AI AND MANUFACTURING
TRANSFORMING THE FUTURE OF PRODUCTION

When people talk about the "Fourth Industrial Revolution", "4IR", or simply "Industry 4.0", they're talking about a broad suite of innovations being brought to sectors such as manufacturing, but something that has AI at its heart.

The integration of AI into the manufacturing sector has marked the beginning of a new era in industrial production. In manufacturing, AI, if implemented well, is a crucial driver of efficiency, productivity, and innovation.

Most critically, well-structured AI integrated into processes mean that manufacturers have the tools they need to stay competitive in an increasingly complex global market. It means being able to offer total customisation and personalisation to customers, with minimal delivery time and just-in-time warehousing, and moving away from mass production and managing large quantities of inventory.

Manufacturers today need to adapt to dynamic market conditions, periods of high and low demand, and increasingly large "normalisations" across the market. With the way that these businesses are traditionally set up, the flexibility is not there in the systems and processes, and this makes adaptation difficult. AI is a core opportunity to overcome that challenge.

However, while AI offers both agility and flexibility, it also presents challenges that manufacturers must navigate. These include high initial investment costs, data security concerns, and the need for workforce reskilling.

This white paper explores the role of AI in manufacturing, its applications, benefits, challenges, and future trends, providing a comprehensive overview of how AI is shaping the industry.

SOLUTIONS TOWARDS
FLEXIBILITY AND AGILITY

Achieving both agility and flexibility in manufacturing requires a holistic all-of-business approach to IT. This white paper looks predominantly at AI, but it, and other applications of technology, should be tuned towards:

Shop Floor Control: Real-time monitoring and control of production processes on the shop floor, resulting in better production control, and faster issue response.

Multi-Plant Management: Develop the ability to manage multiple manufacturing plants or locations from a centralised system, resulting in streamlined operations, standardised processes, and better overall visibility.

Financial Management: Integrate financial processes, including accounting, budgeting, and cost control, leading to enhanced financial visibility, accurate cost analysis, and improved financial decision-making.

Demand Forecasting and Planning: Use ERP's data-driven demand forecasting capabilities to make more accurate demand planning, reducing inventory carrying costs, and minimising stockouts.

Production Planning: Have the ability to plan and schedule production processes, considering resources and lead times, enhancing production efficiency, reducing downtime and optimising resources.

Inventory Management: Track inventory levels, stock movement, and reorder points in real-time, improving inventory control, reduced stockouts, and minimising excess inventory costs.

Real-time Reporting and Analytics: Leverage robust reporting and data analysis tools in ERP to make data-driven decisions, identify opportunities for improvement, and engage in strategic planning.

Quality Control and Compliance: Integrate quality control processes, ensuring adherence to product quality standards, resulting in consistent product quality, reduced defects, and increased customer satisfaction.

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THE ROLE OF AI IN MANUFACTURING
## IT STARTS WITH DATA

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2 minutes

The manufacturing sector has undergone significant changes over the past few decades, but it has always been at the forefront of innovation, with each technological advancement paving the way for the next.

From the advent of the assembly line to the rise of computer-aided design (CAD) and computer-aided manufacturing (CAM), the industry has consistently embraced innovation to improve efficiency and productivity.

In line with this, the manufacturing industry has already become very comfortable with the idea of the collection and use of data before AI came onto the scene. Data has been relied on for forecasting models, demand planning, managing capacity and analysis of the sales history. Finding the right solutions that can use data for these outcomes has been a "Holy Grail" to the manufacturing industry since the 60's.

AI represents the next frontier in this evolution, helping manufacturers to fundamentally do more with their data and in doing so significantly optimise how their products are designed, produced, and delivered.

For example, AI technologies that are already commonly used in manufacturing include machine learning, robotics, and data analytics. Machine learning enables systems to learn from data and improve their performance over time without being explicitly programmed. This capability is crucial in manufacturing, where processes are often complex and data-driven. Robotics, powered by AI, are increasingly being used to perform tasks that were once considered too dangerous, repetitive, or precise for humans. Data analytics, meanwhile, helps manufacturers improve those forecasts, and capacity planning, and adapt to the real-time changing market conditions, enabling more informed decision-making.
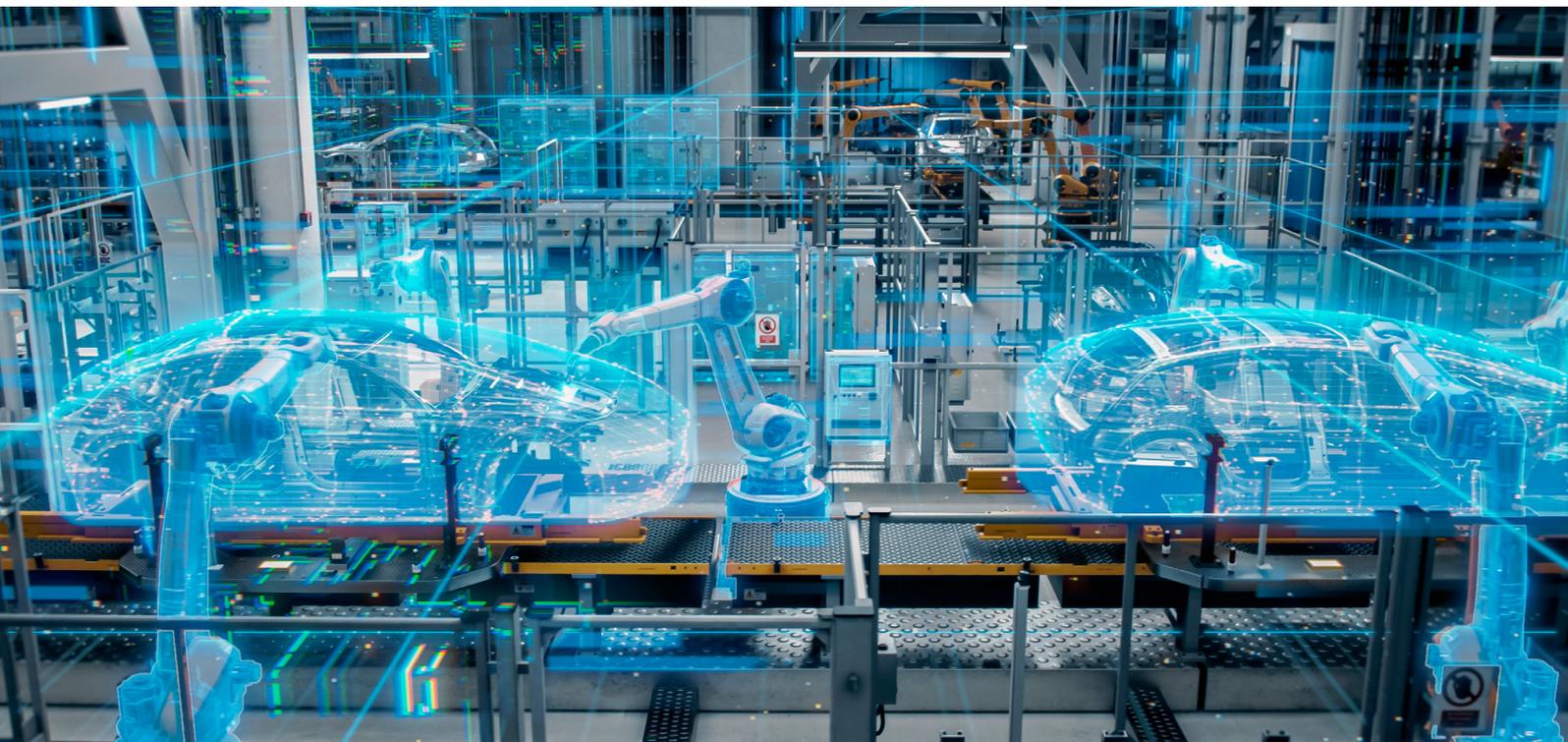
As far as business health and risk management is concerned, in many cases, when paired with a well-designed AI model, manufacturers can also now leverage data to improve their operations.

A good example of this is geopolitical disruption. If war breaks out in an area, affecting supply chains and access to resources, AI can help a manufacturer come to terms with the impact that this has on their capabilities far more quickly than manually monitoring, researching, and calculating.

AI could also be used to help model the potential impact of another conflict breaking out, and subsequently develop contingency plans that would mitigate the damage done to the business. More locally, AI can predict when a machine is likely to fail, allowing for maintenance to be scheduled before a breakdown occurs. This predictive maintenance minimises downtime and reduces the cost of repairs. AI is also used in quality control risk management, where sensors on technology can detect defects in products with greater accuracy and speed than human inspectors. Manufacturers that are processing raw materials, for example, can detect subtle variations in scrap that was previously particularly laborious as a manual process.

THE LADDER TO SOPHISTICATED AI IN MANUFACTURING

Reading time:
2 minutes

1. **FOUNDATION: DATA COLLECTION AND MANAGEMENT**

    - **Data Integration:** Consolidate data from various sources (sensors, machines, ERP systems) into a unified platform.
    - **Data Quality:** Ensure data accuracy, consistency, and completeness.
    - **Data Governance:** Establish policies for data usage, privacy, and security.

2. **INITIAL AI IMPLEMENTATION: PREDICTIVE MAINTENANCE**

    - **Condition Monitoring:** Use sensors and IoT devices to monitor equipment health.
    - **Predictive Analytics:** Implement AI algorithms to predict equipment failures and schedule maintenance proactively.
    - **Cost Reduction:** Reduce downtime and maintenance costs by addressing issues before they escalate.

3. **PROCESS OPTIMISATION: AI-DRIVEN PRODUCTION PLANNING**

    - **Demand Forecasting:** Utilise AI to predict customer demand and adjust production schedules accordingly.
    - **Resource Allocation:** Optimise the use of materials, labour, and machinery to maximise efficiency.
    - **Quality Control:** Implement AI for real-time quality inspection and defect detection.

4. **ADVANCED AI INTEGRATION: DIGITAL TWINS**

    - **Virtual Modelling:** Create digital replicas of physical assets and processes.
    - **Simulation and Testing:** Use digital twins to simulate different scenarios and optimise processes without disrupting actual operations.
    - **Continuous Improvement:** Leverage insights from digital twins to continuously improve manufacturing processes.

5. **SUPPLY CHAIN AGILITY: AI-ENHANCED LOGISTICS**

- **Supply Chain Visibility:** Use AI to gain real-time insights into supply chain operations.
- **Risk Management:** Identify and mitigate risks such as supply disruptions or demand fluctuations.
- **Sustainability:** Optimise logistics for reduced environmental impact and cost savings.

6. **WORKFORCE EMPOWERMENT: AI TRAINING AND COLLABORATION**

- **Skill Development:** Train employees on AI tools and technologies.
- **Human-AI Collaboration:** Foster a collaborative environment where humans and AI work together to enhance productivity.
- **Change Management:** Implement strategies to manage the transition and address resistance to AI adoption.

7. **INNOVATION AND SCALABILITY: CONTINUOUS AI EVOLUTION**

- **R&D Investment:** Invest in research and development to explore new AI applications.
- **Scalability:** Ensure AI solutions can scale with the growth of the manufacturing operations.
- **Feedback Loop:** Establish a feedback loop to continuously refine and improve AI systems based on real-world performance.

HOW AI APPLICATIONS STRENGTHEN MANUFACTURING OPERATIONS

Reading time:
4 minutes

A strong manufacturer in the modern era has the agility and flexibility to continue operation through changing conditions, and then mitigating any risks that those changes represent.

What this looks like to a manufacturer can vary greatly from one business to the next. A manufacturer that specialises in processing agricultural products is going to need to be able to account for the impact of weather on crops. Microsoft, for example, is working with the agricultural sector with AI-powered technology called AgPilot to help all those involved make better use of data feeds, including weather, to fuel decision-making.

Meanwhile, Australia manufactures a great deal of product for the Chinese market, as our largest trading partner. China also has a tempestuous relationship with the West, and this can impact on businesses rapidly. For example, when China responded to trade hostilities with Australia by imposing heavy tariffs on wine exports, it took manufacturers such as Yellowtail, which heavily relied on the Chinese market, several years to find a solution (it now bypasses current and future tariffs by producing the wine for the Chinese market in Chile). The right applications of AI could have assisted in mitigating this risk much more quickly.
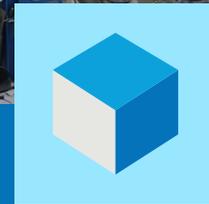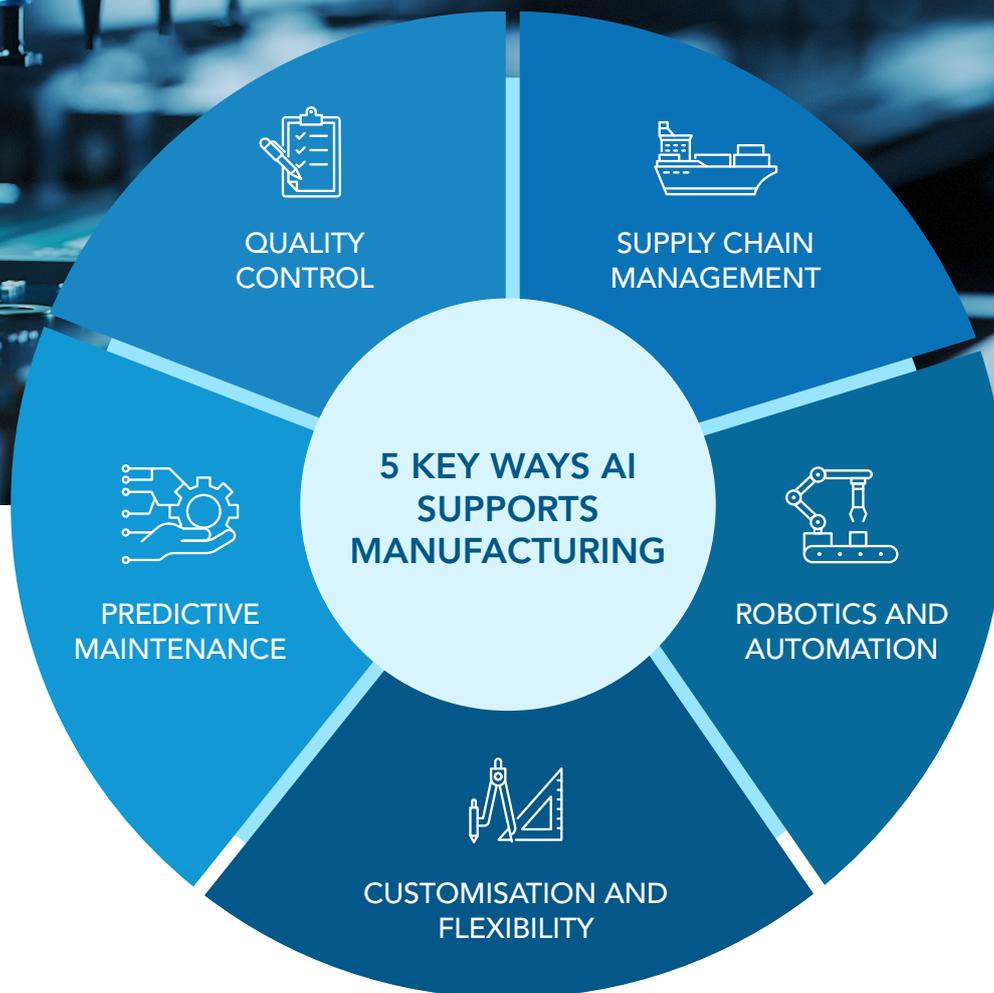

MODERNISING THE RBM PLASTICS TECHNOLOGY ENVIRONMENT

Australian-owned veteran manufacturer, RBM Plastics, had seen a rapid increase in demand for its products, and realised that it needed to modernise its technology to meet these growing needs.

In particular, its processes and data environment was difficult to cut through, resulting in significant inefficiencies and left the company prone to errors. For one example, there were always communication duplication issues in orders. When a purchase order was raised in one system, that would then go off to admin staff for a second system input. Then if the stock arrived early and that wasn't communicated properly, it would sit in the wrong place or accounting period. That ended up driving inefficiencies in cash flow and P&L forecasts, due to the stock coming in at the 'wrong' period.

To solve this challenge, RBM Plastics and Wild Tech turned to a custom NetSuite implementation, which allowed the company to streamline operations, manage supply chain risks, and enhance its general strategic decision-making through improved insights.

5 KEY WAYS AI SUPPORTS MANUFACTURING

- QUALITY CONTROL
- SUPPLY CHAIN MANAGEMENT
- PREDICTIVE MAINTENANCE
- ROBOTICS AND AUTOMATION
- CUSTOMISATION AND FLEXIBILITY

1 PREDICTIVE MAINTENANCE

One of the most transformative applications of AI in manufacturing is predictive maintenance. Traditional maintenance strategies are often reactive, meaning that repairs are only carried out after a machine fails. This approach can lead to costly downtime and unexpected expenses. Predictive maintenance, on the other hand, uses AI algorithms to analyse data from sensors embedded in machinery. These algorithms can predict when a machine is likely to fail, allowing maintenance to be carried out proactively.

2 QUALITY CONTROL

Quality control is another area where AI has made a substantial impact. Traditional quality inspection methods are often manual, time-consuming, and prone to human error. AI-powered quality control systems use machine vision and deep learning algorithms to inspect products for defects in real-time. These systems can detect even the smallest imperfections, ensuring only products that meet strict quality standards reach the market.

3   SUPPLY CHAIN MANAGEMENT

AI is also revolutionising supply chain management by providing manufacturers with better tools for demand forecasting, inventory management, and logistics optimisation. AI algorithms analyse historical sales data, market trends, and other relevant factors to predict future demand with greater accuracy. This enables manufacturers to optimise their inventory levels, reducing the costs associated with overproduction and stockouts. Additionally, AI can optimise logistics by selecting the most efficient routes and methods for transporting goods, reducing both time and costs.

4   ROBOTICS AND AUTOMATION

Robotics, powered by AI, are becoming increasingly prevalent on manufacturing floors. These robots can perform a wide range of tasks, from assembly and welding to packaging and material handling. Unlike traditional robots, which are often limited to repetitive tasks, AI-powered robots can adapt to changing conditions and learn from their experiences. This makes them more versatile and capable of working alongside humans in collaborative environments. Collaborative robots, or cobots, are designed to work safely with human workers, reducing the rate of mistakes and providing additional support without replacing jobs.

5   CUSTOMISATION AND FLEXIBILITY

AI is also enabling manufacturers to offer greater customisation and flexibility in their products. In the past, mass production was often at odds with customisation, as producing customised products was more time-consuming and expensive. However, AI-driven systems can now analyse customer preferences and automatically adjust production processes to create customised products at scale. This capability allows manufacturers to respond more quickly to changing consumer demands and offer personalised products without sacrificing efficiency.

AI AND
MATELEC

Wild Tech's work with MATelec is a good example of how shifting towards Industry 4.0 and embracing AI improves the capabilities of a manufacturer, and from there provides a platform for further innovation and a stronger business.

MATelec is a manufacturing and distribution company based in Shepparton, Victoria that is 100% Australian-owned and delivers both quality commodity products and highly technical control solutions to the electrical industry.

The company knew that its legacy systems, while sufficiently capable in the current environment, would quickly become inadequate as the business evolves. The pressure to transition to a platform built for a modern workplace was emphasised by the fact that the old infrastructure that the legacy systems resided on was no longer supported, bringing increased risk of failure and data loss.

Working with Wild Tech, the company was able to modernise its technology platform and prepare its environment for AI. This means:

- **Defined Processes:** with a view to embrace automation and AI in the future, business process has had to be defined and documented. You cannot automate "it depends", so a defined process provides consistency and scalability.

- **Enhanced Visibility:** Business Central, in conjunction with Power BI, provides comprehensive insights into operations, enabling informed and timely decision-making and proactive management. Data transparency empowers the company to identify opportunities, mitigate risks, and optimise resource allocation effectively. Reporting development is an ongoing requirement that will continue to add exponentially more value as the richness of data grows over time.

- **Scalability and Growth:** Equipped with a modernised infrastructure, the company is well-positioned to pursue its ambitious growth targets. The scalability of Business Central ensures that the system can evolve alongside the company, accommodating future expansion seamlessly.

- **Cultural Shift:** Beyond technological advancements, the transformation fostered a cultural shift within the organisation. With a newfound openness to change and innovation, employees are eager to explore technology-driven solutions that enhance efficiency and productivity.

CHALLENGES
AND RISKS

Reading time:
2 minutes

While AI does offer a host of benefits around risk mitigation, it itself can become a source of risk if the implementation isn't managed strategically. Some of the common risks associated with AI implementation include:

1 HIGH INITIAL INVESTMENT AND INTEGRATION COSTS

Implementing AI systems often require a significant upfront investment in technology, infrastructure, and training. For many manufacturers, especially smaller manufacturers, these costs can be prohibitive. Additionally, integrating AI into existing systems can be complex and time-consuming, requiring careful planning and execution.

2 DATA SECURITY AND PRIVACY CONCERNS

The use of AI in manufacturing generates vast amounts of data, much of which is sensitive and proprietary. Protecting this data from cyberattacks and ensuring compliance with data privacy regulations is a major concern for manufacturers. As AI systems become more integrated into manufacturing processes, the potential for data breaches and cyber threats increases.

3 COMPLEXITY OF AI ADOPTION

Successfully implementing AI requires a deep understanding of both the technology and the specific needs of the manufacturing process. This complexity can be a barrier to adoption, particularly for companies that lack the necessary expertise. Collaborating with AI experts and investing in research and development are essential steps for overcoming this challenge.

**4 WORKFORCE RESKILLING AND JOB DISPLACEMENT**

The automation of tasks traditionally performed by humans raises concerns about job displacement and the need for workforce reskilling. While AI can enhance productivity, it can also lead to job losses in certain areas. Manufacturers must invest in reskilling and upskilling programs to ensure that their workforce remains relevant in the age of AI.

5 DATA QUALITY AND GOVERNANCE

Another significant issue is the need to retain control over the quality of the data and ensure that it doesn't degrade to the point where it becomes a liability. This requires high levels of data science and modelling capabilities and is not traditionally a role that manufacturers invest in.

6 DEPENDENCE ON TECHNOLOGY

Finally, the over-reliance on AI can make manufacturing processes vulnerable to technology failure. There needs to be redundancy – manual backup processes – to mitigate against this risk.
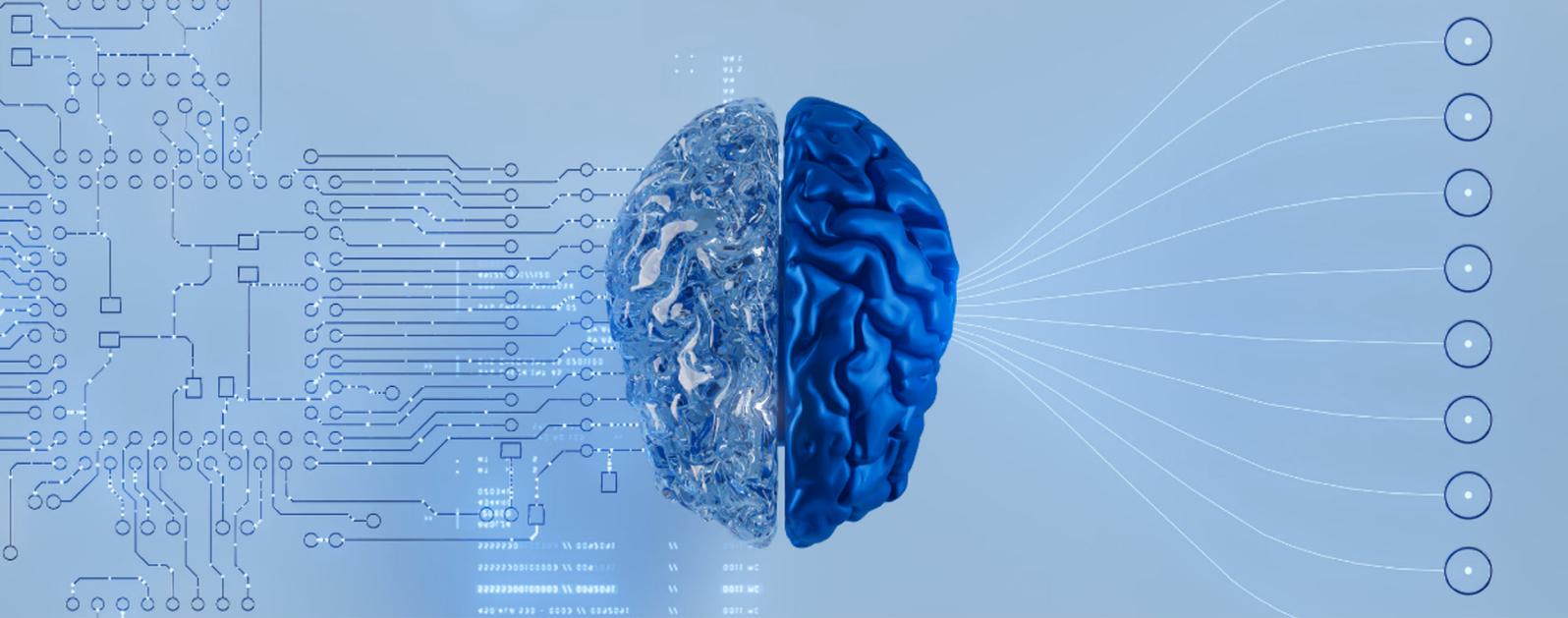
Finally, there's the strategic implementation of the technology to consider.

For example: one of the common ways to gather the data required to train AI models and properly embrace AI is through the use of IoT sensors embedded into equipment, packaging, and so on. That application of AI can become compromised if the sensors fail – for example, they start falling off the packaging – and this can then become both time-consuming to diagnose and disruptive to the entire manufacturing and supply chain process.

In other words, it's important to have resilience built into the AI processes themselves.
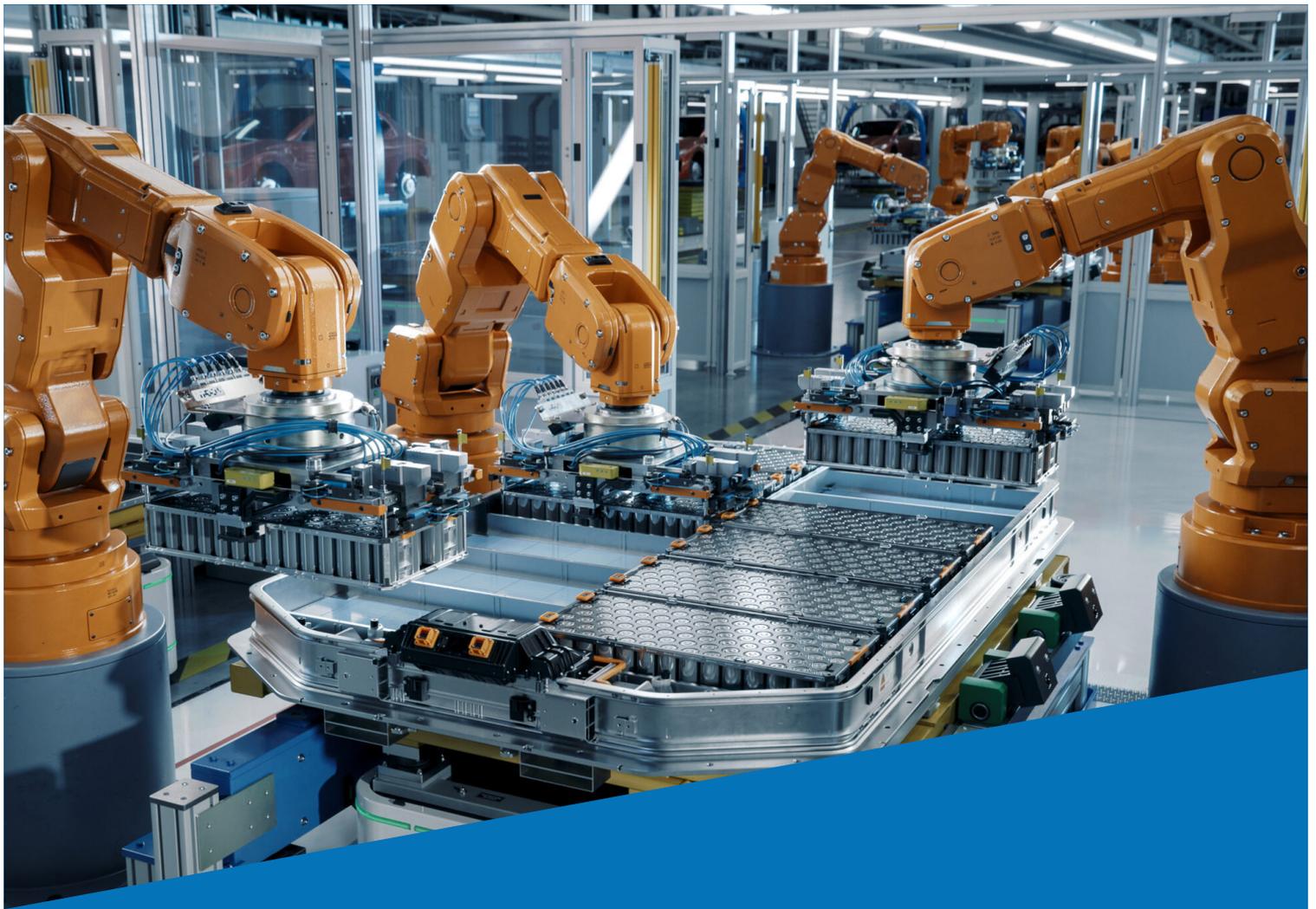
A BROAD LOOK AT WHAT AI IN MODERN MANUFACTURING UNDERPINS

Reading time:
1-2 minutes

As AI continues to evolve, several trends are expected to shape the future of manufacturing

1. **Smart Factories and Industry 4.0 Applications we Haven't Considered Before:** The concept of the smart factory, where AI, IoT, and advanced robotics work together to create fully automated and flexible production environments, is becoming a reality. Industry 4.0 represents the next phase in the digital transformation of manufacturing, characterised by the seamless integration of AI and other digital technologies across the entire production process.

2. **Advances in AI Algorithms:** Ongoing research and development in AI are leading to more advanced algorithms that can handle increasingly complex tasks. These advancements will enable even greater levels of automation and optimisation in manufacturing, further enhancing productivity and efficiency.

3. **Sustainable Manufacturing:** AI is playing a growing role in promoting sustainable manufacturing practices. By optimising resource use, reducing waste, and improving energy efficiency, AI is helping manufacturers minimise their environmental impact. As sustainability becomes a priority for consumers and regulators, the adoption of AI-driven green manufacturing practices is expected to increase.

4. **Human-AI Collaboration:** The future of manufacturing is likely to see greater collaboration between humans and AI. While AI will take over more routine and dangerous tasks, humans will continue to play a critical role in managing and overseeing AI systems. The ability to effectively collaborate with AI will become a key skill for the future manufacturing workforce.

CONCLUSION

Looking ahead, the future of manufacturing will likely be characterised by smart factories, where AI and other digital technologies work in harmony to create highly automated, flexible, and efficient production environments. Agility and flexibility will be at the core of the use of AI and as a risk management platform. With those foundations in place, AI algorithms will become more sophisticated and their applications will continue to expand, opening up new possibilities for innovation in the manufacturing sector.

The balance between embracing AI's benefits and addressing its risks will ultimately determine the success of the industry in the years to come. By strategically integrating AI, manufacturers can ensure that they not only survive but thrive in the future of production.

ABOUT
WILD TECH

Wild Tech are end-to-end digital transformation partners, that leverage a unique industry led approach, combined with market leading platforms, to build Australia's next generation of digital operating models.

The company is Australian-owned and operated with a demonstrated APAC regional capability.

For Wild Tech, the evolution of transformation starts with a deep understanding of industry requirements. That means listening in order to be a step ahead, ensuring that end-to-end business processes, and organisational maturity, are considered in light of the nuances of each platform and their ability to deliver on the promise of truly transformative technology.

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