

Creating Best-in-Class Machine Designs

Machines that are optimized for safety, compliance and productivity can give machine builders a unique competitive edge.



Best-in-class industrial safety involves three principal areas: culture (behavioral), compliance (procedural) and capital (technical). Machine builders that embrace these elements to their fullest can create high-value, globally compliant machine designs that improve safety and productivity. This can give them a unique competitive advantage and help better meet the needs of multinational customers.

In Brief:

The Problem

Machines built to minimal safety standards fall short of optimal performance, are ultimately costlier to design and build, and reduce usefulness to the end user.

The Risk

Standing out from the competition today requires delivering machines that optimize productivity and use safety to help protect workers with minimal impact on downtime. Anything that falls short of this best-in-class performance can place machine builders at a competitive disadvantage, as well as increase worker risks and machine builder liability.

The Solution

Building machines that adhere to global safety standards and make optimal use of alternative measures can reduce costs, improve the machine's usefulness, and strengthen a machine builder's brand and customer appeal.

LISTEN.
THINK.
SOLVE.™

Separate the Best From the Rest

Machine builders can leverage best-in-class safety in their machine designs to help end users achieve significant productivity gains and comply with modern safety standards. This can help differentiate their offerings from the competition and cost-justify higher-value machines.

And because machines with best-in-class safety can achieve compliance with global safety standards, machine builders can use them to consolidate their product portfolios – from multiple machine models to common designs. This can help reduce design costs, minimize software and spare-parts requirements, streamline start-up and engineering support services, and simplify maintenance for end users.

Globally compliant designs also can meet the needs of multinational customers that use the most-demanding safety standards, ISO 13849 and IEC 62061, as the common standards for their operations in any location. And they can help machine builders reduce their own product liability risk and future-proof their offerings as regional machine safety standards continue to harmonize toward these global standards.

However, machine builders can't expect to deliver best-in-class safety to customers until they first embrace it in their own operations.

“Many of our customers come to us with compliance issues. But if we can provide machines that maximize uptime in addition to complying with appropriate safety standards, we're able to add value and become a true business partner.”



Manager of engineering and R&D, Bevcorp

2014 Manufacturing Safety Excellence Award winner

Three Pillars of Best-in-Class Safety

Many in the industrial world still view industrial safety as a burden on productivity. However, research by The Aberdeen Group has repeatedly found that top-performing companies, defined as the top 20 percent of aggregate performance scorers, outperform their average-class counterparts in key areas of both safety and productivity, including:

- 5 to 7 percent higher OEE
- 2 to 4 percent less unscheduled downtime
- Less than half the injury rate
- Far fewer workplace incidents (1 in 2,000 employees vs. 1 in 111)

These results show that safety need not be a burden. Rather, a commitment to safety can lead to tremendous performance improvements and cost savings in industrial operations.

So, what are these companies doing differently to achieve world-class safety and operational excellence? While each may have its own unique approach, they do share common best practices that can be grouped into three core safety pillars:

1. Culture (behavioral)

2. Compliance (procedural)

3. Capital (technical)

Each of these pillars is equally critical and interdependent on the other two. For example, robust compliance procedures may be in place. But they will only be effective if the larger employee culture believes in and follows them, and if capital investments are made in technologies that address both safety and productivity.

By embracing these safety pillars to their fullest, machine builders can bring best-in-class safety to their own operations and to those of their customers anywhere in the world.

Culture

Machine builders with a strong safety culture do more than make safety compliance a priority. They make it a core value and a differentiating and competitive part of the value proposition to their customers.

This requires that every employee have a shared appreciation for industrial safety – from the executives responsible for promoting a world-class safety culture to the engineers responsible for designing safety-compliant machines. It also requires that employees never ignore proper safety practices, either in their workplace or in their machine designs and procedures.

Striving for continuous improvement is also integral to a best-in-class safety culture. After all, machine builders can't expect to deliver the best safety performance to their customers if they're not always seeking to become better in that area themselves.

“Employees who aren't honest about safety won't likely feel obligated to be honest about other things, which can lead to a culture of mistrust and dishonesty.”

Donna Rae Smith, founder and CEO of Bright Side

Some questions to help gauge safety culture include:

- Is safety a core company value and prominent part of strategic plans?
 - Is safety essential to the customer value proposition?
 - Do leaders and managers actively work to improve safety in the production and value of machinery?
 - Is safety performance ever sacrificed in machine designs, such as for regions where compliance requirements are less demanding?
 - Are employees rewarded for safety improvements and competency?
- Are field workers trained to manage the safety systems in their machines?
 - Do company leaders and employees coach customers about the value of safety?
 - Do all employees really “own” safety? Not just for themselves, but for their co-workers?

Compliance

Machine builders should establish standard processes to meet rigorous machine safety standards and maximize productivity. These processes should take into account the expectations of machinery operators, service technicians and others that will come into contact with the machine.

Performing a proper task-based risk assessment and considering all human elements involved with a machine is critical. Studies show that most machine safety incidents occur outside of normal operation.

For example, a bolt-on safeguard could be fixed over a hazardous spinning blade on a machine. But if workers need to clean that blade on a daily basis, they may look for a workaround – such as permanently removing the guard or reducing the guard fasteners. This would expose workers to the hazard and thus negate the safeguard. Therefore, a more flexible and user-friendly solution is warranted.

The Functional Safety Life Cycle, defined in IEC 61508 and 62061, provides a systematic approach to compliance that is universal and globally accepted. It involves first conducting a documented risk assessment to identify hazards and estimate probability of an incident and severity of harm. Then, it involves designing a safety system that helps mitigate those hazards, achieve compliance and improve productivity by making tasks easier and safer to perform. The goal is to design safety solutions that do not inhibit efficiencies while still attaining an acceptable reduction of risk.

Collaborative Machine Building

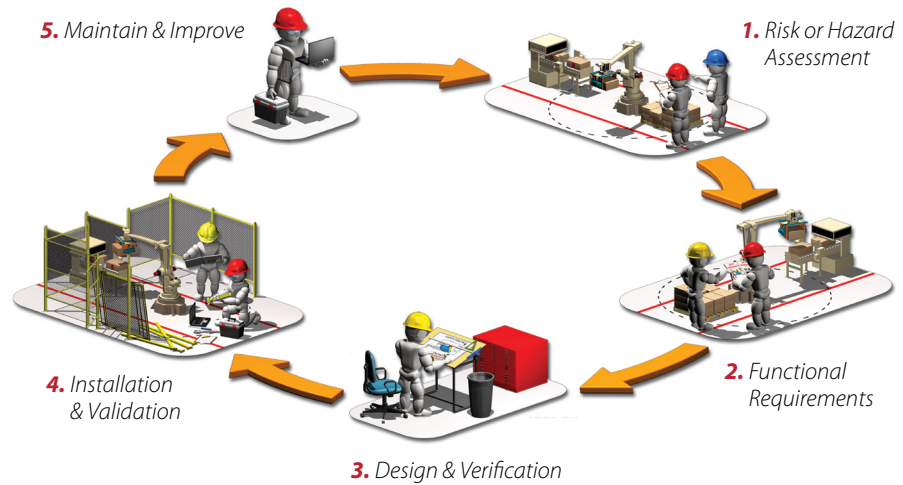
OCME, a global supplier of packaging, filling and handling solutions, makes a point to collaborate with its customers' engineering and EHS groups. It helps the company make sure its machinery achieves the goals of both sides.

"This is especially helpful for large multinational customers who are responsible for compliance across multiple plants," said Antonino Eneide, project and portfolio director, OCME. "We deliver systems with advanced safety features and documented risk assessments, so it's a win-win for both teams."



2016 Manufacturing Safety Excellence Award winner

Functional Safety Lifecycle



Capital

Contemporary machine safety technologies and techniques can help optimize both safety and productivity.

74 percent of best-in-class manufacturers say they use integrated safety technologies to improve diagnostics and reduce unscheduled downtime.

Aberdeen Group

Integrated safety controllers combine safety, discrete, motion, drive and process control into one system. They also can be connected to plant-wide information systems to give end users insights into safety and productivity metrics, including downtime, line efficiency, and safety system use or misuse.

Alternative protective measures, such as safe-speed monitoring and zone control, can be used in place of lockout/tagout for routine, repetitive and integral tasks. These strategies can enhance how end users interact with a machine by allowing them to make minor adjustments or service a machine while it is in a safer state. This can help reduce incentive to bypass safeguards for productivity.

In Australia's manufacturing industry, workers aged 25 and younger experience almost double the incident rate of older workers.¹

Optimizing Safety and Productivity in Beverage Equipment Bevcorp is a supplier of filling and blending equipment and services for the beverage industry. The company purposely designs contemporary safeguarding and automation controls into all of its machines to help its customers achieve significant productivity gains.

For example, by integrating a machine's safeguarding system and electronic bowl-level controls, the company eliminates the need for end users to shut down the machine for manual adjustments. On average, Bevcorp estimates this helps reduce product-changeover downtime by 30 percent.

"Bevcorp believes that it is important to design safety into every machine to help keep people safe, while also improving plant productivity and adding business value," said a manager of engineering and R&D at Bevcorp.

¹Work-Related Injuries Experienced by Young Workers in Australia, 2009–10, Safe Work Australia, 2013

Meeting the Needs of a Changing Workforce

Machinery must be designed for a more diverse workforce. Today, the average age of a highly skilled manufacturing worker in the U.S. is 56. And as these workers leave the workforce, they're being replaced by less experienced, early career workers.

Older workers generally require less strenuous interactions with machinery, including reduced bending, lifting and twisting, and fewer repetitive actions. Younger, less experienced workers require more passive safety systems, which automatically perform functions with little or no effort required by a worker. This can help mitigate risks of inexperience or inappropriate actions, such as placing a hand in a hazardous position.

Safety and productivity should be optimized with these considerations in mind.

Hazard assessments should take into account ergonomic and usability issues for a broad range of workers. For example, do operators need to lift materials, or could that be avoided by changing a machine or process design?

Contemporary safety systems are safer and easier to use than legacy systems. They can improve ergonomics, and reduce the probability that workers will override the systems and put themselves at risk.

Design strategies such as safe-speed monitoring and zone control can provide alternative protective measures to lockout/tagout procedures. This helps reduce physical demands put on workers and helps keep a machine running longer for improved productivity. It also helps reduce any "designed-in" incentive to bypass a safety system or procedure for the sake of efficiency or convenience.



Safety Maturity Index™ for Machine Builders

**Rockwell
Automation**

Allen-Bradley • Rockwell Software

LEVEL	FOCUS	CULTURE	COMPLIANCE	CAPITAL
		BEHAVIORAL	PROCEDURAL	TECHNICAL
SMI 4	Customer Value SMI 4	Safety is a value – essential to the value proposition of products and brand.	Standard processes established to design worker safety and productivity into each machine for shipment throughout the globe .	Use of contemporary safety technologies & techniques to optimize safety and productivity .
SMI 3	Operator Safety SMI 3	Safety is a priority – important customers and for risk management.	Standard processes established to design machinery for operator safety .	Use of safety technologies & techniques to optimize safety .
SMI 2	Legal Compliance SMI 2	Safety is a necessity – to meet compliance requirements.	Standard processes established to meet minimum legal requirements .	Use of basic safety technologies & techniques .
SMI 1	Minimizing Costs SMI 1	Safety is minimized – it could increase cost and complexity.	Build to customer specifications. Safety given no particular priority.	Incomplete or improper use of safety technologies.

Measuring the Three Cs of Safety

Rockwell Automation developed the Safety Maturity Index™ for Machine Builders tool to help machine builders identify and improve their standing in the three pillars of safety so they can serve customers around the world. The tool aligns with the Safety Maturity Index tool designed for end users, and is applicable to any industry, any company size and any location.

By answering a series of questions, companies see where they fall within four levels of maturity based on what factors are driving equipment design goals:

SMI 4: Customer Value

SMI 3: Operator Safety

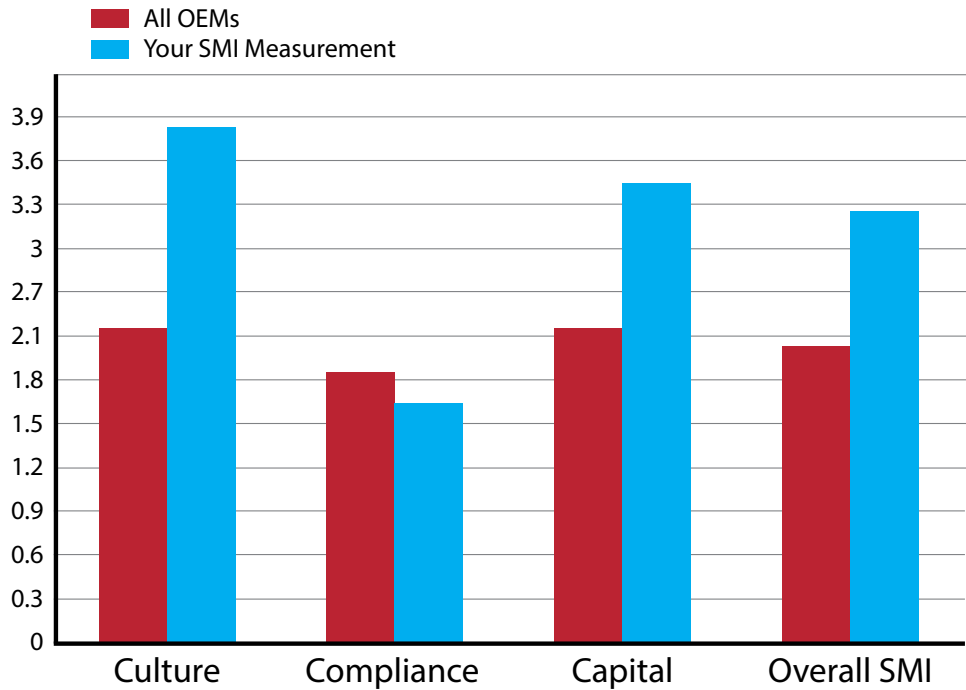
SMI 2: Legal Compliance

SMI 1: Minimizing Costs

The tool also provides insight to help machine builders determine which areas need the most improvement to attain best-in-class equipment design and performance.

Companies can use the tool to identify inconsistencies between their own facilities and benchmark themselves against peers. Companies can compare and baseline their scores across the three C's with others based on industry, region, size, and more.

Information shared in the Safety Maturity Index tool is confidential. Each company's profile is not associated with its responses or results.



	Your SMI Measurement	All Facilities
SMI Overall	3.2	2.2
Culture	3.8	2.3
Compliance	1.8	2
Capital	3.4	2.3

Safety as a Competitive Differentiator

Best-in-class safety requires achieving peak performance in all three pillars: safety culture, compliance processes and procedures, and capital investments in the proper application of contemporary safety technologies.

“Focusing on safety has enabled us to expand into new markets around the world. We build machines using the most stringent global safety standards while also continuously improving our own safety culture.”



**Mingjin Yu, vice president,
MESNAC**

*2016 Manufacturing Safety
Excellence Award winner*

Machine builders that accomplish this can offer the value proposition of optimized safety and productivity in their products. And they can meet the needs of global customers with high-value, globally compliant machinery. They also can create new revenue streams leveraging their safety expertise, such as with risk assessments, education and training services, or with safety-system retrofits on older legacy machines.

To take a self-guided, confidential assessment using the Safety Maturity Index for Machine Builders tool, visit:

www.rockwellautomation.com/global/go/smi-mb

“We differentiate ourselves from competitors by guiding our customers through the safety process and educating them on the opportunities safety presents. Some might not recognize safety as a fundamental part of the equipment, but by the time we’re done, they see the value.”



**Jason Stover, senior
electrical project engineer,
Paper Converting Machine
Company (PCMC)**

*2015 Manufacturing Safety
Excellence Award winner*

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