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The Future of Automation: Unleashing the Power of Industrial Robotics

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SPOTLIGHT

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Business requirements are driving the demand for industrial robotics technology along with the ability to automate complex and repetitive tasks, freeing up the workforce to focus on more value-added activities.

The Future of Automation: Unleashing the Power of Industrial Robotics

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Introduction

Supply chain disruptions are testing organizations like never before. As companies cope with ongoing talent shortages, along with geopolitical concerns and transportation congestion over the past few years, these challenges have highlighted the need for industrial automation. Robotics automation for the industrial sector is an area of technology that is rapidly transforming the way companies operate in a manufacturing environment as they strive to maximize efficiency, improve operations, and remain competitive. Robotics automation found in a manufacturing environment is slightly different from robotics automation found in a warehousing environment. Robotics automation for the industrial sector is used in factories and other automated production lines to help build products.

AT A GLANCE

KEY TAKEAWAYS

- According to IDC, over 59% of manufacturers said the largest challenge they face when hiring talent is finding rapidly changing skills required to keep up with evolving technology. Robotics automation can provide instant ROI in this area as it is programmable to the operation.
- Companies should seek an end-to-end robotics solution that provides value and insight at every stage in the machine life cycle.

Robotics automation is designed to perform specific manufacturing operations such as material handling, processing operations, assembly, and inspection. Industrial robotics can be programmed to complete a specific set of tasks, whereas warehouse robots are used to automate various tasks within a warehouse. These robots are designed to transport items, store items in the right locations, pick, pack, and ship. This makes industrial automation incredibly versatile, enabling robots to be used in a variety of applications.

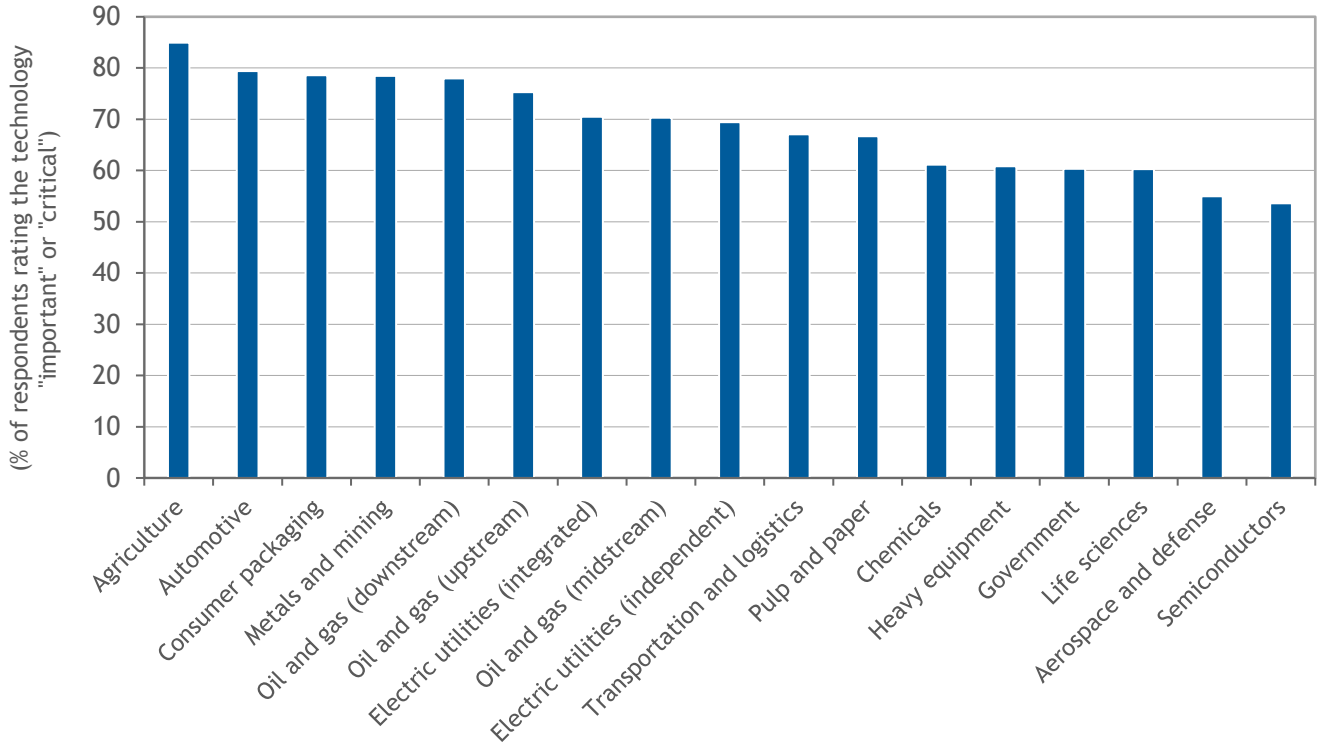
Robotics automation has become highly desired in a variety of industries, including manufacturing, automotive, aerospace, electronics, pharmaceuticals, food and beverage, plastics and rubber, and metal fabrication. Although different industries will have different operational processes and procedures, there are also many similarities, and many of the challenges around labor and efficiency are common. Industrial robots can also be programmed to learn and adapt to new tasks, which is an important characteristic of this technology.

Several different types of robotic arms can be used in a manufacturing environment. These include articulated robots, SCARAs, Cartesian robots, delta robots, cylindrical robots, and collaborative robots (cobots). Articulated robots have joints that allow them to move in multiple directions. SCARAs are designed for precision tasks such as assembly tasks and pick-and-place operations. Cartesian robots are used for linear motions, such as picking and placing, cutting, and palletization. Delta robots are designed for pick-and-place and high-speed assembly operations.

IDC research indicates that robotics automation plays a significant role in helping organizations achieve operational excellence and resilience (see Figure 1).

FIGURE 1: ***The Significance of Robotics in Achieving Operational Excellence***

Q How would you rate robotics in terms of its ability to help your organization achieve operational excellence and resilience?



n = 1,372

Source: IDC's Future of Operations Survey, 2022

Benefits of Integrating Industrial Robots

Productivity and Quality Efficiency

Robotics automation can aid manufacturing and industrial operations in various ways. The main topic of conversation for the past several years has been the labor/skills gap and the issues in developing and retaining skilled workers. According to the Bureau of Labor Statistics (BLS), today, 43% of manufacturing workers are 45–65 years old. If the average retirement age is 65, then by 2030, a large percentage of those workers will retire or be close to retiring. The BLS also predicts that by 2029, 38.5 million workers will be 35–44, making them the largest age group within the workforce. This emerging demographic is not applying for jobs that involve repetitive and menial labor; members have grown up during the digital age. They have had access to the internet and digital devices for over a decade and expect to encounter the same level of interaction in their jobs. The Internet of Things has introduced a level of digital systems that need workers who are familiar with cloud networks, online databases, data analytics, and digital resources.

Companies should leverage these workers to fill higher-skilled positions instead of manual labor jobs. The role of robotics automation is to aid workers by performing repetitive, dull, dirty, and dangerous tasks.

By implementing robotics automation, companies can achieve higher productivity and operational efficiency while maintaining consistent quality. Robots can be programmed to repeat the same manual tasks, without error and at a pace that often exceeds human capability. This attribute has existed since the 1970s when industrial robotic arms changed how automakers assembled vehicles. The robotic arms, however, were too dangerous to perform near humans and could not handle delicate items.

Today, cobots have changed how industrial robots operate. Cobots are articulated robotic arms that have been designed to work safely alongside humans; they can operate next to people in a collaborative space. Cobots can perform repetitive, subordinate tasks, while human workers can perform more complex operations. For example, instead of human workers having to lift objects for palletization or packaging, a robotic arm with a payload range of 3–18kg can lift and sort the object alongside the human worker while the cobot manages the logistics. This helps reduce the likelihood of human injury and the resulting productivity hit. Cobots' safety features include torque sensors, collision protection, rounded surface edges, advanced machine vision for visual detection, and force control. These robotic arms have allowed industrial robotics to escape the automotive floor and enter new workspaces such as agriculture, electronics, food and beverage, and consumer goods.

Along with cobots, advances in electronics and lightweight materials have enhanced delta robots (parallel robots with three universally connected arms) and Cartesian robots (robots that move along linear axes). These robots are used in sorting, picking, and placing operations in the food and beverage, life sciences, pharmaceuticals, electronics manufacturing, metals and machining, and logistics and warehouse industries. Delta and Cartesian robots can be enhanced by pairing them with connected sensors and advanced vision systems; these robots can more efficiently and accurately sort through various products that are moving down a conveyor belt.

These efficiencies help companies achieve higher productivity rates, improve quality, enable higher and more flexible production, and reduce manufacturing cost by as much as 50% when factoring the hidden cost to not automate. Robotics optimize production, enabling continuous operation and reduction of lead times. Increased flexibility in production lines is essential for organizations to meet online demand, which is often volatile. Many industrial operations are adapting from stock inventory to on-demand manufacturing. Automation allows companies to shift production where it is needed, increasing production flexibility to meet online purchasing.

Increased Safety and Worker Benefits

Robots can help ease the type of repetitive work done by today's workforce. They can take on tasks that can be dangerous to humans. When companies think about labor, they tend to focus on employees versus automation in terms of labor cost. However, one factor that is not considered when calculating labor cost is the availability of employees. Difficulties of filling a given job can arise due to injury, lack of training or expertise, paid time off, or even a transfer. With automation as the replacement, downtime is reduced, and productivity remains consistent. For example, automating specific tasks in a warehouse can help lower staff turnover by reducing the need for employees to perform repetitive tasks. Less turnover can be very beneficial for companies that are experiencing high turnover rates due to a lack of skilled talent.

According to IDC's recent *Talent Management Survey*, over 59% of manufacturers said the largest challenge they face when hiring talent is finding rapidly changing skills required to keep up with evolving technology. While locating talent has been a concern for organizations, even after they find talent, a learning curve is required to get employees up to speed.

In 2019, the BLS reported that 31% of work-related injuries were due to overexertion and bodily reactions, with the latter category referring to repetitive movements made by workers found on construction sites and in manufacturing plants and warehouses. Performing the same physical motion consistently throughout the workday can negatively impact the body, which in turn impacts worker performance and overall productivity. Robotics automation can take on the burden of these repetitive tasks. Since robots today have a smaller footprint, are more affordable, and are designed to operate safely around people, the types of repetitive tasks they can perform have increased.

In hazardous settings, robots can perform tasks that would jeopardize human workers' lives. For example, robots can be used to monitor remote operations in environments that experience extreme temperature ranges or that are loud, treacherous, or not easily accessible. These working conditions can result in safety and health risks for operators. For these reasons, industries such as oil and gas (midstream transportation and storage) and electric utilities have listed robots as one of their top 3 investments over the next three years, according to IDC's 2022 *Future of Operations Survey*.

In clean room environments, robots can be designed with a protective coating, bellows covers, seals, and an ingress protection rating of IP65 or higher to protect against dust and liquids. For companies in the pharmaceutical and semiconductor industries, these types of robots are essential. They can easily handle items without damaging them by introducing dust or foreign contaminants. According to IDC's 2022 *Future of Operations Survey,* semiconductors ranked robotics automation as the most critical enabling factor for remote operations. Using robots in a sealed environment allows semiconductor manufacturers to operate several assembly lines continuously with little outside monitoring.

Future IoT Trends for Robotics

The next stage of robotic evolution involves introducing IoT connectivity and digital tools. Robotic manufacturers are using IoT networks to connect robots to industrial control systems. These connections provide insight into robotic operation, allowing for predictive maintenance and digital visualization. Digital twins can help operators plan, install, assemble, operate, and maintain robotic systems. By connecting robots to IoT networks, supply chains, or operations, digital twins can be simulated using performance data to provide real-time, operational insights.

Robots are also embracing new technologies and approaches for ease of programming. Software programming is becoming more flexible and automatic. Applications can automatically determine the code generation to perform tasks based on minimal boundary input. The programming can also be done via cloud-based web apps, allowing for remote operations and assistance.

Many robots can also be programmed through intuitive applications that are user-friendly, reducing the need for extensive programming. The software can interpolate the movement and self-program a tool path by recording a few robot positions. Augmented reality headsets and handheld devices such as a smart operator pendant can aid operators in recording the tool path movement from the robot's physical movements. For example, welding is a skill that is becoming harder to find in today's workforce. For welding applications, these advancements in programming have made it easier for operators to plan the welding path. The advantage of robotic welding is precise motion and execution with minimal programming requirements.

Defying Implementation Roadblocks

As robotics automation has matured, the traditional roadblocks to implementing the technology are eroding, including the following:

- **Companies have resisted implementation due to the complexity of large-scale customization.** Previously, automation was very new, so it lacked the ability to scale as the business grew. This inability to scale was exacerbated by integration issues with the facility's existing software and technology. Now that automation is widely used, businesses are recognizing the benefits and value of software and hardware and the ROI that automation provides. Additionally, perception of technology has advanced to the point where automation solutions can almost immediately deliver highly tuned automation experiences tailored to a specific factory or facility, without the massive overhead of a nonrecurring engineering project.
- **Companies are striving for a zero net carbon footprint as part of their corporate transformation initiatives.** Robotics automation is contributing to corporate sustainability initiatives in a variety of ways, such as helping reduce energy consumption and facilitating more efficient production processes. Robotics automation can help reduce waste through more efficient production processes and limiting the amount of waste created. Robots can also help reduce emissions by running on renewable energy sources.
- **Companies need to mitigate risk and increase resiliency.** The global health pandemic and transportation congestion caused major havoc for supply chains worldwide. Companies were left scrambling to meet service-level agreements with limited material. Now they are embedding risk and resiliency mitigation into their operations. Robotics can help manufacturers manage disruptions and production peaks more efficiently by providing a resilient and consistent production rate. Robots can work continuously and at a higher rate during peak times, allowing manufacturers to increase their production rate without having to increase staff in factories. This increased production rate can help manufacturers meet customer demands while also reducing labor costs associated with overtime. Additionally, robots are much less prone to errors and can help increase accuracy and consistency in production, further improving production efficiency.

Considering Schneider Electric

Schneider Electric's vision is to empower all organizations to make the most of their energy and resources, bridging progress and sustainability. Schneider's mission is to be the digital partner for sustainability and efficiency. Schneider drives digital transformation by integrating process and energy technologies. The company offers endpoint-to-cloud connecting products, controls, software, and services across the entire life cycle, enabling integrated management for homes, buildings, datacenters, infrastructure, and industries.

With more than 20 years' experience in industrial robotics, Schneider has upgraded many of its own and its customers' manufacturing sites with robots and digital solutions. Schneider has a global perspective on how to design, build, and operate effective robotics and digital solutions across operations.

Challenges

For over 20 years, Schneider Electric has sold Cartesian and delta robots for industrial applications. Now the company is expanding its portfolio to include collaborative robots and SCARAs. Schneider will need to leverage its domain expertise to execute successfully within the robotic market. Appealing to existing customers that need to automate can help Schneider incorporate robotics automation into its other offerings, providing an integrated system.

A single-source trusted partner to help guide companies will make the automation journey less painful, especially for companies that are looking to robotics for the first time. To offer an end-to-end integrated automation solution, Schneider will need to combine its offerings in mechanical, electronic, and software domains.

The robotics market is very complex. Schneider will need to approach businesses with a comprehensive automated solution by utilizing its current product line. If Schneider can offer installation visualization, design and engineering, operation integration, maintenance, and service assistance, customers considering robotics for the first time will find it easier to embrace automation solutions. Schneider's EcoStruxure, an open IoT-enabled architecture and platform, can help create digital twins, ease programming, and monitor operations. This comprehensive approach will ease customer concerns, reduce downtime due to installation, and overcome adoption hurdles.

Schneider could also appeal to customers by exploring different procurement plans. Many companies starting their path with robotic solutions do not want to buy robots, but they would rent or use robots as a service. These options are becoming more popular as companies look to automate quickly to speed up production. This alternative procurement model also helps customers that may not be able to afford the price point of certain robots.

Robotic connectivity to existing IoT infrastructure will be a challenge for new customers. Schneider Electric's EcoStruxure, and the company's acquisition of industrial software developer AVEVA, can help new users integrate robotic solutions with established IoT databases, cloud networks, and industrial controls.

Conclusion

The COVID-19 pandemic highlighted the importance of the digital marketplace and the need for increased and flexible automation. Using robotics automation provides the benefit of increased productivity that can be programmed for various manufacturing tasks. By aiding workers with continuous and repetitive automation, robots provide consistent productivity and allow workers to complete higher-skilled tasks, increasing production efficiency.

With the integration of industrial robots, businesses increase efficiency, reduce costs, and improve customer satisfaction.

The global supply chain has also been disrupted and is still in the process of rebuilding. Companies must make additional effort to identify vital supplier partners and maintain strong supply chains and operations coordination to meet fluctuating demand. With the integration of industrial robots, businesses increase efficiency, reduce costs, and improve customer satisfaction.

Robotics automation is an increasingly important technology for businesses to take advantage of, as it can significantly improve their operations. Industrial robotic integration is a long-term investment that can improve productivity and reduce costs. The barriers to robot adoption are lowering with affordable hardware and easier programming methods.

With the proper implementation, businesses can reap the rewards of industrial robot integration and ensure they remain competitive in the ever-changing landscape of modern business.

About the Analysts

Roderick Gaines, *Research Director, Worldwide Supply Chain Strategies: Warehousing, Inventory and Order Management*

Roderick Gaines is a Research Director for IDC's Worldwide Supply Chain Strategies Program, responsible for providing research, analysis, and guidance on key business and IT issues pertaining to manufacturing, retail, and healthcare supply chains. He currently leads the Worldwide Supply Chain Strategies: Warehousing, Inventory and Order Management practice, providing fact-based research, analysis, and insight on best practices and the use of information technology to assist clients in improving their capabilities in these critical supply chain fulfillment areas. This practice specializes in advising clients on warehouse management systems, warehouse control and automation systems, distributed order management systems, and more. Roderick also covers the Wholesale Distribution industry.

Carlos Gonzalez, *Research Manager, Operational Technology*

Carlos M. González leads IDC's Operational Technology (OT) research program. He is responsible for research on the hardware and software used in managing operations across a range of industries, most notably the energy and manufacturing sectors. Mr. González's research will cover how the OT sector is changing as the result of the rapid pace of innovation in areas such as sensors, wireless communication, and the cloud.

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More About Schneider Electric

From single-axis machines to high-performance multi-axis machines, the comprehensive range of Schneider Electric's Lexium robots enable high-speed motion as well as precise positioning. The integration and collaborative efforts of robots into the machine control solution is one of the outstanding benefits of EcoStruxure, Schneider Electric's IoT-enabled, plug-and-play, open, interoperable architecture, and platform. It provides end-point to cloud integration connecting products (including robots, HMI, drives, etc.), controls, software and services. It enables lifecycle solutions from design and build to operate and maintain phases through a digital twin. Digital platform, enables manufacturers to better integrate, understand the data and putting in place predictive analyses for realizing the full efficiency and sustainability opportunities for their business. Find out more at www.se.com/robotics.

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