Workplace Safety

Machine Guarding: What's Changed in Industry 4.0 – Smart Factory

Gillian Scott | Mar 14, 2019

What You Need to Know

The increasing use of automation and data exchange in manufacturing, termed Industry 4.0, means new technology is being integrated into a variety of processes.
Smart factory similarly describes how increasing automation allows machines and equipment to improve processes through self-optimization.
Beyond improving efficiency and reducing waste, new technology can also play a role in increasing safety.
Smart technology is already being integrated into safety processes like machine guarding, helping protect workers from injury.

Imagine a manufacturing facility in which the machines can monitor their own safe use—recording how often machine guards are being moved or whether guards are worn and need to be replaced. Welcome to a smart factory, part of Industry 4.0 and the internet of things (IoT).

"Industry 4.0" is the name for the increasing use of automation and data exchange in manufacturing. That means new technology is being integrated into more manufacturing processes, including safety processes such as machine guarding, increasing efficiency and decreasing waste and costly mistakes.

Similarly, "smart factory" describes increasing automation, "an environment where machinery and equipment are able to improve processes through automation and self-optimization," says *Otto Motors*. "The benefits also extend beyond just the physical production of goods and into functions like planning, supply chain logistics, and even product development."

In an article in *Forbes* magazine, Manuel Grenacher, chief executive officer at Coresystems AG, calls Industry 4.0 "the next Industrial Revolution."

"Industry 4.0 is a current trend in manufacturing that involves a combination of cyber-physical systems, automation and the internet of things (IoT), which together create a smart factory," he says. "Industry 4.0 manufacturers worldwide are connecting their machines to the cloud and developing their very own industrial internet of things (IIoT). In doing so, they are scratching the surface of untapped potential,

which promises exponential growth and enormous scalability for their business."

The Internet of Things

Industry 4.0. Smart factory. The internet of things. They're all related concepts, but the terms have different meanings. The internet of things is the technology that is making Industry 4.0 and smart factories possible, says Brian Ray, writing for *IoT for All*.

But what is it?

"The internet of things revolves around increased machine-to-machine communication," Daniel Burrus of Burrus Research writes in *Wired*. "It's built on cloud computing and networks of data-gathering sensors; it's mobile, virtual, and instantaneous connection; and they say it's going to make everything in our lives from streetlights to seaports 'smart.' "

Burrus says the connection between sensors and machines is what really ties the IoT together.

"That is to say, the real value that the internet of things creates is at the intersection of gathering data and leveraging it," he writes. "All the information gathered by all the sensors in the world isn't worth very much if there isn't an infrastructure in place to analyze it in real time."

Cloud-based applications are a big part of the process, helping interpret and transmit the data from the sensors, Burrus says, and enabling quick responses to potential problems.

How Smart Factories Can Facilitate Workplace Safety

Beyond advances in production, Industry 4.0 and smart manufacturing processes can also improve safety.

"Companies are already using greater connectivity and data to create smarter, higher-performing production," Thomas Helpenstein, business manager of safety products and TÜV Rheinland functional safety engineer at Rockwell Automation, writes in *EHS Today*. "But such capabilities don't only benefit your production operations. By applying them to your industrial safety efforts, you can improve productivity, minimize downtime and improve your safety performance."

Helpenstein says the connectivity and real-time analytics offered by smart manufacturing processes can help transform safety process—as well as other parts of an operation.

"By connecting safety devices into your operations and giving workers more insights into those devices, you can boost productivity, identify and resolve common machine-stoppage problems, and even predict production issues before they happen," he says

Leverage 3D Printing to Create Machine Guards On-Site

At the National Safety Council Congress & Expo's Executive Forum in 2018, Michelle Garner-Janna, director of corporate health and safety for Cummins, said her company was actively using smart technology to enhance safety efforts, according to an *article in Occupational Health & Safety magazine*.

Among Cummins' Industry 4.0 initiatives? The use of 3D printing to quickly create *machine guards*. Cummins also uses QR codes on machines in some plants, allowing operators to easily access machine-specific training and other safety information.

Custom Safety Solutions

Malcolm Sharp, managing director of Fortress Interlocks' Australian operations, says increased automation is decreasing the need for traditional machine guarding while increasing the need for smart interlocks.

Fortress now allows customers to custom create safety components.

"Two years ago Fortress launched an online configurator, enabling customers to create complex safety products from our wide range of modules and components," *Sharp says*, noting there are more than 4.9 billion potential configurations. "Five years ago, such a configurator was unimaginable."

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Predict Maintenance Needs

"Smart machines can facilitate predictive maintenance by noticing part wear, recommending a replacement time and ordering a new part for delivery," says an International Manufacturing Technology Show press release.

"Today's computing power makes data analytics so fast, so users can gain insights and analyze the results rapidly," Peter R. Eelman, vice president of exhibitions and business development for the Association for Manufacturing Technology, *says in the release*. "AI will give users the ability to learn from that data so machines can fix problems on their own."

Track Use of Machine Guards and Safety Devices

"Safety data collected by smart safety devices can create a trail of bread crumbs that point you to larger issues impacting production," Helpenstein says. "For example, a production manager could see that an interlocked guard door is being used frequently and disrupting production. And when he discusses the high usage level with operators, he could discover that they're routinely opening the door to adjust a malfunctioning device."

Confused about what the "point of operation" means in machine guarding? Get visual guidance in our helpful infographic.

Monitor Lifetime Use for Safety

Collecting safety data over the long term lets facilities track performance over time, Helpenstein notes.

"Eventually, this data can help you predict when a device is nearing the end of its life based on its usage or age," he says. "Maintenance staff can then create a plan for replacing devices before they fail, while also making sure those replacements occur during planned maintenance downtime."

How are you integrating smart technology into your manufacturing facility?

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