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

## Module 6 - “Plant Repair”

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**FOR THE**
**SAND, GRAVEL, AND CRUSHED STONE INDUSTRY**

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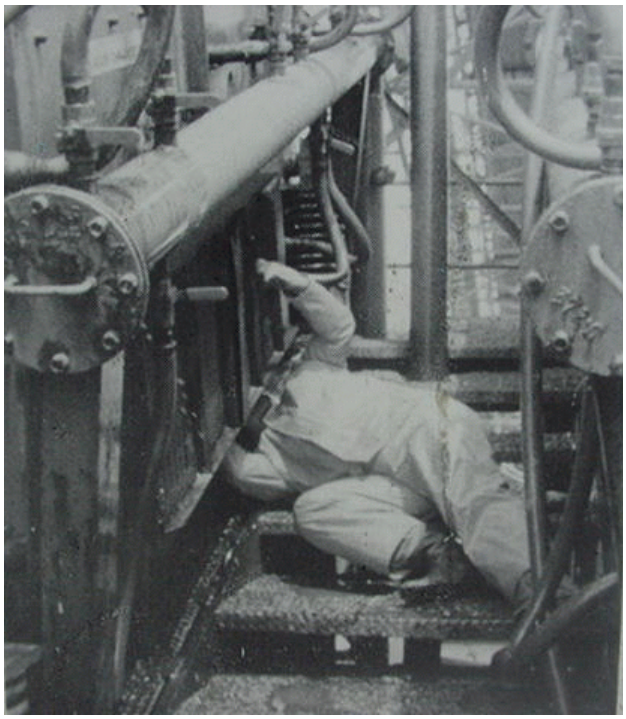
# PLANT REPAIR



This module describes the basic job steps, potential hazards and accidents, and the recommended safe job procedures for repairing plant equipment.

Plant repair jobs are usually done by plant operators, maintenance personnel, and other occupations, such as utility worker, laborer, etc. Members of management, and persons doing repair work, must make sure that all employees, and others, are protected from accidents and injuries resulting from plant repair work.

## ACCIDENT AND DAMAGE PREVENTION

Normally, accidents that cause personal injury are not the result of faulty design or component failure. They are usually caused by human carelessness, inadequate training in operations, or lack of awareness of possible hazards.

Operating and maintenance personnel, and their supervisors, should be initially, and then periodically, instructed in safe operating procedures, recognizable hazards, precautions, and maintenance of a safe work place. Operating and maintenance personnel should also be provided with the proper tools and equipment to operate, and maintain, plant equipment in a safe condition. Maintenance personnel should receive training in the value and conduct of a comprehensive preventive maintenance program. Employees, who do not have proper training, must not be allowed to enter hazardous areas.

## PRE-SHIFT INSPECTIONS

Before initial operation on production runs, a careful and detailed inspection of the plant, and all of its components, must be conducted. Check alignment of all mechanical components. Also, check the operating alignment of the belts on the carrying and return idlers, and visually inspect belts for defective splices. Be sure that all moving parts have guards in place.

Check to see that there are no construction materials, tools, or projecting members that can rub, tear, or cut the belt when it is started. Be sure that chute skirtboards are intact, and not touching the belt. Adjust rubber edging strips on the skirtboards, so that they touch lightly on the belt surface. Adjust belt scrapers, if necessary.

## WALK-THROUGH INSPECTIONS

Walk through the operating plant soon after it is started. Listen for any unusual sounds made by idlers, pulleys, shafts, bearings, drives, bolts, and belt splices.

Walk-through inspections of all plant equipment should be made several times each day, during operating shifts. Guards, safety devices, and warning signs should be checked, in order to determine that they are in proper position and in good working order. Only competent, properly trained, and authorized persons should repair defective safety devices.

## LUBRICATION AND REPAIR

A comprehensive lubrication program is essential for low maintenance costs and dependable plant operations. Pay particular attention to lubrication of all bearings. Equipment life can be extended by following manufacturer's recommendations for types of lubricant, amount and frequency of application, and type of greasing equipment to be used.

People can become entangled in moving parts while lubricating equipment. Extended grease fittings, and hoses, allow the safe lubrication of moving equipment. Equipment must be shut down, and locked-out, if lubrication requires either the removal of guards, or people placing themselves in potentially dangerous positions to perform the job.

The remainder of this module covers safe job procedures for two repair and maintenance tasks. Repair and maintenance of conveyor belts is covered in Module 5 of this Instruction Guide. These procedures will help to minimize incidents which may cause injuries and adversely affect production.

REQUIRED AND/OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT:

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

## I. REPLACING SCREENS

| SEQUENCE OF BASIC JOB STEPS | POTENTIAL ACCIDENTS OR HAZARDS | RECOMMENDED SAFE JOB PROCEDURES |
|---|---|---|
| 1. Positively identify equipment to be locked out. Properly shut down and deenergize equipment. Lockout and tag power in the “off” position. | 1. A) Mechanical hazard - caught in, or struck by, equipment. | 1. A) Never work on equipment unless you have locked out power. Each person doing work must lockout and tag. Each person must keep their key in their possession. Confirm that proper equipment was locked out by testing start switch. |
| 2. Select tools and supplies. | 2. A) Strains from lifting. | 2. A) Use proper bending and lifting technique by using knees and legs rather than back. |
| 3. Check/inspect tools and workplace. | 3. A) Cable or chain break injuring personnel.<br>B) Shock from electrical impact wrench. | 3. A) Inspect cable or chain. Repair or report if damaged.<br>B) Inspect impact wrench for three-prong plug, or other means of grounding; or a double insulated case. Check that cord is not frayed or damaged. Dry damp equipment. |

| SEQUENCE OF BASIC JOB STEPS | POTENTIAL ACCIDENTS OR HAZARDS | RECOMMENDED SAFE JOB PROCEDURES |
|---|---|---|
| | C) Slips and falls. | C) Remove slipping and tripping hazards from walkways and work areas. |
| 4. Wash front part of screen, and use come-along to pull cover back. | 4. A) Dirt in eyes. | 4. A) Wear eye protection. Wash front part of screen to clean material out before pulling cover back. |
| | B) Cuts on hand from burrs on cable. | B) Wear gloves. Do not slide hand along cable. |
| 5. Replace screens. | 5. A) Falling through opening in chute box. | 5. A) Cover opening in chute box with a used screen, and/or use fall protection. |
| | B) Back injury. | B) Use proper lifting and handling methods for tools and screens. |
| 6. Restore power to screen. | 6. A) Person caught in, or struck by, screen deck. | 6. A) Remove lock and tag, and make sure that area is clear of people. Sound start-up warning alarm if provided. Stand to side, and face away from breaker box when throwing switch. |

## II. CHECKING AND GREASING SHAKERS

| SEQUENCE OF BASIC JOB STEPS | POTENTIAL ACCIDENTS OR HAZARDS | RECOMMENDED SAFE JOB PROCEDURES |
|---|---|---|
| 1. Inspect shakers daily at end of shift. Check screens for holes. Visually check for worn or stretched belts. Check for missing wedges. | 1. A) Mechanical hazard. | 1. A) Do not remove guards, or climb on or near equipment, unless power is locked out and tagged. |
| 2. Grease shakers daily, or weekly. | 2. A) Slips and falls.<br>B) Mechanical hazard. | 2. A) Keep walkways and work areas clear of extraneous materials, snow, ice, etc.<br>B) Do not remove guards, or climb on or near equipment, unless power is locked out and tagged. |

## 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.