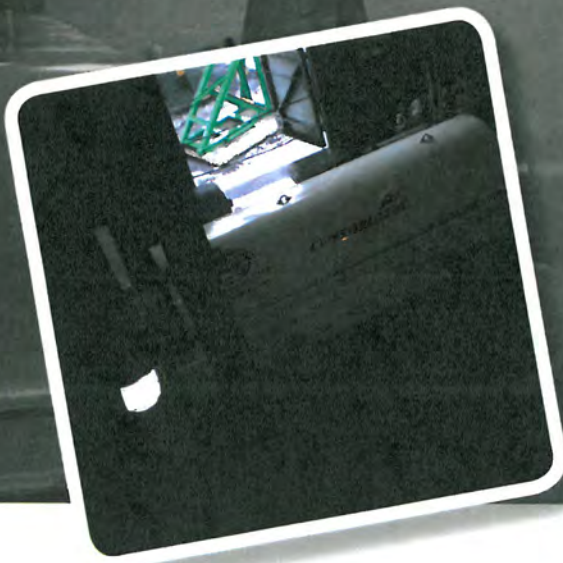


WORLD COAL[®]

APRIL 2011 - VOLUME 20 NUMBER 04



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Conveying the message

AARON GIBBS, ASGCO MANUFACTURING INC., US, DESCRIBES CONVEYOR SYSTEM SAFETY AND MAINTENANCE SERVICES TO IMPROVE EFFICIENCY, SAFETY AND PRODUCTIVITY.

Every year miners are injured, sometimes fatally, because of a lack of training or because guarding has not been properly installed or maintained. Sometimes guards have been removed or modified in an unsafe manner, to allow certain tasks to be performed as the equipment is operating. This is why proper training and safety procedures are essential to any mining operation, its employees and its contractors. According to the Mine Safety and Health Administration (MSHA), at metal and nonmetal mines in the US, equipment guarding standards are the most frequently cited violations. MSHA's documentation on moving machine parts states that:

- Moving machine parts shall be guarded to protect persons from contacting gears, sprockets, chains, drive, head, tail and take-up pulleys, flywheels, couplings, shafts, fan blades and similar moving parts that can cause injury.
- Guards shall not be required where the exposed moving parts are at least 7 ft away from walking or working surfaces.

Reviewing guard-related injuries

Figure 1 is from a June 2010 MSHA presentation on guarding conveyor belts at metal and nonmetal mines. It summarises the distribution of injuries caused by behaviours (reaching past

or around a guard, removing guards during operation or climbing on guards) as opposed to injuries caused by conditions (handling oversized and heavy guards, dropping the guards and being injured by inherently hazardous guards). Injuries caused by at-risk work practices represent about one third of all guarding-related injuries. Injuries caused by inadequate guard design, construction and maintenance represent approximately two thirds of all guarding-related injuries. If the statistics also consider the muscle sprains and strains and back injuries caused by handling heavy, large or awkwardly shaped guards, and the injuries that occur when miners drop guards because they are heavy, large or do not have



Figure 1. Injuries relating to equipment guarding.

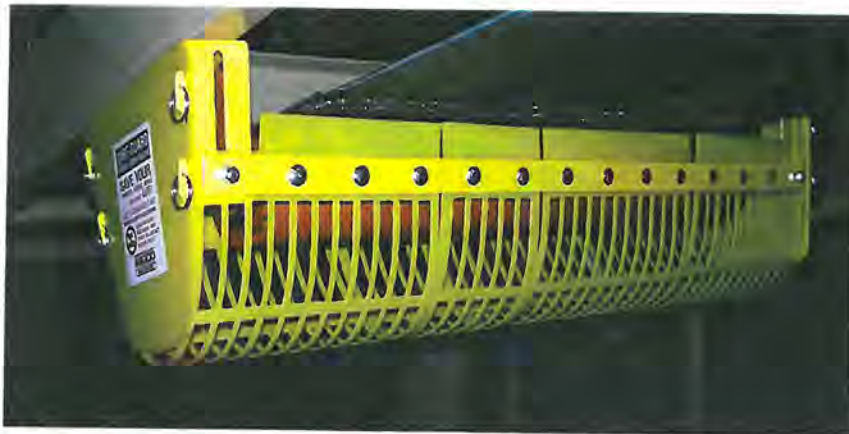


Figure 2. Correctly installed, highly visible guard.

handles, the total percentage of injuries due to poor design, construction and maintenance of guards rises to well over 50%. Some 12% of guard-related injuries occurred because the guard itself was a hazard to miners. Most of these injuries were lacerations and puncture wounds caused by handling or striking against a guard that had sharp edges or points. Mining industry injuries can be reduced by improving guard design and construction, as stated by MSHA.

Strategies for guarding moving machine parts

There are three strategies for guarding moving machine parts: guarding at the point of contact; guarding by locating moving machine parts out of normal reach; and enclosing multiple moving parts in a single guard or preventing access to moving parts in a specific area. The guard should prevent hands, arms and any other part of an operator's body from making contact with dangerous

moving parts. The guard should be difficult to remove or tamper with. Lastly, the guards should be made of a durable material that will withstand the conditions of normal use and should be firmly secured and removable only with a proper tool.

Guarding conveyor belt return rollers

Conveyor belt return rollers (idlers) are among the moving parts that MSHA states need to be guarded when miners work or travel under the conveyor. Unguarded return rollers that can be contacted by miners are particularly hazardous because they have in-running pinch points across the entire width of the belt into which persons can be drawn and trapped. All moving parts identified under this standard are to be guarded with adequately constructed, installed and maintained guards to provide the required protection. The use of chains to rail off walkways and travel ways near moving machine parts, with or without the posting of warning signs

in lieu of guards, is not in compliance with this standard.

Conveyor belt rollers are not to be construed as similar exposed moving machine parts under the standard and cannot be cited for the absence of guards and violation of this standard where skirt boards exist along the belt. However, inspectors should recognise the accident potential, bring the hazard to the attention of the mine operators and recommend appropriate safeguards to prevent injuries.

Conveyor idlers under 7 ft must be guarded to prevent incidental contact from an individual touching or reaching the roller. Conveyor idlers above 7 ft must be caged where the idler is above a road or walkway where people are present. The guard in Figure 2 is neatly framed and installed close to the belt to protect persons from being drawn into the in-running nip point. Because the openings in the guard material are small, material may accumulate inside the guard. This guard has a pinned side to make cleaning easier.

The guard in Figure 2 is coloured safety yellow so that it is easily recognisable as a guard and neatly framed and installed close to the roller so that if it were to fall out of its mounting brackets due to buildup or mis-tracking, it will not injure someone below, as could happen in the setup shown in Figure 3.

MSHA's 2004 "Guide to equipment guarding" handbook states an area guard is a barrier that prevents entry of a miner into an area containing moving machine parts, thus preventing contact with the moving parts. Effective area guards may require additional practices and provisions, such as signage, locks and colour coding, in addition to the physical barrier. When designing, installing, and/or using area guards, a number of considerations must be taken in account:

- The security of the area.
 - Does the guard prevent entry?
 - Is it locked or bolted?
- How will the moving machine parts be shut down before entry?

- Will the guard be interlocked with the hazardous equipment so entry will automatically shut down the moving parts?
- Will manual shutdown be used?
- Is the area guard easily recognised as a guard?
 - Are warning signs or colour coding in use?
- The amount of access to the guarded area.
 - Areas that are frequently accessed or that have large numbers of people requiring access may not be suitable for area guarding.
- Education and training in proper procedures.
 - Does the work force understand who may enter area guards?
 - Have lock-out, tag-out procedures been addressed?



Figure 3. Falling idler.

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