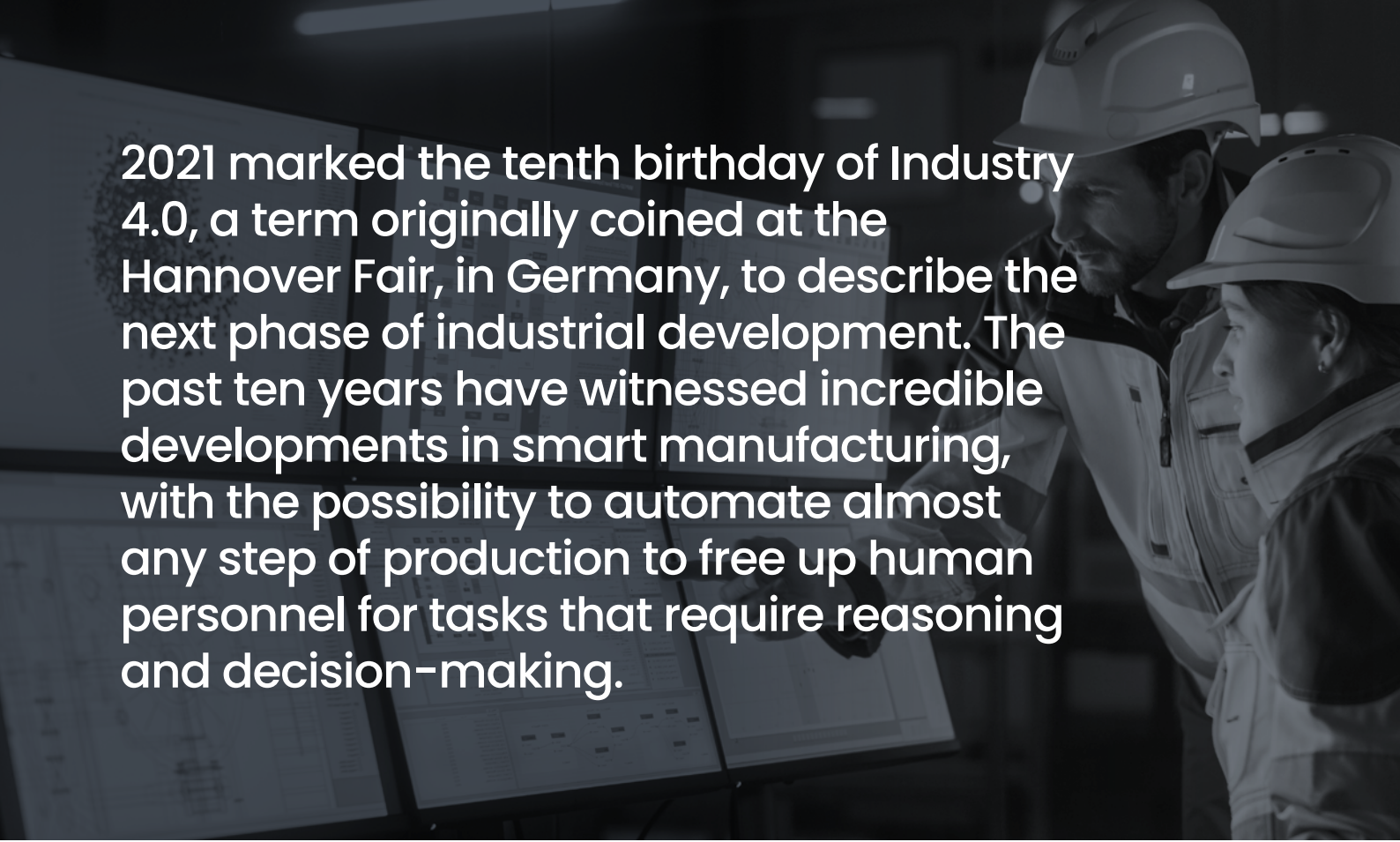


The next ten years of Industry 4.0

What will the future hold for smart manufacturing?





2021 marked the tenth birthday of Industry 4.0, a term originally coined at the Hannover Fair, in Germany, to describe the next phase of industrial development. The past ten years have witnessed incredible developments in smart manufacturing, with the possibility to automate almost any step of production to free up human personnel for tasks that require reasoning and decision-making.

The use of big data for condition monitoring has also revolutionised equipment maintenance, allowing manufacturers to predict failures and minimise downtime, as well as optimise production processes by eliminating bottlenecks and reducing waste.

Innovation in smart manufacturing is continuing to progress rapidly, with new technologies being launched on the market almost daily. As such, manufacturers might struggle to keep up and have a vision for the long-term future of their businesses.

The following guide highlights some of the core industry developments that are likely to happen in the next ten years, so that manufacturers can plan ahead and gain a competitive advantage.





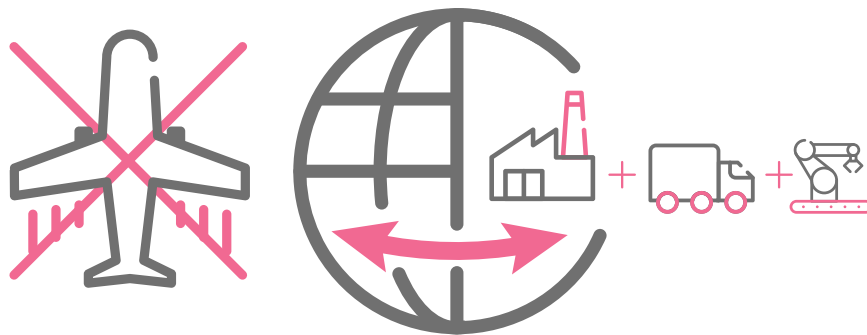
Take a look into the future

2022-23 — A need for supply chain visibility

The ongoing supply chain crisis, which started in 2020 as a result of political upheavals, pandemic-related delays and natural disasters, is likely to impact the next two years according to recent predictions.

In 2022, manufacturers might be more inclined to consider investing in supply chain visibility platforms that allow users to monitor all nodes of a complex chain and rapidly react to disruptions that could compromise the regular flow of goods.

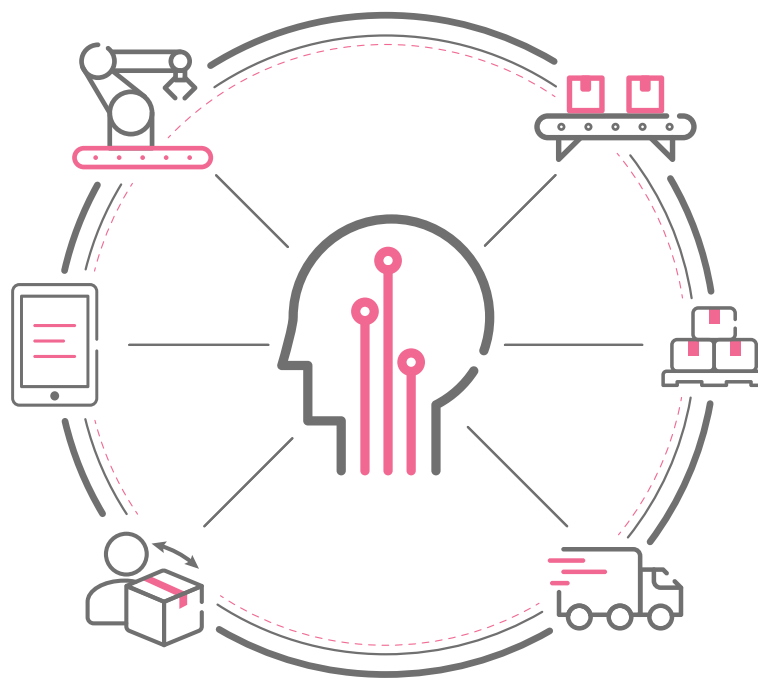
Another major trend is the localisation of production and distribution. An increasing number of manufacturers are reshoring production, partially or in its entirety, to lessen their reliance on China. Initiatives such as Reshoring UK and The Reshoring Initiative in the US are helping manufacturers in this complex process.



Once production is closer to the final customer, last-mile solutions, such as AI-based GPS devices, can more easily help optimise the final route. These devices can anticipate how traffic will change during the travel time and direct the driver accordingly, preventing delays.

In 2023, the need to simulate processes, including the path of goods along global supply chains, will translate into increased adoption of digital twins. This technology was in its infancy until just a couple of years ago but has rapidly evolved to become one of manufacturers' best allies to increase their agility and ability to react to sudden market changes.

In a 2019 report by Gartner, the company predicts that by 2023 at least 50 per cent of large global companies will be using AI, advanced analytics and IoT technologies, including digital twins, to improve their supply chain operations. Supply chain managers should consider investing in these key technologies if they want to stay ahead of the competition.

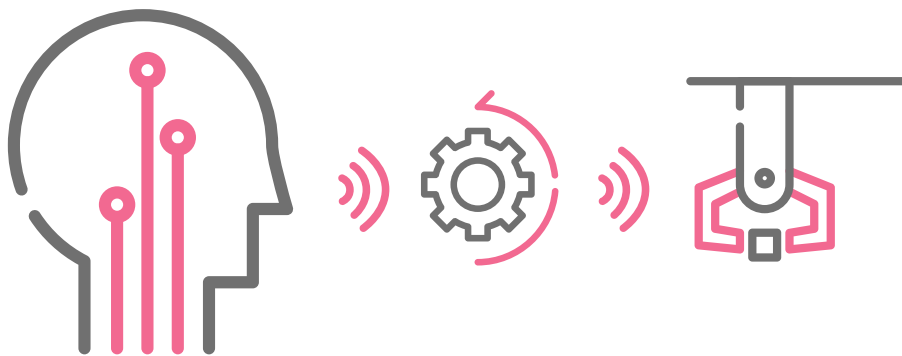


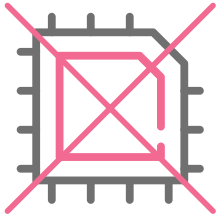
2024 — The rise of AI

Supply chain is only one field where the use of AI will add substantial value for manufacturers. By 2024, market research experts at ABI Research predict that the global manufacturing industry will incorporate 15 million AI-enabled devices such as IoT sensors. The huge variety of processes will revolutionise predictive analytics and machine vision systems for defect detection.

The most common application will be predictive maintenance and equipment monitoring, but AI will boom in fields as diverse as product design, inventory management and quality assurance. However, the analyst firm advises that the major challenges to AI implementation will be integration and training. Starting a comprehensive training program and ensuring that IT and OT teams collaborate on a consistent basis might be a good step to avoid these issues.

Manufacturers should also remember that investing in AI doesn't necessarily involve a cost-prohibitive factory overhaul. Retrofitting legacy equipment with smart sensors and having AI solutions to process the collected data can be a great way to implement AI in a cost-effective manner.





2025 — The breaking point for the semiconductor industry

The rise of AI will naturally push for development in the semiconductor industry. According to McKinsey, IoT could generate up to \$11.1 trillion in revenue by 2025, leading to a huge demand for semiconductor innovation. However, the sector has shown the fragility of its business model in 2021 and will need to drastically innovate to keep up with demand. By 2025, the need to improve the production and distribution model of semiconductors will become pressing.

Currently, lead times for semiconductors are up to 28 weeks. By cutting these, manufacturers will be able to gain a substantial competitive advantage. However, semiconductor manufacturers have many challenges to overcome to rethink their supply chain model. Meanwhile, manufacturers are advised to stock up in advance.

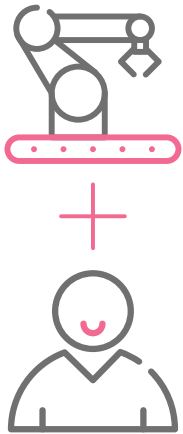
2026 — The Silver Tsunami hits

Robotics Update warns that in the UK alone, 91,000 engineers and 29,000 engineering technicians will retire by 2026. A similar trend is visible worldwide, leading to an increase in the cost of labour due to the scarcity of qualified personnel.

To be prepared, manufacturers should promote initiatives to turn tacit knowledge, which exists only in the minds of the most experienced workers, into company-wide training programmes. They should also incentivize the expansion of their talent pool, looking for talent in traditionally underrepresented groups such as women and ethnic minorities.

However, managing costs and dealing with labour shortages will be a huge incentive to invest in robotics. Manufacturers should look at automating repetitive tasks and move their staff to roles that require problem-solving, decision-making and fine dexterity.





2027 — The golden age of cobots

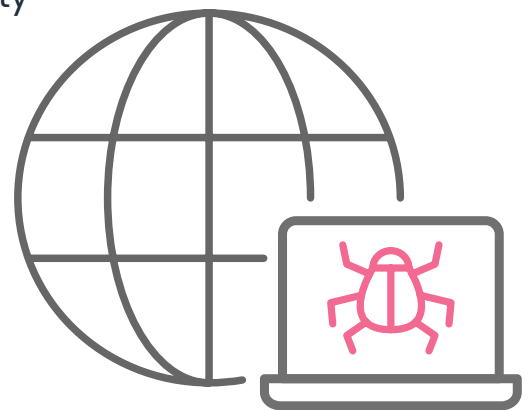
Market research from Interact Analysis reveals that by 2027, cobots will account for 30 per cent of the global robotics market, and annual revenues from their sale will reach \$5.6 billion. This is an impressive rate of growth, up by nearly 60 per cent from 2017.

The most popular applications will be material handling, assembly and pick & place, but new functions will be developed for non-industrial applications in sectors such as life sciences and logistics. This is because cobots are flexible, user-friendly and cost-efficient, making them an attractive investment for businesses of all sizes.

2028 — Cybersecurity threats

The increased use of connected devices, together with the popularity of remote and hybrid work, will lead to more online security threats. In 2021, ransomware was one of the biggest security concerns for manufacturers, especially when critical infrastructure was involved, and the frequency and severity of cyberattacks are only expected to grow.

For this reason, the global network security market is projected to grow from \$27.39 billion in 2021 to \$60.38 billion in 2028. Manufacturers are advised to conduct regular security audits and to patch any vulnerabilities before it is too late.





2029 — Storage is never enough

The global market for big data is anticipated to rise exponentially — from \$1.42 billion in 2022 to \$6.94 billion by 2029. For this reason, traditional technologies for data storage might not offer enough capacity to handle this amount of information.

Luckily, several research and development projects are already tackling the need for data storage technology that offers security and durability in a limited space. Glass data storage and DNA data storage are the two most promising technologies in this sense.

2030 — Achieving sustainability goals

The United Nations 2030 Agenda for Sustainable Development encourages all signatories to combat inequalities worldwide, end poverty and ensure lasting protection of the planet's resources by 2030.

To achieve this incredibly ambitious goal, manufacturers must play their part. This means clean tech will become an increasingly popular area of investment for the sector, with the triple goal of reducing the industry's carbon footprint, saving on energy costs, and complying with increasingly strict environmental regulations. However, the costs associated with the installation and maintenance of clean tech are expected to fall, leading to more widespread deployment of renewable energy sources.





2031 — From sci-fi to reality

By 2031, technologies that are now in their infancy are expected to become commonplace. Among them, the metaverse is predicted to be the most impactful. Market Watch revealed that the global metaverse market is anticipated to grow at a compound annual growth rate (CAGR) of 45 per cent between 2022 and 2031, leading to an unprecedented amalgamation between the physical and digital worlds.

The metaverse has a huge potential to improve manufacturing, taking process simulation to a whole new level thanks to the possibility to create entirely digital simulation scenarios that do not require connection with physical assets. Recently, the first virtual factory set in a metaverse environment opened in South Korea, and various more industry giants are set to invest in the development of metaverse, further propelling the market growth.





Conclusions

These predictions reveal that ten years from now, the factory floors of most production and assembly plants might look very different from now. Thanks to the massive potential of digital technologies, manufacturers will be able to streamline processes and optimise efficiency like never before.

At the same time, there are core issues to solve to allow the sector to flourish and make the most of these technologies. Rethinking supply chain management, training future generations of manufacturing professionals, and meeting crucial sustainability goals are just some of the challenges that the manufacturing community will need to overcome.

At EU Automation, our mission is to keep the manufacturing industry turning. For more insight into the future trends of digital technologies for the smart factory, and to stay updated on how Industry 4.0 will evolve, visit our Knowledge Hub and stay tuned for the next industry guide.



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