OSC|12
Ohio Safety Congress & Expo

WELL AT HOME. SAFE AT WORK.

154 Case Studies: Learning from Rigging Accidents

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Wednesday, March 28, 1 to 2 p.m.

Ohio | Bureau of Workers' Compensation

Royal Arc Presents…

Signalmen

Hand Signals & Verbal Commands

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Rigging Procedures in Construction

- Christmas Treeing

Steel Connector

History

- 1914-1918 mobile cranes begin to appear
- 1916 first crane standard ASME
- 1920-1925 meetings and discussions on crane safety ASME
- The Safety Code for Cranes Derricks & Hoists ASA B30.2-1943
- Jointly ASME and the U.S. Navy reorganized as an American National Standards Committee in 1962 with 39 members and 27 organizations

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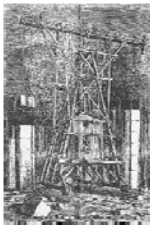
Quick History

- Tower Cranes are newer than mobile cranes, but still 100 years old
- Less than 5% of crane accidents involve tower cranes. Most accidents occur on mobile equipment.
- Most are designed in Europe(Germany, France, Italy, Spain), and now China



France, 1867

Cologne, 1819

England, ~1910 (Morris & Bastert)

Germany, 1910 (Wolff)

Germany, 1913 (Wolff)

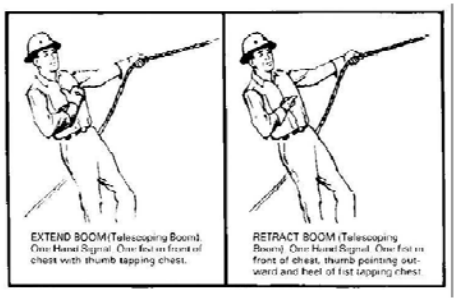
Germany, 1949 (Liebherr)

Germany, 1956 (Liebherr)

Denmark, 1975 (Kroll)

Chicago, 2008 (Potain)

Chicago, 2006 (Linden)



ANSI A10.42-2000

5.2.1 Communication

Riggers shall be capable of understanding spoken and written English and should understand the language in use at the location.

Title 8 CCR §5001.

(a) A signal person shall be provided when the point of operation is not in full and direct view of the operator unless a signaling or control device is provided for safe direction of the operator.
(b) Only qualified persons shall be permitted to give signals.
(c) A uniform signal system shall be used on all operations and if hand signals are used, they shall be clearly understood by the operator.
(d) Signal systems other than manual shall be protected against unauthorized use, breakage, weather or obstruction which will interfere with safe operation. In the event of any known malfunction, an alternate signal system shall be used or all motion shall be stopped.
(e) There shall be conspicuously posted in the vicinity of the hoisting operations, a legible chart depicting and explaining the system of signals used.
NOTE: Authority cited: Section 142.3, Labor Code. Reference: Section 142.3, Labor Code.

ASME B30.5 2004

5-3.3.3 **Signal Person Qualifications.** Prior to signaling crane operations, all signal persons shall be tested by a designated person and demonstrate their qualifications in the following areas:

(a) Basic understanding of crane operation and limitations.

(b) Standard hand signals described in para. 5-3.3.4 whenever hand signals are used.

(c) Standard voice signal procedures described in para. 5-3.3.5 whenever voice signals are used.

ASME B30.5 2004

(a) Telephones, radios, or equivalent, if used, shall be tested before lifting operations begin. If the system is battery powered, extra batteries should be available at the jobsite.

(b) Prior to commencing a lift, the operator and signal person shall contact and identify each other.

(c) All directions given to the crane operator by the signal person shall be given from the operator's direction perspective, e.g. swing right.

(d) Each series of voice signals shall contain three elements stated in the following order:

1. Function, direction
2. Distance and/or speed
3. Function stop

Verbal Crane Signals
(Tower Cranes)

Hoist		Trolley		Swing	
Fast	Up Up	Fast	Trolley Out	Fast	Swing Right
	Up		Easy Trolley		Easy Swing
Stop	Up Easy	Stop	Trolley	Stop	Swing
	High				
Fast	Down Down	Fast	Trolley In	Fast	Swing Left
	Down		Easy Trolley		Easy Swing
Stop	Down Easy	Stop	Trolley	Stop	Swing
	High				

Travel (Optional)	
Fast	Travel Forward
	Easy Travel
Stop	Travel

Travel	
Fast	Travel Backward
	Easy Travel
Stop	Travel

Hooking / Unhooking From A Load

Up To Choke
Down To Cut Loose

Adjustments in Speed can be made with one word commands.

Faster or Slower

Verbal Crane Signals
(Conventional Cranes)

Hoist		Boom		Swing	
Fast	Up Up	Fast	Boom Up	Fast	Swing Right
	Up		Easy Boom		Easy Swing
Stop	Up Easy	Stop	Boom	Stop	Swing
	High				
Fast	Down Down	Fast	Boom Down	Fast	Swing Left
	Down		Easy Boom		Easy Swing
Stop	Down Easy	Stop	Boom	Stop	Swing
	High				

Travel	
Fast	Travel Forward
	Easy Travel
Stop	Travel

Travel	
Fast	Travel Backward
	Easy Travel
Stop	Travel

Hooking / Unhooking
From A Load

Up To Choke
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Faster or Slower

ASME B30.5 2004

Note: Examples of Signals

- Swing right 50 feet, 25 feet, 15 feet, 10 feet, 5 feet, 2 feet, swing stop
- Load down 100 feet, 50 feet, 40 feet, 30 feet, …2 feet, load stop
- Load up slow, slow, slow, load stop

ANSI A10.42-2000

4.1 General Requirements

When an operation is determined to be critical, a competent person shall be appointed who has overall responsibility for the critical rigging operation.

Commentary: The employer or enforcing authority may require various levels of review due to the complexity of tasks. The Person In Charge (PIC), Competent Person, qualified rigger, and employer representative may be the same person.

4.2 Signaling

Only designated signalers shall give signals to an operator (see Appendix A). **However, the operator shall obey an emergency STOP signal at all times, no matter who gives the signal.**

ANSI A10.42-2000

5.1 General

Personnel who are designated to operate rigging tools and equipment or perform work covered by this standard shall be qualified and trained to the level of proficiency consistent with assigned tasks. The employer or other entity responsible for supervising the lifting, hoisting, or movement of a load shall assess the knowledge, skills, and abilities of individuals designated as qualified riggers.

5.2.1 Communication

Riggers shall be capable of understanding spoken and written English and should understand the language in use at the location.

5.2.3 Calculation Skills

Have sufficient skills to calculate loads, load weights, safe capacities, and apply other safe rigging principles and procedures.

5.2.5 Skills

Demonstrate the ability to utilize rigging materials and principles.

5.2.4 General Requirements

A qualified rigger shall be capable of safely performing rigging operations.

5.3.1 General

Riggers shall be trained on the materials, methods, equipment, techniques, communication and other items as is necessary for safe performance of their specific tasks.

5.3.1.1 Without limiting the generality of paragraph 5.3.1, tasks for which qualified riggers may be trained on include but are not limited to: preparing a load for safe movement; assisting in movement or directing the movement of the load; safe utilization of various hoisting and load movement equipment; or selecting components used to assist cranes, hoists, or other equipment to achieve mechanical advantage for the purpose of moving loads. A rigger may also assist in the setup, erection, movement, placement and dismantling of cranes and other equipment.

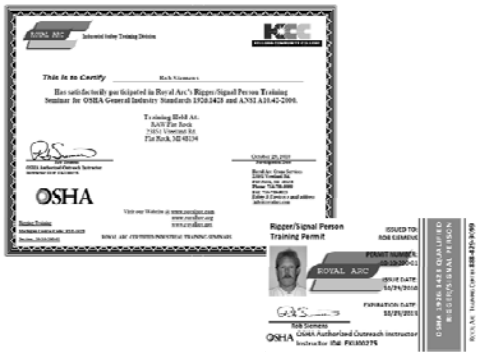
5.3.1.3 If previous training is limited or does not prepare a rigger for a task, the rigger shall not accept the task and management (the Person In Charge or Competent Person) shall not assign the task until the rigger is suitably trained.

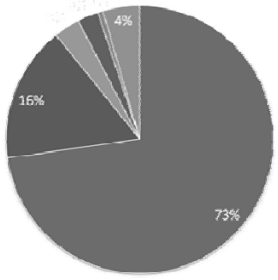
ANSI A10.42-2000

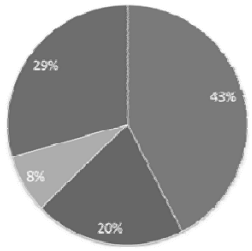
5.3.1.4 New or different equipment, methods, applications, techniques, procedures, standards, manuals, and unique loads may require special or updated training during planning stages prior to rigging or moving the load(s).

5.3.2 Qualified Riggers shall have completed training in the safe application, use, and limitations of the following, if applicable to the person's specific tasks:

- Anchor Points and deadmen
- Synthetic ropes for rigging
- Wire rope
- Chains
- Reeving
- Scaffolds
- Spreader bars and equalizing beams
- Synthetic slings
- Lifting points
- Dollies
- Trolleys
- Tuggers and winches (manual and power)
- Bars and levers
- Come-alongs
- Fiber rope for rigging jerks, jacking systems, and rams
- Forklifts and attachments
- Wire rope slings
- Rigging hitches/knots
- Hooks and similar attachment devices
- Shackles
- Eye bolts
- Turnbuckles







B. Instability, Lack of Communication and Other Causal Factors

1. Instability

Instability accidents for mobile cranes generally resulted in either the crane tipping over, or the load falling off the hook or slings. Instability accidents were further broken down into separate categories.

2. Lack of Communication

Lack of communication was another major cause of accidents because the point of operation is usually some distance from the crane's operator station or not in full and direct view of the operator in operations involving mobile cranes. Seventy-five percent of accidents caused by both "lack of communication" and "electrical contact" involved mobile cranes.

3. Lack of Training

Although "Lack of Training" did not rank very high as a primary cause, it would have been ranked within the top three if a secondary cause were listed.

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