

# Five steps to improving safety maturity

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*Building a corporate safety program that overcomes the challenges of company size, location and standards compliance.*

Whether your operations are based in one country or spread around the world, deploying an effective, holistic safety program that encompasses all of your plants, employees, machinery, standards and production goals is a substantial undertaking.

Even the most comprehensive companywide safety program can experience head-scratching inconsistencies from plant to plant. Maybe one of your U.S. plants was recognized with a “safest plant” award, and your plant in Germany is consistently a top safety performer, but your plant in Brazil is plagued with ongoing safety incidents. Perhaps your safety performance is strong across the board, but there are wild variations in safety-related machinery downtime and productivity.

One of the biggest challenges facing your corporate safety program, particularly if you are a global manufacturer, is the dispersed nature of your operations. You are responsible for hundreds or thousands of machines and equipment in plants spread out across multiple regions. You are also likely dealing with multiple business units, a diverse employee population with varying levels of experience, and a mix of standards.

In addition, many companies expand their manufacturing footprint, whether due to acquisitions or the establishment of new plants. One day they discover their safety programs are hindered by dated manufacturing applications that don't use the latest safety technologies and techniques.

This could include applications that rely on the operator and maintenance technician to be alert to hazards, or applications that are only bolted on in response to an injury-related accident. Some plants may still be using a black box approach in which the safety system is separate from the automation system and does not provide diagnostics or machine status information to help reduce nuisance shutdowns. Others still may be using safety technologies that optimize safety, but also result in unnecessary downtime events, which hurt productivity and the bottom line.

These dated approaches come with varying degrees of risk. A safety program that isn't committed to maximizing safety is the most serious offender. There are approximately 317 million workplace injuries and more than 2.3 million deaths resulting from workplace accidents or work-related diseases every year, according to the International Labour Organization.

Risks also extend beyond worker safety. In the U.S., 6 million nonfatal worker injuries cost businesses more than \$125 billion annually, according to the U.S. Occupational Safety and Health Administration. Safety-related events also hurt productivity and threaten the bottom line. Your safety program must be designed around not only how to keep workers safe, but also how to can enhance productivity around safety-related downtime events.

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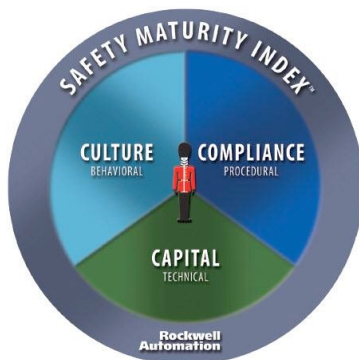
New standards and advances in contemporary safety technologies are enablers for improving safety and productivity, but an effective companywide safety program requires far more than technology add-ons. It requires a systematic approach that begins with a thorough evaluation of where your safety performance stands today and guides you through a step-by-step journey that impacts every plant, every machine and every employee. **Five key steps** are critical to evaluating, developing and implementing an effective, holistic, corporate safety program.

## The Rockwell Automation Safety Maturity Improvement Process

### Step One: Evaluate Safety Maturity

A holistic and effective safety program begins with forming a cross-functional team to conduct a comprehensive measurement of your current performance levels. At a minimum, this team should include engineering and environmental, health and safety (EHS) representatives who will need to make sure their productivity and safety goals are in concert, rather than competition, with each other. An effort should also be made to include operations and management personnel, ensuring a wider range of stakeholder representation and acceptance.

The team should seek to evaluate the three categories that are absolutely integral to effective safety: culture (behavioral norms), compliance (established safety and engineering procedures and practices), and capital (use of technology).



**Culture:** Your safety culture includes the behavior of both your company and your workers. A shared mindset must permeate across all employee levels (shop floor to top floor) that safety is a value – not simply a priority on a list with other shifting priorities. Safety must be more important than productivity, and vital to both the health of the employees and the sustainable success of the company. Ideally, this culture extends beyond your employees and throughout your supply chain to help prevent disruptions and reduce reputational risk. A strong safety culture also requires accountability, meaning that management is held accountable for safety metrics, and all safety incidents are reported with complete transparency.

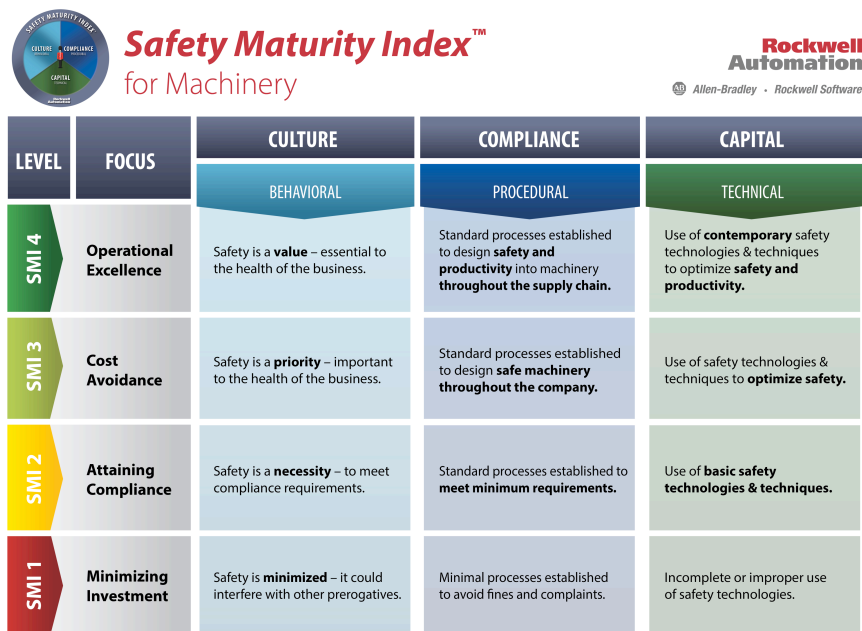
**Compliance:** Your company’s formal procedures and processes make up your safety compliance. Your engineering, EHS, operations and maintenance teams should be collaborating to establish functional safety standards and procedures that can help prioritize and mitigate risks. Compliance should also extend beyond your company walls and into your supply chains, because your suppliers’ preventable safety incidents and mistreated worker issues pose real risks to your brand and reputation.

**Capital:** Capital reflects your company’s safety technologies. Using the highest-performing, contemporary safety techniques and technologies can do more than optimize safety – it also can provide improved diagnostics, and reduce scheduled and unscheduled downtime to improve your productivity.

*Best-in-class manufacturers that thrive in these three categories achieve 5 to 7 percent higher overall equipment effectiveness (OEE), 2 to 4 percent less unscheduled downtime, and less than half the injury rate of average performers.*

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The Rockwell Automation [Safety Maturity Index](#)™ tool was developed to help you evaluate your company's performance in these core areas and provide measurements to see where you succeed and what can still be optimized.



Rockwell Automation has set specific steps and benchmarks for each element (culture, compliance and capital) and performance level (SMI 1 to SMI 4) based on studies of safety and manufacturing performance, and by collaborating with cultural development firms serving global manufacturers.

If your evaluation uncovers opportunities for safety culture improvement, consider working with a cultural development expert. Rockwell Automation is delighted to share contact information for several proven cultural development firms that we have collaborated with in the past.

If your evaluation shows opportunities for improvement in compliance or capital, Rockwell Automation has developed the following steps to help you chart a path forward:

### Step Two: Develop a Holistic Safety Strategy

It is important that your teams outline the nature and scope of the safety program. Your organization's specific needs will shape your program's unique identity.

Key considerations here include whether the program will span one country or the entire globe; the number of plants and/or divisions it will encompass; the current SMI performance level of those plants; whether or not it will include any acquired plants or businesses; the timing of the program; the roles and responsibilities of the personnel involved; the results you intend to achieve; and any documentation requirements.

As part of this step, you will want to develop a comprehensive inventory of machinery that can be used to help identify what machines exist at which locations. Every machine should be categorized according to its risk of serious injury and frequency of exposure to a hazard.

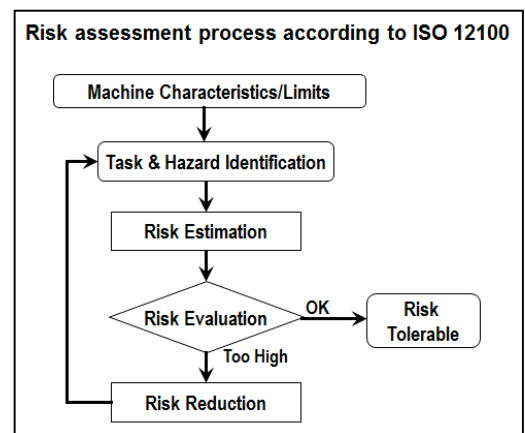
You will also need to determine which standards best meet your needs. This includes electrical, mechanical, ergonomic, safety, energy isolation and control standards. Whenever possible, work toward the most stringent and encompassing international safety standards, such as ISO 13849 and IEC 60261. These standards can allow for the use of contemporary safety technologies, such as safe-speed monitoring and zone control, which enable you to optimize safety and productivity. Using international standards also helps standardize your machinery to the most stringent Performance Levels or Safety Integrity Levels, ensuring that it meets regional requirements no matter where a plant is located.

### Step Three: Establish Compliance and Assessment Methodologies

Once you have determined the scope of the program and which standards best meet your needs, you should evaluate the conformity of your existing machinery against the appropriate standards and address noncompliance. ISO 12100 outlines a risk assessment process to help with risk reduction, and provides guidance for documenting and verifying your processes.

As you evaluate equipment, you will want to use an approach that can pinpoint specific improvement opportunities.

Before deciding on your risk-assessment approach, some key considerations include what kind of reports you will need to generate and how you want to document both initial and residual risk ratings.



Assessment methods can range from a more basic hazard assessment to an in-depth, team-based risk assessment. Rockwell Automation can help ensure an approach that best fits your needs.

### Step Four: Develop a Mitigation and Implementation Plan

Creating and implementing your plan is a complex process. But only through a comprehensive approach can you expect to achieve results that maximize productivity, minimize potential safety gaps and deliver a measurable return on investment (ROI).

Develop functional specs: Too often, manufacturers or safety solutions providers jump from the assessment phase to the mitigation strategy. In doing so, they are omitting a very important consideration: the safe day-to-day operation of machinery. Understanding the effect of each machine's functionality and safety system on each other enables you to identify opportunities – as allowed by the previously mentioned international standards – to optimize both safety and productivity.

Evaluating all human-machine interactions and how machinery needs to function in every mode of operation – including normal operation, maintenance, cleaning, setup and safety-related downtime events – allows you to define new opportunities to improve machine and line performance.

Determine acceptable risk: Safety standards provide several methods of risk reduction, but not every method is acceptable for every manufacturer. For example, you may consider signage to be insufficient or you may avoid the use of procedures because they are difficult to enforce with every employee, in every plant and in every instance. This may indicate a culture issue, which

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you can work to improve, but in addition, acceptable risk-reduction methods could include designing the hazard out of a machine or using fixed guards and interlocked movable guards.

Which methods are right for you? A tiered approach (or hierarchy) to risk reduction is often an effective way to determine which method(s) is appropriate. Your safety program should clearly establish for all plants the specific mitigation methods that are acceptable and when they are to be used.

<b>Risk Reduction Methods Hierarchy</b>
1. Design the risk out
2. Fixed enclosing guards or distance guarding
3. Interlocked guards or other safety devices
4. Awareness means, such as horns and lights
5. Safe working procedures and safety training
6. Personal protective equipment and policies

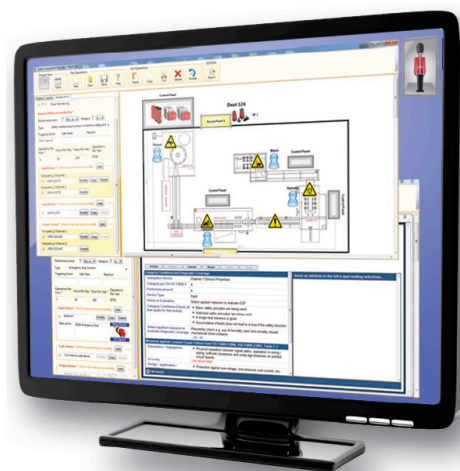
Develop design specifications: Next, you will need to determine the hardware and safety circuit levels that you will be using. Some industries now have minimum requirements. Food and beverage, for example, requires a Category 3 Performance Level D minimum safety design level, unless your risk assessment demands otherwise. You will also need to determine how you will use emergency stops and contemporary safety strategies, such as zone control, and build your standardized parts list.

Some companies are also taking the step of developing machinery-specification guidebooks for OEMs and machinery suppliers to standardize all of their safety systems. These guidebooks can include:

- Standard machine templates and designs
- Standard control platforms and components
- Standardized assessment methodologies
- Standardized acceptance forms and reports
- Standardized validation forms and reports

Determine ROI: The myriad sophisticated safety technologies, varying international standard requirements and the time-consuming task of designing your safety system can make for a daunting experience. A number of online and software tools are available to help you develop your safety projects, and quantify savings and productivity gains to justify the costs of your safety investments.

Specify installation requirements: Too often a safety system will fail because specifications were not developed for the installation of a mitigation solution. You need to be sure to specify how your safeguards are to be installed to prevent incorrect or inconsistent installations that could lead to a safety incident.



A standard, for example, may specify that a fixed guard requires a tool to be removed. As a result, your installation specification should spell this out so an easily removable thumb screw isn't used.

Other examples include specific interlock types and mounting considerations, installation and location of sensing devices, and the location and mounting processes for emergency-stop devices. Even the specific formats, locations and fonts used for signage should be articulated in your installation specifications.

### **Step Five: Verify, Validate and Maintain the Program**

Verifying your safety system requires that you perform an analysis to prove the system is properly set up and meets specified performance-level requirements. Electricians and engineers must confirm the safety system is wired and configured correctly, according to installation instructions.

Validation is a functional test that confirms the safety circuit works correctly. It is carried out in normal operating mode and also requires fault injection in all identified modes of operation. Make sure your validation process aligns with the requirements of the applicable standard.

**ISO 13849-2** requires that you plan and document your safety system validation. A third party, independent of the safety system design, should perform a variety of testing methods to confirm the safety-related parts of a control system interact correctly and perform safety functions as intended.

**IEC 62061** also requires a documented plan that includes when the validation takes place, identification of the machine's operating modes, criteria that define pass/fail for validation, and the identification of corrective actions that will occur in the event of a failure.

Remember: Validation requires that *all safety functions* on your system – the protection method, circuit and components – are proven to work correctly.

Implementing a safety program that accounts for each of these considerations can be a major accomplishment, but implementation itself is not an end. Safety is a constant journey, and your safety systems must be continually maintained, improved and measured just like every other aspect of your plants. Implementing procedures, methods and guidelines that ensure safety systems are maintained and re-evaluated on a regular basis can help ensure continued compliance.

Ultimately, safety should be approached with the same mentality as productivity, with a goal of constant improvement. Particularly as contemporary safety technologies flourish and standards evolve, your corporate safety program can flourish and thrive in new ways if you are committed to its improvement.

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