SAND, GRAVEL, AND CRUSHED STONE ON-THE-JOB TRAINING MODULES

Module 15 - “Using and Overhead Hoist to Handle Material"

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ON-THE-JOB TRAINING
FOR THE
SAND, GRAVEL, AND CRUSHED STONE INDUSTRY

USING AN OVERHEAD HOIST TO HANDLE MATERIALS

This module describes the basic job steps, potential accidents and hazards, and recommended safe job procedures for handling materials with an overhead hoist.

This job is normally done by a hoist operator, mechanic, mechanic's helper, or other maintenance worker. Persons operating an overhead hoist must make sure that other people in the area are protected from possible accidents and injuries that might result from handling materials with the hoist.

Hoisting apparatus is used to raise, lower, and transport heavy loads for limited distances. The safe load capacity should be marked clearly on the hoist. All hoists should be attached to their supports (fixed member, or trolley) either with shackles, or with support hooks that have safety latches. Hoist supports should have an adequate safety factor for maximum loads to be lifted.

Scheduled, and detailed, inspection of a hoist is extremely important. Special attention should be given to load hooks, ropes, brakes, and limit switches. Flanges, on hoist drums with single layer, spiral grooves, should be free of projections that could damage the rope. A material hoist that is operating on rails, tracks, or trolleys, should have a positive stop, or limiting device, on the rails or tracks to prevent over-running the safe limits. The hoist should also be equipped with over-speed protection. A retaining cable, or chain, looped around the body of the hoist, and the support, can provide extra protection against failure of the supporting hook, shackle, or block.

A load should not be picked up until it is directly underneath the hoist. Improper lifting procedure places stresses on the hoist that it was not designed to handle. A floor operated electric, air, or hand powered hoist must not be used to lift, support, or transport people unless it is used in combination with safety devices that are approved by the hoist manufacturer. Standard commercial hoists do not provide a secondary means of supporting a load if the wire rope, or other suspension element, fails.

Electric Hoist

Electric hoists should have nonconducting control cords, unless they are grounded. Control cords should have handles that have distinctly different contours so that, even without looking, the operator will know which handle is the hoisting control, and which is the lowering control. Each control cord should be clearly marked “hoist,” or “lower.” An arrow can be attached to each control cord, showing the direction a load will move when the rope is pulled. Also, it may be advisable to pass control cords through a spreader, in order to keep them from becoming tangled. Control cords should be inspected weekly, for wear and other defects.

On electric hoists that are pendant controlled, means for effecting an automatic return to the “off” position should be provided on the control, so that a constant pull on the control rope, or push on the control button, must be maintained in order to raise or lower the load. Push-button control circuits must be limited to 120 volts. A limit stop should be installed on the hoist motion, and at least two turns of rope should remain on the drum when the load block is on the floor.

Air Hoist

When a piston-type air hoist has been in operation for a long time, the lock-nut that holds the piston on its rod may become so loose that the rod will pull out of the piston, and let the load

drop. The piston can be secured to the rod with a castellated nut and cotter pin. Check that the piston is well secured to the rod whenever the air hoist is overhauled.

If an ordinary hook is used to hang the hoist from its support, the cylinder may unhook if the piston rod comes in contact with an obstruction when lowering. A clevis, or other device, should be used to prevent the hook from being detached from the hoist support.

Hand-Operated Chain Hoist

Chain hoists are suitable for many jobs where a block and tackle (fitted with fiber rope) might be used. Chain hoists are stronger, more dependable, and more durable than fiber rope tackle. There are three general types of chain hoists: spur-geared, differential, and screw-geared (or worm-drive). The spur-geared chain hoist is the most efficient, because it will pick up a load with the least effort on the part of a worker. The differential-type chain hoist is the least efficient.

Screw-geared, and differential, hoists are self locking, and will automatically hold a load in position. Since the spur-geared hoist is free running, an automatic load brake, similar to that on a crane, is provided to hold the load.

The chains must be made of high quality, welded steel, with a load safety factor of at least five. Chain hoists should have a larger capacity than regular work requires. Supports for hoists must be strong enough to carry loads imposed on them. People handling a chain hoist must follow safe lifting procedures, in order to avoid strains and other injuries.

The following safe job procedures will help minimize incidents which may adversely affect production and cause injuries.

REQUIRED OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT:

HARD HAT, STEEL-TOED SHOES, SAFETY GLASSES, HEARING PROTECTION, GLOVES

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
1. Move hoist to object to be lifted.	1. A) Overexertion while pulling hoist.	1. A) Keep hoist rollers lubricated for ease of movement.
	B) Slip/trip/fall.	B) Face direction of travel. Keep walk areas free of extraneous materials. Clean up slick spots.
	C) Struck against stationary objects. Caught on projections.	C) Face direction of travel. Avoid protruding objects.
	D) Foreign objects in eyes.	D) Wear safety glasses or goggles. Practice good housekeeping - clean work areas regularly.
2. Inspect slings, chains, and lifting devices.	2. A) Contact with sharp wires or metal burrs.	2. A) Wear gloves. Sand or file down sharp burrs. Replace bad ropes.
	B) Struck by dropped or swinging chain or sling.	B) Hold firmly to parts. Do not allow chains to swing out of control.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
3. Lower hoist hook.	3. A) Struck by hook, control handle, or chain.	3. A) Do not allow loose control handle to flop around. Tie bar should connect control ropes. Stay clear of hook being lowered.
4. Make hook-up to material.	4. A) Struck by, or caught between, material or moving parts.	4. A) See that material is stable. Keep hands and feet out of pinch points. Use hook or pole to place sling under material.
	B) Contact with sharp wires or burrs.	B) Wear gloves. Use hook or pole to push slings under load.
5. Raise load to desired height.	5. A) Struck by, or caught on load being raised.	5. A) Position hoist directly over load, so that load will be raised straight and will not swing. Wear snug fitting clothing. Stand clear of load after hook-up.
	B) Caught between load and another object.	B) Use push pole to maneuver lift.
	C) Caught between sling and load on hook.	C) After hook-up, remove hands before lifting. Use hook, tag line, or push pole to handle lift.
	D) Overexertion, if lifting with a manual hoist.	D) Do not overload hoist capacity. Keep working parts of hoist well maintained to make operation easier. Get help if needed.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
6. Move load to desired location.	6. A) Struck by load slipping out of sling. Caught between load and floor, or other object.	A) Have load well balanced in sling. Stay safe distance from load by using push pole, hook, or tag line to pull hoist to place.
	B) Hitting other employees with load.	B) Clear travel path of other personnel before moving. Warn all nearby persons of plan and hazards involved.
	C) Slips, trips, or falls.	C) Face direction of travel. Keep walkways clear of slipping/tripping hazards.
	D) Overexertion.	D) Get assistance, if needed. Keep hoist rollers well maintained.
7. Lower load.	7. A) Struck by load, if sling or hoist fails.	7. A) Slings and hoist should be checked before use. Do not overload sling or hoist capacity.
	B) Caught between load and floor.	B) Do not position body directly beneath load.
	C) Caught on, or struck against load or sling.	C) Stand clear of load. Use push pole or tag line to maneuver load.
8. Unhook sling from hoist.	8. A) Caught between sling and hook, or load.	8. A) Remove hands from controls after adequate slack is dropped, in order to prevent accidental engagement of hoist controls.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
	B) Overexertion - removing sling from hook.	B) Have adequate slack to make release easier.
	C) Struck against, or contact with sharp burrs or wires.	C) Wear gloves. Remove burrs, and replace damaged or deteriorated ropes.
9. Remove sling or chain from load.	9. A) Caught between load and floor.	9. A) Use hook or push pole to remove sling from under material.
	B) Overexertion - removing sling.	B) Load should be set on blocking to make removal easier.
	C) Caught on, or struck against load, sling, or other object.	C) Avoid undue haste, and avoid protruding objects.
	D) Struck by load moving/caught between load and other object.	D) See that load is well chocked to prevent movement. Material should not be stacked or stored too high.

GENERAL INFORMATION

This module is part of an Instruction Guide that was developed to assist the sand, gravel, and crushed stone industry in conducting effective on-the-job training (OJT) of new employees, or employees reassigned to different jobs. The use of training materials, such as this module, is an important part of an effective, systematic, OJT program.

This Instruction Guide uses a generic Job Safety Analysis (JSA) of jobs common to the industry. The JSA format facilitates uniform basic training in safe job procedures, while requiring only a minimum of time and effort on the part of the trainer. This material is generic to the industry; therefore, each company using this guide will need to tailor the material somewhat to fit their particular requirements. In some cases, the material must be general in nature, and will not include specific details of procedures or equipment that must be taught by the trainer.

Recommendations for an overall OJT program are contained in the Mine Safety and Health Administration (MSHA) guide: “Structuring Effective On-The-Job Training Programs”

TRAINING RECOMMENDATIONS

On-the-job training is usually best done by the employee’s immediate supervisor. If the supervisor relies on another employee to do certain parts of the training, the supervisor should be present to monitor the training. OJT is conducted at the actual job site, where the work will be done.

The supervisor/trainer should use the training materials (this module, or other materials) while the training is being done, to help ensure that all job steps are covered, and that no important safety precautions are omitted. Effective OJT should begin with an explanation (lecture and/or discussion) of the safe job procedure. The explanation should be followed by a hands-on demonstration of the proper job procedure. A good demonstration is, perhaps, the most important part of OJT. The demonstration is followed by supervised practice, during which the supervisor/trainer coaches (corrects and encourages) the employee, and evaluates when the employee is ready to do the job without direct supervision.

The first step - explaining the job to the employee - can be done in different ways. The supervisor/trainer and the employee can sit down and go through the training materials together. It may be advantageous to provide the employee with a copy of the training modules that are applicable to his/her job. The fact that most of the training is conducted at the job site does not preclude the use of a classroom, or a quiet office, for the first part of the training. Any general theory, or knowledge training, as well as the initial explanation of the job procedure, may be best done in an office/classroom setting; especially when noise levels, or other conditions at the job site, make communication difficult. A complete series of job steps could be presented through the use of slides developed at the mining operation.