene (EPS). UK Health and Safety Executive, Plastics Processing Sheet 1 (1998, September), 24 KB PDF, 4 pages.
  - How to reduce your hand knife injuries UK Health and Safety Executive, Plastics Processing Sheet 12 (2000, May), 41 KB PDF, 4 pages.
  - Controlling fume during plastics processing UK Health and Safety Executive, Plastics Processing Sheet 13 (2002, October), 58 KB PDF, 4 pages.
  - It takes your breath away: Health Advice to the Plastics Industry. UK Health and Safety Executive (1998, May).
- NIOSH Alert: Preventing Injuries and Deaths of Workers Who Operate or Work Near Forklifts. DHHS (NIOSH) Publication No. 2001-109 (2001, June), 12 pages.
- Powered Industrial Trucks (Forklifts). OSHA Safety and Health Topics Page (2001).

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Plastics Industry

Additional Resources

Plastics Industry
- Standards
- Hazards and Solutions
- Additional Resources
- Credits

Training

- Plastics Learning Network. Live, interactive training sessions transmitted by satellite. Sponsored by The Society of the Plastics Industry, Inc. (SPI) in partnership with South Carolina Educational TV and the Polymers Center of Excellence.
- OSHA Training Institute: Course Catalog and Course Schedule (2003). Course # 204A, Machinery and Machine Guarding Standards, provides guidance on "hazards associated with various kinds of machinery and the control of hazardous energy sources (lockout/tagout) [and]... presents an approach to machinery inspection that enables participants to recognize hazards and to provide options to achieve abatement."

Trade Associations

- Society of the Plastics Industry
- Alliance for the Polyurethanes Industry
- American Plastics Council

Other Resources

- Job Hazard Analysis. OSHA Publication 3071 (revised 2002), 497 KB PDF, 50 pages. Offers guidelines in conducting a step-by-step job hazard analysis.
- Assessing the Impact of Occupational Injuries on Profitability: OSHA $afety Pays Program. OSHA (August 1998). Interactive software developed by OSHA to assist employers in assessing the impact of occupational injuries and illnesses (with Lost Work Days) on their profitability.
- Hazard Awareness Advisor. OSHA (1997, September). Interactive, expert software that will help you identify and understand common occupational safety and health hazards in your work place.
- Safety and Health Management System eTool. OSHA (2001, January).
- Personal Protective Equipment (PPE) Safety and Health Topic Page. OSHA (2002).
- Plastics Processes: Descriptions and Animations. British Plastics Federation. Provides an overview of plastics processes for various machines, including animations for the following processes (Note: Macromedia Flash Player needed to view animations):
  - Injection Molding
  - Injection Blow Molding
  - Injection Stretch Blow Molding
  - Extrusion Blow Molding
  - Rotational Molding

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200 Constitution Avenue, NW
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Follow-up Activities

Crossing the bridge to a safer workplace

BWC's Division of Safety & Hygiene Training Center

The Division of Safety & Hygiene wants Ohio workplaces to be safer and healthier by reducing occupational injuries and illnesses. To accomplish this goal, the Training Center emphasizes the importance of applying what you learn in class to your workplace.

Effective July 1, 2003, class participants will have a list of follow-up activities to review as possible steps to take when they return to work. During or at the end of a class, you may choose from among these follow-up activities or customize your own activity as appropriate for your workplace.

When you complete a follow-up activity in your workplace, notify the Training Center. Following notification, a certificate with continuing education credits for the class will be sent to you. You must complete this notification process from your first class in order to be eligible to enroll in a second class.

(Please see details on reverse side.)

BWC
Better Workers' Compensation
Built with you in mind.

Examples of follow-up activities

- Develop or improve a training program on the class topic;
- Organize a new or improve an existing safety team;
- Conduct a safety audit on one or more machines at work;
- Analyze illness/injury trends;
- Find and document hazardous chemicals to add to Hazard Communication program.

Notification process

Provide the following information when notifying the Training Center of your completed activity:

1. Please describe the activity you completed at your workplace as a result of taking the class;
2. Who at your company was involved in this activity;
3. The impact of this activity on your company;
4. What barriers, if any, you encountered;
5. How you would like your certificate sent to you (e-mail, fax, or no certificate needed);
6. Please estimate the amount of time you spent on this activity.

Methods of notifying the Training Center will be provided when you attend the class.

Summary

1. Enroll in one class at a time;
2. Attend class;
3. Select a follow-up activity that is reasonable and manageable at your workplace;
4. Complete the activity;
5. Notify the Training Center;
6. Receive certificate with continuing education credits;
7. Enroll in another class.

Exceptions

- Safety Works for You, Modules 1-7 (See Division Services catalog for course description)
- Safety Works for Kids (See Division Services catalog for course description)
- Students who are unemployed

Safety for Plastics

Follow up activities:

- Conduct a machine-guarding assessment on one type of machine.
- Review & update my company's Hazard Communication program.
- Review & update my company's Lockout/Tagout program.
- Conduct an ergonomics assessment for job of concern.
- Conduct a PPE assessment.
- Implement a new safety management tool or strategy.
- Review & update my company's Hearing Conservation program.

Activity Plan

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

Notification of Completed Activity

Your name (please print) _____ Locator number of class _____ Date of class _____

PIN* _____ Class title _____ Location of class _____

* PIN: First letter of your last name, four digits representing your day & month of birth, the last four digits of your SSN. Example: G03059784

1. Please describe the activity you completed at your workplace as a result of taking the class.

2. Who at your company was involved in this activity?

3. What impact did this activity have on your company?

4. What barriers, if any, did you encounter?

1a. What category fits your activity most accurately? Check more than one, if it applies.

- ☐ Personal protective equipment
- ☐ Policies, procedures
- ☐ Management directive
- ☐ Training
- ☐ Housekeeping
- ☐ Inspections/audits/assessments
- ☐ Tools & equipment
- ☐ Recordkeeping
- ☐ Written program
- ☐ Injury/illness trends
- ☐ Safety team
- ☐ Safety culture

Other _____

_____

5. How would you like your certificate to be sent to you?

☐ E-mail (If so, please print on line below.) ☐ Fax (If so, please list on line below.) ☐ No thanks. I don't need one.

_____ _____

6. Please estimate the amount of time you spent on this activity.

☐ Less than 1 hour ☐ 1-3 hours ☐ 3-5 hours ☐ Over 5 hours

See reverse side for methods of notifying the Training Center of your completed activity.

Methods of notifying the Training Center of your completed activity

Internet: www.ohiobwc.com
Safety Services
Training Services
Training Center, scroll down to:
Reporting follow-up activity
Notification form
You can enter your information directly on the electronic Notification form.

E-mail: safety@bwc.state.oh.us

Fax: 614-365-4974

Call: 1-800-OHIOBWC (1-800-644-6292), follow the prompts for employer services, then safety services.

Mail: Ohio BWC Division of Safety & Hygiene Training Center
Attention: Contact Center
13430 Yarmouth Drive
Pickerington OH 43147

Statement of Attendance

(Student name)_____ attended the

(Class title)_____ class on

(Date)_____ at (Location) _____.

Instructor's signature

Note to student:
Please enter the class information above prior to asking the instructor to sign it.

After you notify the Training Center of your completed follow-up activity, a certificate with continuing education credits will be sent to you.

Training Center New Direction
Student Questions & Answers

Question: Several of us from our company attended this class. May we work on one follow-up activity together back at our workplace?
Answer: Yes, but each person needs to individually notify the Training Center of the completed activity.

Question: If I am not sure what activity I will do back at the workplace, what should I write on the sign-in sheet?
Answer: Please write your most likely activity. It is OK to change your mind or modify the activity when you return to the workplace.

Question: Do I have to do an activity on the list?
Answer: No, you can customize an activity that will benefit your workplace.

Question: May I enroll in a second class if the follow-up activity from the first class is not complete?
Answer: Sorry, no.

Question: Why are you restricting us to enrollment in one class at a time?
Answer: The DSH mission is to prevent injuries & illnesses. DSH is willing to invest resources in those students who contribute to that mission by improving the workplace through meaningful activities.

Question: When I am limited to enrollment in one class at a time, how can I plan out my year of classes? Won't all the classes be full?
Answer: Plan out your classes with at least 4-6 weeks between them, pencil them on your calendar. Promptly after completing a class, begin your follow-up activity back at the workplace. When you notify the Training Center of your completed activity, send in your registration for your next class. Starting July 1, everyone will be "in the same boat;" that is, no one can sign up for more than one class at a time.

Question: Do web-based classes have follow-up activities?
Answer: Yes, but you may enroll in a web-based class and a regular class simultaneously.

Question: Can I be on a wait list for one class and be enrolled in another class?
Answer: No, you will have to choose whether to be on a wait list or to be enrolled in another class.

Question: Is "one class at a time" by individual or by company?
Answer: By individual.

Question: Some activities may take longer than others, so it may take months to complete an activity.

Answer: Here's a suggestion: break down the activity into smaller, but nonetheless significant, steps. Report to the Training Center the first completed step.

Question: What about PDP companies? All PDP requires them to do is attend a class to meet their Step 6 requirement.

Answer: For Step 6 credit, BWC will accept the "Statement of Attendance" signed by your instructor.

Question: What is the fastest method to report my completed activity and get my updated status, so I may enroll in a future class?

Answer: All methods of reporting will take 1-2 days for updating your status, but you may send in your registration form for the future class along with your notification form. Within two weeks, you should receive a confirmation notice of your enrollment in the future class.

Question: Why do I have to write the intended follow-up activity on the sign-in sheet?

Answer: What you have written on the sign-in sheet will be reviewed by BWC staff members who are responsible for assuring high-quality classes.

Question: What is the purpose behind the new direction?

Answer: It is a way of measuring the effectiveness of the Training Center in reducing occupational injuries and illnesses.

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.

Students from the DSH training center can use the services and collections of the libraries to assist with the completion of their course **follow-up activities**. The librarians have recommended a variety of resources for the follow-up activities and are available to answer questions and provide assistance.

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