

## Robots See a Safer Future

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## EDITOR'S NOTE

It's commonly understood that robots can do the dull, dirty, and dangerous tasks that people shouldn't have to do. But robotics developers and users must still keep human workers and safety in mind as they build and deploy autonomous systems, respectively. Fortunately, guidance exists in the form of voluntary safety standards from the International Organization for Standardization (ISO) and other groups. Industrial automation, mobile robots, and service robots operate in a wide range of environments, each of which requires a safety assessment.

End effectors, payloads, and other equipment should also be considered in such assessments, note robotics safety experts. New sensing, software, and motion control technologies are making this easier. They are even helping collaborative robots start to converge with their industrial cousins.

In this Special Focus Issue, learn how robot safety standards themselves are evolving to keep up with the latest tools. We also look at certifications and partnerships focusing on protecting human workers, as well as at some applications that benefit from robots and best practices.

Not only can robots relieve human workers from hazardous or repetitive tasks, but they can also improve productivity, especially when human-machine interactions are optimized.



**Eugene Demaitre, Editorial Director**

Comments? E-mail me at [edemaitre@peerlessmedia.com](mailto:edemaitre@peerlessmedia.com)

### EXECUTIVE CONTACTS

**Group Publisher/International Sales  
Tom Cooney**  
[tcooney@peerlessmedia.com](mailto:tcooney@peerlessmedia.com)  
973-214-6798

**President and CEO, Peerless Media  
Brian Ceraolo**  
[bceraolo@peerlessmedia.com](mailto:bceraolo@peerlessmedia.com)  
508-663-1553

**Editorial Director  
Eugene Demaitre**  
[edemaitre@peerlessmedia.com](mailto:edemaitre@peerlessmedia.com)  
508-380-5457

**Associate Editor  
Cesareo Contreras**  
[ccontreras@peerlessmedia.com](mailto:ccontreras@peerlessmedia.com)  
508-663-1558

### SALES

**Western Regional Manager  
Len Petttek**  
[lpetttek@peerlessmedia.com](mailto:lpetttek@peerlessmedia.com)  
805-493-8297 office  
805-231-9582 Mobile

**Midwest/Eastern Regional Manager  
Michael Worley**  
[mworley@peerlessmedia.com](mailto:mworley@peerlessmedia.com)  
508-663-1561

### CLIENT SERVICES

**Director of Client Services  
Mary Ann Scannell**  
[mascannell@peerlessmedia.com](mailto:mascannell@peerlessmedia.com)  
508-663-1560

**Director of Marketing  
Karen Bligh**  
[kbligh@peerlessmedia.com](mailto:kbligh@peerlessmedia.com)  
508-663-1550

**Director Content Management  
George Kokoris**  
[gkokoris@peerlessmedia.com](mailto:gkokoris@peerlessmedia.com)  
508-663-1555

**Director Online Technology  
John Brillon**  
[jbrillon@peerlessmedia.com](mailto:jbrillon@peerlessmedia.com)

**Webcast Project Manager  
Steve Paul**  
[spaul@peerlessmedia.com](mailto:spaul@peerlessmedia.com)  
617-281-7125

**Office Manager  
Laurel Peddie**  
[lpeddie@peerlessmedia.com](mailto:lpeddie@peerlessmedia.com)  
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# Robot Safety Experts Outline Updates to Key Industrial Safety Standards

Safety is a key factor that developers, integrators, and users must consider for different types of robots.

BY CESAREO CONTRERAS



*Before safety assessments can be conducted, robotics developers, integrators, and users should know the latest relevant safety standards.  
Source: Getty Images*

**A**s robot manufacturers develop their systems to work in tandem with humans, several regulatory bodies around the globe are working on making sure those vendors are building with safety in mind. From the International Organization for Standardization to the American National Standards Institute, experts regularly convene to outline what robot makers should consider when building their machines.

That work is ongoing, and

these organizations continue to make changes as technologies improve and robots begin to be used for more applications. Luckily, the groundwork has been laid, Aaron Prather, director of robotics and autonomous systems at ASTM International, a global standards group, said in an interview with *Robotics 24/7*. But standards bodies must work fast to keep up with the changing industry.

“We have good bones is what I would say,” Prather said. “But

we’ve got a lot of work to do just to keep up. Also, we need to address some of the bureaucracy that exists within the standards framework.”

While many safety guidelines are voluntary in the U.S., companies have been incentivized to implement them to increase the safety of their systems. And in other parts of the world, particularly in Europe and Canada, governments are increasingly requiring more specific robotic safety measures.



**Updates coming to ISO 10218**



Carole Franklin

There is some work being done to update the current standards. One of the most foundational documents outlining

robot safety is ISO 10218, which is broken up into two parts.

Part 1 addresses the requirements of robots, and Part 2 addresses integrating robots into a system, Carole Franklin, director of standards development at the Association for Advancing Automation (A3 and formerly the Robotics Industries Association), told *Robotics 24/7*.

The two parts are being updated for the first time since the last version was published in 2011, and the International Organization for Standardization (ISO) plans to add a Part 3 to focus on end users.

The participants hope that the updated document will be published by the end of the year, Franklin said. It is currently going through ISO's review process.

Franklin noted that there are some misconceptions about collaborative robots as they relate to safety. For the safety community, a more accurate description of a cobot arm is a power- and force-limited robot or a PFL.

In addition, it's possible for a manufacturer to

use an industrial robot arm for a collaborative application if it has the correct safety functions and safety programming. It is not the robot arm itself that is collaborative, but rather the specific application or system it is being used for or in, Franklin argued.

"This new edition of 10218, for one thing, has integrated the concept of collaborative robot safety throughout the whole document," she said. "In the past, the guidance for collaborative safety was found in ISO technical specification 15066, and the contents of 15066 has been integrated into 10218 in the update."

**Robot safety needed for new settings**

ASTM's Prather noted that much of the standards work surrounding robotics has focused on industrial automation. Standards involving service robots being used around the public are less robust.

"Delivery robots? Who do they fall under?" Prather asked. "When I bring that question up, some states' local departments

of transportation say, 'Yeah, we should address them.' Some states are like, 'No, that should be done at the federal level.' Who is it?"

Similar challenges arise with robots used in healthcare settings or restaurants.

Franklin echoed Prather's sentiment. "Robots have begun to move out of where they have been for the past few decades, which was manufacturing," she said. "Now, we're seeing them performing various services for people."

Franklin noted, however, that the vast majority of robots in use and sold today are still in the industrial sphere. Sensor providers such as SICK Inc. and software providers such as FORT Robotics have focused on industrial applications.

**Veo Robotics unlocks collaborative applications for industrial robots**

Waltham, Mass.-based Veo Robotics Inc. develops systems designed to make industrial robot arms more collaborative. The company said its FreeMove



system takes advantage of 3D simulations along with “dynamic speed and separation monitoring as defined by ISO 10218-2:2011 and ISO/TS 15066:2016.”

Patrick Sobalvarro, CEO of Veo Robotics, asserted that safety has to be foundational when building any robotic system.

When identifying safety functions in a system, for example, you have to understand the failure rates of the parts that make up that function, said Sobalvarro. Some components don’t offer great fail rate numbers, he noted.

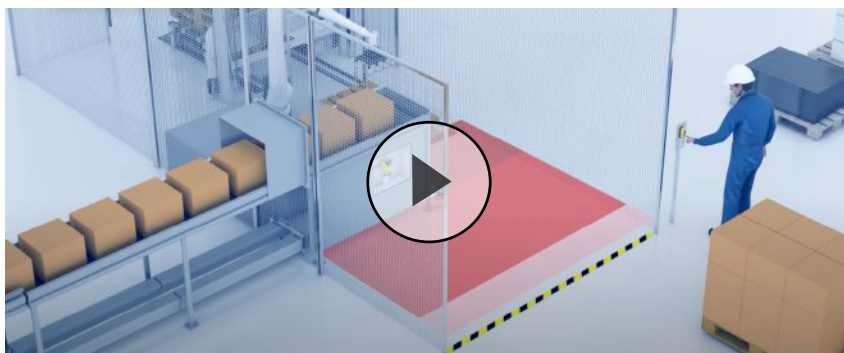
In addition, placing an emphasis on safety can be expensive and time-consuming, added Sobalvarro.

Veo Robotics started selling the first FreeMove system in 2019. The company sold a number of them to a number of big manufacturing customers, but they wanted versions that were safety-certified. That proved to be a long process, Sobalvarro recalled.

“Getting to safety certification took us another two years with a 35-person engineering team,” he said. “They weren’t sitting on their hands or wasting time playing Call of Duty. They were working hard.”

Veo Robotics put a couple of measures into place to ensure that it was doing things correctly. It kept separate code bases for the unsafe version of the system that was solely used for research purposes and the one going through the certification process.

“We didn’t allow any of that [unsafe] code into the func-



tionality safe code repository,” Sobalvarro said. “We had to build that from the ground up to understand all the failure modes and so on. That’s a tremendously expensive thing to do.”

Most the engineers at Veo Robotics work in software, ensuring its systems are running optimally and safely, he added. That requires the team to go through a maintenance review with TÜV Rheinland anytime the company updates or modifies its software.

“In the software world, there is a huge penalty in doing something that you know is going to be safe,” said Sobalvarro. “It’s hard. It took us two extra years of full-time work by a very competent team.”

### **Sevensense Robotics gives mobile robots visual AI capabilities**

One way in which autonomous mobile robot (AMR) providers approach safety is by retrofitting their systems with safety-certified lidar sensors, noted Gianluca Cesari, co-founder and chief business development officer of Sevensense Robotics. However, depending on the application, an AMR maker might forgo using lidar sensors and instead use other sensor modalities, he said.

Cesari highlighted the cleaning robot Marvin as an example. The robot, which is developed by the Swiss company Wetrok AG, a customer of Sevensense Robotics, takes advantage of components such as thermal cameras, passive cameras, and time-of-flight cameras to provide vision data.

Sevensense Robotics designed an autonomous navigation stack to help mobile robots perceive and maneuver through their environments. Its systems take advantage of visual simultaneous localization and mapping (vSLAM) and a camera system to allow robots to construct accurate 3D maps of their environment.

In 2021, ABB partnered with the company to take advantage of its vSLAM on its lineup of AMRs.

“With vision, we gain higher-context information about the environment,” Cesari said. “This allows the system to run more robustly, especially when you look at the 3D space, not only for localization, but also for finding obstacles.” •

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*Cesareo Contreras is associate editor at Robotics 24/7.*

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## Machine Vision Is a Boon for Robot Mobility and Safety

Machine vision can now ensure robot safety, as well as increased functionality in a variety of environments.

BY JIM ROMEO

**T**he increasing use of robots across sectors has raised concerns about their safety in industrial workspaces. Along with sensing technologies and industry standards, machine vision is helping to improve robot operations, value, and ultimately safety.

As manufacturers come to view robotics an asset, machine vision and motion control systems are being integrated for their automation, control, and safety. Machine vision typically uses a camera with a lens, specialized lighting, and other camera controls to keep pace with any necessary movements.

These components may also be synchronized with more extensive motion systems and equipment

*Industry experts say machine vision is essential for improving robot safety. Source: Getty Images*

such as small AC, DC, and servo motors, as seen in the example below from Doosan Robotics.

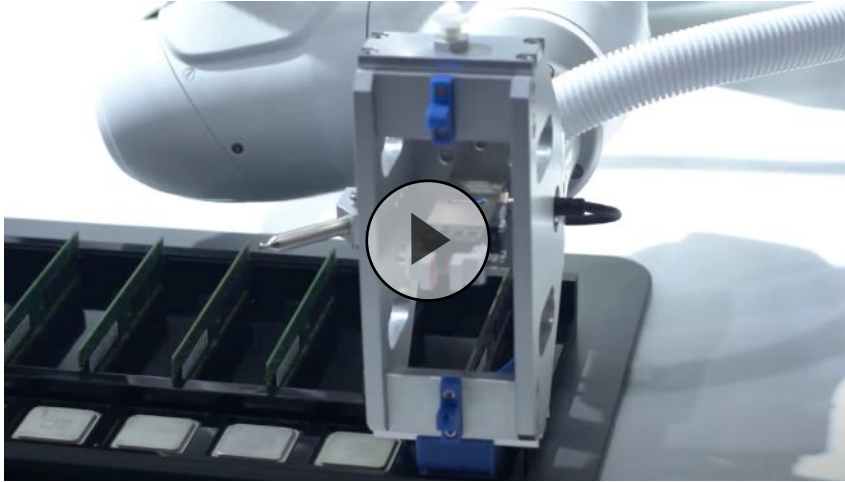
In addition to increasing a system's overall utility, machine vision can reduce the risks associated with the operation of robots. It enables robots to "see" their surroundings, thus enabling them to detect and avoid obstacles in real time.

Developers and manufacturers implement motion control systems to ensure that robots move in a controlled and safe manner.

Along with machine vision, technologies such as proximity and force sensors are playing an important role in improving robotics safety. Proximity sensors can detect the presence of objects in the robot's path and automatically stop the robot to prevent collisions.

On the other hand, force sensors can sense the pressure applied during interactions with objects. Developers such as BeBop Sensors are working on new technologies such as smart tactile sensors and





contact sensors to improve robotics accuracy and efficiency.

### Machine vision edges out lidar

New technologies sometimes push out traditional ones. As machine vision advances, robotics navigation may depend less on lidar.

Traditionally, mobile robots have relied heavily on lidar technology to guide and navigate their mobility. Lidar is a sensing technology that uses lasers to measure distances and create 3D maps of the environment.

Machine vision is just more practical and economical than legacy lidar systems, according to Rand Voorhies, co-founder and chief technology officer at inVia Robotics in Westlake Village, Calif.

“2D machine vision in warehouse settings is cheaper, easier, and more reliable than lidar,” he said. “inVia Picker robots utilize 2D machine vision with fiducial stickers. Our robots can detect the position and orientation of a fiducial sticker with ultra-precision. By sticking these fiducials

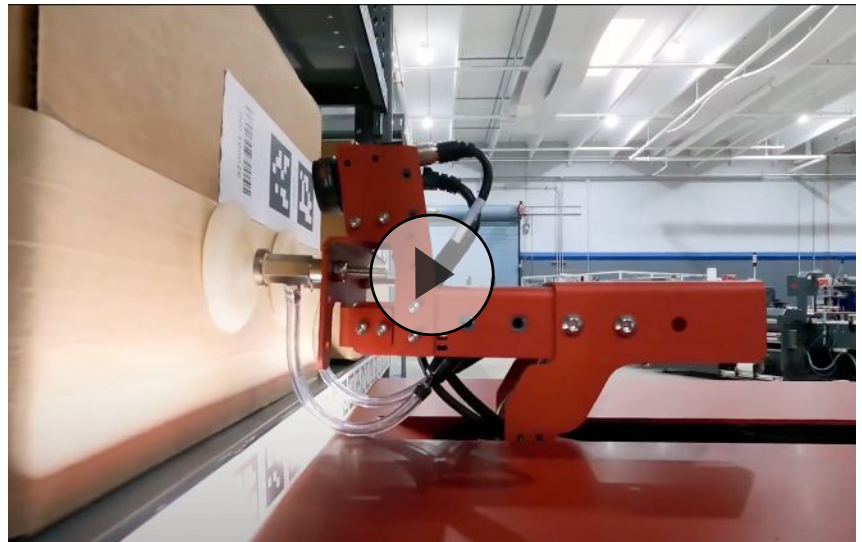
all over a warehouse, robots can easily localize themselves.”

While machine vision allows precise navigation in warehouse environments, there is still concern about the safety of nearby personnel and assets.

to improve overall safety by setting up industry standards. More mobile robots means more situations that could lead to accidents and possible collisions.

The International Organization for Standardization (ISO) has developed a series of standards to ensure the safety of industrial robots. The importance of these standards cannot be overstated, as they provide safety and reliability guidelines for robot manufacturers and users.

Also, the Robotics Industries Association (RIA, now the Association for Advancing Automation or A3) has developed a set of safety guidelines that provide comprehensive recommendations for the safe design and operation of robotics systems.



### Industrial standards help ensure robot safety

The growing use of machine vision comes at a time when the robotics industry is working hard

“It’s better to design in safety from the start, rather than try to tack on safety features to an otherwise-completed design, or worse, apply a fix to an exist-



ing system after someone was injured,” said Carole Strait Franklin, the director of standards development for A3, in an interview.

ABI Research agreed with Franklin’s view on the need for safety standards for robotics. It emphasized the importance of incorporating technology such as machine vision into future system designs.

“The importance of automatic protection for industrial mobile robot safety cannot be understated,” said ABI. “While standardization and legal regulations are the driving forces in robot safety, a convergence with technological solutions is a must.”

Along with the design process, it’s essential to include process, payload, and safety assessments. Process assessments evaluate the efficiency and accuracy of the robotics system.

Payload assessments

ensure that a robot can handle the expected load without any risks, and safety assessments evaluate the risks associated with the robot’s operation and suggest mitigation strategies. By incor-



porating these assessments into the design and development of robotics systems, manufacturers can ensure that their products are safe and reliable.

### Sensing improvements offer a safer future for robots

The safe operations of robots is of paramount importance, and machine vision, sensing technologies, and industry standards all play essential roles in ensuring that these systems are safe and reliable.

As innovations and improvements continue to be made in the field of vision and sensing technologies, we can expect to see a safer overall future for robots in industries worldwide. Ryan Marti, product manager for industrial cameras and smart cameras at Omron, summarized it best: “Machine vision and automation are in a symbiotic relationship — essentially, vision is the ‘eyes’ of automation,” he wrote in an A3 blog. “When innovations in machine vision technology happen, automation becomes more efficient. While certain applications and tasks in machine vision can be daunting, the reality is that there are many applications that can be solved simply and with incredible ease.” •

*Jim Romeo is a freelance writer and contributor to Robotics 24/7 based in Chesapeake, Va.*



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# Roberta Nelson Shea Reflects on Role in Steering Development of Robotics Safety Standards

Nelson Shea said updates are coming to ISO 10218, which outlines requirements and guidelines for robot safety.

BY CESAREO CONTRERAS AND EUGENE DEMAITRE



Universal Robots develops robots designed to work in collaboration with humans. Source: Universal Robots

**W**hen it comes to robot safety and the standardization of industrial automation, Roberta Nelson Shea is one of the best-known people in the space.

She has served on numerous standards boards and committees for the Robotics Industries Association (now the Association for Advancing Automation or A3), the American National Standards Institute (ANSI), and the International Organization for Standardization (ISO). Nelson Shea currently serves as the global technical compliance officer at Universal Robots.

Recently, she received an Engelberger Award at this year's Automate Show in Detroit. The award is named after Joseph F. Engelberger, who is considered "the founding force behind industrial robotics,"

according to A3. The award is among the highest that one can receive in robotics. A3 said it recognized Nelson Shea the honor for her work in advancing robot safety.

*Robotics 24/7* spoke with Nelson Shea about the latest developments in robotic safety and where she sees the industry heading. This interview has been edited for clarity and brevity.

**What advancements have you seen in robot safety since you helped introduce ISO/TS 15066, the first safety document defining human-robot collaboration?**

**Nelson Shea:** There was a preceding document ISO 10218 Part 1 and Part 2, which talked about features in order to get a collaborative application, but they needed 15066. So, we started off with something very vague and came out with 15066, which helped but didn't answer all the questions.

With the topic of collaborative, we stepped out on a limb as it relates to safety standards. Safety standards are really meant to talk about what exists because you know what's out there. You know what the problems are within robot standardization world, and I was the conveyor chair of that group before 15066.

But with that activity, we said, "Why do you have to have guards and protective devices if the robot application won't hurt you?" That's where we came from, but nobody was using anything that way. It didn't exist, so we came up with a concept and this was really not typical.

It was a good thing because minds suddenly exploded and said, "This is really cool; what can



be developed around it?” and that actually was the starting point for Universal Robots. Their first robots came out before the 2011 publication of the last 10218. UR was involved in the standards development where we talked about it, and it was talked about in the 2006 document.

It was almost like spreading seed on the dirt. Things cropped up, and then we said, “We don’t have a lawn mower.” We came out with 15066 to give some more information, and we still have more to do about it. But I will say in putting forth the concept and trying to frame safety around it, all of a sudden, a lot of development work by robotics manufacturers and integrators occurred.

The reality is, to build safety into any given sort of machine, it costs money. If a robot manufacturer has a notion that there is no market for it, why spend money on development? Let’s be realistic. We don’t have nuclear-powered appliances. There isn’t a market for it.

In this case, we almost created a market before we had products for it. A lot of stuff has happened, and the robot safety standards are being updated right now. They have been submitted to the ISO to go to final balloting. Within that, there is a lot greater clarity about what do you have to do in the robot so that it has features that can be used, and what is absolutely required of building a collaborative application.

I think in 2023 and 2024 we will come out with good updated standards to talk about the “collaborative” subject we brought up in 2005. However, I’m not aware of any incidents with collaborative applications using robots.

For all of the horse escaping the barn [with ISO 10218:2011 and 15066], I think this has been a good thing because it has fueled all sorts of applications without putting people in danger. We have learned tremendously because we only learn what to standardize when people are using something.

So if we don’t get people using it, how do we

learn what we need to standardize? It ended up working out very well. But I will tell you, it’s counter to what we are supposed to do in safety standards.

**You mentioned that a new ISO 10218 iteration is moving through the ISO process. How much of that was you filling in the gaps and explaining things more clearly, and how much of it is the technology catching up to the vision of eight years ago?**



*Roberta Nelson Shea*

**Nelson Shea:** It’s a combination of both. ...

There’s a concept called functional safety, which means that you will have a safety function that is identified, has a specific purpose, and if it fails, there’s an increased risk to a person.

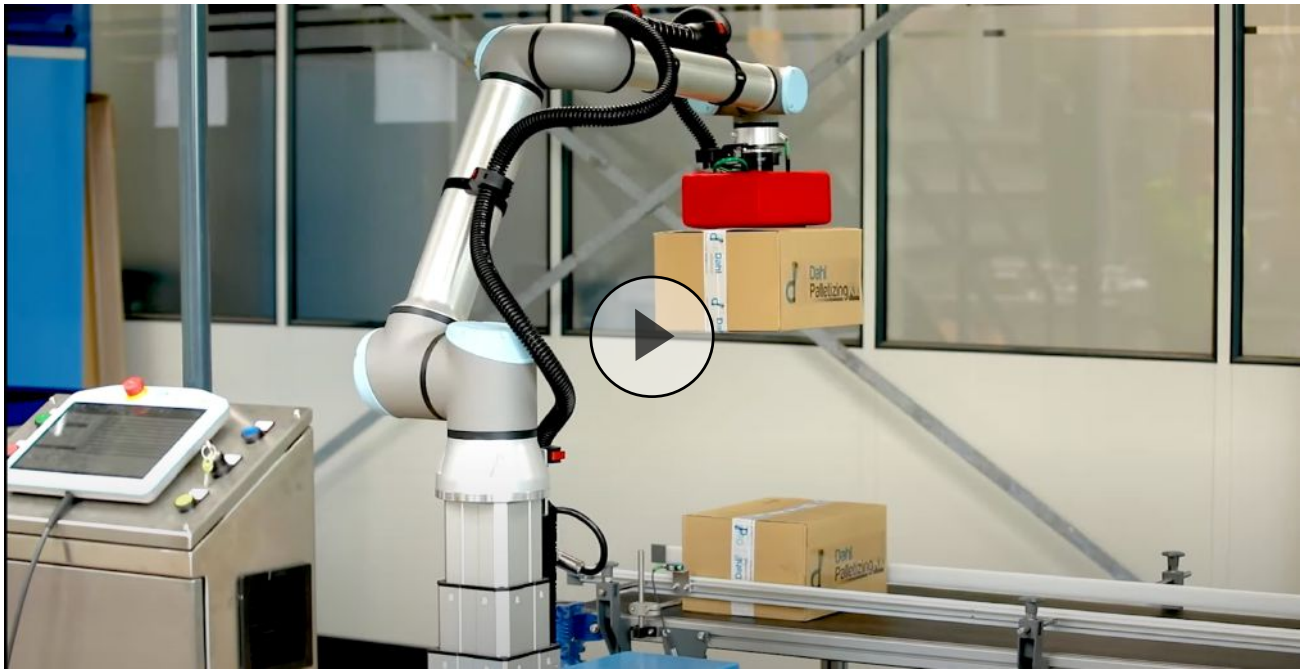
A good example of that is that you can have speed limiting as a safety function. You [can] say, “This machine, in this situation, must go no faster than  $x$  speed.” ... You have sensors that monitor that safety. And if you are approaching that speed, you either lower it, or you cause it to shut down immediately.

And that safety function has to meet particular safety standards, which incorporate monitoring, being able to signal the intended reaction –stop– in a variety of different ways or signal the output, and reliability. It’s a three-legged stool of reliability, the architecture of the circuitry, and the diagnostic coverage of things not working as they should.

In the 2011 document, we gave a little detail about it. The 2011 document only has an absolute requirement for two safety functions. As the writers, we thought that we were requiring more, but we didn’t make explicit statements. Go forward a few years, and we all looked at each other and said, “Crapola, look at all we didn’t include.”

It’s a combination of all us learning more about functional safety. At the time we started this, functional safety as a topic globally was really quite new, but not as new in Europe. The classic thing is that everybody’s comfortable in what they know and not as comfortable in what they don’t, so the transition was tough.

Over the past 10 years, we’ve made a enormous transition from a very simplistic way of “How do you have safety circuitry?” to “How do you have potentially very complex safety functions that have a very high



degree of safety reliability?” and implementing them.

Robot manufacturers have become much more sophisticated. You have more coders working on developing safety software, with electronics and all sorts of other things. ... So the new standard, we are going from having two required safety functions to there being almost on the order of 25, and maybe another 15-plus that are optional.

**When we speak about robotic safety standards, we seem to focus on industrial automation. Now that robots are entering into different industries such as fast food and delivery services, how are those spaces taken into account when you write these safety documents?**

**Nelson Shea:** It’s really, really super tough. If you are talking about it being in a workplace, if you think industrial, think workplace, the industrial safety standards can still apply.

The big thing about the workplace is that the people that are going to be near robots are considered working age, meaning they are given training. They’re given safety operating procedures, even someone

working the fryolator. You have instructions. You have particular clothing you have to wear, and they are at least working age, although that age could be 16.

All of our global standards give a lot of data about anthropometrics for a variety of different ages, but in particular in the workplace, it’s considered 14 years and older. We understand what the likely hand sizes would be, finger sizes, leg lengths, feet, and so forth.

Where we get into problems is the open public. There is a safety standard that already exists. It’s an international standard. It’s ISO 13482, and that’s for service robots. I will tell you there’s very few real applications because as soon as you get into that sector, you have to really define exactly the application and the robot is absolutely designed for that.

It’s not like in the industrial area where you’ve got a manipulator then you figure out how you want to use it. This is “I’m going to use it as a pill delivery cart in a hospital” and get it designed for that purpose and intended use. And then it [the pill delivery cart] gets designed for the fact that you can have wheelchairs [in the same space]. It gets designed for the fact that you could have



people with walkers. It's designed for the fact that you have children.

And that's the reality in a public setting. You have all sorts of people that have no training, no knowledge, they expect it all to work, and they won't get hurt. So, it's a really complex topic. And there's a lot more safety standardization effort going into it.

So, in the ISO revision of the service robot standard, they jettisoned one topic that was in the existing edition. They're trying to write an updated standard for a couple of specific uses and stated requirements.

**These standards are voluntary. Why?**

**Nelson Shea:** In order to have any change to OSHA [the Occupational Safety and Health Administration], you need an act of Congress, and look at how well it works right now. So that's one answer.

The other one is that OSHA operates from the vantage point of market demand. Many years ago, Jeff Fryman, who used to be the standards director at what was RIA, now A3, and I went to OSHA requesting they adopt R15.06. This was the 1999 edition, before we went to ISO.

OSHA said, "Robots are not our problem. We have so many bigger fish to fry. Here's our top 10. Here's the list that we work off of, and the numbers of people killed and maimed. Robots are not our problem."

They said to Jeff and me, "Your industry is doing what it should be doing. It should be writing standards and pushing out what's needed. You've been doing it. Keep doing it."

In Europe, they have the machinery directive, and that's turning into a regulation. It's law—there's no way about it in Europe in the next couple of

years. ... In Europe, they have required a review by their own experts as to whether the standard does comply with the machinery directive.

That doesn't exist elsewhere in the world, to be very truthful. The closest is the province of Ontario in Canada, and other provinces are getting more strict. Ontario requires that machinery has to be



reviewed by a professional engineer, and the engineer has to evaluate a machine or a large automation cell to all the applicable standards.

In Canada, the standard is whatever is the state of the art at the moment. It could be Canadian. It could be international. It could be European.

The engineer reviews code, circuitry, and complete layout designs. When the engineer signs off, they sign off on personal liability. That's even more stringent than the machinery directive because in Ontario, they do a review of the design, give changes, and provisionally approve. Then they are required to go in and review as installed — before final approval of the machinery. They don't do that in Europe. •

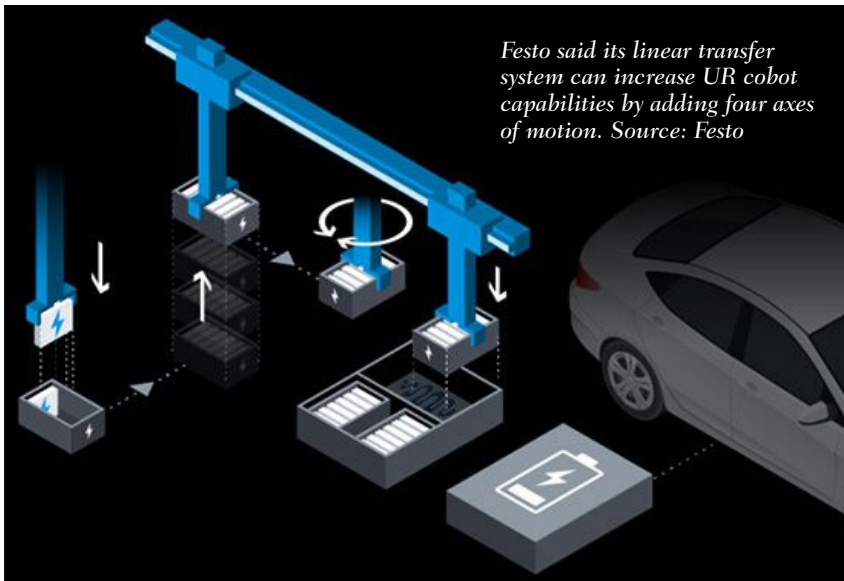
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*Cesareo Contreras and Eugene Dematire make up Robotics 24/7's editorial staff.*

# Festo Features UR+ Certified Multi-Axis System, Mechatronic Learning Systems at Automate 2023

The Festo/UR system offers up to four axes of motion, including a linear transfer for a seventh axis.

BY ROBOTICS 24/7 STAFF



*Festo said its linear transfer system can increase UR robot capabilities by adding four axes of motion. Source: Festo*

ing future flexibility for users, claimed Festo. The company added that its Customer Solution Team can customize the FMCP-UR to the application.

“Streamlined axis configuration allows for less engineering, integration, and troubleshooting during set up and can be easily done through the UR HMI,” it said. “The Multi-Axis Drive (MAD) controller is a URcap software that allows users to set position, speed, and acceleration on the HMI or use the toolbar to jog the axes in manual mode to configure motion.”

The 10-axis UR demo at Automate also featured the Festo Essentials Pin Ball Maze. The unit of Esslingen, Germany-based Festo welcomed attendees to test their skills to complete the maze using wireless tablet controls.

## **Festo shows Simplified Motion Series**

In addition, Festo showed the Simplified Motion Series (SMS) of electric actuators at its booth.

“SMS combines the simplicity and cost-effectiveness of pneumatics with the benefits of low energy consumption and precision positioning of electrics,” said the company. “SMS actu-

**C**ollaborative robot arms can gain more axes of motion, making them useful for new applications. Festo Corp. last month showed its UR+-certified multi-axis system at Automate 2023 in Detroit. The company said it adds up to four axes beyond the six axes of Universal Robots’ cobots.

Islandia, N.Y.-based Festo said its multi-axis system features the Festo Motion Control Package (FMCP-UR), which is a complete motion-control panel for up to four axes. The FMCP is fully integrated with the UR cobot control panel and human-machine inter-

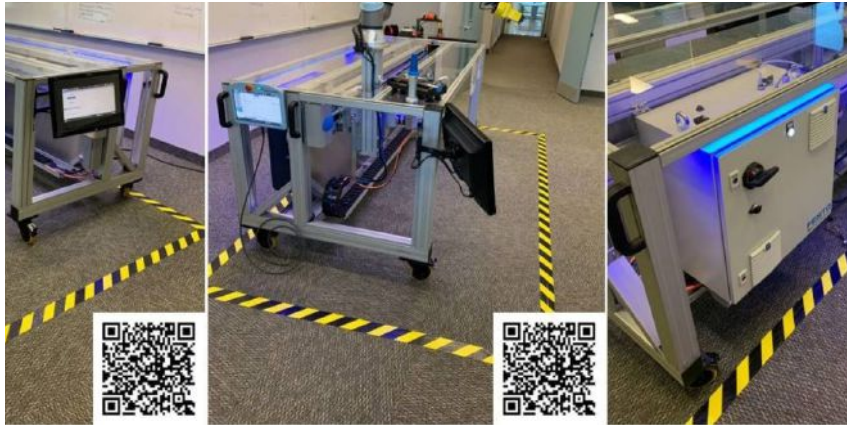
face (HMI), and it includes an enhanced safety I/O handshake and communications interface, noted the company.

“The FMCP-UR can control turntables, gantry systems, conveyors, transfer tables, and any combination of linear and rotary servo axes up to the 10th axis—all under the UR+ partner umbrella,” said Festo. It displayed full 10-axis motion at Automate.

## **FMCP-UR can be tailored to the application**

The FMCP-UR has specific features to interface with Universal Robots’ systems while allow-





The Festo UR multi-axis system controls up to four axes: UR cobot with optional E30 smart magnetic gripper, teach pendant, and the seventh axis. Scan QR code for virtual reality image. Source: Festo

ators deliver infinitely variable three-position motion for an economical all-in-one servo-motion solution.”

The SMS series includes ball screw, toothed belt, mini slide, electric cylinder, piston rod, and rotary actuator styles for a wide range of applications. Festo asserted that the simple setup ensures fast startup and nimble changeover.

**CPX-AP-I delivers decentralized I/O**

Festo also touted its Ethernet-based CPX-AP-I decentralized

I/O. Integrators, OEMs, and end users can network up to 500 I/O modules on a single bus node. They can mix and match both electrics and pneumatics on the same I/O network for greater flexibility and to develop unique systems, it said.

A free online configuration tool can speed design, while plug-and-play performance can reduce wiring and shorten installation time, Festo said.

CPX-AP-I is compatible with the leading communications protocols, including Ethernet/IP, PROFINET, and EtherCAT



Festo said its Simplified Motion Series axes provide an economical and easy-to-use system for electric motion. Source: Festo

to enable the Festo ecosystem’s connectivity.

**Festo Didactic debuts at booths**

For the first time at Automate, Festo Didactic, the company’s educational unit, presented at its booth.

“The joint appearance of Festo and Festo Didactic illustrates the importance the company places on workforce development as North American reshoring accelerates,” it said.

Festo Didactic showed its new online learning portal—the Festo Learning Experience, or Festo LX. It focuses on the growing need for more individualized learning, said the company.

Festo LX provides modular resources for technical training. These resources can be individually assembled into courses and entire learning paths. Varied formats, such as videos, animations, simulations, and text units can help participants remain engaged, said Festo Didactic.

Existing courses can be modified as desired to meet the employer’s or school’s requirements, it noted. New content in text, image, or video format are easily added, according to the company.

Beyond Festo’s booth, Festo Didactic had Robotic Manufacturing Production System (MPS) training stations at the booths of AUBO Robotics USA and SICK Inc. The MPS is used to teach the core competencies of robotic material handling and vision.

The MPS stations will be outfitted with a 360-degree Safety Awareness package that



*Festo Didactic and SICK partnered to create a curriculum and hardware package they said integrates into any robot platform. Source: Festo*

the technical competencies educational institutions can integrate into their curriculums, and the skill sets that will enable frontline workers to thrive in an AI environment.

Rozier also presented during the A3 Educator Networking Luncheon held by the Association for Advancing Automation (A3). Attendees heard about Industry 4.0 technology trends, the importance of data, the competencies required to thrive in this new environment, and tips for beginning the training journey.

“From large organizations to mom-and-pop shops, manufacturers use automation and data exchange among robotics and machines to maximize uptime, shorten lead times, and reduce scrap,” Rozier said. “To thrive within the fourth industrial revolution and the emergence of applied AI manufacturers, workforce professionals and educators must understand the key challenges and adjust career pathways to be successful.” •

consists of two area scanners tightly integrated through a safety PLC. To facilitate training, Festo and SICK said they developed a training curriculum covering the basics of robot safety and risk mitigation using an “easy-to-follow six-step method.”

artificial intelligence and real-time data. Ted Rozier, director of digital, advanced technology, and robotics at Festo Didactic, described how organizations can unleash the power of AI based on real-time data from robotics and automated manufacturing components.

He discussed the types of data that must be captured, the solutions most applicable to AI,

**Festo presented at conference**

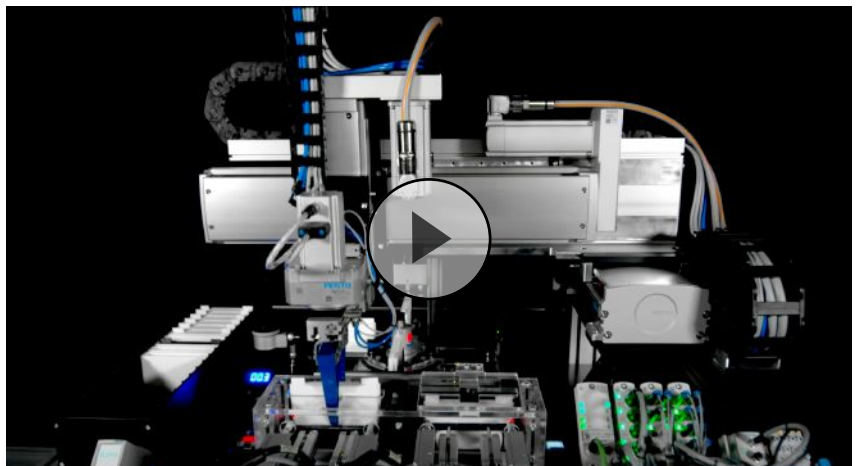


*Ted Rozier, Festo Didactic*

Festo presented a session on “When and Where to Use Cartesian Robots” in the Huntington Place Con-

vention Center. It focused on key application considerations for Cartesian robots, including payload, reach, speed, degrees of freedom, environment, end-of-arm tooling, and commissioning.

Festo Didactic also gave presentations. The first covered



# ASTM International Launches New Subcommittee on Legged Robotics

The new F45.06 subcommittee will focus on test and performance standards for these unique types of robots.

BY ROBOTICS 24/7 STAFF



*The NERVE Center at UMass Lowell tested Boston Dynamics' Spot quadruped. Source: ASTM International*

**W**ith the recent wave of developments in quadruped and biped robots comes a need for standards. ASTM International's F45 Committee on Robotics, Automation, and Autonomous

Systems has approved the creation of a new subcommittee—F45.06 Legged Robot System. It will focus on developing standards for this type of robot regardless of its application be it industrial or service-related.

The new subcommittee will be chaired by F45 member Bowen Weng, a technical specialist at the Transportation Research Center in East Liberty, Ohio, and a Ph.D. candidate at The Ohio State University.



### ASTM defines scope of legged robot subcommittee

“The scope of the Subcommittee is the development of a set of standards and testing procedures to evaluate the performance of the class of mobile robots primarily relying on articulated limbs and legged mechanisms for locomotion, including but not limited to the quadruped robots, bipedal robots, and humanoids, that operate semi-autonomously or in full automated modes,” said ASTM International.

The new subcommittee is seeking experts in the field but is not limited to members who work directly on or use these types of robots. The goal is to have as many voices contributing to this work as possible, said the West Conshohocken, Pa.-based organization.

“Legged robotics show a lot of promise,” stated Aaron Prather, director of Robotics & Autonomous Systems Programs at ASTM. “For a world built for humans and our type of locomotion, legged robots have numerous use cases and applications available to them going forward.”

“However, with the lack of test standards that can show performance levels of any type, it is going to be a challenge to convince the public and potential regulatory agencies that these robots can operate around humans, especially in public settings,” he noted.

New types of robots, including both two-legged and four-legged, have been coming to



market in what seems to be a daily occurrence, said Prather. He stressed the need for getting a standards framework out quickly to help build public confidence.

### Standards necessary for public acceptance

ASTM is celebrating its 125th anniversary this year as a standards development organization (SDO), and with that comes a history of the public looking for compliance with an ASTM standard or another SDO like UL to install confidence in a product’s safety and reliability, Prather said.

Many companies have internal requirements stating that only equipment meeting specific industry standards can be used within their facilities. For legged robots, Prather said the lack of standards for legged robots could eventually slow their deployments.

“By building out a family of

test standards for legged robots, both manufacturers and users of these types of robots will be able to show to the public and others that their robot was tested to a known industry-accepted standard,” he added. “This will give the public more confidence when they see these robots at their workplaces or operating in the public sphere. These standards will only help accelerate deployments because they address the current unknown – public acceptance.”

The first step for the subcommittee will be to focus in on the first test work item it wants to develop into a test standard. Stability testing appears to be the biggest focus area raised by members so far.

If you are interested in joining this new subcommittee, please go to ASTM International’s website to start the membership process: <https://www.astm.org/get-involved/technical-committees/committee-f45>. •

# Veo Robotics Raises \$29M for Intelligent Safeguarding for Industrial Robots

Industrial investors in Veo Robotics' proprietary safety system include Amazon, Yamaha Motor, and Safar Partners.

BY EUGENE DEMAITRE



*Veo Robotics' FreeMove uses proprietary sensors and software to enable safe human-machine interaction. Source: Veo Robotics*

Unlike current collaborative robots, which are limited in size, speed, and power, robots using Veo Robotics Inc.'s proprietary safety technology can combine industrial capabilities with human-in-the-loop efficiency. The company recently announced that it has closed a \$14 million funding round, bringing its latest investment to a total of \$29 million.

"With the increased need for efficiency improvement in industrial environments, we've seen increasing requirements for safe robot operation in the close presence of humans," stated Patrick Sobalvarro, co-founder and CEO of Veo Robotics.

The Waltham, Mass.-based company said the funding will accelerate its strategy of working with corporate partners to deploy a new class of collaborative systems.

“These integrated work-flows involving both robots and employees provide maximum flexibility and ROI [return on investment] for our customers in manufacturing and logistics,” Sobalvarro added. “We’re working closely with select customers who share our vision for the future of automation. This funding enables us to add a few more partners to our early-adopter program.”

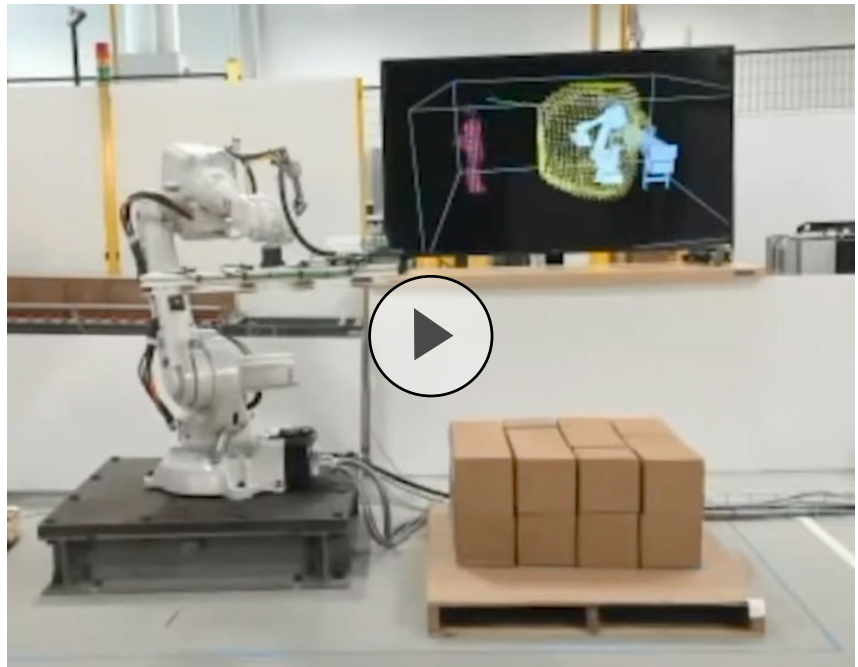
“We’re not looking for new customers but rather to deepen relationships with existing ones,” he told *Robotics 24/7*.

### FreeMove enables people plus robots

Sobalvarro claimed that Veo’s flagship FreeMove product is the only 3D intelligent safeguarding system to have received functional safety certification to Performance Level D, or single-digit failures per billion hours of operation. It enables humans to work closely with standard industrial robots from FANUC, Yaskawa Motoman, ABB, Kawasaki, and KUKA.

“The newest generation of intelligent robotic systems work with people, not separately from them,” said Clara Vu, co-founder and chief technology officer of Veo. “Unlocking this potential requires a new generation of safety systems—this is Veo’s mission, and we’re very excited to be taking this next step.”

With FreeMove, industrial robots can work at speed but then slow down or stop when a person enters a workcell. Veo



Robotics released FreeMove 2.0 Engine in October 2022.

FreeMove is more sophisticated than a standard light curtain because of Veo’s perception software and its fail-safe requirement for “never a false negative”—proof of a vacant space rather than proof of human presence, Sobalvarro said. “Our volumetric analysis was built from the ground up,” he recalled.

How has demand for more collaborative industrial robots been growing?

“We were hearing about workforce and supply chain problems before the pandemic, but their visibility has increased,” said Vu.

Sobalvarro added that manufacturers have learned the value of supply chain diversification and are opening more plants in or near the U.S. and Europe. But they need to maximize their productivity by taking advantage

of the precision and repeatability of automation and the cognitive and troubleshooting abilities of human supervisors, he said.

“Robots are fundamentally different from people—we want to enable each to do what they’re best at and allow companies to decide which parts of their processes to automate,” asserted Vu. “We’ve already seen this with AMRs [autonomous mobile robots] from 6 River Systems or Locus, where making robots more intelligent has led to more human-machine interaction, not lights-out facilities.”

“Cobots showed the value of people plus robots in the same environments, but the industry has other problems to solve,” she said. “It’s a new way of thinking about machines—augmenting human capabilities.”

“You can automate 99%, but it’s better if a person can come



in for exceptions without shutting down the whole line,” Vu noted. “The set of things you can automate completely is always a subset of the things you can automate.”

### Investors validate Veo Robotics’ value

In the past several months, venture capital has been harder for startups to obtain, and many technology companies have laid off workers. The Silicon Valley Bank failure has led some industry observers to question the health of the robotics industry.

However, demand remains strong for systems that serve

surprise that people are conservative about safety.

“Safety the one thing you can’t just DIY,” said Vu. “We’re partnering more closely with customers now that we have expertise in integration for flexible applications.”

“We’re lucky to have investors that recognize the importance of safe, practical, state-of-the-art robotics,” added Sobalvarro. Veo Robotics has raised \$66 million to date.

The Amazon Industrial Innovation Fund, Safar Partners, and Yamaha Motor Ventures Inc. participated in Veo Robotics’ latest round. They expressed confi-

excited to support Veo Robotics and their vision to design innovative and human-centric robotics.”

As a local investor with ties to MIT, Safar Partners was already familiar with Veo Robotics’ culture as a “startup for grownups,” with values of responsibility and respect, as well as three months of parental leave, noted Vu.

“Veo’s innovative technology, which allows for safe and seamless collaboration between humans and robots, has the potential to revolutionize a wide range of industries,” said Arunas Chesonis, managing director at Safar Partners. “We’re particularly excited about the company’s growth potential, as it expands its capabilities and reaches new markets,”

“[Veo’s] innovative approach to robotics and their commitment to safety in the workplace have impressed us greatly,” said Anish Patel, chief operating officer and managing director of Yamaha Motor Ventures.

“Veo’s cutting-edge technology, which combines advanced sensing and computer vision with powerful software, has the

potential to transform manufacturing and other industries,” he added. “We believe that the team’s deep expertise and focus on customer success position Veo Robotics to become a leader in the industry.” •

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*Eugene Demaitre is editorial director of Robotics 24/7.*



specific applications or tasks, according to Sobalvarro and Vu.

“The investor community has been supportive when it knows you’re serious and understand customer operations,” Sobalvarro said. “Shutting down an automotive production line, a fulfillment or palletizing operation, or an ASRS is expensive, so it’s no

dence in the company’s approach to advancing automation.

“As investors, we were drawn to Veo Robotics’ focus on safety in the workplace,” said Matt Peterson, director at Amazon’s Industrial Innovation Fund. “Their technology is both collaborative and effective, prioritizing employee wellbeing. We are

# Clean Room Robots Can Safely Perform Demanding Manufacturing Tasks

Clean room robots are becoming essential in electronics, pharmaceuticals, and aerospace manufacturing.

BY EMILY NEWTON

**C**lean room robots may be safer than employees, but they come with some risks. Particulate shedding, static electricity, and inadequate precision can make it difficult for robots to operate safely in the clean rooms.

How do these risks affect aerospace, electronics, and pharmaceuticals manufacturing, and how can they be resolved?

## Risks of clean room robots

Robots often seem like the perfect solution to the strict hygiene needs of clean room environments. There are advantages to using clean room robots rather than humans to manufacture sensitive items. However, robots have cleanliness risks to consider.

### Particulate debris

Humans are often considered the biggest risk in a clean room environment — they shed an estimated 40,000 skin cells every hour and track in biological debris when they enter a clean room.

Robots don't have these issues. They can stay in the clean room 24/7 and obviously don't have biological risk factors.

However, robots can still



*FANUC's LR Mate 200iD/7C clean room robot is resistant to water and dust in accordance with IP67.*

shed debris that can threaten the integrity of a clean room. Most people wouldn't notice, but machines drop particulate matter during regular operation.

For example, a rubber belt on a robot will shed bits of material over time as it wears down. Friction between metal or plastic components on a robot can also trigger particulate shedding during normal operations.

### Electrostatic discharge

Electrostatic discharge (ESD) is one of the most common risks in electronics manufacturing

specifically. Any time electronics like printed circuit board (PCBs) or semiconductors are being handled, ESD should be a concern.

Static can be caused by humans, such as the electricity generated by clothing rubbing together. However, robots are capable of presenting ESD risks, as well.

ESD can damage or even ruin electronic components during manufacturing. This poses serious quality control challenges due to the increased risk of product defects. ESD can even injure clean room robots.

If materials or electronic components in the clean room generate static electricity, the robots could experience a short circuit that causes a malfunction. This could lead to more severe damage, such as damage to parts, goods, or the robot.

### Inadequate precision

Clean rooms are often required for sensitive products in the manufacturing process. For instance, the delicate ribbon cables in many small electronic devices can tear or break easily during assembly.

## CLEAN ROOM ROBOTS

Similarly, chemicals and other components used in pharmaceuticals have to combine in highly specific amounts. Robots may be capable of performing these tasks, but they require careful programming and part selection.

For example, many advanced clean room robot systems have options for several different end effectors, including soft vacuum grippers. Soft robotic grippers improve the range of delicate parts clean room robots can handle, but careful programming is still necessary to ensure precision and accuracy.

### How to prevent robot-related contamination



*Yamaha makes Cartesian robots for clean room applications. Source: Yamaha*

Despite the risks, adopting clean room robots has clear benefits for businesses. In fact, the increasing adoption of robotics is largely due to their increasing capabilities.

But what can businesses do to minimize the risks associated with clean room robots so they can perform their jobs safely? Robotics developers can use non-conductive materials like rubber or fiberglass for the exterior plating and grippers on clean room robots. This minimizes the likelihood of the robot spreading ESD.

Careful electrical grounding in the clean room can also reduce the risk of electrical acci-

dents. Many clean room robots have a thick exterior casing to prevent ESD and contamination.

For example, the FANUC LR Mate 200iD/7C clean room robotic arm is completely encased in an outer shell. This shell is IP67 water resistant and dust proof, preventing both types of debris from getting either in or out. The shell material itself is non-conductive to prevent ESD risks.

Robots like the LR Mate are also a great example of how clean room robot designers navigate precision concerns. The LR Mate is a six-axis robot, so it has a wide range of motion and flexibility. It can also integrate with many types of end-of-arm tooling (EOAT), which is important for dexterity in clean room applications. These design qualities improve the robot's ability to safely and delicately handle fragile materials.

Clean room robots can also be designed with an interior vacuum or high-grade seals to prevent particulate shedding. Staubli provides six-axis arms that are rated for clean room applications.

Yamaha's clean room actuators have high-grade seals that

serve a dual purpose — the seals prevent dust debris from leaking from the robot and improve suction for a performance boost.

### How clean room robots can work safely

The global market for clean room robots could grow from an estimated \$6.4 billion (U.S.) in 2022 to \$25.6 billion by 2030 at a compound annual growth rate (CAGR) of 18.77%, according to Research and Markets. The analyst firm noted that it includes a variety of robot types, from collaborative and parallel to SCARA.

Clean room robots have a few key risks, but they are still generally safer than humans in highly sensitive manufacturing environments. Engineers must ensure that such robots are able to operate effectively in clean rooms by taking steps to prevent accidents and contamination.

Innovative robotic grippers, interior vacuums, and non-conductive materials can help clean room robots work safely and efficiently. •

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*Emily Newton is a tech writer who enjoys writing about the latest innovations changing our world.*





# Cloud Ground Control Enables Remote Monitoring and Control of Unlimited Uncrewed Systems With New Micro-Modem

CGConnect is transforming robotic vehicles across air, land, and sea into a connected autonomous fleet.

BY CLOUD GROUND CONTROL



*The CGConnect modem has a compact design. Source: Cloud Ground Control*

Cloud Ground Control, developed by Advanced Navigation, has announced the launch of its cellular micro-modem CGConnect. Using 4G/5G networks, CGConnect can link any uncrewed vehicle to Cloud Ground Control's cloud-based drone fleet management platform, enabling live-streaming, command, and control from a

Web browser.

Cloud Ground Control is a software-as-a-service (SaaS) platform that supports multi-user and multi-vehicle operations. This makes it ideal for enterprises with multiple robotic fleets for emergency, security, construction, asset inspection, agricultural, and environmental purposes, said Sydney, Australia-based Advanced Navigation.

## Fast track into the cloud with CGConnect

"Enterprises who rely on drones and robotics for business operation often own a diverse range of uncrewed vehicles that may not be compatible with one another," said Michal Weiss, head of product at Cloud Ground Control.

"CGConnect is designed to solve this pain point by linking them to the Cloud Ground Control platform, regardless of manufacturer or model, turning them into a holistic, connected fleet," she said.

## Plug-and-play connectivity

With CGConnect, remote users can gain instant access to Cloud Ground Control's rich features, including real-time telemetry, cloud storage, video, and payload data. They can get them all from a Web browser simultaneously, the company said.



Weighing only 55 grams with similar sizing to a credit card, CGConnect is easily integrated into any product design. Cloud Ground Control said it offers the following benefits:

- **Open platform.** The flexible and customizable platform operates on the MAVLink standard. This multiplies potential product applications and enables diverse autonomous vehicles and payloads to operate as a coordinated fleet.
- **Robotic-agnostic.** It works flexibly with open-sourced libraries and is agnostic to the type of technology and vehicle that enterprises may wish to use.
- **White-labeled.** CGConnect is available as a white-label product, allowing businesses to rebrand the user interface in seconds to complement branding and coding requirements.
- **High-grade security.** The platform uses military-grade encryption and authentication

to safeguard data and intellectual property from vulnerabilities and security breaches, helping users meet compliance obligations.

- **Simple and accessible.** Cloud Ground Control said its product revolutionizes multi-drone operation by making it simple, cost-effective, and accessible to users of every skill grade.
- **AI modelling.** The platform runs AI algorithms in the cloud, relaying real-time camera feed data to the end user to support versatile missions, such as object detection, tracking, and thermal imaging.
- **Edge AI.** CGConnect supports edge AI to perform intensive object identification and classification directly on the vehicle for dynamic missions.

a vehicle's design expands the product's functionality and applications while saving development time, said Cloud Ground Control. This allows manufacturers to fine-tune the product's competitive advantage, expanding the robot's potential and ultimately unlocking access to new markets.

Cloud Ground Control helped Clean Earth Rovers transform its Rover AVPros into an autonomous connected fleet. By integrating CGConnect, Clean Earth Rovers was able to provide customers with real-time situational awareness, allowing for enlightened decisions and greatly accelerating recovery efforts in ocean health. (See video below.)

For more information, visit [www.cloudgroundcontrol.com/product/cgconnect/](http://www.cloudgroundcontrol.com/product/cgconnect/).

### Unlock new markets

Integrating CGConnect into

*Stephanie Qiu is public relations and communications manager at Cloud Ground Control.*



# Owl Autonomous Imaging Develops AI Vehicle Vision, Releases Whitepaper Examining Safety Regulations

Owl Autonomous Imaging looked at new regulations and technologies affecting the ADAS and autonomous vehicle markets.

BY EUGENE DEMAITRE



*Owl AI delivers monocular 3D thermal ranging computer vision. Source: Owl Autonomous Imaging*

**W**ith U.S. traffic fatalities still high, vulnerable road users or VRUs are a concern for autonomous vehicle developers. Owl Autonomous Imaging Inc. yesterday announced the availability of “New Regulations for Cars to Protect Pedestrians at Night.” The whitepaper examines the status of the latest interna-

tional, automotive industry, and insurance regulations that will affect how automakers design and build vehicles.

“If you are involved in the development of next-generation autonomous vehicle safety and ADAS [advanced driver-assist systems], it is essential for you to understand how the industry will be changing over the next

decade,” stated Chuck Gershan, co-founder and CEO of Owl. “Safety, especially night-time driving safety, is a critical milestone for the automotive industry’s next-generation vehicles.”

Fairport, N.Y.-based Owl Autonomous Imaging delivers monocular 3D thermal ranging computer vision systems to the automotive and industrial





dense urban environments as well as dark country roads.

Owl AI is intended to allow drivers and autonomous vehicles to safely navigate and stop to avoid catastrophic damage or injury. In February, the company released a whitepaper explaining how Thermal Ranger uses convolutional neural networks (CNNs) to locate and identify the thermal signatures of pedestrians and animals in the dark with a single infrared camera.

“The technology stack includes everything from pre-processing, sensor fusion, localization data, and decision making to the actuator system,” Gershman told *Robotics 24/7*. “We built the sensor and reference camera system and the perception stack for that sensor-specific interpretation of the data. We can get a true 3D response from 2D images, and we’ve built a high-definition digital thermal sensor.”

The CNN builds a disparity map, like stereo vision, in which the pixel disparity is converted to depth measurement, he explained. Owl’s API can con-

mobility markets. The company claimed that they can enhance safety by day or night and in adverse weather conditions. It has 16 patents.

### Whitepaper tracks regulatory efforts

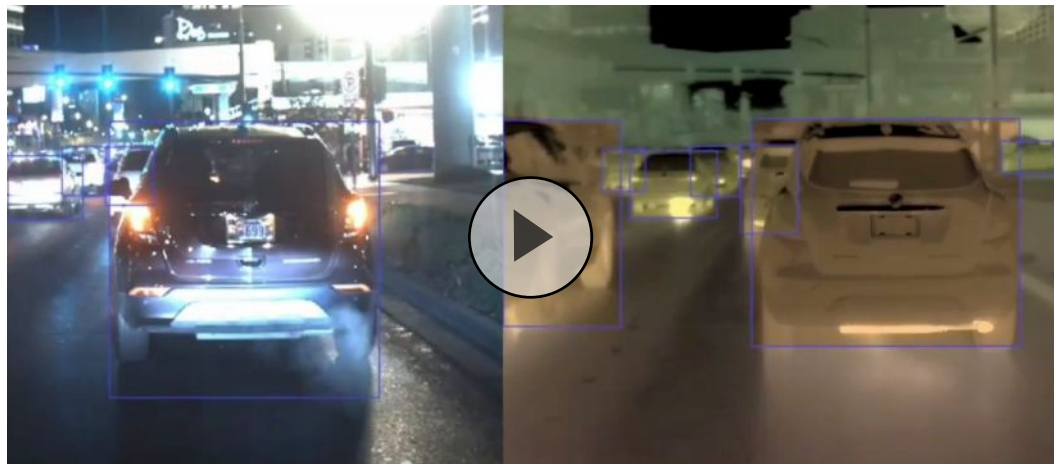
Around the world, government agencies and industry organizations are developing and implementing safety regulations, noted Owl Autonomous Imaging. The new regulations could force vehicle makers to adopt safety and night-time driving technologies that are more effective than those in use today, it said.

This new whitepaper examines the ever-changing state of various regulations and their potential impact on pedestrian emergency

braking systems (PAEB). Owl said it specified emerging technologies to improve road safety for pedestrians, bicycles, motorcycles, etc.

### Owl AI sees 3D, in the dark

Owl Autonomous Imaging’s Thermal Ranger is a passive 3D sensor that uses deep learning and custom thermal sensors to extract dense range maps. The company said its artificial intelligence can identify, classify, and determine the distance to living objects in



vert data sets for sensor fusion, but the company is not building perception systems or bounding boxes, which take longer, said Gershman.

### Sensor fusion for safety

Cost, resolution, and the ability to integrate are barriers, but Owl's thermal sensor is 200 times cheaper than cameras, and its computer vision algorithms

“The cheapest thermal camera today has a sensor board, an ISP [image signal processor] for image correction, and a third board for the interface,” he said. “We turn a three-board system into a one-board system.”

“Cameras are still cheapest, with radar next, and 4D is more expensive,” Gershman noted. “Then there's thermal and finally lidar, which starts at \$5,000,

commercially available,” he recalled. “They can be applied to pure autonomy, but in the near term, we're focusing on ADAS for our go-to-market perspective.”

Now, Owl Autonomous Imaging is in discussions with nearly 80 companies, including trucking, ADAS, and self-driving vehicle makers. Are there regional differences in demand for vehicle imaging systems?

“The German market understands lidar limitations and the value proposition of seeing deer at night, so it is pushing hardest to test and get down the learning curve, followed by the U.S.,” replied Gershman. “We're also talking with one sensor player in South Korea and have just started to do road shows in Japan.”

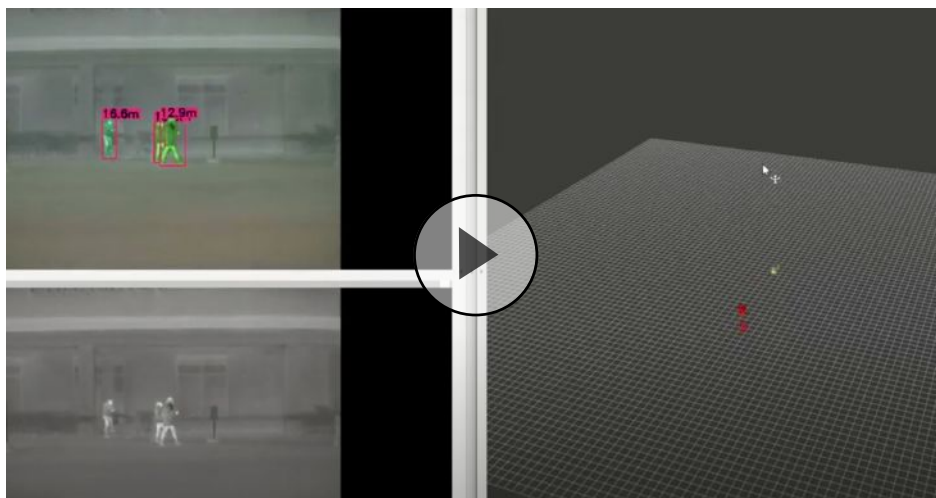
Other sectors interested in Owl's technology include agriculture and transportation.

“Combine makers want them to run 24/7, but fields can be really dusty. Cameras and lidar don't work well in dust, and radar works but doesn't know where it is,” said Gershman. “Automotive wants military-grade performance and better-than-military reliability at no cost.”

“Some robotaxi companies have already deployed test vehicles with Owl's HD thermal system,” he added. •

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*Eugene Demaitre is editorial director of Robotics 24/7.*



make it easy to integrate, Gershman said. Sensor fusion provides richer data than relying just on lidar, claimed Gershman.

“For example, finding deer works better with our algorithms and sensor fusion between color and thermal imaging,” he said. “Also, RGB plus thermal helps spot pedestrians in chaotic urban environments with lots of lights, such as Las Vegas.”

Owl AI's goal is to bring down resale costs to \$150 for Tier 1 automotive OEMs, according to Gershman.

depending on the distance. Lidar is not a unilateral solution.”

### From space to the street

“Two of our cameras are in outer space—one for NASA, and one for Google Earth,” Gershman said. “Seven years ago, we entered into a proof-of-concept contract with the U.S. Air Force for a challenge. We're the only one who built a camera that met their needs.”

“The Air Force used thermal imaging and computer vision at resolutions beyond what was

# SWIFTI CRB 1300 From ABB Offers Industrial Speed, Accuracy With Cobot Safety

ABB said its 'industrial collaborative robot' is six times faster and five times more precise than other robots in its class, and it has 11 kg payload capacity.

BY ROBOTICS 24/7 STAFF

**C**ollaborative robot arms are typically smaller and slower than their industrial cousins. ABB has launched the SWIFTI CRB 1300 "industrial collaborative robot" to bridge the gap between cobots and industrial robots.

The SWIFTI CRB 1300 is suitable for a wide variety of production and product-handling applications, ranging from machine tending and palletizing to pick-and-place operations, it said.

"Our customers are looking to robotic automation to make their processes more flexible, efficient, and resilient, helping to counter labor shortages by enabling their employees to perform more value-added work," stated Andrea Cassoni, managing director for global general industry robotics at ABB.

"The latest addition to our SWIFTI family is a highly accurate, high-payload cobot that's up to six times faster than other robots in its class," he said. "This means it can be used by both SMEs and large manufacturers looking for collaborative automated solutions to achieve new levels of flexibility and productivity."



*The SWIFTI CRB 1300 cobot is intended to be fast and accurate enough for a variety of industrial applications. Source: ABB*

## **SWIFTI designed for speed and accuracy**

The SWIFTI CRB 1300 incorporates several features that can improve production efficiency by up to 44% in comparison with other cobots in its class, claimed ABB. In a typical palletizing application, SWIFTI's speed and performance enable it to handle up to 13 boxes per minute compared with nine boxes handled by other cobots in its class, said the company.

Powered by ABB's OmniCore

C90XT controller, the SWIFTI CRB 1300 is up to five times more precise than any cobot in its class, making it ideal for tasks requiring consistent accuracy and repeatability, ABB said. The cobot also a top speed of 6.2m/s, and payload options from 7 to 11 kg (15.4 to 24.2 lb.) and reaches from 0.9 to 1.4 m (2.9 to 4.5 ft.).

The robot can perform a range of higher-payload tasks including screwdriving and assembly, said ABB. With protec-





*With a higher reach and payload capacity than other collaborative robots, the SWIFTI CRB 1300 is 44% faster than other cobots, said ABB. Credit: ABB*

tion against dust and moisture (up to IP67), it can also be used in demanding environments and machine-tending applications.

### **ABB programs cobot for safety, simplicity**

The SWIFTI CRB 1300 includes a safety laser scanner integrated with ABB's SafeMove collaborative safety software. These technologies enable safe collaboration without the space requirements and costs associated with installing protective fencing or other physical barriers, asserted ABB.

If the laser scanner detects a human worker within SWIFTI's operating area, ABB's SafeMove software is designed to automatically slow the robot or stop it completely. As the person moves away, movement will be restored, returning to full speed for full productivity only once the workspace is completely clear.

As a further protective mea-

sure, a built-in interaction status light provides a visual indication of the cobot's status when a worker is within the area, said ABB. It added that SafeMove add-ins allow for easy integration of the scanners, enabling workers to quickly set up a safe working zone and other safety features using the handheld FlexPendant

operating unit.

The same simplicity applies to programming the SWIFT CRB 1300, said ABB. Users can set up the robot by either physically guiding it through a process (lead-through programming) or through ABB's new Wizard Easy Programming software.

Based on simple graphical blocks, Wizard Easy Programming makes programming

accessible for non-specialists in robotics, ABB said.

### **ABB Robotics portfolio grows**

The SWIFTI CRB 1300 is part of ABB's wider cobot portfolio, which covers payloads from 0.5 to 11 kg (1.1 to 24.2 lb.). Options include the YuMi single and dual-arm robots, the GoFa CRB 15000, and the SWIFTI CRB 1100 industrial collaborative robot for payloads up to 4 kg (8.8 lb.). The company added that its high-quality designs are backed by expert support.

Zurich-based ABB Ltd. said it has a history of technical excellence stretching back more than 130 years. The electrification, automation, and motion company has more than 105,000 employees in over 100 countries.

The ABB Robotics & Discrete Automation unit said it has shipped more than 500,000 systems as it supports customers of all sizes in "their transition to the connected and collaborative factory of the future." Its U.S. offices are in Auburn Hills, Mich. •



*The SWIFTI CRB 1300 is designed to be easy to integrate and use, said ABB. Source: ABB*

# Festo and SICK's New Safety Program Designed to Teach Students the Importance of Risk Assessment

The companies said the curriculum is being used by several community colleges and universities but did not share which ones.

BY ROBOTICS 24/7 STAFF



**F**esto Didactic and SICK Sensor Intelligence recently announced the creation of their Safety Awareness Bundle. Designed for students, the bundle includes lessons on robot risk assessment and the differences between the system approach and automation à la carte.

The bundle includes Festo Didactic's manufacturing production system and a

simulated cyber-physical smart factory with a six-axis robot. SICK's area scanners, safety programming logic controllers, and safety relay are also included.

## **Industry should drive education**

“With such a demand for Smart Manufacturing methods to be demystified, students who have been exposed to this

## EDUCATION AND TRAINING

sort of implementation have a real advantage when it comes to applying to jobs compared to students not provided the same experiential learning and job training,” said Ted Rozier, director of engineering at Festo Didactic North America.

Students will also learn the definition of the terms performance measure, areas of severity, frequency, and avoidance as they relate to robotics.

“In the past, robotics education has traditionally focused on a specific robot brand and only the robot operation itself,” Festo Didactic said in a statement. “By adding safety curriculum to FESTO’s product line MPS (Manufacturing Production System) and Cyber-Physical training equipment, students develop a well-rounded working knowledge of how robots are tightly integrated as a system in the real world.”

### **Curriculum designed for use in schools and by those already working in industry**

FESTO and SICK said they designed the curriculum to be platform agnostic so any leading robotics manufacturer can adopt it. The bundle is being used at several community colleges and universities across the country, according to the companies. They added they are also offering the bundle to those working in the industry already as well.

### **The bundle includes a six-step safety guide for robotic equipment safety.**

- 1. Risk assessment**
- 2. Safe design**
- 3. Technical protective measures**
- 4. Administrative measures/information about residual risks**
- 5. Overall validation of the machine**
- 6. Deployment of machinery**

“Incumbent workers may also sign up for the safety awareness course to upskill their robotic knowledge base,”

the companies said. “After learning and performing the competency-based exercises in the curriculum, students acquire the in-demand skills they need to be successful at work and throughout their career.”

Susan Nangle, national key account manager at SICK, said the partnership lines up with the goals of SICK’s founder, Dr. Erwin Sick.

“SICK wants to make the world a safer place. It’s about educating students that safety is important. It’s about getting beyond the manufacturing site and taking a step back to those students before they even hit the plant floor, so they recognize the importance of machine safety,” Nangle said.

The companies also teamed up at IMTS 2022 and hosted a student competition. •







*The new C2D1-rated EOAT automated sander from Aerobotix and FerRobotics. Source: BusinessWire*

## Aerobotix and FerRobotics Create End of Arm Tool for Sanding in Hazardous Environments

Companies say automated sander for flammable dust will reduce the risk of worksite fires and health risks for humans.

BY ROBOTICS 24/7 STAFF

**R**obotics continues to take on dull, dirty, and dangerous tasks to relieve employees for other tasks. Aerobotix and FerRobotics GmbH have jointly created an automated sander to reduce human involvement in hazardous tasks in response to industry demand.

The companies claimed that they designed the first Class II, Division 1 (C2D1) end-of-arm tool (EOAT) sander. It is based on FerRobotics' Active Orbital Kit (AOK) with patented Active Compliant Technology and can

improve efficiency and safety, they said.

### **Aerobotix works to make aerospace jobs safer**

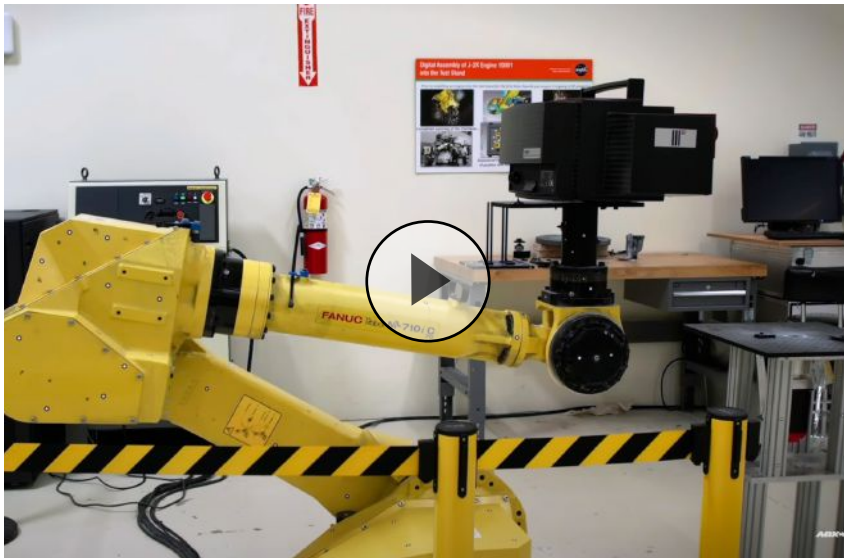
Each year, tens of millions of workers globally are afflicted with silicosis, an incurable lung disease caused by crystalline silica dust inhalation, leading to thousands of deaths, according to the International Labour Organization. Many jobs in the aerospace and defense industries involve combustible, dangerous dust created by sanding.

The invention of a force-com-

pliant C2D1-rated automated sander, with integral dust collection, virtually eliminates the risk of exposure and occupationally acquired respiratory infections, said Aerobotix and FerRobotics.

"Aerobotix remains committed to improving safety in the aerospace and defense industries," said Josh Tuttle, business development manager at Aerobotix. "As such, we're proud to partner with FerRobotics on this important tool to help save lives and reduce lung disease in the workplace."

Huntsville, Ala.-based Aerobotix specializes in the



controlled tooling market. It is the world's first AI-conditioned, active force-compliant tool – a true game changer that enables customers to implement state-of-the-art, guaranteed plug-and-play processes,” he added. “Creating this first C2D1 EOAT sander of its kind with Aerobotix is a proud achievement for FerRobotics.”

Linz, Austria-based FerRobotics develops and distributes sensitive elements for robotic surfacing and finishing end effectors. The company said its EOAT can equip an industrial robot or collaborative robot with contact intelligence and real force control.

The company said its Active Compliant Technology gives robots a sense of feeling, ensuring more efficient, finer, and more valuable production results. FerRobotics said its products are ready for applications such as robotic grinding, sanding, polishing, brushing, satin finishing, deburring, or taping. •

creation of automation for the production of high-value, high-precision components, aircraft, and vehicles. The company has more than 130 robotic systems installed in the U.S. and abroad.

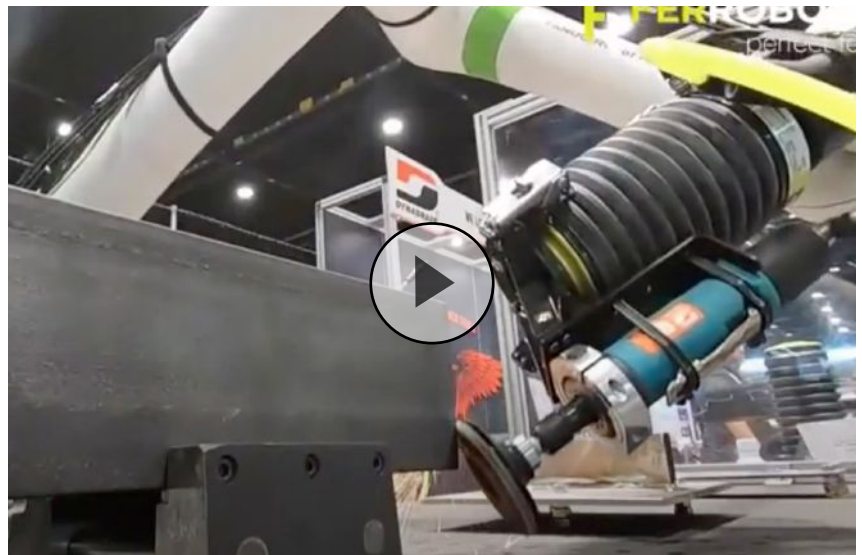
### **FerRobotics helps address combustion risk**

In addition to putting human workers at risk of serious respiratory illness, C2D1 worksites produce combustible dust in the air that can be quickly ignited by an equipment malfunction or the improper use of rated equipment. In a C2D1 environment, combustible dust of an electrically conductive nature might also be present, or dust might be emitted into the air continuously, intermittently or periodically.

“Because combustible dusts have resulted in injuries, as they can be easily ignited by a spark, it’s been an area of huge concern in industrial, construction and fabrication

workplaces,” said Ronald Naderer, FerRobotics founder and CEO. “Now, with this specially developed orbital sander, we finally have the right equipment to keep humans safely away from these hazardous environments while enabling teams to also avoid monotonous and time-consuming tasks.”

“It is a revolution in the force-



# Rite-Hite Features Smart-Connected Equipment Options

Rite-Hite presented several smart-connected equipment options for DCs and warehouses—all designed to increase productivity and safety.

BY CHRIS LEWIS

Rite-Hite recently presented several smart-connected equipment options for DCs and warehouses—all designed to increase productivity and safety.

The company's Dok-Commander Combined Controls integrates numerous loading dock control components into a central panel. It can also be programmed to work only in a safe sequence of operation.

The Rite-Vu Hazard Recognition and Control System uses audible alarms, interior monitors, LED lights and motion detection to alert dock employees of possible loading dock hazards, decreasing their injury risks and potential downtime.

"Since operational insights, particularly from captured data, can increase productivity and safety, these products feature additional smart capabilities that utilize sensors to capture data, which can be fed into our digital platform for analysis," said Sara Everts, director of corporate



marketing at Rite-Hite.

The company is showcasing other smart-connected products like Dok-Lok vehicle restraints, FasTrax industrial doors with GUI door controls, and the Safe-T-Signal intersection warning system. It will also debut the GuardRite Polymer Safety Barrier.

"As the logistics industry becomes more competitive, facility managers will continue to seek out new methods to boost their productivity," Everts added. "Each of these options will help

them achieve their productivity goals long term."

ProMat 2023 was held March 20-23 at Chicago's McCormick Place. The trade show displayed the latest manufacturing, distribution and supply chain solutions in the materials handling and logistics industry. •

*Chris Lewis is the owner of Innovative Written Solutions, a content development and editorial services company based in Troy, Mich.*