

Technology Spotlight

ROBOTICS

TECHNOLOGY SUMMARY

Robots are computer-controlled devices capable of precisely handling materials and tools in place of, or alongside, humans. Robots are available in various configurations, including autonomous mobile robots (AMRs), automated guided vehicles (AGVs), articulated robots, humanoid robots, and collaborative robots (cobots). Adoption of robotics may be limited by high purchase and maintenance costs, technology limitations, and worker concerns regarding being replaced by automation. Focusing applications on tasks that reduce human exposure to risk, beginning with small-scale pilots, and proactively engaging employees, including offering reskilling or retraining programs, can help address these barriers and facilitate successful implementation.



AMRs can find and pickup objects, perform visual inspections, and transport materials without relying on fixed routes.



Robotic arms can perform repetitive and precise tasks, such as assembly, packaging, welding, cutting and more.

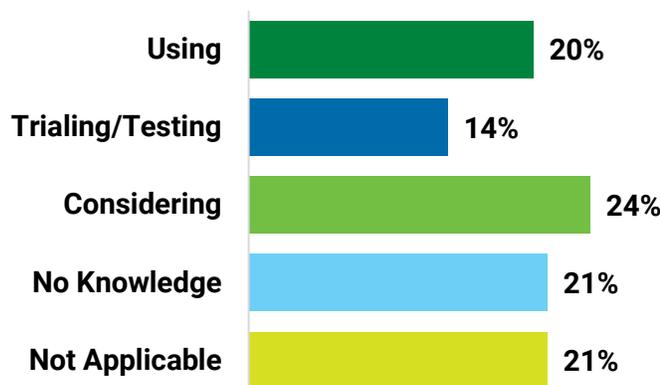


AGVs can perform visual inspections and transport materials along fixed, predetermined paths within a facility.

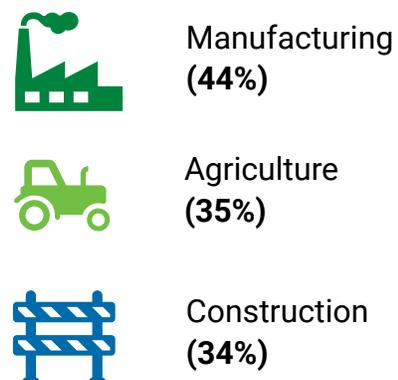
SAFETY TECHNOLOGY 2024 SURVEY RESULTS

According to an [NSC survey](#) of 500 employers and 1,000 employees in safety-sensitive industries, 20% of employers reported currently using robotics in the workplace, while 38% said they are either testing or considering its use. The highest reported use of the technology came from employees in manufacturing, agriculture, and construction.

Use of Robotics in the Workplace:



Top Industries Testing or Using:



Voices from the Workplace:



"Robots or automated vehicles remove workers from dangerous environments by having machines perform high-risk tasks instead."—*Employer (Agriculture)*



"The motion control is complex, requiring professional and technical personnel to maintain and maintain, and the maintenance cost is high."—*Employer (Mining and Quarrying)*



"We use AMRs to deliver parts from one section of the factory to others. These are very helpful as they are generally much safer than a human running a forklift."—*Employee (Manufacturing)*



"The mining environment is complex and ever-changing, and robots may face challenges such as irregular terrain, harsh weather, and other obstacles."—*Employee (Mining and Quarrying)*

Benefits of Robotics

- Robots can reduce exposure to hazardous environments and substances by performing inspections and other work in high-risk settings.
- Worker fatigue is associated with an increased risk of injury; robots can replace repetitive tasks, allowing employees to focus on more varied and engaging work.
- Robots can perform repetitive or physically demanding tasks, helping to reduce the risk of musculoskeletal disorders (MSDs) by augmenting or replacing human labor.

Considerations for Adoption

- High purchase costs and ongoing expenses for maintenance, training, and upgrades can post a significant barrier for small and medium-sized organizations.
- Technology limitations can restrict the use of robotics in rugged or complex environments like construction, mining, or logging.
- Without transparent communication, automation efforts can lead to fear or resistance from workers concerned about being displaced.

BEST PRACTICES

- **Engage with employees** to identify high-risk tasks or jobs and explore how robotics can be used to eliminate these risks and fit into existing workflows. To support a smooth transition, **proactively communicate any changes** and offer retraining or reskilling for any impacted roles.
- **Prioritize applications that eliminate or minimize the need for human exposure to risk**, such as work at height, confined space entry, performing repetitive or manual tasks, or handling hazardous materials.
- **Begin with small-scale pilots** to evaluate how the technology performs in specific use cases or environments, identify technical or operational challenges, gather worker feedback, and adjust before scaling up to reduce initial monetary and resource investments.

For more information, see our report [Improving Workplace Safety with Robotics](#). For additional resources and guidance on adopting safety technologies, explore the [Work to Zero Safety Innovation Journey](#).