Five Serious Machine Guarding Problems
By Chris Soranno

Many people believe the adage, “Perception is truth.” Unfortunately, when it comes to machine guarding, perception can be far from the truth. Managers and safety professionals from manufacturing firms often believe that their machinery and equipment are well guarded. Often, they don’t see the forest for the trees, as their internal standards and inspections fail to identify and, ultimately, correct machine guarding problems.

Reliable data and professional experiences indicate that machine guarding problems are prevalent. Vulnerability to injuries because of improperly guarded machines and equipment continues at a high rate. This gap occurs across industries and is found in many companies recognized as top performers from a safety perspective.

Consider the following:
- During FY2010, 24% of OSHA’s most commonly cited standards for the manufacturing industry dealt with machine guarding violations, which resulted in more than $6 million in proposed penalties.
- Nearly 6,000 occupational amputations occurred in the U.S. during 2009 (most recent data available), many of which were the result of improperly guarded equipment or interrelated lockout violations.
- Machine guarding specialists and consulting safety professionals commonly find many machine guarding standards violations when assessing client operations.

Since machine guarding problems and associated injuries persist despite good intentions and employer confidence that guarding is well controlled, one must ask, “Why?” Supporting examples (actual violations of machine guarding standards) are easy to cite, but the root causes of the problems are not as straightforward. The following top reasons for serious machine guarding problems are based on Omron STI’s experience in assessing machine guarding over the past 30 years, combined with OSHA data and interviews with corporate safety managers and consulting safety professionals. Although data do not support a specific ranking, the list is presented in order of perceived priority.

1. **Lack of Understanding of Machine Guarding Requirements**
   At first glance, machine guarding requirements seem straightforward and easy to understand. However, many people limit their evaluation of machine guarding requirements to OSHA standards and never consider the myriad of applicable consensus standards.

   First, let’s consider OSHA standards. If these standards were truly easy to understand and apply, would more than 20,000 citations have been proposed in FY2010? While numerous standards apply to the safe operation of machine tools and equipment (including 29 CFR 1910.147, Control of Hazardous Energy (Lockout/Tagout)), industry may incorrectly believe that only these seven machine guarding standards apply to stationary equipment in general industry:
   - 1910.212, General Requirements for All Machines;
   - 1910.213, Woodworking Machine Requirements;
   - 1910.215, Abrasive Wheel Machinery;
   - 1910.216, Mills and Calenders in the Rubber and Plastics Industries;
   - 1910.217, Mechanical Power Presses;
   - 1910.218, Forging Machines;
   - 1910.219, Mechanical Power-Transmission Apparatus.

   The actual number of machine guarding requirements embedded in these standards is exponentially larger than expected. The standards (including their mandatory appendixes) contain more than 600 separate and enforceable requirements. The directly enforceable consensus standards that are specifically referenced by these seven regulatory standards require compliance with another large number of requirements.

   The total number of machine guarding requirements explodes when one considers the many requirements from unreferenced yet relevant consensus standards. (The sidebar lists several consensus safety standards that should be considered.)

   While not directly referenced by regulations, these consensus standards are important for two key reasons:
   1) They represent the most current thinking and contemporary technology with regard to machine guarding. Adherence to such standards helps ensure the highest level of worker protection. Consensus standards often progress in a more timely and orderly fashion than regulatory standards since they are not subject to burdensome administrative rules and competing interests, which can produce gridlock and litigation.
   2) Consensus standards can be enforced and used against employers in litigation. Consensus standards can be interpreted as implicit regulations through the U.S. legal system. The standards reference how a machine should be—or more likely, in the case of a trial, should have been—guarded. OSHA supports issuance of machine guarding violations under the General Duty Clause by referencing consensus standards.

2. **Improper Design or Installation**
   Problems related to improper design or installation may be linked to a lack of understanding. Inexperienced designers and installers and/or those who do not have current knowledge of the myriad of machine guarding requirements are prone to errors and omissions. On the installation side, in-house maintenance generalists may be particularly vulnerable. They cannot be expected to be aware of and execute all machine guarding requirements. However, there are no allowable exceptions when it comes to complying with safety standards.

   Designers and installers have another common exposure: lack of oversight. These individuals often are seen as the final word and their errors are uncovered only after an incident, OSHA inspection or lawsuit.

3. **Failure to Consider All Risks**
   Comprehensive machine guarding requires a formal risk assessment that considers inputs not.
only from the guard designer, but also from machine operators, maintenance personnel, supervisors, engineers, safety professionals, machine guarding experts and original equipment manufacturer (OEM) representatives. Requirements for conducting risk assessments are discussed in yet another series of regulatory and consensus standards.

It is unlikely that any designer can independently anticipate all potential hazards associated with equipment setup, operation, inspection and maintenance. Comprehensive lockout planning and execution is required in situations where workers must access areas inside of machine guards.

 inadequate risk assessments also can overlook important requirements regarding the design and performance of interlock devices and monitoring components (e.g., relays, safety-rated programmable logic controllers) used for protection while performing alternative safeguarding measures.

4 Inadequate Controls to Ensure That Guards Are Adjusted & Maintained

Even well-designed guards and devices must be properly adjusted, and require inspection and maintenance to ensure that they continue to perform intended functions. As a practical matter, employers cannot begin to ensure that they meet the many machine guarding requirements without an effective inspection program conducted by well-trained personnel. These inspectors must be able to detect both obvious and subtle guarding deficiencies.

5 Belief That Manufacturer Is Responsible for Machine Guarding

Many purchasers of machine tools and industrial equipment mistakenly believe that the OEM is responsible for properly guarding the equipment that it delivers. While an OEM has many safety responsibilities as defined in ANSI standards, U.S. regulations hold the employer responsible for machine and equipment guarding. In the event of an injury and subsequent third-party suit against the equipment manufacturer, the OEM often can defend itself by establishing the position that it was neither responsible nor had the process knowledge to adequately guard the equipment which it designed, built and/or delivered.

Equipment purchasers often include a boilerplate clause in purchase orders or contracts intended to require the OEM to guard the equipment in accordance with OSHA standards and, perhaps, appropriate consensus standards. While these agreements may provide the purchaser some protection in the event of a third-party suit, they have no influence over OSHA.

A similar vulnerability exists when purchasing equipment from local hardware suppliers. While such equipment (e.g., small lathes, bench grinders, drill presses) may be attractively priced, the equipment may not be manufactured in accordance with the applicable ANSI or OSHA standards since the equipment often is designed for home use, not industrial use. However, when such equipment is introduced into an industrial setting, the various ANSI and OSHA standards become applicable and the equipment likely will be found noncompliant. The risks associated with such equipment are often higher than for similar equipment that meets the requirements of relevant consensus and regulatory standards.

While perception is not always truth, solutions to even the most serious machine guarding problems and challenges can be found through diligent effort and involvement of knowledgeable professionals.

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