Performing a machine safety evaluation or risk assessment is an important step for any manufacturer to protect its people.
In today’s competitive business environment, many concerns affect the profitability of manufacturing companies throughout North America. They have to be prepared to overcome challenges that include domestic and foreign competition, export tariffs, government regulations, wage increases to retain competent staff, increases in raw material costs, and GDP positive or negative growth, to name a few.

One of the most important concerns is the need for machine safety that protects valuable personnel and equipment and meets national and international safety standards. Manufacturers must make every effort to prevent catastrophic accidents that could injure or even kill machine operators, maintenance crew or other people working around the machines.

The occurrence of such an accident is not only a tragedy, but it can cost a company tens of thousands of dollars in OSHA fines, as well as possibly millions in associated lawsuits.

Example of a typical machine safety setup.
“When they consider the problems that can arise financially, it is an astute decision to look into machine safety because the consequences are dire in some cases and expensive, depending on what happens after,” says Jim Sandzik, manager, marketing communications, ABB Jokab Safety Products.

Other benefits of implementing a good machine safety program are reducing production stoppages and protecting the equipment. “And machine safety makes production more efficient because most safety programs have diagnostics that help the manufacturer locate a problem in the safety circuit so they can repair it quickly and get back online,” Sandzik says.

For all of these reasons, manufacturers must consider complete machine safety systems that meet the highest level of safety. This article provides an overall picture of what is involved in a machine safety program and information on how to get started.

The first steps to improved machine safety begin with a machine safety evaluation or risk assessment. The first question manufacturers have is: How do I go about performing a machine safety evaluation or a risk assessment? Companies that are machine safety specialists can offer guidance in both of those areas.

**Machine evaluation**

Machine safety evaluations on individual or multiple machines allow a company to evaluate its machines and processes according to the machine safety standards that apply to its industry. The evaluation can be a basic or detailed appraisal of the safety-related conditions for one or more machines in a plant. Multiple machines can be prioritized by potential risk.

“The evaluation will show the areas that need to be the priority as far as safety is concerned,” Sandzik says. “It tells you where those hazardous areas are and provides a written report on what you can do to bring yourself up to standard.”

Manufacturers in various industries have to adhere to the particular safety standards that apply to them. In the United States, OSHA enforces current prevailing standards.

“If you are not meeting the current standards that apply to your industry, and there is an accident, OSHA will visit you almost immediately and they will cite and fine you and do a number of things your company does not want to experience,” Sandzik says.

In most cases, the machine standards that companies are most concerned with are the ANSI B11 Machine Tools Safety Package, which includes standards that address the safety requirements for various machines, and
the RIA 15.06 Safety of Robotics. For welding specifically, there are American Welding Society standards used in conjunction with RIA 15.06 and ANSI Z49.1:2012 Safety in Welding, Cutting, and Allied Processes standards. For example, the AWS D16.1M:

D16.1:2004 Specification for Robotic Arc Welding Safety standard establishes safety requirements with respect to the design, manufacture, maintenance and operation of arc welding robot systems and ancillary equipment. It also helps to identify and minimize hazards involved

Safety features can include safety controllers, switches and sensors.
in maintaining, operating, integrating and setting up arc welding robot systems.

On the international front, OEMs building machines going to Europe have to meet other standards to sell there. These are the European Nations directive and ISO standards. EN ISO 13849-1 is the main standard for the design of safety-related control systems in the machine safety sector.

All types of machines have the possibility for a person to get into an area and injure themselves. For example, pinch points, defined as any point where it is possible for a body part to be caught between moving and stationary parts on equipment, are areas that if a person gets into there is a high probability of injuries, such as fractures, amputations or even death.

OEMs design their machines to try to eliminate as many potential hazards as possible with the original design. But there are always areas where the design is not going to be able to accomplish that. Therefore, the end user has to put on additional safety features to make sure people can’t get into those hazardous areas while the machine is operating.

The additional safety features can include software or controls on the machine that warn the operator if they are in trouble. Preventative systems can include a safety mat that stops the machine if a person steps into an area where they are not supposed to be or a set of light curtains that stops the machine if the person breaks the beam. Others safety devices include safety switches for machine doors, hard guarding and two-hand controls.

While machine personnel are trained on how to avoid accidents, “training fades,” Sandzik says. “If the operator forgets and sticks their hand where it shouldn’t be one time, it isn’t because the training failed, but because you allowed it to happen.”

Overall, “the machine safety evaluation gives you an excellent idea of how to meet all the standards that are governing you,” Sandzik notes. “And I would say that every company needs to do at least that. Additionally they can do a machine risk assessment.”

Assessing the risk
A machine risk assessment may be required on all new and used machines. In addition, any machine that has been moved or modified may also require a risk assessment. The machine safety specialists can help to identify what steps need to be taken to comply.

“Risk assessment is 100 percent necessary if you are going to export new machines to Europe because their standards are more stringent than those in the United States,” Sandzik says. OEMs may end up building two versions of the machine, or as added protection, they may choose to build according to the EN ISO 13849-1 standard for the U.S. machines as well, he adds.

When ordering a machine from an OEM, it is suggested that a risk assessment requirement be added to the purchase order.

“I don’t think it’s a totally common practice for OEMs to do a risk assessment, but we advise people buying new equipment to have them include one so you have that documentation when the machine arrives,” Sandzik says. “The OEMs should do it anyway to protect themselves. Then they can say, ‘This is the status of the machine up until the point the end user received it. We’ve done the assessment and here is the paperwork for it.’”

Sandzik adds that it would behoove the end user to also do an extension of that risk assessment. “Once you bring that machine in and make any changes or alterations you have to make to install it, you have to see if you’ve created any new potential hazards.”

Members of a risk assessment or machine safety evaluation team can include anyone who has anything...
to do with the machine and works in the area. This includes operators; maintenance; engineers; technicians; supervisors; environment, health and safety personnel; housekeeping; management; and the outside machine safety expert source.

“Everyone should be involved because everyone will have a different take on what they think is dangerous about the machine,” Sandzik says. “Get everyone’s opinion.”

After the hazard identifications are made, the team leaders evaluate how likely and severe the risks are and then decide what measures should be in place to effectively prevent or control the risk. Documentation created during the assessment process, and the paperwork from the machine safety evaluation, as well, is the proof the company did its due diligence to provide the highest level of safety to protect valuable personnel. “If someone does circumvent the safety measures and is injured, you are probably not going to be held liable,” Sandzik says.

Clear up the confusion

It is not surprising that OEMs and end users have many questions and concerns when beginning a machine safety evaluation or risk assessment. More and more companies are beginning to understand the need to bring in a safety specialist.

“The process is confusing and there are a lot of components to it,” Sandzik says. “If you want to meet the safety standards that apply to your industry, you have to delve in and figure out what they mean. While you may have some people on staff that understand some of the standards, you aren’t in business to know everything about standards. It is something that takes a lot of time and energy to understand.”

Manufacturers must find a source that has experience in machine safety and can identify what steps need to be taken to comply with national and international safety standards. ABB Jokab Safety Products, for instance, offers more than 30 years of experience and has a complete line of machine safety components and systems. Some of these sources, including Jokab, offer training courses on risk assessment and machine safety standards. Whether it is for a machine safety evaluation or risk assessment, by collaborating with an experienced second party, the end result is a safer workplace for a company’s personnel. It also includes protection for a company’s equipment, which will improve the bottom line.

A final step in implementing a machine safety program is system validation. Validation establishes evidence that provides assurance that a system accomplishes its intended requirements. This is often an external process by a qualified third party.

“After you’ve done your due diligence, bring in an unbiased third party that has not sold you the system and products to evaluate if your safety program does everything it is supposed to do,” Sandzik says. “There are a number of people out there doing this, as well.”

It should be noted that a machine safety evaluation or risk assessment will not prevent all accidents. “You can’t eliminate all problems when working with machinery,” Sandzik says. “Even though you’ve looked at it every way you can, something can slip through. But what OSHA or anyone else needs to know is that you did your due diligence. You have done what you can to reduce the risk.”

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