



# How **Global Standards** Affect Machine Builders

*Complying with international safety standards gives machine builders a competitive advantage while providing manufacturers machines with excellent reliability.*

**I**nternational safety standards are reshaping how global machine builders approach machine safety system design. Do machine builders need to comply?

The answer depends on the machine builder's competitive goals and customer base. For those serving or seeking to do business with global customers, the answer is a definitive "yes." For those aiming to satisfy customer demands for machinery with improved safety and excellent reliability, the answer also is "yes."

Machine builders who currently only serve the needs of their domestic end users should also follow international standards as a guideline for best practices — not only to gain a competitive edge domestically but also to prepare in case they later expand to pursue global customers.

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## **Today's Key Standards**

Increasingly, global and multinational manufacturers around the world are moving toward following internationally accepted machine-safety system standards to improve flexibility and take advantage of technologies supported by updated standards.

The European Union standards' bodies (CEN and CENELEC) elected to mandate two of the most rigorous machine safety standards: the International Organization for

Standardization (ISO 13849-1/2) and the International Electrotechnical Commission (IEC 62061). As a result, any machines shipped into or out of Europe must comply with one of the two standards after the final withdrawal of EN 954-1 in 2011.

In addition, many machine builders that design machines destined for Europe will need to comply with the European adoption of these international standards.

Increasingly, manufacturers, especially global ones, are seeking machine builders that understand how to design machines in line with these international standards, according to Mike Miller, FS TÜV expert, global safety market development, Rockwell Automation. In some cases, it's mandated to do so in order to

manufacture in these countries.

More and more, manufacturers follow internationally accepted standards to streamline their plants globally. These global manufacturers can be assured they're investing in safe machinery with excellent reliability that helps protect workers and equipment. They understand the inherent business value in investing in contemporary machine safety systems and standardising their plants worldwide. These upfront investments help reduce incidence, minimise

training and maintenance costs, and often increase productivity.

## **The Role of Time and Risk Requirements**

Historically, machine control-system safety standards were prescriptive in nature, simply providing guidance on the structure of control systems to help meet safety requirements. The newer international safety system standards are more rigorous in their design requirements and provide a more quantifiable methodology to help attain overall safety system performance and integrity.

Miller explains that the international standards add two very important elements to the definition of the reliability of the machine's safety function: time and risk. These two elements help machine builders take advantage of a more methodical approach to safety system design.

Both international standards require machine builders to identify and document the potential hazards associated with a machine and the risk levels the hazards present to users. The safety system is then designed to the level of risk associated with the hazards present on the machine. This allows the machine designer to design the safety system to the correct functional level.

Appropriate documentation proves a machine's level of safety, and designers can better justify a need for a safety system upgrade. In addition, operators can be more confident in the reliability of a machine's safety system.

Just how easy is it for machine builders to comply with these standards? The requirements are summarised below.



**ISO 13849-1.** To comply with ISO 13849-1, a machine builder is required to define and document the statistical probability of an unwanted occurrence or dangerous failure, or the calculated mean time to dangerous failure (MTTFd). A machine builder must also define and document the machine's structure, or hardware configuration (often called categories), and its ability to detect dangerous failures, called diagnostic coverage.

Each component in a safety system must have an assigned probability of, or mean time to, dangerous failure. By adding the "time" element and the ability to detect dangerous failures to the existing safety structure approach, the ISO 13849-1 standard forces the designer to validate that the control system does what is required of it.

This standard applies beyond electric/electronic systems to include mechanical, hydraulic and pneumatic safety-related parts of the control systems.

**IEC 62061.** To comply with IEC 62061, a machine builder is required to describe the amount of risk to be reduced and the ability of a control system to reduce that risk in terms of safety integrity level (SIL).

The machinery sector uses three SILs; SIL 1 is the lowest and SIL 3 is the highest. A SIL applies to a safety function. The subsystem making up the system that implements the safety function must have an appropriate SIL capability. Conducting a risk assessment helps a designer define the amount of risk to be reduced and

the SIL claim limit that safety-related control function must meet.

Both the documentation process and the performance-based approach help make it easier for designers to quantify and justify the value of safety.

Previously, a designer might have had difficulty understanding – or explaining – why a costly or seemingly sophisticated safety system was needed for a particular application. Now, with the ability to quantify circuit reliability through specific performance and system integrity calculations, the designer can show the value in terms of actual risk reduction, thereby, more easily justifying the value of safety. Furthermore, machine designers can leverage the required documentation to cost-justify a system upgrade that includes a more effective safety solution.

Requiring designers to document risks and the control system's ability to reduce those risks also increases a machine builder's confidence in the reliability of the safety components. Because the standards are designed to assess risk over a prolonged period, a machine's safety system can be more predictable in the long term. This can help enhance a machine operator's confidence while operating a machine and, in turn, can help increase protection and productivity on the job.

Ultimately, a more predictable machine is a machine with improved safety. A machine with improved safety is a more productive machine.

## Helping Machine Builders

In support of the industry's move toward internationally accepted standards, automation suppliers are taking measures to help machine builders fully understand the benefits and meet the requirements of machine safety control systems standards. These include getting safety products certified and offering education, training programs and tools.

For example, Miller explains that Rockwell Automation® provides a product library file designed for use with the SISTEMA calculation tool from Germany's IFA, and a PDF file designed for manual calculation. Functional safety data, including the SISTEMA calculation tool and library, can be downloaded at the Rockwell Automation Safety Solutions Portal ([www.rockwellautomation.com/services/safety/](http://www.rockwellautomation.com/services/safety/)). Also available on the Rockwell Automation Safety Solutions Portal are white papers, animations on safeguarding techniques and technologies, and archived versions of a functional safety webinar series ([http://discover.rockwellautomation.com/SA\\_EN\\_Functional\\_Safety.aspx](http://discover.rockwellautomation.com/SA_EN_Functional_Safety.aspx)).

Miller sums up the importance of international standards: "The machine safety world continues to change, and the European Union's mandate of rigorous international safety standards represents the global trend toward standardisation. Ultimately, this will provide more flexibility to achieve and cost-justify designs, safe machine control systems and more consistency across plants." AT