



OMRON

Machine safety myths

Ten common misconceptions
to watch out for

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Introduction

Although the consequences of inadequate or misplaced machine safety practices can be severe, there are nonetheless a number of misunderstandings in existence that put many facilities – and their employees – at risk for accidents. At Omron, we assess and evaluate over 3,000 machines per year across the globe, and we've seen the ways in which a lack of safety knowledge and proper training can lead to poorly functioning safety systems. For this reason, we decided to investigate the causes of machine safety misconceptions and present them in a white paper format to help manufacturers better understand this important topic.





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What trends are currently causing a deficit in machine safety knowledge?

Misconceptions about machine safety are currently on the rise in part because older workers are retiring in large numbers with few mid-career workers to inherit their expertise. This trend is causing many industrial facilities to lack the engineering expertise required to ensure that their machines meet modern safety standards.

In addition, an increase in the prevalence of newer, fully automated solutions may in some cases lead to complacency, as manufacturers believe (mistakenly) that their new systems must be compliant. This brings us to our first machine safety myth.



Myth #1: If a machine is brand-new, then it must be compliant

This is false. Generally, in the Americas, OEMs have no legal obligation to include safety measures on their machines. This is usually due to cost considerations, as safety products and compliant solutions may make the OEMs less competitive in the market. Furthermore, safety usually isn't a core competency of these companies, so they avoid designing safety solutions that they have little expertise in. All of this means that safety measures have become the responsibility of the end user.

End users, of course, also face the need to minimize costs. This can unfortunately lead to a tendency to cut corners on a safety system. In some cases, manufacturers worry that safety measures hamper productivity and make processes less efficient. Although it's true that safety systems can slow down some processes, their benefits far outweigh the costs. Poorly designed systems can lead to serious injuries or even death, and there's no excuse for knowingly putting someone's life in danger. Furthermore, when it comes to costs, safety measures actually save money in the long run by helping to avoid expensive, traumatic incidents. Although the upfront investment is always a consideration, it shouldn't deter facility leaders from implementing a solid solution. In fact, if there's one myth to debunk in this white paper, it would be that the cost of safety measures is too high.

Myth#2: Safety is too expensive, and it reduces productivity and efficiency by adding extra steps to key processes

The costs of an accident – which could be several times the initial investment in safety infrastructure – immediately demonstrate the falsehood of the above statement. These costs include not only fines and workers' compensation, but also lost productivity due to poor morale. An on-the-job injury affects not only the injured person, but also the employees who witnessed the accident or learned of it after the fact. The stress of the event and the resentment towards an employer that failed to protect its people – particularly if the employer is found to have knowingly ignored safety standards – is likely to lead to apathy and higher turnover.

To address the effect of safety measures on overall productivity, it's important for manufacturers to note that safety measures can be designed in ways that don't impact the efficiency of the machine. An example of this would be an application that uses a safety laser scanner to minimize downtime in areas with collaborative robots. In this scenario, if a worker enters the robot work area, the safety laser scanner will trigger the robot's reduced speed mode and cause it to slow down to a safe operating level. When the employee steps out of the area, the robot will go back to its faster speed.

Misconceptions about administrative controls and training vs. good engineering

Some manufacturers mistakenly believe that they can substitute engineered safety solutions with enhanced training and the implementation of strict guidelines for employee behavior around dangerous machinery. Although thorough training is obviously beneficial and necessary, the presence of administrative controls alone doesn't constitute a true safety solution. It's not enough to simply change the way employees work; there must also be safeguarding measures in place to physically prevent them from entering the hazard zone. This brings us to our third major misconception.

Myth #3: Good administrative controls and comprehensive employee safety training can replace good engineering

Thinking along these terms can put employees in harm's way. The foundation of machine safety consists of a hierarchy of controls published by the National Institute for Occupational Safety and Health (NIOSH), which lists administrative controls and personal protective equipment (PPE) as the least effective ways to mitigate risk. Physically removing the hazard ("Elimination") and replacing the hazard ("Substitution") are the most effective measures, but these can be impractical. Engineering controls form the middle ground for protecting operators from hazardous machine motion.

Trends leading to a lack of machine safety knowledge

Why are machine safety misconceptions currently on the rise?

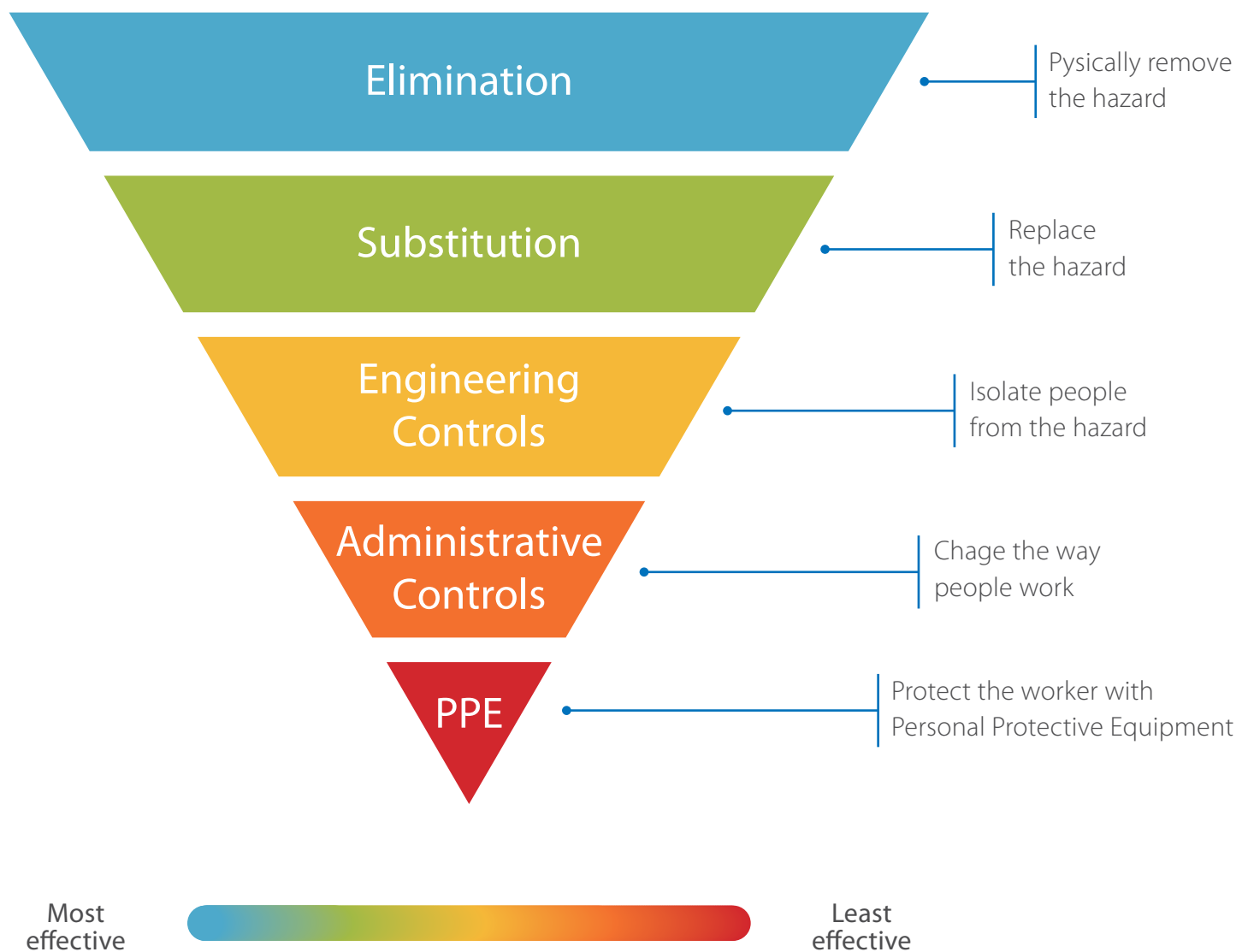
The trends underpinning this issue are likely to include the following:

- Older workers are retiring in large numbers, and there are relatively few mid-career workers to inherit their expertise.
- Manufacturers often mistakenly believe that automated systems are compliant by default.
- End users don't always understand that OEMs have no legal obligation to include safety measures on their machines.
- Companies face the need to minimize costs, causing a temptation to cut corners on safety system implementation.

The Hierarchy of Controls

What safety measures are most effective?

The NIOSH Hierarchy of Controls graphic shows that administrative controls and PPE are among the least effective ways to mitigate risk. When it's not possible to physically remove or replace the hazard, engineering controls are the recommended safety measure.



Misconceptions about exemptions older equipment and smaller companies

Retrofitting a safety system onto legacy equipment can be a challenge, and some manufacturers are under the impression that older equipment doesn't fall under the same standards as new equipment. They cite the fact that these machines were built before certain safeguarding standards came into

existence as justification for their decision not to implement engineering controls. However, the idea that older machines are exempt from safeguarding requirements is a myth that can easily lead to a standards violation and possibly a serious accident.



Myth #4: Older machines can be “grandfathered in,” so they don’t need safeguarding

No equipment is exempt from current machine-guarding standards, and so-called “grandfather clauses” simply do not exist for machine safeguarding. An exemption does exist under some robot standards, and it applies to a robot’s safety circuit integration. This very narrow exemption has led to some confusion as manufacturers mistakenly interpret it to apply more generally.

The underlying reason for the resistance to retrofitting legacy equipment with current standards-compliant safeguarding is the cost. This concern also relates to another misconception that exemptions exist when there are none, this time with regards to smaller companies. Smaller manufacturers have much less cash on hand than larger manufacturers, so there’s a tendency to believe that the rules don’t apply in the same way.



Myth #5: There are machine safeguarding exemptions for smaller companies

This is false. All companies are required to safeguard their machines properly and protect the lives and safety of their employees. What may depend on company size is the amount a company is required to pay in case of a safety violation. In general, regulatory agencies see enforcement actions as way to motivate compliance, rather than simply functioning as punitive measures. Regulatory bodies often have discretion in the nature and size of an enforcement actions. They can issue a warning or a fine, or – in extreme cases – lock out noncompliant equipment. In determining the appropriate level of enforcement, the agencies will look not only at the seriousness of the infraction and whether it’s a repeat violation, but also what would be necessary (within statutory limitations) to motivate the offending company to bring its equipment into compliance. In this current year, OSHA fines have ranged from \$964 to \$13,494 per serious violation.



Misconceptions about identical machines and machines that have been moved

Another way that some companies seek to cut corners is to avoid performing risk assessments on machines that are very similar or that have been moved or modified slightly. This brings us to machine safety myths #6 and #7.

Myth #6: When several machines are identical, it's only necessary to do a risk assessment for one of them

This is not necessarily true; it depends on the complexity of the machine. Even seemingly insignificant differences between machines and their positioning relative to one another could change the outcome of a risk assessment. For instance, the addition of a small step to one of several otherwise identical machines could be sufficient to place a worker in harm's way.

Myth #7: If a machine was assessed for risk before it was moved to a new location, there's no need to do another risk assessment

As with the previous myth, this depends on the complexity of the machine. Moving it to a new location could create a requirement for a new risk assessment. When assessing access to a hazard on a machine, Omron's safety experts use a system known by the acronym "AUTO" to determine whether an employee can reach around, under, through or over a safeguarding measure to reach a hazard area. When a machine is first assessed in its original location, there may have been a wall or another structure blocking access to part of it. Once it's placed in a new location, the immediate surroundings may not block access in the same way, giving employees unrestricted access to the hazard. Similarly, the new location may include nearby steps that allow someone to reach over a guard in a way that they couldn't have done previously.



Engineering-specific machine safety misconceptions

The more technical aspects of a safety system can also be rife with misunderstandings. Here are a couple of the more frequent ones we've come across during our risk assessments.

Myth #8: A gate using a padlock to prevent access is an acceptable and sufficient safety measure

This is false. Movable guards providing protection against hazards need to be interlocked to signal the apparatus to stop. Fixed guards should be securely held in place either permanently (by welding, for example) or by means of tamper-resistant fasteners that make it impossible to open the guards without using tools that aren't readily available to operators on the manufacturing floor. Since the guards must never remain closed without their fasteners, a gate must be fastened shut or interlocked.

Myth #9: Performance requirements for safety measures stop at the wire

This misconception has to do with the ways in which various energy sources must be safeguarded. Many manufacturers believe that safeguarding is only necessary when the energy source is electrical. As it turns out, all hazardous energy sources need to be "single-fault tolerant," including hydraulic and pneumatic sources.



The "AUTO" acronym for risk assessments

Key factors include the following:

When assessing access to a hazard on a machine, Omron's safety experts use a system known by the acronym "AUTO" to determine whether an employee can reach around, under, through or over a safeguarding measure to reach a hazard area. This is why manufacturers should always have a new risk assessment performed if a machine is moved or altered in any way.

What to look for in an assessment service provider

Given the sheer number of misconceptions that exist with regard to machine safety, it's more important than ever for manufacturers to have thorough risk assessments performed on their equipment by a trusted provider. When selecting an assessment service, companies should make sure that the team is composed of safety experts and engineers rather than sales professionals. The provider needs to have a thorough understanding of machinery control systems and should hold relevant industry certifications from a professional certification organization (such as TUV Rheinland) and, in some circumstances, professional engineering credentials. They should also have professional liability insurance.

In addition, these risk assessments should be performed on a regular basis, not just with the acquisition of new equipment but also in accordance with any modification to or relocating

of existing equipment. This brings us to our final myth, the debunking of which should come as no surprise given the conclusions of the previous ones.

Myth #10: Safety is something you can just take care of once and then forget about.

This is completely false. Safety is an ongoing requirement, and companies must have regular risk assessments performed on their machines to ensure that they meet the most recent safety standards. Standards evolve with the purpose of making workplaces safer, and it's imperative for manufacturers to stay up to date and protect their employees.



Summary

We hope that this white paper clarifies not only the need for regular risk assessments, but also the importance of seeing past the common safety misconceptions to understand what's actually needed to protect workers in manufacturing environments. When it's not feasible to completely remove a hazard, manufacturers must put the appropriate engineering controls in place to isolate

the danger source from the operator. There's no justification for cutting corners in this situation, and it's not worth the risk (and financial penalties) of a serious on-the-job accident. A robust and frequently updated safety solution is always a worthwhile investment.

References

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