

FESHM 10140: MOBILE CRANES

Revision History

Author	Description of Change	Revision Date
John P. Cassidy	<ul style="list-style-type: none">• Chapter renumbering.• Clarified the training requirements for mobile crane operators to include formal classroom training and retraining.• Added the physical examination requirements of ASME B30.5• Added the requirements for monthly and annual inspections to be conducted by a qualified crane service contractor.	January 2015
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1.0 INTRODUCTION

Mobile cranes pose unique hazards to the crane and hoisting industry. Improper use of material handling equipment creates a significant potential for property loss and serious injury. This chapter outlines the requirements for operating, testing, inspecting, maintenance, and documenting of mobile cranes.

It is the intent and purpose of this chapter to provide a means for governing the safety of Fermilab personnel and equipment. Mobile crane subcontractors who move materials and or equipment at Fermi National Accelerator Laboratory are governed by FESHM Chapters 7010 and 7020. The Task Manager/ Construction Coordinator is responsible for verifying that all inspections of the crane are up to date.

2.0 POLICY

Hoisting and rigging equipment and all design, installation, inspection, testing, and operations activities shall be in accordance with Fermilab Work Smart Standards (WSS). For mobile cranes these regulations (available in the library) are:

- 29 CFR 1910, Subpart N, OSHA General Industry Standards, Materials Handling and Storage.
- 29 CFR 1926, Subpart N, OSHA Construction Standards, Cranes
- ASME B30.5 (Mobile Cranes)

3.0 DEFINITIONS

Load - The total weight superimposed on the load block or hook. This includes not only the material being lifted but also all the rigging equipment necessary to attach the load to the load block: lines, shackles, rigging, etc.

Mobile Cranes - Crawler cranes, locomotive cranes, wheel-mounted cranes, and any variation thereof that retain the same fundamental characteristics. This scope only includes the type of cranes listed that are powered by internal combustion engines or electric motors.

Mobile Crane Contractor – A mobile crane contractor is a contractor through ownership or rental operates a business that provides mobile crane services to others.

Modified - A variation or alteration that changes the original configuration of the crane or adds other features not originally installed with the crane and impacts the crane's lifting capacity or load bearing components.

Person-in-Charge (PIC) – A Qualified Person appointed to be responsible for the safe execution of a Planned Engineered Lift or a Special Lift.

Qualified Person - a person who, by possession of a recognized degree in an applicable field or a certificate of professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work.

Qualified Operator - A person who has successfully completed the training requirements outlined in this chapter and has been so designated by the division/section head.

Rated Load (Capacity) - The posted maximum load designated by the manufacturer.

Special Lift - Load requires exceptional care in handling because of size, shape, close-tolerance installation, high susceptibility to damage, value, impact to operations, or other unusual factors.

4.0 ROLES AND RESPONSIBILITIES

4.1 The Division/Section Head

The Division/Section Head is responsible for implementing this program. Specifically he/she is responsible for:

- Assuring, through the line management, that employees assigned to perform rigging or crane operation duties are qualified to perform the work assigned. Successful completion of crane training is necessary, but not necessarily sufficient, to deem a person qualified to perform all rigging and crane operation tasks.
- Ensuring that documentation on mobile cranes is maintained.
- Ensuring that all cranes within their areas of responsibility are inspected, tested, maintained, and repaired as required in this document.
- Assuring that service subcontractors who perform inspection, testing, maintenance and repair of cranes have adequate oversight, usually provided by Facilities Engineering Services Section.

4.2 The Facilities Engineering Services Section (FESS)

The Facilities Engineering Services Section (FESS) is responsible for:

- Maintaining manuals and manufacturer information and records related to testing, inspection, and repair of mobile cranes.
- Arranging contracts with qualified subcontractors to perform annual inspection, testing, maintenance and repair of cranes.
- At the request of divisions/sections, arranging for qualified subcontractors to perform annual inspection, testing, maintenance and repair of cranes. FESS will provide oversight of the subcontractor.

4.3 The ESH&Q Section

The ESH&Q Section is responsible for:

- Providing consultation services to division/section heads regarding safety of operations and training opportunities.

- Coordinating and scheduling training opportunities for newly selected and qualified operators.
- Maintaining training records of operators in the TRAIN database.

4.4 The Person-in-Charge (PIC)

The Person-in-Charge (PIC) is responsible for:

- Reviewing HA and lift plan for special lifts with all involved or affected by the lift before the lift is initiated.
- Directing the operation of assigned lift in accordance with the HA, lift plan, and all appropriate rigging and lifting best practices.
- Identification of appropriately trained individuals participating in the lift. Skill level of each participant in the lift shall be commensurate with the assigned duty.

4.5 The Qualified Operator

The Qualified Operator is responsible for:

- Recognizing if a lift or rigging task is within his/her capability based on previous experience or training. If level of training or experience is insufficient to assure a safe lift, operator must state this to their supervisor or the Person-in-Charge and not proceed with the task.
- Following best practices in rigging and hoisting to assure a safe lift.
- Identify hazards and mitigations associated with the hazard, including appropriate personal protective equipment (PPE).
- Identifying appropriately trained individuals, if required, to participate in the lift. Skill level of each participant in the lift shall be commensurate with the assigned duty.
- Performing a pre-lift inspection of lift site location. If a problem or situation appears to not be safe, or if the crane is not operating properly, contact FESS to have a pre-lift inspection/repair completed by a subcontractor.
- Conducting crane inspection and checks prior to use.
- Inspecting slings, fastenings and attachments for damage or defects prior to each use and remove from service if damaged or defective (See [FESHM Chapter 10130](#)).
- Ensuring the sling identification is legible and shows the rated capacities for each type of hitch: vertical, basket and choke (See [FESHM Chapter 10130](#)).
- Performing lift in accordance with any formal hazard analysis (HA) or lift plan, if one exists.

4.6 The Mechanical Safety Subcommittee (MSS)

Mechanical Safety Subcommittee is responsible for:

- Serving the Divisions/Sections in a consulting capacity on all Mobile Crane matters.

4.7 The Task Manager

Task Manager is responsible for:

- Acquiring Advanced Rigging Training (designed for these mobile crane tasks).
- Being able to use and demonstrate knowledge of the “Standard Hand Signals for Controlling Crane Operations.”

5.0 OPERATIONS

5.1 Qualification for Operators

Operators shall be required to successfully meet the qualifications for the specific type crane that they are operating. Operators shall be required to meet the qualifications requirements listed in ASME B30.5 Section 5-3.1.2.

5.2 Physical Qualifications

The Fermilab Medical Office with the aid of ASME B30.5 standard, Section 5-3.1.2(a) shall determine if the operator or operator trainees meet the physical qualifications to operate a mobile crane, unless it can be shown that failure to meet the qualifications will not affect the operation of the crane.

5.3 Training for Operators

5.3.1. Initial Training Course

- Operators are required to be initially trained and re-qualify every 3 years. The training consists of three phases:
 - Classroom
 - On-The-Job Training (OJT)
 - Evaluation
- Supervisors may “waive” the OJT requirement for operators who use the equipment on a frequent basis. Operators who fail the performance evaluation may be required to complete additional OJT.
- Operators who fail the performance evaluation shall NOT operate a crane without supervision until they have successfully completed the evaluation.
- If warranted, at their discretion, supervisors may require re-evaluation of already qualified operators.
- The specific portions of the training are as follow:
 - Classroom Phase - This phase of the program will be presented as needed. Coordination and scheduling will be the responsibility of the ESH&Q Section. The training is currently provided by an outside contractor and is eight (8) hours in length. It includes classroom training, field exercise, and a written exam. Prospective operators must successfully complete the written exam and field exercise before continuing with the remainder of the qualification process. Operators are NOT allowed to test-out of the initial phase since this is the only opportunity for all operators to be exposed to the same material, changes to the program and lab policies, lessons learned, etc.
 - Practical (OJT) Phase - Divisions/Sections will designate OJT trainers and present this phase within their respective areas. This training may consist of demonstrations, supervised exercises and coaching with the type of equipment to be operated and within the work environment where work activities take place. The Operator will be fully aware of all safety features of the equipment and safety-related activities surrounding the work. Supervisors may waive this phase of the qualification process for experienced operators. The Crane

Operator Performance Evaluation form will be forwarded to the division/section by the ESH&Q Section after the classroom phase is successfully completed, and must be used to document the dates/times of OJT training or the waiver.

- Performance Evaluation Phase - The evaluation is completed after the classroom/OJT training phases. It is conducted by a qualified and designated person within the division/section. The Crane Operator Performance Evaluation form must be used to document the completion of this phase. If the operator is not successful in the evaluation, appropriate remedial training should be provided before attempting the evaluation again. The evaluation form must be completed by the evaluator and signed by both the evaluator and the operator's supervisor. If the supervisor wishes to waive this phase of the qualification process for experienced operators, they shall document this on the Crane Operator Performance Evaluation form and forward it to the ESH&Q Section for filing and documentation.

5.3.2. Retraining

- a. Crane operator training expires three (3) years after the initial training. This re-training shall consist of the classroom phase, OJT, and evaluation. OJT and evaluation may be waived by the supervisor and shall be documented on the Crane Operator Performance Evaluation Form.
- b. Retraining must be completed within 120 days of the expiration of the previous training or all training must be repeated.

5.4 Conduct of Operators

The operator shall not engage in any practice that will divert their attention while actually engaged in operating the crane.

The operator shall respond to signals from the person who is directing the lift or an appointed signal person. The standard hand signals shall be as specified in the ASME B30-5 standards. When a signal person or a crane follower is not part of the crane operation, the operator is then responsible for the lifts.

Before leaving the crane unattended, except as permitted in ASME B30-5.3.1.3.e.7, the operator shall:

- land any load, bucket, lifting magnet, or other device;
- disengage the clutch;
- set travel, swing, boom brakes, and other locking devices;
- put controls in the off or neutral position;
- secure the crane against accidental travel;
- stop the engine

5.5 Operating Practices

Know the rated capacity of the crane and the weight of the load. A safe lift depends on many factors including boom length, boom angle, and load radius. At no time shall the operating capacity of the crane be overloaded.

A durable load-rating chart with legible letters and figures shall be provided with each crane and attached in a location accessible to the operator while at the controls. The load rating chart shall provide a full and complete range of manufacturer's crane load ratings at all stated operating radii, boom angles, work areas, and all stated boom lengths and configurations, jib lengths and angles (or offset), as well as alternate ratings for use and nonuse of optional equipment on the crane, such as outriggers and extra counterweights, that affect ratings.

A 10BC or larger fire extinguisher shall be installed at all operator stations. Fire extinguishers shall be maintained in a serviceable condition.

Always position the crane on a solid and level footing. It may be necessary in certain situations to use heavy timber mats to build a good working foundation.

When moving a crane:

- Secure the boom and hook block.
- Check clearances under overpasses, overhead lines, or any overhead obstruction; when side clearances are tight, install a barrier or post a lookout, and make certain there is sufficient clearance for tail swing.
- When traveling with a load, snub the load to prevent swaying if possible; never travel with near-capacity loads.
- Never travel a rubber-tired unit with a load over the side.

To minimize the hazard of electrocution or serious injury as a result of contact between the energized power lines and the crane, load line, or load, observe the safe working distances list in the table below:

Normal voltage (phase to phase)	Minimum required clearance
to 50 kV	10 ft (3.1 m)
Over 50 to 200 kV	15 ft (4.6 m)
Over 200 to 350 kV	20 ft (6.1 m)
Over 350 to 500 kV	25 ft (7.6 m)
Over 500 to 750 kV	35 ft (10.7 m)
Over 750 to 1000 kV	45 ft (13.7m)

See [FESHM Chapter 10100](#), "Special Lifts," for special lift requirements.

6.0 TESTING

All Mobile Cranes are subject to the test requirements of ASME B30.5, the manufacturer, and this chapter. Operational and Load tests shall be performed using hoisting equipment of the proper size and capacity for the mobile crane being tested. Operational tests do not require that written records be kept. Rated load tests require testing at 125% of the mobile crane's rated capacity. The tests details shall conform to the specific requirements for the unit and shall be documented in form at the end of this Chapter. This test shall be conducted and a record signed and dated with the signature of the qualified person.

7.0 INSPECTIONS

All mobile cranes shall be inspected in accordance with ASME B30.5 and the manufacturer's recommendations. Each mobile crane shall be inspected and documented on a monthly and annual basis by a qualified crane service contractor. Minimum inspection criteria shall incorporate the items as noted in this chapter and ASME B30.5.

The FESS Crane Management Office will maintain records of all monthly and annual inspections on units requiring compliance to this Chapter.

8.0 MAINTENANCE

8.1 Seasonal

Seasonal maintenance will be done to verify that the mobile cranes covered by this chapter are well lubricated, tires are in good condition and all fluids are at appropriate levels. An inspection of the unit for any other functional issues or problems will be completed to prepare the unit for summer or winter operations.

8.2 Regular

Operators are responsible for reporting regular maintenance items to the Crane Operations Office. They will make arrangements for personnel trained to maintain these units to repair or perform maintenance tasks.

All units shall be kept indoors through inclement and/or winter weather. This type of weather ages the units quickly and it is best to avoid extended exposure.

9.0 REFERENCES

Hoisting and rigging equipment and all design, installation, inspection, testing, and operations activities shall be in accordance with Fermilab Work Smart Standards WSS). For mobile cranes these regulations (available in the library) are:

29 CFR 1910.180, Subpart N, OSHA General Industry Standards, Materials Handling and Storage, Crawler locomotive and truck cranes

ASME B30.5 Mobile and Locomotive Cranes