Improving the results of your EH&S program

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Shifting focus from avoiding negative outcomes to achieving positive results.

Most organizations use two fundamental metrics to measure the success of the environmental health and safety (EH&S) program: regulatory compliance and reduced incident rates. While these are certainly valid and important performance indicators, they only measure past results. Moreover, the organization’s primary focus is on avoiding negative consequences rather than striving for greater performance by improving safety, productivity, competitiveness, sustainability and overall profitability.

That’s not surprising, considering industry historically has viewed safety practices as punitive actions or compliance activities rather than as opportunities to deliver value or gain a competitive edge.

It’s also becoming easier to understand why safety should be considered a sustainable business imperative, much like product quality, since a single significant failure can dramatically change customer and investor perceptions of your brand. Increasingly, company stakeholders are realizing that automation technology, including machine safety equipment, can deliver positive, business-enhancing benefits for EH&S programs, while mitigating risks and reducing costs.

Machine risk mitigation has a recognized hierarchy:

- Eliminate the risk – Design the hazard out to reduce unnecessary motion and exposure.
- Physical barriers – If the hazard cannot be designed out, install fixed guarding to provide a barrier to the hazard and reduce exposure.
- Monitored access – If a physical barrier cannot be installed, then monitor access to the hazard to prevent unsafe conditions from occurring.
- Awareness means, Personal Protective Equipment (PPE) – If exposure to unsafe conditions cannot be prevented, then personnel must be protected from injury by the conditions.
- Training and Procedures – If personnel cannot be protected from exposure and potential injury, then administrative controls regarding work procedures must be in place to minimize the potential for injury.

EH&S professionals often initiate hazard assessments to look for potential points of exposure beyond the administrative controls. For best results, EH&S staff should partner with others in the organization or with third-party machine safety specialists to implement solutions that best address the identified hazards.
In many cases, the application of automation technologies improves organizational behavior and serves as a bridge to other practices to help boost productivity, increase efficiency and improve overall safety, sustainability and business performance. This includes financial returns, such as from improved manufacturing output, energy savings and reduced waste, beyond the benefits of reducing costs associated with accidents, medical expenses and regulatory noncompliance.

Recent research shows that manufacturers with mature, executive-endorsed EH&S programs see benefits that go well beyond compliance, according to Matthew Littlefield, senior research analyst at Aberdeen Group. The analyst group surveyed nearly 200 organizations and found on average, these organizations enjoy a 4 percent higher OEE, a 71 percent lower injury frequency rate, and 50 percent larger reduction in energy use.

“Clearly, these organizations see EH&S as a strategic enabler of operational improvement and support these programs with automated and integrated tools that enable more than just Compliance Management, but also Risk Management, Performance Visibility, Analytics, and Reporting,” Littlefield said.

Outdated Practices

At the plant floor level, many of today’s assembly and machine operating stations employ technology and safety practices that focus more on reaction than anticipation. In worst cases, some applications were developed with a blind eye toward safety – relying only on the operator and maintenance technician to be alert to hazards. Others were deployed as an afterthought – in response to an accident or new industry standards.

Also contributing to this reactive approach were the limitations of safety technology, which often required machines to come to a full stop to be considered in a “safe state” for repair, maintenance or anytime operator access was needed. Because this downtime due to a safety event decreased productivity, operators and maintenance personnel often bypassed safety systems, risking their own safety in the process. Still other systems were developed with safety in mind, but were improperly implemented and the equipment lacked required productivity – using a “trade off” mentality that resulted in neither being fully optimized.

Such risks are no longer acceptable or necessary, thanks in large part to progressive, enforced global standards, significant technological innovation and risk management. When deployed properly using a proactive approach, today’s safety automation devices allow the best of all worlds – a safer environment for employees, reduced environmental impact, better processes and optimized productivity.

The Impact of Standards

Though safety standards have continued to change throughout manufacturing history, the most recent wave of revisions improves the way machine safety systems will be designed. These are commonly referred to as “functional safety standards.” A key difference in these global standards is they add a time element to the “performance level” rating of safety devices. Known as the Probability of Dangerous Failure, this time element adds a confidence factor that the safety device will perform well into the future.

A fundamental shift in two essential and related areas has helped make this new functional approach to safety possible. The first is major developments in physical guarding and safeguarding control technologies (i.e. light curtains, safety relays) – most notably the advent of new microprocessor-based technologies in lieu of electromechanical or hardwired control. The second is the evolution of global safety standards to allow these new electronic technologies to be incorporated into industrial safety systems.
This holistic approach can lead to opportunities for designing out hazards where possible, based on detailed risk assessments in the early stages of any new machine installation or upgrade. It also can help speed maintenance processes.

For example, safety guidelines historically required employees to remove all sources of energy from a machine in order to gain access to the machine to perform maintenance operations, a process known as lock-out/tag-out. This often time-consuming process reduced the machine’s overall availability for production. Furthermore, plant maintenance personnel often bypassed it to avoid time delays.

With changes to safety standards and the advent of new, more sophisticated safety control, production line managers can create safety zones in applications that can be managed independently based on the specific operational or maintenance task at hand. This design flexibility helps reduce the time required for plant personnel to restore the machine to working order after performing the necessary maintenance, thereby improving productivity. It also reduces operator motivation to bypass the safety system, thereby improving plant safety.

**Safety Controls and Guarding**

Where hazards cannot be removed through design, plant safety or maintenance personnel typically will install a fixed physical barrier, such as a plastic or metal shield, that protects users from the hazard. When users require frequent access to the hazardous area, maintenance staff will install non-fixed guards, such as removable, swinging or sliding doors. In areas where non-fixed guards are impractical, safety personnel can employ guarding solutions that monitor the presence of the operator – rather than the status of the gate.

While relays and other devices prove effective, many safety applications require a level of programming or more sophisticated safety logic that is best met through a safety controller. Safety controllers offer significant benefits in multistep shutdown or ramp-down sequences, such as transfer line applications, because of their excellent reliability and ease of use compared to hard-wired relays. An integrated safety controller is an ideal solution for any discrete application requiring advanced functionality, such as zone control.

With properly designed safety controls and guarding, designers reduce access time for maintenance tasks while helping improve machine safety and efficiency.

As these examples illustrate, well-designed safety systems deliver production improvements that can cost-justify their implementation. Moreover, as functional safety standards evolve to accommodate technology developments, safety managers can take advantage of new automation tools to improve performance, such as safety mats, light curtains and interlock switches.

**Identifying the Hazards**

A risk assessment also will help improve the performance of an EH&S program. A safety program’s general objective is to help make people, processes and machines safer without decreasing productivity. Organizations that conduct risk assessments are several steps closer to achieving all the above – and in so doing, they help reduce risk and the costs associated with it.

Risk assessments give safety managers a method for identifying specific hazards on a machine or work station; quantify the risk these hazards present to employees; and evaluate practices that can help mitigate the risk. In addition, the process will specify the most appropriate safety circuit architecture required to mitigate the initial risk rating determined by the assessment team.
An effective risk identification process analyzes employee activities and the risks they have through defined work practices, or they could bring to the facility due to limited training or experience. Risk analysis should also identify risks inherent to workers, plant equipment or the environment through potential environmental exposure or limited safety protection measures in the event of improper installation or failures of the equipment. The magnitude of potential loss is reviewed from the most severe scenario, (i.e. a major injury and machine downtime), to the least severe scenarios, such as at-risk behavior and lower production levels. From there, the probability of a given loss occurring is calculated.

Once the risks are fully defined and understood, they must be designed out or mitigated to the greatest extent possible. Risk mitigation measures physically improve the machine and/or production process to reduce the potential of personal injury, environmental or property damage. A variety of effective measures can accomplish risk mitigation. For example, using safeguarding equipment – such as light curtains, safety relays and cable pull switches – helps reduce risk to employees.

Using a formal risk assessment process also provides the benefit of documenting any identified risks, the protective measures and safeguards implemented to mitigate them, and the residual risk remaining once these mitigation methods are deployed. Illustrating due diligence and good engineering practices in providing a safer work environment can potentially help a company lower its risks of litigation in the event of an incident.

After implementing and documenting the process, managers need to provide appropriate training and supervision. This is critical to make sure operators understand all pertinent safety measures, including proper use of personal protective equipment, and how to effectively operate the machines and safely perform their work. It also includes clearly defining and delineating their tasks and processes from those tasks to be implemented by specialized and trained maintenance personnel.

Measuring the effectiveness of training is a process, not an event. Ongoing activities, including behavior-based observations and simple performance evaluations, are effective tools in helping to confirm the effectiveness of training. The result of effective behavior changes and appropriate safeguarding designs is a reduction in incident rates and the associated cost impacts of them to the corporation.

| Most Effective | Eliminate Risk | \- Design it out  
|                |               | \- Process substitution |
|                | Physical Guarding | \- Fencing, guarding or barriers  
|                | \- Fixed covers |
|                | Monitored Access | \- Safety controls: Interlocks, light curtains, safety mats, monitoring relays, safety controllers  
|                | \- Lockout/Tagout (LOTO) |
|                | Awareness Means, Personal Protective Equipment (PPE) | \- Signs, warnings, annunciation lights  
|                | \- Safety glasses, gloves, footwear |
|                | Training and Procedures | \- Work procedures |

By understanding the elements of risk management and the methodology of a safety investment analysis, EH&S professionals can shift the metrics and focal point of how management views their job performance from a negative focus (incident reports) to a positive measure, such as cost savings, increased productivity and improved morale. This helps turn the weekly conversations between the EH&S professional and their superior into a more constructive, upbeat discussion,
rather than a run-down of the latest negative outcomes, i.e. injuries, accidents and regulatory compliance infractions.

The far-reaching effects of a well-designed EH&S program are too significant to overlook, especially in these lean times. By implementing a holistic approach to safety program design – which emphasizes proven automation technology, trained personnel and ongoing risk assessment, all working together – companies have a best practice template to help achieve the highest level of safety possible.

**Eight Key Elements That Can Enhance Your EH&S Program**

Establishing an effective safety program remains a top priority for EH&S professionals. As safety standards continue to evolve and new technologies emerge, the challenge for many organizations is where to begin – and what it will cost. The answer is different for every company, but Rockwell Automation has identified eight core areas of focus that should be considered as part of a comprehensive safety program.

1. **Conduct a Risk Assessment** – Widely regarded as the best place to start, a thorough risk assessment identifies the areas of risk on a machine or within a plant, and helps pinpoint the best people and the right technology to help minimize those risks. A risk assessment also helps companies establish acceptable levels of risk for their operations, which in turn helps determine what safety products they need. Performing a risk assessment up front helps chart the course for an effective machine guarding strategy (as part of subsequent planning steps) designed to protect a company’s investment in both personnel and machinery.

2. **Reduce Potential Hazards through Design** – Ideally, the best way to reduce a potential hazard is to design it out of the machine. When machine designers review the risk assessment and risk reduction process at the earliest stages of inception, they can more effectively reduce hazards – such as pinch points or sharp edges – that would have required guarding. It also helps ensure that machines are designed with the safety and integrity of the machine in mind at an early stage in the machine’s development.

3. **Consider Machine Guarding** – Sometimes hazards cannot be removed through design. In these cases, hard guarding offers a physical barrier that provides more protection at a relatively low cost. A variety of guarding options are available to help protect workers around specific points of an operation or machine or in a perimeter area. Common devices include safety mats, light curtains and interlocks. Determining how frequently a machine or area must be accessed helps refine the list of possible solutions. It’s also important to make sure the solution itself doesn’t cause another hazard.

4. **Add Advanced Controls** – In addition to applying the appropriate guarding devices, engineering controls can be implemented to help reduce potential risks. Electromechanical safety relays have been the backbone of safety control design for decades, offering a wide variety of functions and features. Safety-rated controllers provide more-advanced protection. These devices contain software required for critical safety functions and can take direct inputs from most safety products, such as light curtains, emergency stops and mechanical interlocks.

5. **Promote Awareness** – Encouraging safety awareness can help further reduce levels of potential risk. This can include adding appropriate signage, as well as using visual and audible awareness devices, such as stack lights or alarms. Awareness devices must be positioned where they will best serve their intended purpose. It is also important that audible signals can be heard over normal operating noise, and complies with current standards and regulations.
6. **Training** – Another key step toward reducing potential risk is providing appropriate instruction and training on safety procedures. All employees who may be exposed to machine or process hazards should participate in these training programs.

7. **Follow Up Assessments** – After installing safeguards, it's important to conduct follow-up assessments to verify the potential risk level was reduced to an acceptable level. Likewise, periodic follow-up assessments of safety methods and practices are critical to confirm that specific programs are being followed and remain effective.

8. **Rely on Experience** – When embarking on a safety program design or review, an experienced automation and safety component supplier who is well-versed in the current requirements that apply to the working environment is highly valuable. This partner should have a thorough understanding of the risk assessment and risk reduction process. When choosing a supplier, consider their ability to supply products, as well as address the device selection process and the development of new machine safeguarding specifications to help with certification and compliance demands.

Adopting these eight core elements into a safety program will help set the path for a more successful safety application that employees will use and that will support a healthier bottom line. It can also help shift the focus of how organizations rate the performance of EH&S professionals - from a focus on measuring negative outcomes, to gauging success based on positive results and forward-looking improvements.