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

Module 13 - "Replacing the Drive Chain or Belt on a Screw Conveyor"

UNITED STATES DEPARTMENT OF LABOR
ELAINE L. CHAO
SECRETARY

MINE SAFETY AND HEALTH ADMINISTRATION
DAVE D. LAURISKI
ASSISTANT SECRETARY

Originally Published AUGUST 2000

INSTRUCTION GUIDE SERIES

MSHA IG 40

MODULE NUMBER 13
OF
INSTRUCTION GUIDE NUMBER 40

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

REPLACING THE DRIVE CHAIN OR BELT ON A SCREW CONVEYOR

This module describes basic job steps, potential hazards and accidents, and recommended safe job procedures for replacing the drive chain or belt on a screw conveyor.

This job is normally done by a maintenance mechanic and a helper. The maintenance mechanic and helper must make sure that all other people in the area are protected from possible accidents and injuries resulting from replacing the drive chain or belt on screw conveyors.

Screw conveyors separate water from sand, chat, and pea gravel; and deliver these materials

to final rinse stations, or storage areas. Screw conveyors are made of curved metal plates arranged in a spiral shape on a shaft. The plates and shaft rotate in a semi-circular trough which is covered by a flat top. The material is carried forward in the trough as the screw rotates. Because the friction in screw conveyors is great, they require more power to operate than other types of short conveyors.

Hands and feet can get caught in screw conveyors; therefore, screw conveyor troughs must be covered by guards, unless power is properly locked out and any possible motion is blocked. Trough covers must be securely fastened, or electrically interlocked, so that power to the screw is cut off when a cover is raised.

The person who restarts a screw conveyor, after replacing the drive chain or belt, must take every precaution to ensure that employees are clear of the screw, and that all covers are replaced, before removing the lock-out device and restoring power.

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

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
1. Remove power from screw conveyor.	1. A) Electrocution.	A) Lockout and tag.
	B) Caught in equipment.	B) Lockout and tag.
	C) Slip/trip.	C) Avoid undue haste. Practice good house-keeping.
2. Select tools and supplies.	2. A) Strains from lifting tools.	2. A) Use proper lifting techniques.
	B) Injury from dropping tools.	B) Keep firm grip on tools.
3. Hook rope, or chain block to guard.	3. A) Struck by chain or block, if dropped.	3. A) Hold firmly to lift device and chain used to lift guard until chain or rope is hooked and tightened.
	B) Struck against, or caught on metal structure.	B) Be aware of working environment, and location of coworkers. Avoid projections.
4. Loosen bolts and remove guards.	4. A) Struck by wrench.	4. A) Get firm grip on tools. Use controlled force on tools.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
	B) Struck by guard.	B) Have secure hook-up to guard. Check chain and lift device for defects. Keep co-workers clear of any sudden movement of guard.
5. Loosen chain adjustment and remove old chain.	5. A) Caught between movable links of chain.	5. A) Keep fingers out of pinch points.
	B) Struck by chain.	B) Hold firmly to chain when removing.
	C) Overexertion.	C) Get help if chain is difficult to handle.
6. Install new chain.	6. A) Caught on, or struck against, chain, sprockets, or structures.	6. A) Wear gloves and snug fitting clothing. Avoid protruding objects.
	B) Struck by chain falling off sprockets.	B) Secure chain to keep it from rolling off sprockets.
	C) Fall from platform or screw conveyor.	C) Keep work area clear of slipping/tripping hazards. Maintain good balance. If work cannot be performed from adequate platform with guard-rails, use proper tie-off.
7. Splice new chain.	7. A) Struck by wrench. Fall against structure if wrench slips.	7. A) Select, or adjust, wrench to fit bolt heads. Use controlled force.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
	B) Oil splashing in eyes.	B) Wear safety glasses or goggles. Use penetrating oil sparingly. Direct oil spray away from nearby persons.
	C) Struck by hammer or punch.	C) Hold tools firmly - use pliers to hold punch. Strike with controlled action.
8. Tighten chain.	8. A) Struck by pry-bar.	A) Use pry-bar of adequate size and length. Seat pry-bar firmly.
	B) Falling.	B) Keep guardrails around work platform, or remain tied-off.
9. Replace guard and bolt in place.	9. A) Overexertion.	9. A) Get help with guard, or handle guard with a lifting device.

PROCEDURES FOR REMOVING AND REPLACING DRIVE BELTS

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
1. Remove power from screw conveyor.	1. A) Electrocution.	A) Lockout and tag.
	B) Caught in equipment.	B) Lockout and tag.
	C) Slip/trip.	C) Avoid undue haste. Practice good house-keeping.
2. Select tools and supplies.	2. A) Strains from lifting tools.	2. A) Use proper lifting techniques.
	B) Injury from dropping tools.	B) Keep firm grip on tools.
3. Hook rope, or chain block to guard.	3. A) Struck by chain or block, if dropped.	3. A) Hold firmly to lift device and chain used to lift guard until chain or rope is hooked and tightened.
	B) Struck against, or caught on metal structure.	B) Be aware of working environment and location of coworkers. Avoid projections.
4. Loosen bolts and remove guards.	4. A) Struck by wrench.	4. A) Get firm grip on tools. Use controlled force on tools.
	B) Struck by guard.	B) Have secure hook-up to guard. Check chain and lift device for defects. Keep coworkers clear of any sudden movement of guard.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
5. Loosen belt adjustment and remove old belt.	5. A) Wrench slipping off and injuring hand.	5. A) Keep firm grip on tools.
	B) Pinched finger.	B) Use tool to pry belt off. Cut old belt if necessary.
6. Install new belts.	6. A) Pinched finger.	6. A) Use a tool to carefully pry new belts onto pulley.
	B) Fall from platform or screw conveyor.	B) Keep work area clear of slipping/tripping hazards. Maintain good balance. If work cannot be performed from adequate platform with guardrails, use proper tie-off.
7. Tighten belts.	7. A) Struck by pry-bar.	7. A) Use pry-bar of adequate size and length. Seat pry-bar firmly.
	B) Falling.	B) Keep guard-rails around work platform, or remain tied-off.
8. Replace guard and bolt in place.	8. A) Overexertion.	8. A) Get help with guard, or handle guard with a lifting device.

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.