Overhead Crane & Powered Hoist Program
Appendix C

Maintenance Training and Maintenance

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1. MAINTENANCE TRAINING

1.1 Purpose of Maintenance Training

Maintenance training shall be provided to promote proficient adjustments, repairs, and replacements on an overhead crane that will allow the crane to perform in accordance with the provisions of this policy.

1.2 Crane Maintenance Training: General

This policy of the B30 Standard recognizes that overhead and gantry cranes are used for many different purposes, handling many different kinds of loads in a variety of workplaces, and are maintained in a manner relative to these purposes, kinds of loads, and workplaces. Nevertheless, the requirements for certifications a crane maintenance person apply to all persons who maintain the mechanical, structural, and electrical components of a crane.

1.3 Sources of Training Material

Examples of sources of maintenance training material are as follows:

(a) Information outlined in the manual(s) provided by the equipment manufacturer.

(b) Information available through trade associations

(c) Government training resources, such as the Department of Labor

(d) Organized labor groups

(e) Courses, seminars, and literature offered by manufacturers of cranes, consultants, trade schools, continuing education schools, employers, and manufacturers of crane component parts

(f) Requirements and recommendations found in National Consensus Standards such as this policy.

1.4 Responsibilities of Crane Maintenance Personnel

Responsibilities of crane maintenance persons shall include, but not be limited to, the following items:

(a) Read the applicable equipment safety standard referenced and the instructions outlined in the manual(s) provided for the equipment by the equipment manufacturer.

(b) Board a crane only at authorized locations and designated boarding entrances.

(c) Not board a crane without the knowledge of the operator.

(d) Not attempt to repair electrical apparatus or to make other major repairs on the crane unless specific authorization has been received and the power is locked out / tagged out.

(e) Lower the load block to the ground or otherwise secure the load block before attempting any repairs or adjustments on the lifting equipment that would allow the load block to lower.

(f) Use replacement parts that are at least equal to the original manufacturer's specifications

(g) Become familiar with wire rope replacement criteria.

(h) Install wire rope clamps correctly. Refer to the manual provided with the equipment.

(i) Not allow the wire rope or hook to be used as a ground for welding.

(j) Not allow the wire rope or hook to be touched by a live electrode.

(k) Not attempt to lengthen the wire rope or repair a damaged rope.

(l) Not remove or obscure the warning or safety labels, plates, or tags furnished on the lifting equipment.

(m) Replace safety labels, plates, or tags when they are obscured or illegible.

(n) Replace all protective guards and panels before returning the crane to normal operation.

(o) Apply lubricant to the rope as recommended by the crane or rope manufacturer (or when relubricated).

2. CRANE MAINTENANCE

2.1 General Maintenance

General maintenance should be performed in accordance with the conditions and practices for a particular workplace. Some factors that influent how maintenance is performed are:

(a) If there are trained and experienced in-house maintenance persons, such as mechanics or millwrights and electricians, who can perform maintenance work on overhead and gantry cranes.

(b) If an outside crane service company is contracted to do inspections, perform preventive maintenance, repairs, and replacements.

(c) Size of workplace and number of employees.

(d) If the cranes have sophisticated performance characteristics, such as reactor or adjustable frequency controls or basic single-speed or two-speed control systems.

2.2 Preventive Maintenance

A preventive maintenance program shall be established.

The program should be based on the recommendations outlined in the crane manufacturer's manual; and, when appropriate, additional recommendations outlined by a qualified person based upon review of the crane application and operation. Dated records should be placed on file.

2.3 Maintenance Procedure

(a) The following precautions shall be taken before performing maintenance on a crane or runway conductor system.

a. The crane shall be moved to a location where it will cause the least interference with other cranes and operations in the area.

b. If a load is attached t the crane, it shall be landed.

c. All controllers shall be placed in the "off" condition.

d. A lockout/Tagout procedure shall be [performed (see Appendix B, Section 8.)

e. Warning signs and barriers shall be utilized on the floor beneath the crane where overhead maintenance work creates a hazard.

f. If the runway remains energized, stops or a signal person(s)—located full-time at a visual vantage point for observing the approach of an active crane(s)—shall be provided to prohibit contact by the active crane(s) with the idle crane; with persons performing maintenance; and with equipment used in performing the maintenance.

g. A guard or barrier shall be installed between adjacent runways for the length of any established work area to prevent contact between persons performing maintenance and a crane on the adjacent runway.

(b) Only designated persons shall work on energized equipment. Electrical work performed by Qualified Personnel shall be completed according to the Minerals' "Electrical Procedures and Safety Standards" or the Concentrates' JSHAs. Training will be given to all electrical personnel and include the use, care, maintenance and inspection of the clothing and the hazard risk categories established by NFPA 70E.

(c) After maintenance work is completed and before restoring the crane to normal operation,

(1) Guards shall be reinstalled

(2) Safety devices shall be reactivated

(3) Replaced parts and loose material shall be removed

(4) Maintenance equipment shall be removed

2.4 Adjustments, Repairs, and Replacements

(a) Any condition disclosed by the inspections performed in accordance with the requirements of Appendix A – Section 1, that is determined to be a hazard to continued operation, shall be corrected by adjustment, repair, or replacement before continuing the use of the crane.

(b) Adjustments, repairs, and replacement shall be performed by designated personnel.

(c) Components shall be adjusted or repair as needed. The following are examples:

a. All operating mechanisms

b. Limit devices

c. Control systems

d. Brakes

(d) Repairs or replacements shall be made as needed. The following are examples:

(1) Damaged or worn hooks as described under Maintenance in ASME B30.10. Repairs by welding or reshaping are not recommended.

(2) All critical parts that are cracked, broken, bent, excessively worn, or missing.

(3) Pitted or burned electrical contacts should be corrected only by replacement and in sets. Controller parts should be lubricated as recommended in the manual supplied with the crane.

(4) Function, instruction, caution, and warning labels or plates on pendant control stations shall be kept legible.

(e) If repairs of load sustaining members are made by welding, identification of materials shall be made and appropriate welding procedures shall be followed.

2.5 Lubrication

(a) All moving parts of the crane for which lubrication is specified should be regularly lubricated. Lubricating means should be checked for delivery of lubricant. Care should be taken to follow recommendations stated in the manufacturer's manual as to points and frequency of lubrication, maintenance of lubricant levels, and types of lubricant to be used.

(b) Machinery shall be stationary while lubricants are being applied, and protection provided as called for in section. 3(a) (1) through (4) unless equipped for automatic or remote lubrication.

3. ROPE REPLACEMENT AND MAINTENANCE

3.1 Rope Replacement

(a) No precise rules can be given for determination of the exact time for rope replacement since many variable factors are involved. Once a rope reaches any one of the specified removal criteria, it may be allowed to operate to the end of the work shift, based on the judgment of a qualified person. The rope shall be replaced after the work shift, at the end of the day, or at the latest time prior to the equipment being used by the next work shift.

(b) Removal criteria for rope replacement shall be as follows:

a. In running ropes, 12 randomly distributed broken wires in one lay or four broken wires in one strand in one lay

b. One outer wire broken at the contact point with the core of the rope, which has worked its way out of the rope structure and protrudes or loops out from the rope structure

c. Kinking, crushing, bird caging, or any other damage resulting in distortion of the rope structure

d. Apparent heat damage from any heat source

e. Reductions from nominal rope diameter greater than 5%

(c) Broken wire removal criteria cited in this policy apply only to wire rope operating on steel sheaves and drums. The user shall contact the sheave, drum, or crane manufacturer, or a qualified person, for broken wire removal criteria for wire ropes operating on sheaves and drums made of mater other than steel.

(d) Attention shall be given to end connections. Upon development of two broken wires adjacent to a socketed end connection, the rope should be resocketed or replaced. Resocketing shall not be attempted if the resulting rope length will be insufficient for proper operation.

(e) Replacement rope shall have the same or higher minimum breaking force as the original rope specified by the hoist manufacturer. Any deviation from the original size, grade, or construction of the rope shall be specified by a rope manufacturer, the crane or hoist manufacturer, or a qualified person.

3.2 Rope Maintenance

(a) Rope should be stored to prevent damage or deterioration.

(b) Rope shall be unreeled or uncoiled in a manner to avoid kinking of or inducing a twist in the rope.

(c) Before cutting rope, means shall be used to prevent unlaying of the strands.

(d) During installation, care should be observed to avoid dragging the rope in dirt or around objects that will scrape, nick, crush, or induce sharp bends.

(e) Rope should be maintained in a well-lubricated condition. Lubricant applied as part of a maintenance program shall be compatible with the original lubricant. Lubricant applied shall be of the type that does not hinder visual inspection. Those sections of rope that are located over sheaves or otherwise hidden during inspection and maintenance procedures require special attention when the rope is being lubricated. The object of rope lubrication is to reduce internal friction and to prevent corrosion.

4. MAINTENANCE RECORDS

Dated records should be kept on file.