AI Adoption in Manufacturing

A Practical Toolkit from Made Smarter

MADE SMARTER

Contents

Foreword

Artificial intelligence has moved quickly from research labs into everyday business. Yet for many manufacturers, especially SMEs, it still feels distant, complex or risky. This is not a lack of ambition. It reflects a simple truth: manufacturing is one of the hardest places to deploy AI well and safely at scale.

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Unlike office tools, manufacturing AI operates in environments where physical assets, people and processes are tightly linked. AI decisions can affect product quality, uptime, safety and compliance. Data is often fragmented across legacy systems and machines, and improvements must be proven in live operations, not just demonstrated in pilots. As a result, manufacturers face a much higher threshold of trust, assurance, and integration before AI can move from experimentation into everyday use.

This is why practical adoption matters more than technical novelty. Successful manufacturers do not start with AI as a technology; they start with tasks, problems, and outcomes. They ask where AI can reduce low-value effort, improve consistency, support decision-making, or strengthen resilience, and only then consider which form of AI is appropriate. For many businesses, that journey begins with AI applied to business and operational support systems, building confidence, capability, and data foundations before progressing to higher-value applications embedded within production and engineering systems.

SCAN → PILOT → SCALE

Approach reflected in this toolkit captures that reality.

Scan helps manufacturers cut through the noise, understand what AI really is (and is not), and identify opportunities grounded in business value and operational readiness.

Pilot provides a safe, structured way to test AI in real settings, using clear success criteria, human-in-the-loop controls, and appropriate governance, to build trust and evidence.

Scale focuses on what ultimately matters: integrating proven AI solutions into everyday operations, skills, and decision-making so that benefits are sustained and repeatable.

Made Smarter's strength lies in translating this approach into hands-on support, from diagnostics and roadmapping, through guided experimentation, to adoption at a pace that suits each business. This practical toolkit is not about pushing manufacturers faster than they are ready to go; it is about helping them move with confidence, avoiding common pitfalls, and ensuring AI delivers measurable impact rather than stalled pilots.

If the UK is to realise the productivity, resilience, and competitiveness gains that AI can offer manufacturing, we must focus less on isolated success stories and more on repeatable adoption pathways. This toolkit is an important step in that direction, supporting manufacturers to move from curiosity to capability, and from pilots to scaled industrial impact.

Setting the Scene:
Why AI Matters Now

Artificial intelligence is not new to manufacturing. For decades, manufacturers have used techniques that would now be recognised as AI, even if they were not labelled as such. Rules based control systems, optimisation algorithms, early machine vision, statistical pattern recognition and anomaly detection have long been embedded in automation, robotics, process control and condition monitoring. These capabilities have steadily improved productivity, quality and reliability by enabling machines and processes to respond more intelligently to data rather than follow fixed instructions alone.

What has changed is how visible and accessible AI has become.

Today, more AI tools are easier to try, more affordable and quicker to apply to everyday problems. Some of this attention has come from high-profile tools that can generate text or analyse information, but these are only one part of a much broader picture. For manufacturers, the real opportunity lies in using AI to support better decisions, reduce wasted effort, and improve how existing processes perform, rather than chasing the latest technology trend.

This shift is not happening in isolation. At a national level, artificial intelligence has been identified as a core enabler of the UK's industrial future, alongside net zero and digitalisation. The Advanced Manufacturing Sector Plan positions AI as a priority for strengthening productivity, competitiveness and resilience across manufacturing. The Government's AI Opportunities Action Plan, published in early 2025, recognises AI as a general-purpose capability that can help businesses of all sizes improve performance and unlock new value.

For manufacturers, this national focus matters because it signals long-term ommitment to skills, standards, infrastructure and support, not a short-term technology trend. The challenge is turning that ambition into practical action on the factory floor.

Manufacturing also faces growing pressures: global competition, rising costs, skills shortages, and increasing expectations around quality, resilience and sustainability. AI can help address these challenges, but only when it is applied in ways that fit the reality of a factory environment. Unlike office software, manufacturing systems are physical, safety-critical and often tightly regulated. Changes must work reliably on the shop floor, not just look promising in a demo.

That is why AI adoption in manufacturing often feels harder, and why many small and medium-sized manufacturers remain cautious. Interest in AI is high, but uncertainty is higher. Common questions include:

Where would AI actually help my business?

What data and systems do I need first?

How do I test AI safely without disrupting production?

How do I know when something is ready to scale?

In practice, manufacturers tend to adopt AI in two related but different areas. The first is AI in business and support systems, such as planning, scheduling, quality reporting or decision support, where experimentation is quicker and risks are easier to manage. The second is AI in production and engineering systems, where the potential value is often greater, but the need for assurance, validation and integration is much higher. These two areas move at different speeds and require different levels of confidence.

This is why a structured approach matters.

The Scan > Pilot > Scale model used throughout this toolkit reflects how successful manufacturers adopt AI in practice. It starts by identifying practical opportunities linked to real business problems, then piloting AI in a controlled and measurable way, before scaling solutions that have proven their value and reliability. This approach avoids unnecessary risk, builds confidence over time, and helps businesses invest where AI can make the biggest difference.

Made Smarter plays a critical role in supporting this journey. By providing trusted, impartial guidance, practical tools and hands-on support, it helps manufacturers move beyond hype and uncertainty towards confident, value-led adoption, at a pace that suits the business.

Cutting Through the Noise:
What AI Actually Is

One of the biggest barriers to AI adoption in manufacturing is confusion about what artificial intelligence actually means in practice.

What is AI?

Artificial intelligence (AI) is software that can learn from data, recognise patterns and support decisions or actions. It is not a single system or product. In most cases, AI sits within existing tools, helping people work faster, spot issues earlier and automate routine steps.

In simple terms, AI helps you predict what might happen, understand what is happening, create useful information, and automate routine tasks.

What is Industrial AI, and why it matters

Industrial AI applies these same capabilities within manufacturing environments, across machines, processes and production workflows (often referred to as Operational Technology, or OT).

This matters because the value is different:

It links AI directly to uptime, quality, energy use and asset performance

It uses real-time operational data rather than just business data

It supports a shift from reactive to more proactive operations

It also changes the challenge. Industrial AI requires higher levels of trust, validation and integration because it affects live production. That is why many SMEs start with IT AI to build confidence, then expand into OT, where the longer-term gains are often greater.

A useful way to cut through the jargon is to focus not on the technology, but on what AI helps businesses do. Across manufacturing, most AI applications fall into four familiar activities:

PREDICT • SENSE • CREATE • DO

Many SMEs will already recognise at least one of these happening in their business today.

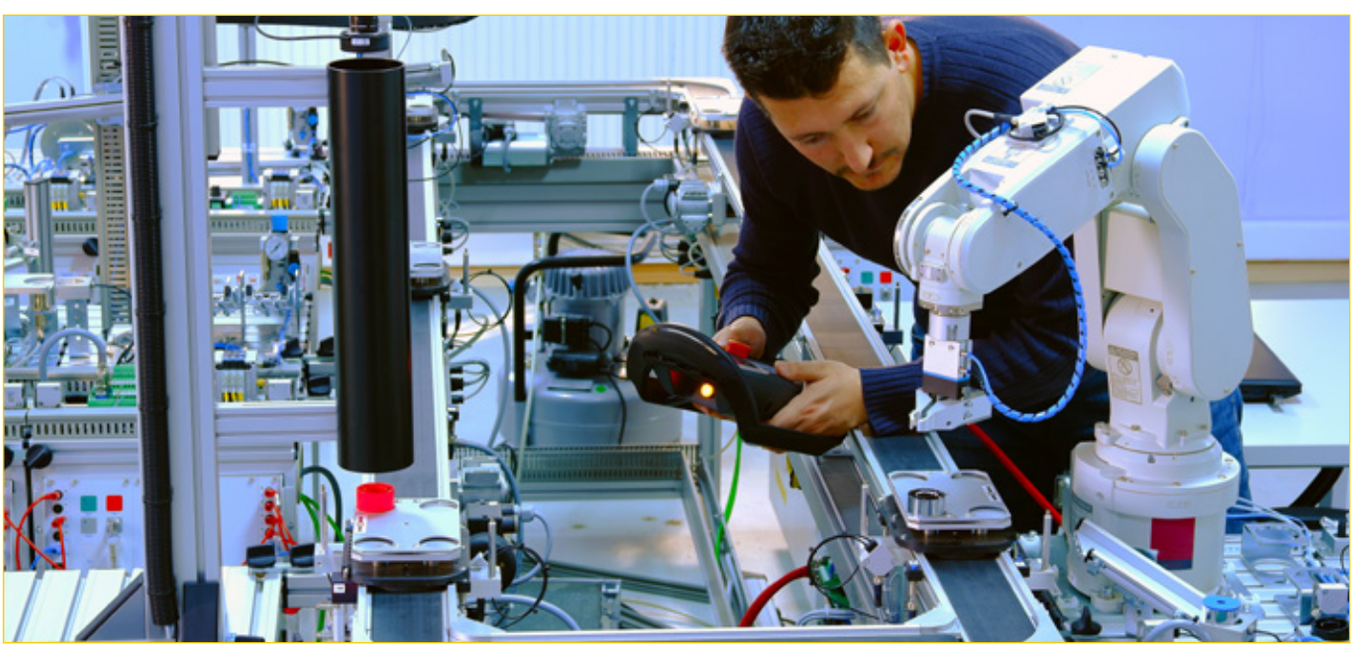
Predict
Predictive AI uses historical and real-time data to forecast what is likely to happen next, allowing teams to act earlier rather than react later. In manufacturing, this might include forecasting demand, planning capacity, highlighting orders at risk of delay, spotting early signs of quality drift, or identifying patterns that suggest equipment is likely to fail before downtime occurs.

Sense
"Sensing" AI helps teams understand what is happening right now, particularly on the shop floor. By detecting patterns, changes or unusual behaviour, these tools can highlight issues before they escalate. Common examples include machine vision inspection, monitoring vibration or temperature trends, and alerting teams when performance moves outside expected limits.

Create
"Create" covers tools that help generate and structure information. These tools support people to work faster and more clearly, for example drafting work instructions, summarising handovers, creating training materials, producing maintenance checklists, and turning rough notes into clear documentation.

Do
"Do" is the action layer. Here, AI automates routine steps within workflows, for example raising maintenance requests, routing approvals, completing repetitive system entries, creating tickets from shop floor notes, or triggering actions within ERP, MES or quality systems.
In practice, these activities often work together. A manufacturer might sense a defect, predict whether it will recur, create a corrective action summary, and then log and assign actions automatically.

This matters because many SMEs assume AI requires vast datasets, specialist teams or major infrastructure changes. In reality, small, focused applications can deliver immediate value using systems and data that are already in place.



Two AI Adoption Domains in Manufacturing

It is also helpful to distinguish between two related but different AI adoption domains in manufacturing. Both matter and both can create value, but they do not adopt at the same speed or carry the same level of operational risk.

Dimension	IT AI (Business Systems)	OT AI (Production Systems)
Where AI sits	ERP, CRM, QMS, copilots, analytics and workflow tools	Machines, sensors, PLCs, robots, vision systems and connected production assets
Typical value	Faster decisions, reduced admin, better knowledge flow, improved service	Higher uptime, better quality, lower waste, more stable operations
Risk profile	Financial, commercial and reputational	Safety, certification, uptime and operational performance
Speed to trial	Usually fast and reversible	Usually slower, more physical and more tightly controlled
Main adoption bottleneck	Time, confidence and clarity	Trust, validation, integration and cost
Skills base	Digital and data literacy	Engineering, process knowledge, controls and AI capability

What changes when AI moves closer to production?

When AI is used in production systems, the question is not only whether it works, but whether it can be trusted in live operating conditions. This brings additional focus on data quality, validation, cyber security, operational ownership, change control and, where relevant, safety, compliance and uptime. The adoption logic is the same, but the evidence threshold is higher.

This distinction matters because manufacturing AI is not a single adoption journey. Most SMEs will begin with IT AI because it is easier to trial, lower cost and a practical way to build confidence. OT AI can unlock deeper operational value, but it usually requires stronger data, tighter integration and a higher level of validation before it can scale. The task-first approach in this paper applies to both; what changes is the level of assurance required.

The Reality for SME Manufacturers

For many small and medium-sized manufacturers, the challenge with AI is not a lack of interest, but a lack of time, capacity and clarity.

Day-to-day pressures are intense. Leaders focus on demand, supply chains, costs and keeping production running. Against that backdrop, AI can feel like a big, disruptive programme rather than something practical, especially when teams are already stretched.

That is why the most successful SMEs start small. In most cases, the first step is IT AI: reducing admin effort, improving consistency, speeding up reporting, supporting quoting, planning or customer communication, and giving teams quicker access to knowledge. These are practical entry points because they are easier to test, lower cost and quick to demonstrate value.

OT AI can be highly valuable too, particularly in areas such as inspection, monitoring, predictive maintenance and process control. However, the barriers are different. OT use cases often depend on stronger data capture, more stable workflows, integration with existing equipment and a higher level of trust, as the consequences of failure affect uptime, quality or safety. In some businesses, more fundamental digital and process challenges still need to be addressed before OT AI will be effective.

While manufacturers generate large amounts of data, much of it is fragmented, inconsistent or locked in separate systems. Legacy equipment and manual workarounds can limit accessibility, creating the impression that AI is out of reach. In reality, this data becomes far more valuable when used in operational contexts. Applied within production environments, AI can turn real-time signals, asset behaviour and process data into predictive insight, helping teams anticipate issues, optimise performance and make better decisions earlier. Over time, this supports a shift from reactive operations to more proactive, intelligence-led production, improving uptime, quality and resource efficiency.

For many SMEs, the opportunity is not to wait for perfect data, but to start using what they already have to build confidence and

improve visibility, then strengthen data quality as adoption progresses.

Cyber security, cost and people concerns add further uncertainty. Many fear that AI will replace roles or undermine skills. In practice, the strongest adoption focuses on tasks rather than jobs, supporting better decisions and reducing low-value work. A phased approach helps here too: starting with contained pilots, clear guardrails and measurable outcomes reduces risk, avoids unnecessary spend and builds trust step by step.

A fundamental consideration is the total cost of ownership. Businesses need to weigh not only the potential gains, but also the cost to implement, integrate, support and sustain AI solutions over time.

These concerns are normal and widely shared. They are not signs of resistance, but of caution in an environment where margins are tight and mistakes are costly. With the right guidance, clear priorities and a practical, people-focused approach, they are solvable.

Best Practice in AI Adoption:
Scan > Pilot > Scale

Successful AI adoption is rarely driven by bold, one-off investments. In practice, it is shaped by a series of practical decisions that build confidence, capability and value over time.

A useful way to frame this journey is Scan Pilot Scale. In the scan stage, manufacturers identify priority tasks, define the outcomes they want to improve, and assess value, feasibility, data readiness and risk before selecting any technology. This keeps effort aligned with real business needs rather than novelty.

In the pilot stage, businesses test safely with real users. Early pilots should have clear success measures, human oversight, cyber and governance checks, and a defined learning objective. For IT AI, this may be a fast, reversible trial. For OT AI, it may also require validation in realistic operating conditions before moving further.

In the scale stage, proven use cases are embedded into live workflows through documentation, training, ownership and continuous improvement. This is where AI moves from isolated experimentation to repeatable business value. Crucially, scaling is not just an internal activity. It often requires the right mix of technology providers and systems integrators to connect AI into existing ERP, MES, quality and production environments reliably and securely.

For many SMEs, this is where adoption can stall, not because the use case is unclear, but because integration, vendor choice and implementation risk become harder to navigate. This is where the Made Smarter adoption programme plays a critical role. Acting as a trusted intermediary, it helps manufacturers define requirements clearly, engage the right partners, and ensure solutions are aligned with business needs rather than a vendor-led technology push.

Successful scaling combines internal ownership with external expertise. Manufacturers retain control of outcomes and priorities, while technology providers and integrators support delivery. With the right guidance, this creates a smoother path from pilot to production, reduces risk, and ensures AI is embedded in a way that is sustainable, secure and aligned with long-term business value.

A Practical Toolkit for AI Adoption

At Made Smarter, we encourage manufacturers to adopt AI using a task-first approach. This avoids expensive, high-risk technology programmes and instead focuses on practical improvements that teams can experience quickly. The same logic applies to both IT AI and OT AI; what changes is the level of evidence, integration and assurance required before scaling.

We describe this as "automating tasks, not jobs", and it follows a simple toolkit within the wider Scan Pilot Scale journey:

Discover the tasks

First, manufacturers identify the tasks that make up everyday work, across both business systems (IT) and production processes (OT). This includes activities such as planning, quoting, reporting and customer updates, as well as shop floor tasks like inspection, machine checks, maintenance logging, fault diagnosis, handovers and quality assurance.

The key point is that the starting place is the task, not the technology. The same task-first method applies whether the opportunity sits in an office workflow or on the shop floor. What changes is not how opportunities are identified, but how they are validated and scaled. This makes AI adoption tangible, avoids abstract "AI strategy" conversations, and ensures both IT and OT opportunities are considered from the outset.

Prioritise by value and feasibility

Next, tasks are prioritised by value and feasibility. Value considers whether a task saves time, reduces errors, improves quality, increases throughput or strengthens customer service, and whether the benefits outweigh the cost to implement and run the solution, including licences, integration effort and ongoing support.

Feasibility considers whether the data exists, the workflow is stable, the risk is manageable, and the task can be trialled safely without disrupting operations. This ensures opportunities are not only impactful, but also commercially sensible.

Match tasks to the right type of AI

Tasks are then matched to the right type of AI capability: Predict, Sense, Create or Do. Most manufacturers do not need a single AI system; they need the right capability for the job in hand, whether the use case sits in business systems or closer to production.

Pilot safely

Start small, test with real users and build confidence. Successful pilots include clear success measures, cyber security checks and a human-in-the-loop review process.

For example, an SME pilot might involve testing AI to summarise production reports, assist with inspection checks, or support maintenance logging within a controlled environment before any wider rollout. This helps teams understand how the tool behaves, refine outputs and build trust without disrupting operations.

For OT use cases, pilots should also include appropriate validation in realistic operating conditions before wider deployment. This may involve testing alongside existing processes, comparing AI-supported outputs with current methods, and ensuring performance is reliable under real production conditions.

Scale and embed

Once value has been demonstrated, the focus shifts from experimentation to embedding AI into existing operational processes through clear ownership, workforce training, governance and continuous improvement. At this stage, AI moves beyond isolated pilots to become part of day-to-day manufacturing practice, enabling repeatable performance gains and sustained productivity improvements rather than one-off project benefits.

Scaling requires the integration of AI into both business and operational technology environments, supported by clear documentation, validated models and defined accountability across engineering, production and digital teams. For operational technology (OT) applications in particular, deployment at scale should only proceed where system performance is trusted, solutions have been validated in live environments, and operational ownership is in place. This helps ensure that AI adoption strengthens resilience, safety and decision-making across production systems.

In this way, AI becomes a durable capability, supporting continuous optimisation, strengthening supply chain performance, and enabling manufacturers to embed data-driven improvement into how they design, make and maintain products over time.

What Good AI Adoption Looks Like

Good AI adoption starts with tasks, not technology. The strongest manufacturers begin by identifying everyday friction points, where time is lost, errors occur, decisions are delayed, or knowledge gets stuck in people's heads. This creates a clear pipeline of practical, testable opportunities.

For many SMEs, the first visible gains come from IT AI use cases, such as drafting customer updates, improving internal documentation, supporting tender responses, summarising handovers, extracting information and reducing repetitive admin. These are valuable because they build confidence quickly without requiring major system change.

As confidence grows, manufacturers can expand into operational insight and OT-related applications. Vision-based inspection can improve quality consistency. Process and sensor monitoring can flag issues earlier. Predictive insights can reduce unplanned downtime and support smarter maintenance and scheduling decisions. These use cases can deliver high value, but they also require stronger data, validation and operational trust.

Over time, businesses also unlock value through Do use cases, where AI supports action and workflow automation across quoting, maintenance, quality, planning and customer service. This might include routing requests, capturing issues more consistently, or moving information into ERP, MES or quality systems with less manual effort.

Crucially, many starting points are low cost or free. Early experimentation does not require major capital investment or grant funding. The most effective approach is to test safely, prove value, and then scale what works into everyday routines.

How Made Smarter Helps SMEs Adopt AI Well

Made Smarter helps manufacturers apply AI in ways that deliver measurable value. Diagnostics and digital roadmaps clarify where AI can support productivity, quality, capacity or decision-making. Templates, tools and guided experimentation support safe, structured trials.

A human-in-the-loop approach ensures AI enhances expertise rather than replacing it. Value-led adoption keeps the focus on outcomes, while cyber, ethics and governance support help businesses adopt AI with confidence. In practice, this helps firms move from scan to pilot to scale at a pace that suits the business.

Our AI Adoption Toolkit is not a single product or visual framework. It is a practical approach used by advisers to guide conversations, prioritise opportunities and structure delivery. It reflects how AI adoption happens in SMEs: starting with tasks, testing safely, and scaling what works.

This same logic underpins how we train advisers and design the AI agents referenced in the appendix. In other words, the toolkit is embedded in how support is delivered, rather than presented as a standalone diagram. Manufacturers experience it through diagnostics, workshops, pilots and implementation support, with each step reinforcing the same task-first, value-led approach.

This ensures consistency without forcing a one-size-fits-all model. Businesses get a clear, structured pathway, applied in a way that fits their operations, pace and priorities.

Case Studies:
AI in Real Manufacturing Settings

These case studies show how AI adoption happens in practice. Most begin with IT AI or hybrid use cases, as this is where many SMEs can move first, quickly, safely and without major capital commitment. This matters because early success builds trust, capability and momentum.

This is also where the Made Smarter Digital Technology Internship Programme plays a critical role. The programme enables manufacturers to bring in a student or recent graduate for a focused, time-bound project to explore, test and implement digital and AI solutions. Rather than funding technology, it builds capability through dedicated time, applied skills and momentum.

Digital interns are particularly well suited to this work. Many graduates are already familiar with AI tools, data-driven thinking and automation concepts, and are comfortable experimenting, testing and iterating. When paired with operational knowledge inside the business, this creates a strong combination.

In practice, interns often act as AI champions. They help teams break work down into tasks, identify where AI could add value, and run small pilots aligned to real workflows. This mirrors the Made Smarter AI Adoption Toolkit and allows learning to be captured and scaled.

As AI becomes more central to manufacturing competitiveness, there is a strong case for scaling this type of capability building. By investing in skills, time and structured experimentation, Made Smarter can help more SMEs move from curiosity to confidence, while keeping adoption practical, safe and value-led.

Each case study is presented in two layers: a quick Impact Box for rapid scanning, followed by a short narrative. This helps busy readers see value quickly while still providing context and learning.

The following examples show this progression. D Squared and Ritherdon illustrate IT-first adoption. Arden Dies shows how structured evaluation prepares a business for broader integration. An additional OT spotlight demonstrates how the same task-first approach can be applied in production environments, where the assurance threshold is higher.

Case Study

D Squared Product Development

D Squared Product Development is a design, engineering and manufacturing consultancy based in Liverpool, working across consumer, industrial and medical products. This case study is best understood as an IT AI example focused on knowledge work and design workflow. As part of its digital transformation journey, the business wanted to explore how emerging AI-enabled design tools could enhance concept generation, visualisation and communication without disrupting live client projects or established CAD processes.

Time and access to specialist expertise were the main constraints. To address this, D Squared used a Made Smarter Digital Technology Internship from the outset, bringing in dedicated capability to explore AI alongside existing workflows. Through the programme, the business secured Anoushka Phillips, a BA (Hons) Product Design student from Nottingham Trent University, to lead a focused exploration of AI-enabled design tools.

Rather than starting with technology, the project focused on specific design tasks where AI could add value, including early-stage concept generation, producing visual assets for client communication, and creating in-context visuals to support faster iteration. These tasks were prioritised based on their potential to save time and improve clarity, while being safe to trial within stable, well-understood workflows.

Generative and AI-assisted visualisation tools were tested in controlled settings, using sketches, CAD geometry and renderings to create visualisations of a wearable medical device. Outputs were reviewed collaboratively, with clear human oversight and learning documented throughout.

The pilot showed that AI could enhance creative capability without compromising engineering rigour. Concept visuals and presentation assets were produced more quickly, improving communication with clients and enabling broader exploration at early design stages. Importantly, it gave the team a low-risk way to build confidence in AI, strengthen internal capability and create a clear roadmap for future adoption.

Case Study

Ritherdon & Co. Ltd

Ritherdon is a manufacturer of stainless-steel enclosures, based in Darwen, Lancashire. This is an IT AI example focused on customer interaction and workflow support rather than shop floor control. Like many manufacturers, the business handles a high volume of customer enquiries through its website, covering product questions, specification checks and sales requests.

Although a chatbot was already in place, its capability was limited. Responses were basic, logic was rigid and many enquiries still required manual follow-up from the sales team. This led to inconsistent response times and meant skilled staff were spending time on repetitive queries rather than higher-value customer engagement. The main barrier was not technology, but time and specialist expertise to redesign and improve the system alongside day-to-day operations.

To address this, Ritherdon used a Made Smarter Digital Internship to explore AI-enabled improvements safely. The business secured Sahil Hathi, an electrical engineering student from Newcastle University, to act as a focused AI champion.

Working closely with the sales and management team, Sahil broke down customer enquiry handling into specific tasks, including recognising enquiry intent, generating accurate responses, capturing key information and routing leads to the right people. These tasks were prioritised as a high-value, low-risk opportunity, with changes able to be tested incrementally without affecting core production systems.

AI tools were used to improve how the chatbot interpreted customer language and generated clearer, more relevant responses aligned to real enquiry patterns. Automation logic was introduced to route enquiries more effectively, reducing unnecessary manual handling while maintaining clear human oversight. Improvements were trialled in stages, with responses reviewed and boundaries clearly defined.

The enhanced chatbot delivered faster, more accurate customer interactions, reduced routine workload for the sales team and built confidence in using AI to support customer-facing processes. It also showed how a contained IT AI pilot can create quick wins, free up capacity and provide a repeatable foundation for wider adoption without disruption or major investment.

Case Study

Arden Dies Ltd

Arden Dies, based in Stockport, is a specialist manufacturer of dies for the packaging industry, operating in a high-volume, order-driven environment. This case study sits between IT AI and OT AI. The use case is administrative, but it is tightly connected to operational flow, system accuracy and production responsiveness. A significant proportion of customer orders arrive via email in unstructured formats, requiring manual interpretation and re-entry into business systems. This made order processing time-consuming, error-prone and heavily reliant on skilled staff carrying out repetitive administrative tasks.

As the business invested in cloud ERP, Power BI and wider automation, it became clear that email order handling was a friction point limiting efficiency gains. The challenge was not ambition or cost, but finding the time and specialist insight to explore AI-enabled approaches safely, without disrupting live operations or committing prematurely to a solution.

Arden Dies used a Made Smarter Digital Technology Internship to provide focused capacity at the start of this exploration. Through the programme, the business worked with two interns, Deniz Beyazgul, an MSc Data Science student at Manchester Metropolitan University, and Husan Vokhidov, an MSc Robotics and Automation student at the University of Salford.

Working with operations and management teams, the interns broke the order process into discrete steps and identified email order extraction as a high-volume, repeatable task suitable for exploration. AI tools were assessed to convert unstructured email content into structured order information, identifying key details such as customer, product, quantity and delivery requirements. Automation options were reviewed to understand how this data could be prepared for downstream systems.

Rather than implementing a live solution, tools were evaluated in isolation, with a focus on accuracy, security, scalability and compatibility with existing systems. This allowed the business to explore options safely and retain full control over next steps.

The project gave Arden Dies clarity on where AI could add value, reduced risk by avoiding rushed implementation, and built internal confidence in AI-enabled automation. It also demonstrated an important adoption principle: the right first step is often not live deployment, but structured evaluation that improves understanding, de-risks integration and prepares the business to scale when ready.

Together, these examples show how a task-first, people-led approach allows AI to be adopted safely, building confidence and capability before scale.

Case Study

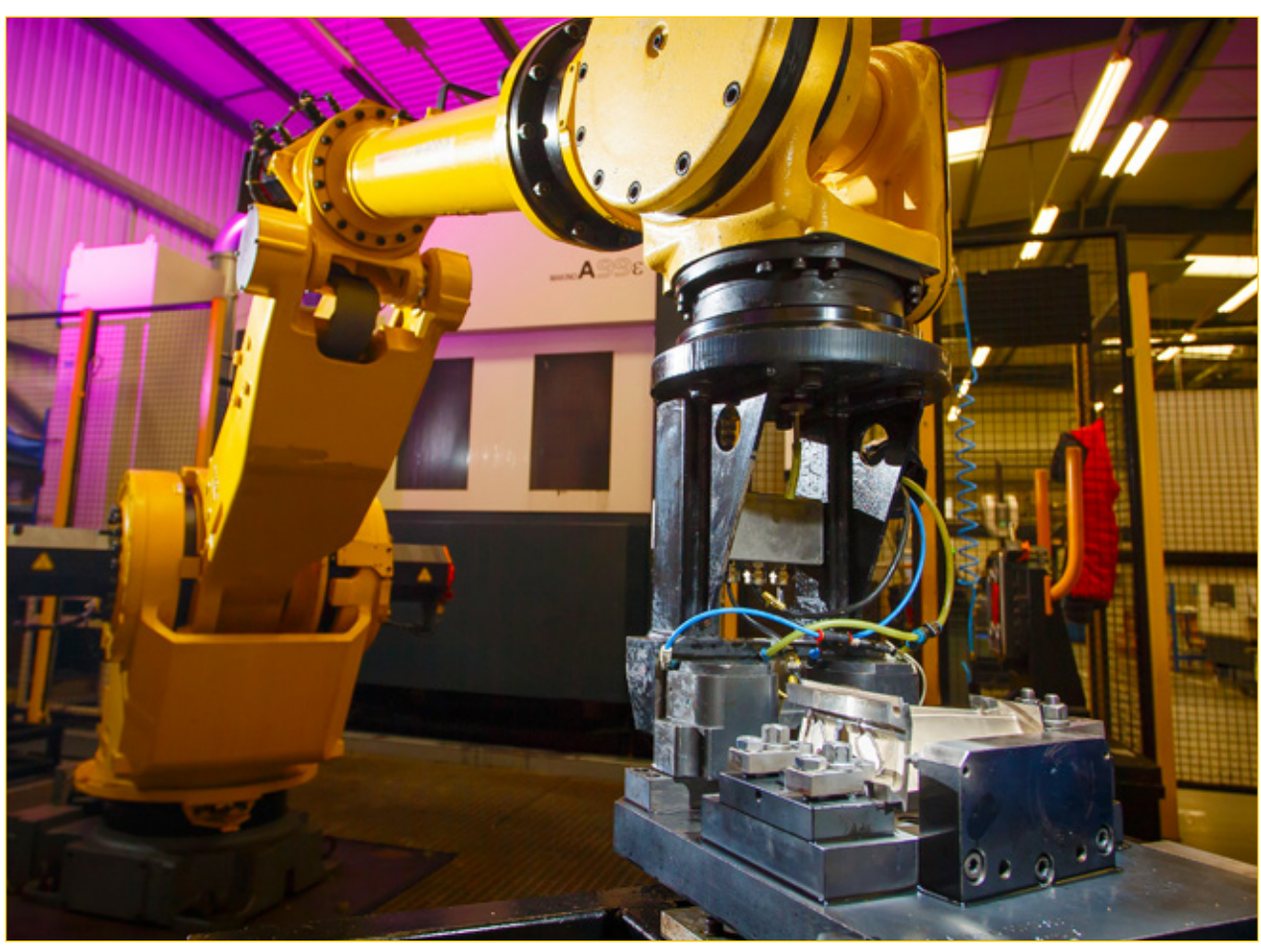
ELE Advanced Technologies

ELE Advanced Technologies introduced a bespoke machine condition monitoring solution supported by Made Smarter. This is a clear OT AI example. AI sits close to the production environment, using machine data to identify issues early and notify supervisors or maintenance teams before faults develop into lost production.

The value case was operational rather than administrative. The solution helped the business move from reactive maintenance towards earlier intervention, while also improving the quality of information available to management. In practical terms, it supported better decisions on reliability, downtime and maintenance planning.

This example reinforces an important distinction in the paper. The task-first approach still applies, identify the problem, assess feasibility, pilot safely, then embed, but the assurance threshold is higher. In OT settings, trust depends not just on ease of use, but on data quality, process stability, validation and confidence that production performance will be protected.

A similar pattern can be seen in Made Smarter's innovation work, including AI-assisted X-ray defect detection with BAE Systems and Machine Intelligence, where machine learning has been applied to support defect inspection in manufacturing.



Expert Insight

The Manufacturing Technology Centre (MTC)

The Manufacturing Technology Centre (MTC), part of the High Value Manufacturing Catapult, provides UK industry with a structured AI adoption journey, supporting manufacturers to identify, develop and deploy AI-enabled solutions that enhance productivity, improve operational efficiency and unlock innovation, as outlined below.

Predictive analytics

Manufacturers can use predictive analytics to streamline processes, identify issues earlier, and build models that anticipate what is likely to happen next. This supports more effective maintenance planning, reduces downtime, and helps prevent potential failures before they occur. By using both historical and real-time data, manufacturers can make more informed decisions and improve overall efficiency.

AI for robotics and vision systems

AI can be applied within robotics and vision systems to automate tasks such as defect detection and sorting. This improves product quality and reduces the risk of human error by supporting more accurate and consistent inspection processes. Integrating intelligent vision systems can strengthen quality control and improve operational performance.

Generative AI

Generative AI can be used to support design and development processes by helping teams explore ideas, generate concepts and structure information more efficiently. This includes applications such as creating design variations, supporting early-stage development, and accelerating the production of documentation and supporting materials. These examples illustrate how SMEs can trial AI in both IT and OT contexts, showing what good looks like in practice and how risk can be managed effectively.

Trustworthy AI adoption

Practical guidance and tools to ensuring AI trustworthiness has now been established through drawing on the capabilities of the High Value Manufacturing Catapult, co led with the National Physical Laboratory (NPL) and delivered through a network of leading organisations. They have shown through many industrial use cases that a structured, independent evaluation can identify risks early, strengthen confidence and enable safer, faster deployment of AI in manufacturing - further information.

Impacts on the Workforce

The impact of AI on the workforce is already becoming visible in manufacturing, but not in the way many initially expected. Rather than large-scale job replacement, the most common impact is a shift in how work gets done. Tasks are being restructured, with AI supporting routine, repetitive or data-heavy activities, allowing people to focus more on problem solving, decision-making and continuous improvement.

Organisations are starting to see work differently. The focus is shifting from roles to the work that needs to be done, and which parts can be supported by AI. This aligns directly with the task-first approach described throughout this paper. AI does not replace entire jobs; it reshapes how tasks are distributed within them.

The impact on the workforce is not fixed. It is evolving. As AI capability increases, more tasks may be supported or automated, but always within the context of real operational needs, human oversight and business priorities. The key shift is from reactive, manual effort to more proactive, insight-led ways of working.

In manufacturing, the most immediate skills gains are often practical and universal. Teams learn how to ask better questions, review and check outputs, spot errors, interpret results, and use data more confidently in everyday workflows. This strengthens continuous improvement rather than displacing it.

As adoption deepens, the skills picture becomes more specific. IT AI mainly requires digital confidence, data literacy and good judgement. OT AI may also require engineering knowledge, controls understanding, process expertise, systems integration and stronger capability in validation, monitoring and change management. This is why workforce development matters as much as technology selection.

Trust plays a central role. AI works best when people understand what it is being used for, where responsibility sits, and how decisions are supported. A human-in-the-loop approach, clear guardrails and open communication help reduce uncertainty and build confidence.

A people-first approach to AI adoption strengthens skills, culture and organisational resilience. The most successful manufacturers treat AI as part of workforce development, building capability step by step and supporting internal champions. In doing so, productivity gains come from better work and clearer processes, not simply faster output.

What's Next:
The Future of AI in Manufacturing

AI is becoming more accessible, more affordable and easier to apply in manufacturing. Capabilities once limited to larger organisations are increasingly available to SMEs, as practical tools that support everyday work across business and production.

The next phase of progress will depend on moving more manufacturers from awareness to adoption through clear pathways such as Scan > Pilot > Scale. This means helping firms identify high-value use cases, test safely in real conditions, and scale proven applications into live workflows rather than leaving them as isolated experiments.

For many SMEs, the near-term path will begin with IT AI because it is easier to trial, lower cost and effective at building confidence. Alongside this, there is a growing need to accelerate exploration of AI within operational environments. While IT AI provides a practical starting point, much of the long-term value in manufacturing will come from applying AI closer to production. This shift can help manufacturers reduce unplanned downtime, improve quality consistency, optimise energy and resource use, and extend asset life.

To realise these benefits, manufacturers need to move beyond isolated pilots and begin testing OT use cases in real operating conditions, supported by the right partners, validation approaches and skills. The opportunity is significant, but it requires a clear focus on building trust, strengthening data foundations and creating safe pathways from experimentation to deployment.
Made Smarter will continue to play a vital role in this transition. By helping manufacturers discover tasks, prioritise value and feasibility, pilot safely and scale what works, the programme can support both immediate productivity gains and longer-term national capability in responsible manufacturing AI adoption.

Conclusion

Artificial intelligence is no longer out of reach for small and medium-sized manufacturers. It does not require vast datasets, expensive systems or specialist teams to get started. As this paper has shown, AI can already support everyday decisions, improve processes and free up people to focus on higher-value work across a wide range of manufacturing settings.

The opportunity now is to act with confidence and clarity. For most SMEs, the right starting point will be IT AI: practical use cases that build trust, capability and momentum without major disruption. At the same time, there is a growing need to accelerate exploration of OT AI use cases, where the long-term gains in uptime, quality, efficiency and resilience are greatest. The same task-first approach applies, but with a stronger focus on validation, integration and operational trust as solutions move closer to production.

Made Smarter exists to support that journey. From early conversations and digital assessments through to roadmaps, experimentation and funded projects, the programme provides trusted, impartial guidance tailored to the needs of SME manufacturers. There is no jargon and no pressure, just practical support to help businesses make informed decisions and move forward at the right pace.

By engaging with Made Smarter, manufacturers are not only strengthening their own operations, but also contributing to wider national capability in safe, practical and competitive AI adoption. Every business that builds confidence and capability in AI helps improve productivity, resilience and competitiveness across the UK manufacturing sector.

The next step is simple. Register for support, explore the available assessments and roadmap tools, and start a conversation about where AI can deliver value in your business. With the right guidance, AI becomes not a leap into the unknown, but a practical tool for sustainable growth.

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Further reading

1. Advanced-manufacturing-sector-plan
2. Ai-opportunities-action-plan
3. Future-factories-powered-ai report
4. The MTC artificial intelligence
5. Trustworthy AI adoption: Enabling safe and successful AI adoption in UK industry

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