

“But It Came That Way”: The Roles, Responsibilities, and Accountability of Machine Guarding

By Adam Haroz, EIT

The Occupational Safety & Health Administration (OSHA) is getting more stringent, both with regulations and enforcement, on machine guarding violations. They are targeting industries with higher risks of potential injuries from machinery. Despite this move by OSHA towards greater expectations from industry, there is still a large cultural gap between employers and original equipment manufacturers (OEMs) regarding who is ultimately responsible for ensuring that the machinery is guarded in compliance with OSHA regulations.

In my years of consulting our clients in regards to OSHA and General Safety compliance matters, there has been one notion that my clients keep telling me, “I don’t understand why this machine is unsafe” or they do not fully understand why they have received an OSHA violation. Another phrase I commonly hear is “The equipment came from the manufacturer that way.” Through some research, it emerged that several equipment manufacturers and distributors were selling equipment stating that the equipment “meets OSHA requirements”, and yet accidents were occurring and OSHA violations were being distributed.

What is machine guarding?

Machine guarding is used as a precautionary safety feature on machinery and other pieces of equipment. It is a shield or other device protecting workers from accidental contact of body parts with hazardous areas of a machine. It can also control hazards like chips and noise from exiting the machine. A guard controls the interaction between the operator and the machine, and can be a significant factor in optimizing a machines performance. An example of guarding solution used at an actual working facility can be seen below.



Left: A potential pinch point hazard from exposed chains on a lumber transfer deck

Right: A guarding solution that is hinged for maintenance access and covers the exposed hazard point.



Machine guarding regulations and responsibilities

Understanding machine safety standards can be a challenging step in reducing risks in the workplace. Although the requirements for machine and employee safety may seem endless, there are ways to ensure proper safeguarding for employees. OSHA regulations state “One or more methods of machine guarding shall be provided ...”¹. Due to this initiative, any gap in machine guarding and overall safety on a piece of equipment falls on the shoulders of the employer.

As outlined in American National Standard Institute’s (ANSI) standard B11.19-2010, The Performance Criteria for Safeguarding, it is the role of both the OEM and the end user to conduct a risk assessment in order to determine the safeguarding that is required for the equipment. One thing to consider about the OEM’s risk assessment is that it is impractical to expect a machine designer to foresee all potential hazards associated with equipment setup, operation, maintenance, and placement within a facility. The end user should conduct a risk assessment, separate from that of the OEM, as a part of due diligence for recognizing and reducing risk.

There is some responsibility on the side of the OEM however. While the OEM is typically unsure of the final location and process staging that the employer has designated for the equipment, the OEM should consider any foreseeable use and misuse of the equipment, as well as the potential point of operation hazards for those who may come in contact with the equipment.

What Makes Machine Guarding So Difficult?

Despite OEMs becoming increasingly aware of the importance of machine guarding – whether it be from a productivity, safety, compliance, or even aesthetic standpoint – machine guarding continues to place on OSHA’s Top 10 Most Frequently Cited Standards². Some things that make machine guarding difficult are:

1. Multiple Functions

Facilities and operators rely heavily on these safeguards being able to perform multiple functions. These safeguards are expected to not only prevent the accidental contact with hazards and moving equipment, but they are also expected to be easily removed and secured for maintenance, protect the equipment itself from falling objects or other moving equipment, and not create any additional hazards. Of course another significant goal is that these safeguards don’t prevent an operator from performing his/her job efficiently and effectively.

2. Failure To Assess Risk

As specified in ANSI Standard ANSI B11.0-2010, “The user shall ensure that additional safeguarding is provided and installed as determined in the user risk assessment.”

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In many cases employers can find it difficult to assess risk as sometimes the employer does not possess the expertise to conduct a proper risk assessment. Conducting a risk assessment of new equipment is not only required; it is a great method of due diligence for determining the risks present for that piece of equipment as well as for that section of the process in order to take a proactive approach to abating those hazards. If hazards are not identified then it is unlikely they will be protected against.

3. Misleading OEM Labels

Along with the intricate requirements of machine safety, employers can sometimes be misled by OEMs and/or machine sales representatives. The phrases “OSHA Compliant” and “Meets all OSHA requirements” have been misused by OEMs and machine sales representatives in order to sell equipment to employers, who may not know any better. OSHA does not certify equipment to be “compliant.” If an OEM claims that a piece of equipment is “OSHA Compliant” or that it “Meets all OSHA requirements”, you should obtain any risk assessments that have been conducted on that equipment, and check for any “UL” (Underwriters Laboratory) and/or NIOSH (National Institute for Occupational Safety and Health) stamps on the equipment. Those types of markings will help indicate that the equipment has at least undergone a safety inspection by a reliable agency. These markings do not relieve an employee from conducting their own risk assessment.

4. Cost and Difficulty of Solutions

Any risk that is identified should be mitigated to ensure a safe work place. If there are hazards present and identified, but they were not mitigated, abated, or somehow guarded due to difficulty of guarding applications or because it is simply too expensive, they could be considered Willful violations by OSHA and any associated fines could increase exponentially.

Solutions

The knowledge, ability, and confidence to perform a risk assessment on equipment is by no means easy. One has to keep in mind the potential risk present on the piece of equipment, as well as understanding that employees do make mistakes, and the presence for serious injury is always present. For these reasons it can be extremely beneficial

to employ and cooperate with a 3rd party specialist. The specialists include machine designers, maintenance personnel, consultants, and an OSHA Compliance Assistance Specialist. While a 3rd party specialist is an expense to the facility, machine guarding specialists and safety consultants can often find several potential violations and potential hazards that many maintenance personnel may overlook. One thing that a consultant is particularly good at, is the ability to not simply focus on OSHA standards. They are able to use their knowledge of other applicable consensus standards as well as their experience working with both government agencies and other industries. Consultants and other specialists being hired by the facility can explore equipment and guarding’s applicability for that specific facility’s needs.

Cost, difficulty of the safeguarding solutions themselves, functionality of the safeguards in relation to the equipment and the operator are all very difficult for anyone to fully comprehend. One thing that each facility should not overlook is the utilization of the employees and staff already employed by the facility. A facility’s employees have hands on knowledge of the equipment and the process, and they are often very aware of potential hazards on the equipment that they see and use on a daily basis. Getting input from those whom actually operate the equipment, and sometimes are the ones constructing or bypassing the safeguards, is a vital tool when implementing guarding solutions in a feasible way. This can also ensure that the guarding solutions being implemented are safe, easy to operate and replace, and that as much common sense goes into the design and placement of the safeguard as possible.

Conclusion

It is everybody’s responsibility to change the culture of safety and to look at machine guarding as not just a means to prevent costly accidents and citations, but to look for the safest solution at every stage of the design and implementation processes. While productivity and efficiency are important, the most vital part of any facility is the safety and well-being of its employees.

1. 29 CFR 1910.212(a)(1) – https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9836
2. <https://www.osha.gov/oshstats/commonstats.html>

NFPA Issues NFPA 652: Standard on the Fundamentals of Combustible Dust

By Chris Frendahl and Jeff Davis, PE

On September 1, 2015, the National Fire Protection Association (NFPA) issued NFPA 652, Standard on the Fundamentals of Combustible Dust. NFPA 652 is the first step to creating a single, unified combustible dust standard that would apply to all facilities.

A significant number of industrial accidents have been associated with combustible dust flash fires and explosions. Historically, the hazards from combustible dust are often overlooked, in part due to facilities not understanding the hazards of combustible dust. However, there are other cases where the hazards are overlooked due to complacency or a general attitude of “that can’t

happen here.” The Occupational Health and Safety Administration (OSHA) worked to increase awareness to the hazards associated with combustible dust through a National Emphasis Program (NEP), reissued March 2008 in direct response to the Imperial Sugar incident near Savannah, GA. OSHA has also released an Advanced Notice of Proposed Rule-making (ANPR) to create combustible dust regulations. OSHA’s NEP and ANPR both cite NFPA standards for combustible dust. However, NFPA’s combustible dust standards are industry specific. For example, grain handling facilities and food processing plants refer to NFPA 61, while wood processing and woodworking facilities would refer to NFPA 664. Many of the industry specific standards will refer, at least in

part, to NFPA 654, the standard for industries without a specific standard. These standards do not align with each other. For example, NFPA 654 has differing dust collector exemptions from NFPA 61, yet NFPA 61 will refer to NFPA 654 for standards on pneumatic conveying lines, which could be associated with dust collectors. This creates confusion. To reduce this confusion and consolidate the combustible dust standards, NFPA has developed NFPA 652, Standard on the Fundamentals of Combustible Dust. In addition to the development of this standard, NFPA has been working to update the industry specific standards to align with NFPA 652.

NFPA 652 applies to “all facilities and operations that manufacture, process, blend, convey, repackage, generate, or handle combustible dusts or combustible particulate solids”. In addition to the general requirements listed in the standard, NFPA 652 will also direct you to any applicable industry-specific standards that would apply to different facilities.

The primary focus of NFPA 652 is to help all facilities identify where hazards exist due to combustible or explosible materials that are handled by the facility. To accomplish this, NFPA 652 requires a qualified person to conduct a Dust Hazard Analysis (DHA). The requirements of the DHA are retroactive and existing facilities will have three years from the issuance of NFPA 652 to complete the DHA. The DHA includes the following:

- Determining the combustibility and explosibility hazards of the materials being handled;
- Identifying and assessing the fire, flash fire, and explosion hazards;
- Managing the identified fire, flash fire, and explosion hazards; and
- Communicating the hazards to affected personnel.

To determine the combustibility and explosibility hazards and identify the areas where the hazards exist, facilities will need to sample and analyze the materials. To do this, all facilities are required to create a sampling plan. This plan must identify where the fine dusts are present, the collection procedures for representative samples, communication with the testing laboratory, documentation of the sampling, and safe sample collection practices.

Once materials have been identified as being combustible or explosible, the facility must then complete a DHA to identify and evaluate the potential hazards associated with a fire or explosion due to the combustible materials being handled. Inspections of areas where combustible dust is handled also allow for the provision of recommendations to minimize the risks of a combustible dust incident. The DHA must be completed or led by a qualified person who has demonstrated the ability to understand combustible dust and associated hazards through education or experience. This qualified person should inspect all buildings and processes to determine how likely it is that a fire or explosion due to combustible dust will occur. This is determined by understanding the properties associated with the combustible dust that is handled in the building or process, identifying all potential ignition sources,

and evaluating the effectiveness of any deflagration suppression or protection systems that are currently in place.

Once all hazardous areas have been identified and a DHA has been completed, the facility should work to reduce the risk of a flash fire or explosion from occurring or should implement procedures or equipment to mitigate the hazards associated with a combustible dust fire or explosion. Often times, updated housekeeping procedures are the first actions facilities take to combat excessive dust accumulation in rooms and buildings. However, this requires extra labor and is often not as effective as expected. Additionally, some housekeeping activities, such as cleaning dusty areas with compressed air, can pose significant hazards resulting from combustible dust clouds forming in the areas that are being cleaned. If possible, the facility should work to contain and collect combustible dust by preventing fugitive dust from discharging from equipment and using an effective dust collection system throughout the processes handling combustible dust. However, if it is not feasible to prevent the discharge of fugitive dust into a room or building, other means of protection or hazard mitigation should be implemented.

Additionally, the facility should develop a management system that monitors how hazards relating to combustible dust are being controlled. This system must include Management of Change (MOC) procedures to be implemented prior to any proposed changes to materials, equipment, technology, procedures, and job tasks. Finally, NFPA 652 requires facilities to provide training to employees and contractors on general safety regarding the hazards associated with combustible dust as well as any job-specific training relating to their work environment.

If you need assistance developing or implementing a sampling plan, conducting a Dust Hazard Analysis, or providing employee training, please do not hesitate to contact CTI.

News You Can Use

- CTI's Director of Engineering, Brian Edwards PE, was appointed as a Principle on the NFPA Technical Committee on Agricultural Dusts (CMD-AGR), which is the committee that maintains NFPA 61 - Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities.
- Our Director of Engineering, Brian Edwards PE and Engineering Manager, Adam Haroz EIT, both presented at the 22nd Annual Georgia Safety, Health and Environmental Conference on Sept. 9-11, 2015, on Combustible Dust and Machine Guarding, respectively. Their presentations can be found on the CTI website.
- ISO 14001:2005 Environmental Management Systems was issued on Sept. 15, 2015. Find out more on our blog.



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- ◆ Boiler MACT/Area Source
- ◆ Environmental Compliance Audit
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- ◆ ISO 14001 Consulting
- ◆ Phase I & II Env. Site Assessment
- ◆ RCRA Compliance
- ◆ SARA Title III - Tier II/Form R
- ◆ Spill Prevention (SPCC)
- ◆ Stormwater Permitting
- ◆ Wastewater Permitting

PROCESS SAFETY

- ◆ Emergency Preparedness & Planning
- ◆ Employee Training
- ◆ Management of Change
- ◆ Process Hazard Analysis
- ◆ PSN Hazard Analysis (PHA)
- ◆ PSM Program Development
- ◆ RMP Development & Submission

COMBUSTIBLE DUST

- ◆ Combustible Dust Hazard Analysis
- ◆ Dust Sampling and Analysis
- ◆ Explosion Protection Design
- ◆ Hazardous Location Determination
- ◆ NFPA & OSHA Compliance Review

OCCUPATIONAL HEALTH & SAFETY

- ◆ Confined Space Entry Procedures
- ◆ Job Hazard Analysis (JHA)
- ◆ Machine Specific Lockout/Tagout Procedures
- ◆ Noise Exposure Monitoring
- ◆ Occupational Air Exposure Monitoring
- ◆ OSHA 18001 Consulting
- ◆ OSHA Compliance Audits and Mock OSHA Inspection
- ◆ OSHA Required Safety Training
- ◆ Safety Policies, Procedures and Programs