



Robotics

Q&A: Expert Tips for Working Safely with Industrial Robots

Matt Morgan | Jul 10, 2025

Robots are integral to metalworking and manufacturing operations. Nearly *4.3 million robots were used in factories worldwide* in 2023, with more than half a million added each of the past three years. These machines are used for welding, workholding, assembly, sanding and finishing, material transport, and quality control.

As more facilities adopt the technology, they must also adapt their safety practices to protect the *humans working alongside the robots*.

Reviewing severe injury reports from the Occupational Safety and Health Administration (OSHA) from 2015–22, *researchers identified 77* robot-related accidents—mainly finger amputations and fractures of the legs, feet, head and torso. A search of *OSHA’s investigation summaries* shows two incidents in 2023–24 that involved workers injured by robots; both workers died.

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Malcolm Smith
LineDrive

To help employers better understand robot safety in the workplace, we spoke with Malcolm Smith, vice president of channel and business development at *LineDrive*, which supports many safety brands that serve the metalworking and manufacturing industries. Smith also consulted with industry experts including Cody Howe, an assistant professor of aviation at Minnesota State University, Mankato; and Bobby Byrd, senior solutions consultant in business development at LineDrive.

Here’s what Smith has to say about working safely with robots.

What specific risks do robots pose to workers in manufacturing facilities?

Smith: Robots introduce both physical and systemic hazards in manufacturing environments. Workspace design and traffic flow are top priorities. In a warehouse or distribution center, you have collisions and crushing errors from vehicles being run without a person manning them.

Industrial arms and autonomous mobile robots are supposed to stay within lanes and channels that are dictated by computer systems or automated systems, but when there are unexpected or uncontrolled movements, there is no person who can honk the horn or prevent a machine from running into a corner that may have ancillary impact that ends in injury.

Read more: Want the Best Robot for the Job? You'll Need a Job Description First

There are ***pinch points*** and entanglements, where clothing or limbs can be caught in moving parts. There are human-machine interactions, where misunderstood programming, failure in sensors or unexpected human behavior around robots can lead to accidents. Electrical and mechanical hazards, such as high-voltage systems and powerful actuators, pose inherent dangers.

Are employers and workers aware of these dangers?

Smith: Some are aware, but many are not.

When you think about the increase in automation and our dependency on automated environments and robots, people are becoming very comfortable. Workers might assume robots are always safe and predictable, leading to lapses in judgment or reduced attention.

And there isn't a lot of awareness of how to equip the workforce to transition into the space.

We're kind of tossing the keys to the car to someone—something—that you can't really reprimand and doesn't really understand the human impact of mistakes.

What can be done to protect employees who are working with and alongside robots on the job?

Smith: Employers should implement a layered safety approach. The majority of solutions are creating ***risk assessments*** that are specific to robot applications in the environment.

Next are engineering controls. Creating more barriers, light curtains, zone monitoring—things of that nature—will afford a sense of security, along with current SOPs (standard operating procedures) to where people feel like they aren't totally overhauling their systems.

There are procedures to force movement control. If you think about speed limits, where you have a lot of traffic in a warehouse, mechanisms force the speeds to be reduced, or that force certain indicators to light up prior to you moving into an environment where it could be hazardous.

Read more: With More Humans and Robots Working Side by Side, How Do You Keep Your Workers Safe?

Employee training is always going to be a factor. Focus on awareness, hazard recognition and emergency procedures.

Keep up with SOPs and regular audits. Take into consideration the ecosystem overall and how every area that you change impacts another area. Make sure that you're ensuring new employees are trained not just once when they start, but there's a pattern. And as updates are made, those updates are also communicated accordingly.

How might employers adjust their safety procedures to account for robots?

Smith: Manufacturers should integrate robotic risk into their broader environmental, health and safety strategy.

For example, traditional **lockout/tagout policies** should be adapted for robots with stored energy or autonomous decision-making. Use dynamic risk management—since robots can be reprogrammed or adapt, safety protocols must evolve alongside. Design a collaborative workspace where clear visual cues, physical separations and safe zones help manage human-robot interaction. Invest in smarter PPE (personal protective equipment), such as **wearables** that signal proximity to machines or mobile robots. Collaborate across functions, so that safety, IT, engineering and operations are all coordinating when deploying or upgrading robotic systems.

Evaluate the risk around all moving parts, automated processes, alerts, noise, functionality and human error into a fail-safe to create redundant systems.

*Read more: **Robots Can Make Workplaces Safer But They Bring New Risks, Too***

Until OSHA develops regulations governing robots, where can employers go to get guidance?

Smith: Employers can refer to **ANSI/RIA R15.06**, which is the leading U.S. standard for industrial robot safety, from the American National Standards Institute and the Robotic Industries Association. The ANSI standard is based on **ISO 10218**, the international standard for robot and system safety.

The National Institute of Standards and Technology (NIST) is starting to publish reports and **best practices around industrial robots**.

There are a few consulting firms that do a really good job. If they choose, companies can hire specialists in this area to help them build maps of where the risk exists and then plan forward in terms of solving for it.

Also, your manufacturers and distributors have a lot of resources at hand. **MSC** has spent time and energy in making sure they have best demonstrated practices in their own environment. Ask questions of their team: How are they managing their distribution network? How are they upskilling their team to be better equipped to ensure the safety of their employees in an environment where robots exist as well?

Continue to collaborate and learn. Those are pretty much the keys to the kingdom at the end of the day.

If you use robots in your facility, what are your top tips for maintaining worker safety? Share in the comments.