MMS
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Safety Alert

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Mechanical Motion Equipment Injuries

Recently, a Field Mechanic (FM) performed a routine platform diesel generator visual inspection, and when the unit was started to check for leaks he discovered lube oil on the radiator shroud. In an effort to clean the oil, the FM utilized a rag to wipe the radiator shroud without shutting down the unit. Due to the amount of air flow created by the fan, the rag contacted the fan blades and pulled the FM's hand into the blades. The FM was evacuated from the platform and required numerous stitches to his hand.

An MMS investigation into this accident revealed that the injury resulted from human error and poor design. The FM attempted to clean the radiator shroud with a rag while the engine was running; and, the radiator shroud was designed in such a manner that did not completely conceal the fan blades. Although amputation did not result from this accident, amputations are among the most severe and disabling workplace injuries that often result from the energy generated by mechanical motion. Since mechanical motion accidents have become a recurrent theme during MMS accident investigations, the following concepts and safeguarding techniques can be used to heighten personnel awareness of the hazards involved with working in close proximity to mechanical motion energy hazards.

Types of Mechanical Motion

The types of hazardous mechanical motions include rotating motion (circular), reciprocating motion (back-and-forth or up-and-down), transversing motion (motion in a continuous straight line), cutting action (may be rotating, reciprocating, or transverse), punching action, shearing action, bending action, and in-running nip points (also known as pinch points).

Hazard Analysis

Mechanical motion accidents can be prevented by looking at your workplace operations and identifying the hazards associated with the use and care of the machine. A hazard analysis is a technique that focuses on the relationship between the employee, the task, the tools, and the environment. When evaluating work activities for potential hazards, consider the entire machine operation production process, the machine modes of operation, individual activities associated with the operation, servicing and maintenance of the machine, and the potential for injury to employees. The results from the analysis may then be used as a basis to design machine safeguarding and an overall Lockout/Tagout (LOTO) energy control program. The guards and devices used need to be compatible with a machine's operation and designed to ensure safe operator use. The type of operation, size, and shape of stock, method of feeding, physical layout of the work area, while production, servicing and maintenance requirements all affect the selection of

safeguards. Also, safeguards should be designed with the machine operator in mind as a guarding method that interferes with the operation of the machine may cause employees to override them.

Safeguarding Techniques

Guard: A barrier that prevents exposure to identified hazards. Guards usually are preferable to other control methods because they are physical barriers that enclose dangerous machine parts and prevent employee contact with them. To be effective, guards must be strong and fastened by any secure method that prevents the guard from being inadvertently dislodged or removed. Guards typically are designed with screws, bolts and lock fasteners and usually a tool is necessary to unfasten and remove them. Generally, guards are designed not to obstruct the machine operator's view or to prevent employees from doing a job. In some cases, guarding may be used as an alternative to LOTO because employees can safely service or maintain machines with a guard in place.

Safeguarding Device: A device that detects or prevents inadvertent access to a hazard by:

- Preventing hazardous machine component operation if your hand or body part is inadvertently placed in the danger area;
- Restraining or withdrawing your hands from the danger area during machine operation;
- Requiring the use of both of your hands on machine controls (or the use of one hand if the control is mounted at a safe distance from the danger area) that are mounted at a predetermined safety distance; or
- Providing a barrier which is synchronized with the operating cycle in order to prevent entry to the danger area during the hazardous part of the cycle.

Awareness Device: A barrier, signal or sign that warns individuals of an impending, approaching or present danger. The first type allows access to machine danger areas, but it is designed to contact the employee, creating an awareness that he or she is close to the danger point. Awareness signals, through the use of recognizable audible or visual signals, are other devices that alert employees to an approaching or present hazard. Lastly, awareness signs are used to notify employees of the nature of the hazard and to provide instructions and training information.

Administrative Controls: Employees need to consider housekeeping practices, and employee apparel. Good housekeeping practices should be implemented to promote safe working conditions around machinery by removing slip, trip and fall hazards from the machine area, removing debris as it is generated, placing machines away from high traffic areas, and make the work area large enough to accommodate the machine operation and maintenance. Employees should not wear loose-fitting clothing, jewelry, or other items that could become entangled in machinery, and long hair should be worn under a cap or otherwise contained to prevent entanglement in moving machinery.

LOTO Program: The LOTO program is used where safeguards are rendered ineffective or do not protect employees from hazardous energy during servicing and maintenance operations

Training: Adequate instruction in the safe use and care of machines and supervised on-the-job training are essential in preventing injuries. Only properly trained employees should operate machinery.

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