

# UNIVERSITY OF TOLEDO

SUBJECT: CRANE AND HOIST SAFETY PROGRAM

Procedure No: S-08-024

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## PROCEDURE STATEMENT

All crane and hoists operated on UT campuses must be adequately maintained and inspected as prescribed by OSHA requirements for overhead cranes and hoists in section 1910.179 and/or as recommended in ASME/ASSI B30 standards.

## PURPOSE OF PROCEDURE

The purpose of this program is to establish requirements and training for work involving the operation of a crane and hoists to:

- Ensure a safe working environment for employees who operate, maintain, or work around cranes and hoists;
- Inform employees of crane and hoist definitions – appendix A
- The requirements for working around cranes and hoists;
- Comply with regulatory requirements for use of cranes and hoists.

This program shall be used in conjunction with other University of Toledo policies and procedures involving the protection of workers in the work place.

## PROCEDURE

This program applies to all university employees who operate cranes and hoists. This program is applicable to all mobile cranes, tower cranes, overhead and gantry cranes, including semi-gantry, cantilever gantry, wall cranes, storage bridge cranes and other hoisting equipment that have the same fundamental characteristics. All crane operators and those working near cranes must be trained in safe operations. The UT personnel are responsible for care and maintenance of all cranes and hoists used by UT.

The Environmental Health and Radiation safety (EHRS) department is responsible for administering this program, periodically auditing crane and hoist operations on campus to ensure compliance with all applicable regulations and safety practices.

## RESPONSIBILITIES

Managers and Supervisors are responsible for:

- Ensuring all cranes are properly inspected and maintained in working order.
- Ensuring any worker assigned to work with a crane or hoist is properly trained.
- Ensuring all crane and hoist operating procedures include appropriate safety instructions.
- Oversight of all crane and hoist operations

Employees are responsible for:

- Working only on equipment for which they have received training.
- Following all manufacturer instructions for operating cranes and hoists.
- Reporting accidents and near miss incidents to supervisors immediately.
- Notifying supervisors when maintenance or repair of equipment is required.

Contractors and sub-contractors are responsible for:

- Complying with all elements of this program.

### General Operating Information

- The safe design capacity of a crane, or other hoisting equipment, must not be exceeded.
- All cranes and hoisting equipment must be in safe working condition and be inspected by a competent person before use, and during use, to make sure it is in safe working condition. Proper guards must be in place for exposed gears, belts, electrical equipment, couplings and fans.
- All operators must be familiar with and be trained to operate the equipment they are assigned to operate. Documentation of the operators training must be available upon request.
- Equipment shall be inspected by a competent person before each use and during use, and all deficiencies corrected before further use. A documented annual inspection log must be kept with the crane at all times. Boom cable installation documents must be readily available as well.
- No persons shall ever be under a load while it is being lifted.
- To avoid tipping, outriggers must be fully extended and remain firmly on the ground.
- Cribbing is necessary when the ground cannot support outriggers. Boom angle indicators and load charts and a standard hand signal chart must be visibly posted in the crane.
- While moving a crane, the "headache" ball must be retracted to avoid swinging.
- Minimum clearance between power lines and any part of the crane shall be at least 10 feet. For power lines rated over 50 kV, additional clearance is required.
- Overhead cranes shall have stops at the limit of travel of the trolley. Bridge and trolley bumpers or equivalent automatic devices shall be provided. Bridge trucks shall have tail sweeps.
- A preventive maintenance program based on the crane manufacturer's recommendations shall be established for all overhead and gantry cranes.
- Any temporary or permanent structure, including cranes, that exceed an overall height of 200 feet above ground level or that fall under the notification requirements shall be marked and/or lighted, in accordance with the guidelines of the FAA publication Advisory Circular AC 70/7460-1K.

### General Operations

- The operator of the aforementioned devices shall perform his/her duties as follows:
- Equipment shall be operated by a qualified operator or trainee that is under the direct supervision of the qualified operator. Exception: Maintenance and test personnel and inspectors, when in the performance of their duties, shall be allowed access only after permission has been granted by the operator.
- The operator, when operating the equipment, shall maintain full attention on the task being performed (e.g., no use of headsets, music).
- The operator shall ensure that hand signals used during the lift are understood and followed by all involved.
- No load in excess of the rated capacity shall be lifted, unless for test purposes and the test shall be an engineered lift.
- Before leaving the crane or carrier unattended, the operator shall land any load, place the controls or master switch in the off position and open the main line device of the specific crane or carrier.
- The main line disconnect shall not be closed until the operator has made sure that no one is on or adjacent to the crane or carrier.
- If the crane or carrier has been locked out or tagged out, the operator shall not remove the lock or tag, unless the lock or tag has been placed there by the operator.
- For cab-operated equipment, make sure that all controls are in the "off" position prior to closing the line-disconnect.
- During use of cab-operated equipment, if the power should fail, the operator shall turn off all controllers. Before restarting, the operator shall check the motion controls for proper direction to ensure controls are in the neutral position.
- Persons boarding or leaving cab-operated equipment shall do so at the designated point of access or egress.

### Attaching the Load

- Hoist chains or ropes shall be free of kinks or twists.
- Hoist chains or ropes shall not be wrapped around the load.
- The load shall be attached to the load block.
- Prior to lifting the load, the operator shall make certain that the load, sling, attachments, lifting devices and the load block are unobstructed.

### Moving the Load

- The person responsible for directing the lift shall make sure that the load is properly secured, balanced and positioned in the sling or other lifting device.
- The person responsible for directing the lift shall make another visual inspection of the hoist chain or rope to make sure there are no kinks or twists.
- The load block shall be brought over the load in a manner that will prevent swinging when lifting the load.
- The chain or rope shall be inspected to ensure that it is properly seated in the chain sprocket or drum groove.
- Lift equipment shall not be used for side pulls.
- The operator shall not move the load while a person is on the load or hook.
- The operator shall avoid lifting the load over people.
- If the load being lifted approaches the rated load to be handled, the operator shall test the brakes by lifting the load a few inches and applying the brakes.
- The load shall not be lowered below the point where there are less than two wraps of rope on the hoisting drum, unless a lower limit device is provided. If a lower limit device is provided, no less than one wrap shall remain.

### Parking the Load

- The operator shall not leave a suspended load unattended
- The load block of the hoist shall be raised above head level when not in use.

### Hand Signals

- When vision is impaired or obstructed hand signals should be used. Hand signals shall be used unless the participants of the lift are equipped with telephones, radios or other equivalent means of communication.

## TRAINING

Trainees may operate a crane or hoist under the direct supervision of persons who have knowledge, training, and experience to train operators and evaluate their competence and where such an operation does not endanger the trainee or other employees. Prior to permitting an employee to operate a crane or hoist, supervisors must ensure that the crane/hoist operator has been trained in safe usage. The training will be specific for the type of cranes and hoists operated and the location they are operated. The training includes classroom and/or online training as well as hands-on practical training. The hands-on practical training is provided by facilities.

All operators must be familiar with and be trained to operate the equipment they are assigned to use. The training should include:

- the importance of the crane and hoist program and procedures;
- a summary of the OSHA crane and hoist standard;
- an overview of the University of Toledo written Crane and Hoist Safety Program;
- crane and hoist specific operating procedures and required inspections;
- general operating information;
- attaching the load;
- moving the load;
- parking the load;

- crane inspection checklist – Appendix B
- crane hand signals should be used when vision is impaired or an obstacle is in the way.
- hands on training will be provided by facilities
- facilities will utilize designated personnel to conduct hands on training
- facilities will determine who is designated personnel

Refresher training in relevant topics is required when:

- an operator has been observed to operate the crane or hoist in an unsafe manner or;
- the operator has been involved in an accident or a near miss or;
- the operator is assigned to a different crane or hoist or a new crane or hoist is brought into use or;
- the conditions change in an area where the crane or hoist is operated or;
- the operator has received an evaluation that reveals that the operator is not operating the crane or hoist safely;

## INSPECTION PROCEDURES

Periodic inspections should be established for every crane and hoist. The frequency of inspections should vary directly with the intensity of the cranes use. Some individual crane components which represent a possible hazard to personnel should be inspected with greater frequency

### **Inspect Monthly and/or before each return to service (Appendix B)**

- Hoist motor brake
- Motor Shaft and couplings
- Hoist gearing
- Drum, drum shafts, and bearings
- Sheaves and pins
- Block
- Rope damage such as worn, cut, crushed, kinked, unstranded, corroded, loss of lubricant, bird-caged, heat damage, weld burns

### **Pre-use (Observational) Inspection at start of each shift**

- Hook : Check to ensure hook is not cracked, bent or spread more than 15%
- Limit Switches per ANSI B30 must be checked to ensure rope not overdrawn
- Reverse reeving – to check hoist direction
- Wire rope replacement when
  1. Twelve randomly distributed broken wires in one lay or four broken wires in one stand of one lay
  2. 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
  3. Wear of one-third the original diameter of outside wires
  4. Kinking, crushing, birdcaging, or any other damage resulting in distortion of the rope structure
  5. Evidence of heat damage or weld splatter
  6. Corroded or broken wires at end connections. Corroded, cracked, bent, or worn end connections
  7. Reduction of nominal wire rope diameter: for example with ropes up to 5/16 inch if a reduction of 1/64 inch or more rope needs replaced

### Cranes in Periodic Use

- A crane or overhead gantry that has not been used for a period of one month or more, but less than 6 months, shall be inspected by the employee trained to use such equipment before each use and the focus for such an inspection is as follows (Appendix B)
- Inspect all functional operating mechanisms
- Check for damage to or leaks from lines, tanks, valves, drain pumps, and air or hydraulic systems
- Check the load hook for deformities or cracks
- Check all hoist chains for excessive wear, including end connectors
- Check all chains for kinks, twists and distorted links and stretches that are beyond what is recommended by the manufacturer
- Inspect the rope for damage such as kinks, cracks, cutting, bending, broken wires, and unraveling, corroded or improperly connected end connections
- A crane which has been idle for a period of over 6 months shall be given a complete inspection.

Regardless of how often a crane or overhead gantry is used, the unit shall be inspected annually by an outside contractor qualified to inspect the unit. This inspection shall be the responsibility of the department to arrange. The contractor shall document and provide the owner with a copy of the findings who will in turn provide copies to Environmental Health & Radiation Safety.

### MAINTENANCE

Preventive maintenance shall be performed as prescribed by the manufacturer as detailed in the owner's manual.

Any unsafe condition noted during the inspection of the crane shall be repaired before the crane is used.

### ADDITIONAL REFERENCES AND RELATED PROGRAMS

The American Society of Mechanical Engineers – [B30.2 - 2005 Overhead and Gantry Cranes \(Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist\)](#); [B30.16 - 2003 Overhead Hoists \(Under hung\)](#); [B30.17 - 2003 Overhead and Gantry Cranes \(Top Running Bridge, Single Girder, Under hung Hoist\)](#)

Crane Manufacturers Association of America – [CMAA Specification 78 - Standards and Guidelines for Professional Services Performed on Overhead Traveling Cranes and Associated Hoisting Equipment](#)

[Pellow Engineering Services, Inc. – Bob's Overhead Crane and Rigging Handbook](#)

[Code Federal Regulations -29CFR1910.179](#)

### ACCIDENT REPORTING

Accident reporting must be completed using the University of Toledo's Accident Investigation report and if needed the University of Toledo's Injury and Illness report if the operator has been involved in an accident or a near-miss incident involving a crane or hoist.

## APPENDIX A – DEFINITIONS

- A crane is a machine for lifting and lowering a load and moving it horizontally, with a hoisting mechanism an integral part of the machine.
- Overhead crane means a crane with a movable bridge carrying a movable or fixed hoisting mechanism and traveling on an overhead fixed runway structure.
- Floor-operated crane means a crane which is pendant or nonconductive rope controlled by an operator on the floor or an independent platform.
- A cab-operated crane is a crane controlled by an operator in a cab located on a bridge or trolley.
- Gantry crane means a crane similar to an overhead crane except that the bridge for carrying the trolley or trolleys is rigidly supported on two or more legs running on fixed rails or other runway.
- Cantilever gantry crane means a gantry or semigantry crane in which the bridge girders or trusses extend transversely beyond the crane runway on one or both sides
- A semigantry crane is a gantry crane with one end of the bridge rigidly supported on one or more legs that run on a fixed rail or runway, the other end of the bridge being supported by a truck running on an elevated rail or runway.
- Bridge means that part of a crane consisting of girders, trucks, end ties, footwalks, and drive mechanism which carries the trolley or trolleys.
- Designated means selected or assigned by the employer or employers representative as being qualified to perform specific duties
- A hoist is an apparatus which may be part of a crane, exerting force for lifting or lowering.
- Load means the total superimposed weight on the load block or hook.
- The load block is the assembly of a hook or shackle, swivel, bearing, sheaves, pins, and frames suspended by the hoisting rope.
- Rated load means the maximum load for which a crane or individual hoist is designed and built by the manufacturer and shown on the equipment nameplate(s).
- Side pull means that portion of the hoist pull acting horizontally when the hoist lines are not operated vertically.
- A stop is a device to limit travel of the trolley or crane bridge. This device normally is attached to a fixed structure and normally does not have energy absorbing ability.
- A switch is a device for making, breaking, or for changing the connections in an electric circuit.
- An emergency stop switch is a manually or automatically operated electric switch to cut off electric power independently of the regular operating controls.
- A limit switch is a switch which is operated by some part or motion of a power-driven machine or equipment to alter the electric circuit associated with the machine or equipment.
- The trolley is the unit which travels on the bridge rails and carries the hoisting mechanism.

**APPENDIX B – Crane Inspection Checklist (Monthly or RTS)**

Date \_\_\_\_\_ Project Name \_\_\_\_\_  
Inspector \_\_\_\_\_ Location \_\_\_\_\_

EVALUATION ITEMS	YES	NO	COMMENTS	ACTION TO BE TAKEN
<b>GENERAL</b>				
All new cranes constructed and installed after Aug. 31, 1971, must meet design specifications of ANSI B30.2.0-1967				
Re-rate modified cranes as long as a Qualified engineer or manufacturer checks the modifications and supporting structure				
Rated load is plainly marked on each side of the crane				
Maintain a clearance of 3 inches overhead and 2 inches laterally between the crane and obstructions				
<b>INSPECTION</b>				
Prior to initial use, inspect all the new and altered cranes to ensure compliance with regulations				
Crane inspections are broken into two classifications – frequent inspections of daily to monthly intervals and periodic inspections of one to 12-month intervals				
Frequent inspections must include the following:				
All functional operating mechanisms for maladjustments interfering with proper operation-DAILY				
Deterioration or leakage in lines, tanks, valves, drain pumps and other parts of air or hydraulics systems- DAILY				
Hooks with deformations or cracks – visual inspection DAILY; MONTHLY inspection with signed reports				
Hoist chains (including end connections) For excessive wear, twists, distorted links interfering with proper function or stretch beyond manufacturer's recommendations – visual inspection DAILY; MONTHLY inspection with signed reports				
All functional operating mechanisms for excessive wear of components				
And rope reeving for noncompliance with manufacturer's recommendations				
Periodic inspections are complete inspections, and include the requirements of frequent inspections as well as checking for the following:				
Deformed, cracked, or corroded members				
Loose bolts or rivets				
Cracked or worn sheaves and drums				
Worn, cracked or distorted parts such as pins, bearings, shafts, gears, rollers and locking and clamping devices				
Excessive wear on brake system parts, linings, pawls and ratchets				
Load, wind and other indicators over the full range for any inaccuracies				

Gasoline, diesel, electric or other power plants for improper performance or noncompliance with applicable safety requirements				
Excessive wear of chain drive sprockets And excessive chain stretch				
And electrical apparatus for signs of pitting or any deterioration of controller contractors, limit switches and push-button stations				
Inspect cranes that have been idle for at least one month, but less than six months, per requirements for frequent, periodic and rope inspections				
Check cranes idle for more than six months per requirements for frequent, periodic and rope inspections				
Inspect standby cranes at least semiannually in accordance with frequent, periodic and rope inspection maintenance				