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THE EVOLUTION OF ROBOTICS IN SMBS—FROM HESITATION TO INNOVATION

White Paper

OVERVIEW

Discover how tech advancements, lowering price points, and the urgent need to augment the existing workforce are ushering in the next wave of robotics adoption by smaller manufacturers.

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DASSAULT SYSTEMES

Digital transformation, made up of what's commonly referred to as Industry 4.0 initiatives, is largely recognized as a key enabler to both spurring growth and delivering the efficiencies manufacturers need to remain competitive today. They need the tools to combat industry-wide issues, such as the lingering skills gap and disrupted global supply chain, while staying operationally agile.

An important aspect of these Industry 4.0 initiatives is automation and robotics. Robotics offer the potential to automate mundane, repetitive tasks, such as welding, painting, and assembly, which can help small and medium-sized businesses (SMBs) in manufacturing cut production costs and improve quality control. Robots can also be used to automate material-handling and packaging tasks, which can help these smaller manufacturers reduce labor costs and improve efficiency.

Integrating robotics into your manufacturing is also a great way to attract the tech talent you will need to fortify your future workforce, which you can learn more about in the white paper "How Robotics Can Help You Build Your Workforce of the Future."

While larger companies, such as Amazon, Ford, Walmart, and many more, have been reaping the cost and productivity benefits of robotics for many years, the vast majority of companies with 500 or fewer employees are still sitting on the sidelines. The good news its the bigger companies' use of automation has pushed the development of robotics technology in ways that will greatly benefit SMBs.

A report by The Manufacturer, published in 2019, found out that only 16 percent of the SMB manufacturers at that time in the U.K. had implemented robotics, while a whopping 71 percent did not plan to or were unsure if they would use robots. The same study revealed the following top five reasons behind these companies' hesitation to using robots:

1. Inflexibility coping with product variation
2. High implementation costs
3. Products not easy to handle
4. Lack of programming and maintenance skills
5. Lack of finance

This lack of deployment among smaller companies can be due to many factors, but certainly the cost of adoption and fear of disruption to production are often-cited reasons.

That was then. Today, the picture is different and the industry is booming. According to a white paper by ROBO Global entitled "Automation Isn't Just for the Fortune 500," the global robotics market is predicted to skyrocket from $65 billion in 2021 to $180 billion by 2027.

A significant portion of this growth will come from the SMB segment. The availability of small-capacity and cost-effective solutions from major providers is helping to increase the penetration of robots into this segment. In addition, the increased availability of smaller sensors and faster processors has enabled the development of smaller, cheaper, and more flexible robots that are easier to program and operate.

ARE SMBS READY TO USHER IN NEXT WAVE OF ADOPTION?

SMBs in manufacturing have made significant advancements in adopting automation technology. The combination of advancements in robotics technology, lowering price points, and the rather urgent need to augment the existing workforce have led to the next wave of robotics adoption by smaller, more innovative manufacturers.

The narrative has now evolved from automation as a good-to-have luxury to a foundational necessity for SMB manufacturers, underpinning their competitive edge in the market. With this context in mind, let's delve into the factors that have enabled SMB manufacturers to embrace automation with more ease than ever before.

EVOLUTION OF AUTOMATION TECHNOLOGY TO HANDLE PRODUCT VARIATIONS

Automation technology has indeed become more adaptable and flexible, enabling SMBs to handle product variations efficiently. Here are a few examples of how modern robotics systems and automation solutions have become more versatile:

1. **Robotic Arms With Vision Systems:** These can adapt to varying product sizes, shapes, and orientations. They use cameras and sensors to identify and locate objects, allowing the robot to adjust its grip and handling accordingly. This flexibility enables SMBs to automate tasks such as pick-and-place operations, assembly, and packaging, even when dealing with different product variations.
2. **Collaborative Robots (Cobots):** Designed to work alongside human operators, these robots can be easily programmed and taught new tasks, making them well-suited for handling product variations, and can be quickly reconfigured to work on different product lines or adjust their movements and force exertion to accommodate varying product sizes and shapes.
3. **Modular Automation Systems:** These allow SMBs to configure and reconfigure production lines based on product variations. These systems consist of interchangeable modules or cells that can be easily rearranged or replaced to adapt to different manufacturing needs.
4. **Adaptive Grippers and End Effectors:** These tools, which attach to robotic arms, have become more versatile. Adaptive grippers, for instance, can adjust their grip strength, shape, or surface contact to handle various product types so users can automate tasks that involve manipulating different product sizes, materials, or geometries without the need for custom tooling.

5. **Flexible Conveyor Systems:** Automated conveyor systems have advanced to handle product variations efficiently. For example, adjustable or modular conveyor belts can accommodate different product widths or shapes. They can also be equipped with smart sensors to detect product variations and adjust the speed or direction of movement accordingly, ensuring smooth material handling in diverse production scenarios.

SIMPLIFYING USE OF ROBOTICS TECHNOLOGY

There's been a perception that embarking into automation, and more specifically into robotics, is an expensive and time-consuming undertaking. In addition, many SMBs might worry about a lack of internal expertise in robotics.

The good news is that in recent years, owning robotics technology has become easier and more feasible for SMBs due to several advancements in the field. Here are some key factors that have made owning robotics technology more accessible for SMBs:

1. **Lower cost of robotics:** Technological advancements, economies of scale, innovations in manufacturing, and improved integration and ease of use have collectively contributed to the significant reduction in the cost of robotics. Additionally, innovations, such as 3D printing, have reduced material usage, while improved integration and ease of use have made robotics more accessible and affordable.

   As a result of these trends, the cost of industrial robots is expected to decline to less than $11,000 per unit by 2025, down nearly 60 percent from 20 years ago, when the average cost was more than $80,000. This trend has resulted in increased demand for industrial robots, with sales projected to reach 3.4 million units by 2025, further driving down costs and enabling smaller companies to embrace robotics technology.

2. **No-Code and Low-Code Technology:** The emergence of no-code and low-code programming platforms has simplified the programming and integration of robots. These platforms allow operators and users without extensive coding knowledge to program and configure robot applications. With intuitive interfaces and drag-and-drop functionalities, SMBs can easily customize robot behavior, define tasks, and integrate robots into their existing processes. This eliminates the need for specialized programming skills and reduces the reliance on external experts or software engineers. It also reduces the chance of smaller companies being at the mercy of expensive outside consultants and systems integrators that can significantly add to the cost of implementing robotics.

3. **Plug-and-Play Solutions:** Driven primarily by advancements in component standardization, miniaturization of components, and improvements in connectivity technology, robotic systems now provide plug-and-play capabilities, enabling SMBs to effortlessly install and integrate robots into their operations. These systems are pre-configured and require minimal setup or customization, facilitating quick deployment. Plug-and-play solutions effectively reduce the complexity and time involved in implementation, making them more feasible for smaller manufacturers with limited resources and time constraints.

ROBOTICS-AS-A-SERVICE

Robotics-as-a-Service (RaaS) has gained prominence in recent years as a flexible and cost-effective solution for businesses seeking to leverage robotic automation. RaaS embodies the concept of access over ownership, where businesses can access robotic capabilities as needed without the burden of long-term ownership or infrastructure investment. This trend aligns with the changing preferences of consumption, where convenience, flexibility, and cost-efficiency are prioritized over the ownership and long-term commitment associated with traditional models.

The growth of RaaS can be attributed to several factors. Firstly, RaaS addresses the increasing pressure for automation in various industries. It provides a solution that lowers the barriers to entry, making it easier for businesses, including smaller manufacturers, to adopt robotics without incurring high upfront costs.

Secondly, it leverages the concept of cloud computing, allowing users to access robotic capabilities on a subscription or pay-as-you-go basis. This flexibility enables manufacturers of all sizes to incorporate automation solutions as needed, scaling up or down based on their requirements. RaaS also eliminates the need for extensive infrastructure investments, as the cloud-based approach provides the necessary computing power and knowledge through the service provider. This significantly reduces the implementation complexity and cost for smaller manufacturers.

Overall, RaaS offers increased productivity, reduced costs, improved quality and accuracy, increased safety, flexibility in automation implementations, and access to industry expertise and innovation. These benefits make RaaS a valuable resource for SMBs looking to leverage robotics and stay competitive in the evolving manufacturing landscape.

GOVERNMENT EFFORTS TO PROMOTE AUTOMATION FOR SMBS

The U.S. government has implemented several initiatives to encourage robotic automation for SMBs in manufacturing. One significant effort is the Advanced Robotics for Manufacturing (ARM) Institute, which is a public-private partnership focused on accelerating the adoption of robotics in manufacturing. The ARM Institute provides funding, technical expertise, and resources to support research and development projects that advance robotics technologies and their integration into manufacturing processes.

The government has also established the Manufacturing USA network, an alliance of innovation institutes that address various advanced manufacturing technologies, including robotics. These institutes foster collaboration among industry, academia, and government agencies to develop and deploy advanced manufacturing technologies, including robotics, to enhance competitiveness.

Additionally, the government offers tax incentives and grants to encourage investment in automation equipment and robotics technology. Programs such as the Manufacturing Extension Partnership (MEP) provide assistance to SMBs, including guidance on adopting and implementing robotics and automation solutions. Overall, the U.S. government aims to support SMB manufacturers in adopting robotic automation through funding, technical support, collaboration platforms, and incentives to enhance productivity, innovation, and global competitiveness.

The European Union (EU) has also taken initiatives to promote automation and support SMBs. The European Commission's strategy for digitizing industry, known as Industry 4.0, aims to facilitate the digital transformation of European industry and enhance its competitiveness. The EU provides funding and support for research and development projects focused on automation, robotics, and advanced manufacturing technologies.

The Horizon 2020 program, for example, offered funding opportunities for SMBs to develop innovative technologies and solutions. The EU has also launched the European Digital Innovation Hubs, which provide access to expertise, testing facilities, and funding for businesses to adopt and implement digital technologies.

Additionally, the EU promotes collaboration and knowledge sharing through platforms such as the European Robotics Forum and the European AI Alliance. These initiatives aim to foster innovation, increase productivity, and create new business opportunities for SMBs in the field of automation and robotics.

THE BOTTOM LINE

SMBs in manufacturing today must start evaluating the role that robotics can play in their business. By leveraging robotics, manufacturers can improve efficiencies, amid a slew of challenges, and start their digital transformation journey to assure they remain competitive today and in the future.

Discover how adding robots can help you attract young skilled talent by downloading the white paper, How Robotics Can Help You Build Your Workforce of the Future.

You can learn more about our manufacturing and production solutions by visiting https://www.solidworks.com/domain/manufacturing-production.
