

A close-up, black and white photograph of a robotic arm's end effector, which is a precision-ground metal tool, positioned above a metal gear. The background is dark and out of focus, emphasizing the mechanical components. The image is partially obscured by a white diagonal shape that contains the text.

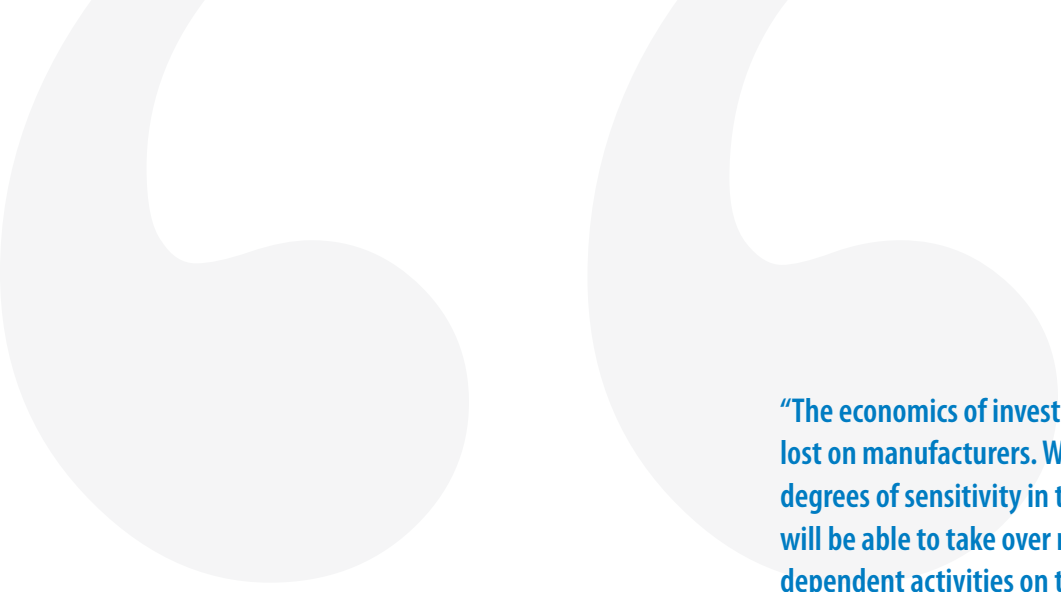
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# AI: BRINGING SMARTER AUTOMATION TO THE FACTORY FLOOR



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“The economics of investing in robotic efficiencies is not lost on manufacturers. With robots attaining greater degrees of sensitivity in their touch capabilities, they will be able to take over many assembly and movement-dependent activities on the future manufacturing floor. At the same time, improvement in sensor and vision technology is creating smarter, lighter and friendlier co-bots that humans can work with safely. Savvy manufacturers will buck the offshore trend, use data to replace inventory, and experience enormous improvements in efficiency and reduction in costs as robots take over most of the assembling, moving, packaging, transporting and other physical tasks. Robots will be collaborative, working together and giving each other feedback. They will learn and improve and make smarter decisions — not just deterministic ones based on their programming, but proactive ones based on their experiences. With advancing adoption of AI, manufacturers can leave the mundane and routine tasks to automation and free themselves up to pursue new ideas and new ways of thinking and making — that’s beyond the realm of machines.”

– An Infosys viewpoint

# INTRODUCTION



The manufacturing sector is evolving into a new state, fueled by massive digital business transformation efforts. Artificial Intelligence (AI) is being used to support and even change the role of the human workforce in the physical workplace. The most dramatic impact of the technology is in bringing efficiency and simplicity to manufacturing's many complex processes and machine-to-machine interactions spanning products and assets, within factories and across global supply networks. From conventional production line robotic equipment consisting of one-bot-per-task systems, automation has now evolved to power and manage multiple tasks simultaneously. AI is the driving force behind a new era of mechanization where processes are being modernized to make production decisions smarter and real time.

As part of its study *Amplifying Human Potential: Towards Purposeful Artificial Intelligence*, Infosys commissioned independent research to investigate the approach and attitudes that senior decision-makers in large organizations have towards AI technology and how they see the future application and development of AI in their industries. As part of the research, 10 industries were surveyed – Retail, Fast Moving Consumer Goods (FMCG), Utilities, Financial Services, Healthcare, Pharmaceuticals and Life Sciences, Manufacturing, Telecoms, Automotive and Aerospace, and the Public Sector.

What follows is a glimpse into the findings specific to the manufacturing sector.

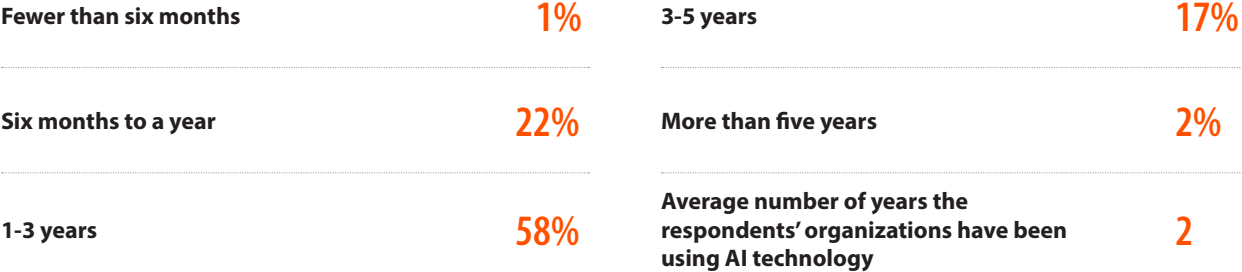
# SMART MANUFACTURERS ARE AUTOMATING DATA AND PROCESSES



Having been an aggressive user of robotics and mechanization for decades, AI is the next logical step for the manufacturing sector to improve productivity, production line and tooling utilization as well as to minimize production cost per unit. To achieve this, manufacturers have been using AI systems as part of their operations for an average of two years, with more than half (58 percent) using AI technology for between one and three years, with a further 17 percent actively using AI for between three and five years. Overall, 29 percent of manufacturers surveyed have fully deployed some form of AI or automation

technology as part of their operations and decision-making processes not just for data analytics, but to automate decision-making and guidance for human decision-makers. For example, when a car maker is running low on a particular component, software can automatically order production of new units. If an entirely new part is needed, the order is dispatched to design teams. Using automated 3D printing technologies, the manufacturer can design, prototype and test a new part in hours instead of days or weeks.

## For how long has your organization been using AI technology?



With each stage being monitored by sensors that feed data to AI-driven analytics software, a manufacturer can determine the production processes of each product much faster than with manual processes alone.

Over half (57 percent) of manufacturers are primarily focusing on investing into security systems and 44 percent into data analytics, for this reason. IT (71

percent) and the operations (31 percent) departments are the most active in their use of AI, while HR (6 percent) and senior management (9 percent) are the least likely to use AI technology. As per the study, the security department is the top active user of AI for its day-to-day processes; this is valuable insight into the direction AI will head in for the manufacturing sector.

# HOW AI WILL IMPACT FUTURE OF MANUFACTURING



With robots attaining greater degrees of sensitivity in their touch capabilities, savvy manufacturers are embracing robotics in greater volume to increase efficiency and work rates on production, picking and packing lines. AI and robotics will be able to take over many assembly and movement-dependent activities on the evolving manufacturing floor, and

reduce costs. At the same time, it will improve sensor and vision technology to create smarter, lighter and friendlier co-bots that humans can work with safely. For example, automobile maker BMW's self-driving Smart Transport Robot travels the floor and sends out communication on any critical situation it sees.

## In your opinion, which areas of AI do you feel require the most improvement before it can be most effective for your organization?

Cost reduction	48%	Training	37%
Time to implement	44%	Interoperability with other systems and platforms	35%
Proof of concept/ROI	44%	Enterprise-grade support	18%
Transparency (i.e. being able to demonstrate how the technology/algorithm works)	44%	There are no areas for improvement	5%
Ease of use	40%		

Alongside these improvements in experience, efficiency, produce-cost reduction and service, AI in manufacturing will deliver opportunities for more personalized and customized manufacturing which will impact the retail space. For example, a retail chain could locate their own manufacturing robot or 3D printer in each store to produce apparel on demand with customized fit, colors, material, and cut based on customer preferences. In addition to automating the process, this also relocates the manufacturing process to a more distributed but still centrally controllable model that shortens the distance between raw materials and end consumers.

Over half of all manufacturers (56 percent) will prioritize developing new products and services when using AI technology over the next three years, and with one of the top benefits of AI in manufacturing being efficiency in experience and produce, this is a positive step forward for the sector. The automation of manufacturing will also support the notion of mass customization and on-demand production of products.

However, AI will bring challenges as well. 37 percent of manufacturers believe that training will be a significant issue when it comes to deploying AI. They will have to ensure training is thoroughly implemented across departments, guaranteeing manufacturers understand what AI is, and how it can benefit and bring about industry progression. Some 32 percent of manufacturers admit to a lack of knowledge about where AI can assist in the industry.

The rapid evolution and convergence of multiple disruptive technologies that are part of AI make this a continuous challenge. There's another dimension to this reskilling that's important to consider. With several roles becoming the domain of smart machines, people skills must evolve to meet the mandate of fluid, new, and somewhat unpredictable roles that machines cannot fulfil, such as deeply understanding product personalization needs, finding new needs of consumers and even evangelizing adoption of new kinds of consumption. Ultimately, this means embedding "learnability" in employees through a systematic process of lifelong learning.

### To what extent do you agree with the following statement: The future growth of my organization is dependent upon large-scale AI adoption?

<b>Strongly agree</b>	<b>26%</b>	<b>Disagree</b>	<b>6%</b>
<b>Agree</b>	<b>38%</b>	<b>Strongly disagree</b>	<b>6%</b>
<b>Neither agree nor disagree</b>	<b>20%</b>	<b>I don't know</b>	<b>3%</b>



# ETHICS AND AI ON THE FACTORY FLOOR



It is inevitable that AI will reshape the composition of the human workforce, freeing individuals from the repetitive, uncreative roles and allowing them to work on activities that add greater value. It will also change the way organizations interact with people internally and externally and how the needs of those people are addressed. For example, AI deployment needs support from employees who may have concerns about roles that were perceived as 'skilled' being reclassified as 'unskilled' by the arrival of AI. This is particularly true in any environment that makes goods and relies on skilled labor to deliver a quality or bespoke product.

Employees may also have reservations about the need to retrain and employers expecting them

to continuously learn and perform multiple roles. There may even be concerns about employee access to training courses and employers investing fairly and adequately in multi-skilling. With some jobs potentially evolving into new roles where people will oversee, manage and augment AI and automation systems, employees may also be worried about being judged on their AI and automation skills and education rather than their career experience. Nonetheless, with the new realities of an AI-driven manufacturing sector clear, these changes will positively impact the industry and help deliver a direction and new employment opportunities through modernized technology.

## In your opinion, has your organization fully considered the ethical issues relating to AI?

<b>Yes, completely</b>	<b>37%</b>	<b>No, not at all and we don't think it is relevant</b>	<b>8%</b>
<b>No, only partially</b>	<b>32%</b>	<b>I don't know</b>	<b>5%</b>
<b>No, not at all but we should do</b>	<b>17%</b>		

Customers and suppliers will see new and different ways of interacting with manufacturers in some circumstances, with less person-to-person interaction and more personalized self-service along with automated, electronic just-in-time ordering. The social elements of working with large teams will also change as a result of more line automation. The gathering and use of data that some may deem as infringing or personal is often questioned by the public, worried about the security and custody of the data. In all cases, people will expect to be treated fairly, honestly and with respect whenever new technology is introduced into their working day or personal time.

Any technology that is going to dramatically impact human aspects of the business is going to be a difficult one to assimilate. Nonetheless, it is a necessary transformation for the future success of individual businesses and the manufacturing sector itself. Therefore, considering the ethics of AI is important for any manufacturer looking to invest in a solution that will materially change the way staff work, the

future of production or the way customers view the organization.

Only a third of the respondents believe for a deployment to reach its full potential their organizations must fully consider the ethical issues relating to AI technology use before implementing it. This is in contrast to 32 percent who have partially considered the issue of ethics in using AI in manufacturing. The deficit of ethical debate in the manufacturing sector is impacting the workforce, with 43 percent reporting concerns around the loss of jobs or change in their jobs due to AI, robotics and other forms of automation.

Considering that almost a quarter (23 percent) of manufacturers believe that they have several barriers to adopting AI technologies internally, 58 percent of businesses have deployed some form of AI or automation technology to innovate into key areas. Extinguishing this new process could shape the overall AI strategy of the business and take it on a different path to current investments.

# CONCLUSION



The adoption and use of AI represents an exciting innovative leap forward for many in the manufacturing sector. However, initiating an AI strategy in a sector that is reliant both on its people as well as on regimented machinery processes requires detailed planning and guidance in the form of professional services to ensure that the increased use of AI is both successful and fully-considered. Understanding the impact an AI deployment will have on a given aspect of business is paramount to ensure that employees and customers are supportive and willing to adapt to new working practices and changing production line environments.

The manufacturing sector shares the view that the long-term role of AI in the sector is inevitable. Considerations around employee training and advocacy along with long-term skill development will require effort by both businesses and state educators. And while the positives of AI continue to outweigh the negatives, successful use of AI requires balance: greater automation but with equal emphasis on people engagement and skills development.

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