MAKE uk
The Manufacturers' Organisation

AI, SKILLS AND THE FUTURE OF THE UK MANUFACTURING SECTOR

CONTENTS

EXECUTIVE SUMMARY

AI for manufacturing is the use of advanced technologies, such as predictive, analytical AI (e.g., quality, maintenance, planning), computer vision, optimisation and generative AI (e.g., assistance, design) that supports engineering, operations, and administrative workflows to help factories operate smarter, faster, and more efficiently.[1]

Artificial Intelligence (AI) has real potential to transform UK manufacturing, boosting productivity, improving efficiency and resilience, and helping businesses do more with the talent they already have. But we are at a critical moment. For AI to deliver its full potential, firms must move beyond experimentation and begin building clear strategies that embed AI across their operations and close the gap in AI adoption.

Addressing the digital gap in UK manufacturing is a critical economic priority, as the industry currently loses approximately £6 billion annually in output due to unfilled vacancies that could be bridged by technology. While larger firms are more likely to adopt advanced tools, a significant "digitalisation gap" remains, closing this could unlock a £150 billion boost to UK GDP by 2035.[2] Specifically on AI adoption, it is projected to increase UK labour productivity by 0.4-1.2 percentage points annually over the next decade, helping to narrow the 20% productivity gap between the UK and the US.[3]

Despite these benefits, adoption remains low. Awareness is a major barrier - according to our previous reports *Future Factory, powered by AI* - only 7% of UK manufacturers describe themselves as very knowledgeable about AI, with a further 36% saying they are somewhat knowledgeable.[4] This lack of confidence continues to dampen investment and keeps deployment focused on low-risk, isolated uses. Our survey shows just 2% of manufacturers have AI widely embedded in their operations; 37% are running small pilots, 43% are still experimenting, and 18% have not adopted AI at all. Larger firms are more likely to be trying out or using AI in some areas, but full, business-wide use is still rare for companies of all sizes.

Importantly, while AI is not yet reshaping jobs at scale, most manufacturers expect its impact on roles and ways of working to emerge within two years of deployment, reinforcing the need to act now on skills and organisational readiness.

The UK is forging a strong positioning of AI as a critical technology for reshaping public services and boosting economic growth, and the policy environment is now moving decisively in a more enabling direction. The AI Opportunities Action Plan (January 2025) [5] marks a shift from a “safety first” mindset towards adoption at scale. The pivot from strategy to execution is welcome, but success will depend on how effectively these initiatives connect to real-world adoption in firms - particularly SMEs.

[1] Professor Chris Dungey, advanced manufacturing AI Champion
[2] Making it Smarter: Global lessons for Accelerating Automation & Digital Adoption in UK Manufacturing | Make UK
[3] The wider economic impacts of emerging technologies in the UK (HTML) - GOV.UK
[4] Future Factories Powered by AI | Make UK
[5] AI Opportunities Action Plan - GOV.UK
[6] AI regulation: a pro-innovation approach - GOV.UK

AI regulation must also provide clear guidance, safeguards, and protections for businesses, ensuring companies can adopt new technologies with confidence and without disproportionate risk. The UK's pro-innovation, principles-based approach was reaffirmed in the government's 2024 response to the AI Regulation White Paper[6], centred on five cross-cutting principles: safety, transparency, fairness, accountability and contestability.

However, skills will ultimately determine whether AI delivers on its promise. Businesses need role-based standards and the leadership capability to manage of risk and scale what works.

Our position is clear. AI adoption must be prioritised, as a human-centred, worker-led transformation grounded in strong digital foundations, practical skills and organisational readiness. Government and industry should focus on:

- Support AI adoption, not just AI awareness.
- Define clear AI skill standards for manufacturing roles.
- Provide hands-on SME support for deploying AI.
- Make training flexible, practical, and production-friendly.
- Ensure responsible, workforce-centred AI adoption.

AI TRANSFORMATION REQUIRES PEOPLE: A WORKER-LED APPROACH TO AI IN UK MANUFACTURING

AI has shaped advanced manufacturing for over a decade, but generative AI has brought it into the spotlight, driving rapid change and unsettling long-established ways of working. Alongside the hype and bold predictions, many businesses and people are understandably cautious about what AI might mean for them. There are real concerns about the unknown: what is AI for manufacturing, whether jobs will be lost, how far automation should go, and whether data can be kept secure and trusted. These questions are shaping how organisations approach new technology. At the same time, evidence from Make UK members points to a more practical and reassuring reality. When used responsibly, AI is already helping manufacturers transform how they operate, improving efficiency and productivity, reducing energy costs safely, and strengthening profitability. For those adopting it today, AI is less about replacing people and more about supporting better decisions, smarter processes and more resilient

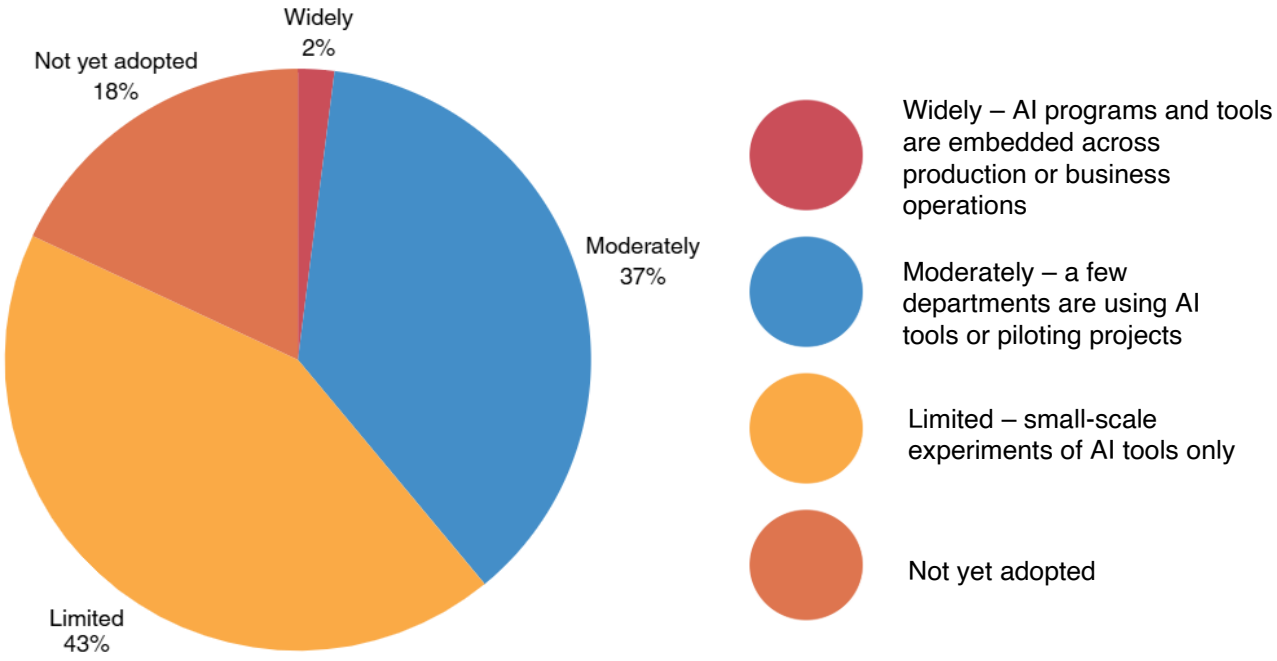
AI DEPLOYMENT IN UK MANUFACTURING

Manufacturers are changing their businesses with AI tools, with most of them starting in back-office areas like HR and finance where tools are affordable and easy to deploy. While adoption in production and supply chains is slower due to complexity and cost, momentum is building as companies explore pilots and prepare to scale.

Make UK evidence highlights a cautious picture:

- Around 2% of manufacturers report widespread AI use across their business
- Nearly 40% are using AI tools in a few of their departments
- Around half are limited to pilots or small-scale experiments
- Almost 1 in 5 have not adopted AI at all

CHART 1. CURRENT LEVEL OF AI ADOPTION IN THE MANUFACTURING SECTOR



According to our survey, bigger companies aren't necessarily further ahead. Across all sizes, the widely embedded AI is almost absent (only 2% among 10–249 employees; 0% everywhere else). What changes with size is the type of adoption not the depth.

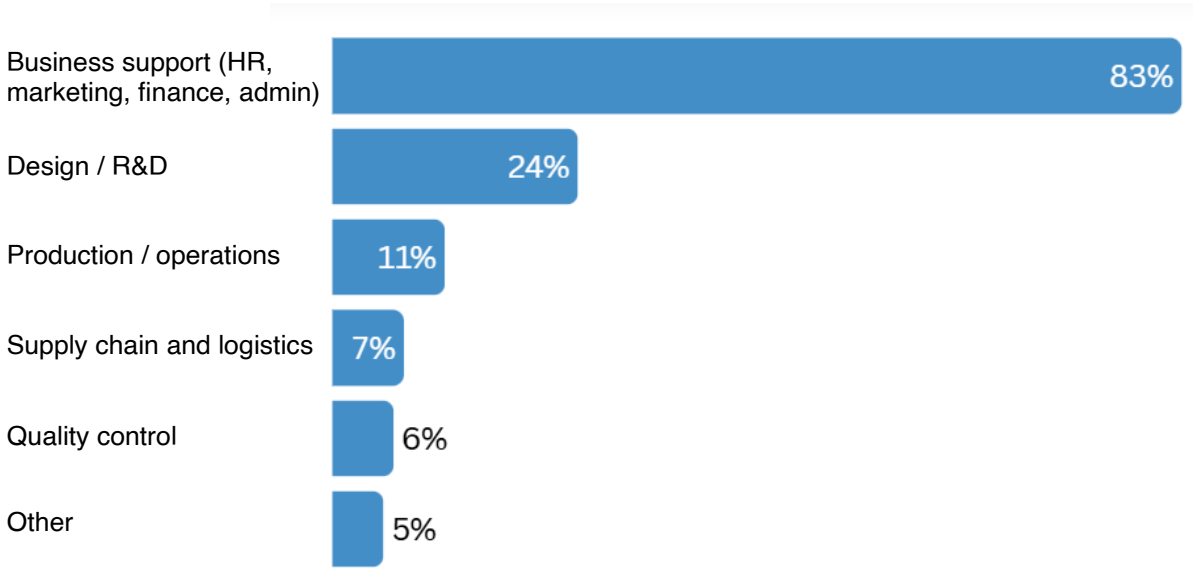
As organisations grow, AI moves from "not adopted" to at least "moderate," but it doesn't progress to deep, business-wide integration. That suggests a pilot-to-production gap: larger firms face tougher system integration, governance, data readiness, and change-management hurdles. Meanwhile, small firms can adopt cheaper, more accessible back-office tools (HR, admin, finance), but fewer have the capacity to scale or tackle production use cases.

The story isn't "the bigger you are, the more advanced you are." It's "the bigger you are, the more complex adoption becomes." To move from moderate to wide, manufacturers, especially the larger ones need deliberate investment in data infrastructure, integration with legacy systems, clear governance, and workforce upskilling, plus a plan to scale successful pilots beyond single departments.

HOW AI IS BEING USED IN MANUFACTURING

CHART 2. WHERE AI TOOLS ARE BEING DEPLOYED

Across manufacturing, AI is moving from experimentation to selective adoption. Typical applications include:



Source: Make UK, AI and jobs and skills position paper, 2026

AI implementation in manufacturing is concentrated in business support functions, with 83% of companies using it for areas such as HR, marketing, finance, and administration. In contrast, only 24% apply AI in design and R&D, and even fewer in core operational areas: 11% in production, 7% in supply chain and logistics, and 6% in quality control. This pattern suggests that manufacturers prioritise automation of administrative tasks because the used tools are easier to implement, technology is already mature and is familiar to people. In terms of factory floor, the delay is likely due to complexity, cost, and skills barriers. One reason for this trend is that AI tools for admin, HR, and other back-office tasks can cost less and are more accessible than those needed for production or supply chain integration.

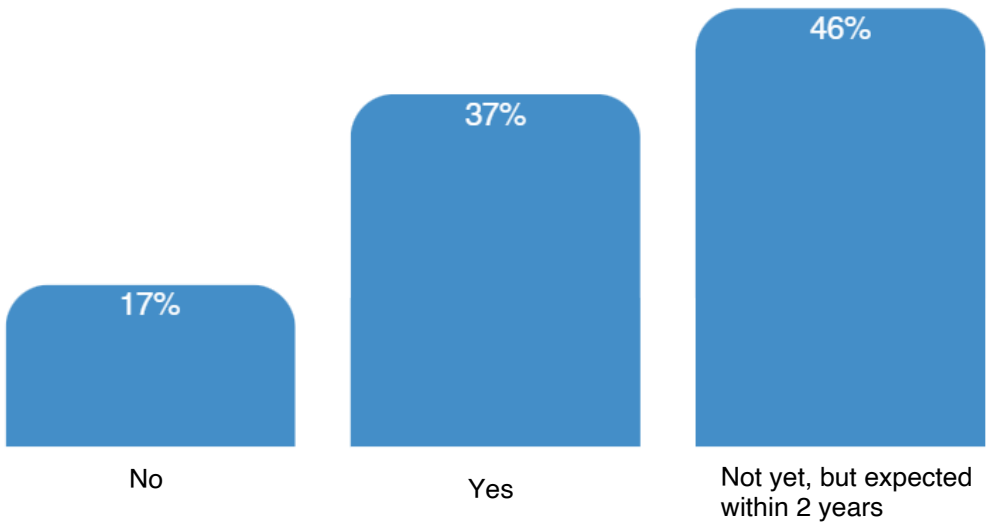
While many businesses are successfully using AI to streamline back-office functions, far fewer have been able to translate pilots into scaled, business-wide transformation, particularly in production and supply chains where the productivity gains could be greatest. The challenge is not enthusiasm or ambition; it is moving from “trying” AI to truly deploying it. Closing this gap will require deliberate investment in data readiness, integration with existing systems, strong governance, and the skills to use AI confidently and responsibly. Without this, AI risks remaining a collection of useful tools rather than the catalyst for productivity, resilience and growth that the sector needs. With the right support, however, manufacturers can move beyond pilots and unlock the full potential of AI across their operations.

JOBS AND SKILLS – FROM TASK AUTOMATION TO WORK REDESIGN

So far, AI's impact on jobs in manufacturing has been modest and highly focused. Where change has happened, it's almost entirely about automating specific, repetitive tasks: routine admin or data entry rather than reshaping roles or creating new positions. None of the companies that we have surveyed have created jobs around AI yet, and new AI-specific roles haven't appeared. But the story is about to shift.

Our survey says AI's impact on jobs in manufacturing is still in its early stages, but change is coming. So far, only 17% of businesses say AI has already altered the structure of work, while 37% report no change yet. The real signal is in expectations: 46% anticipate structural changes within two years. That means most firms see disruption on the horizon, even if they haven't felt it yet.

CHART 3. IMPACT OF AI ON THE STRUCTURE OF WORK



Source: Make UK, AI and jobs and skills position paper, 2026

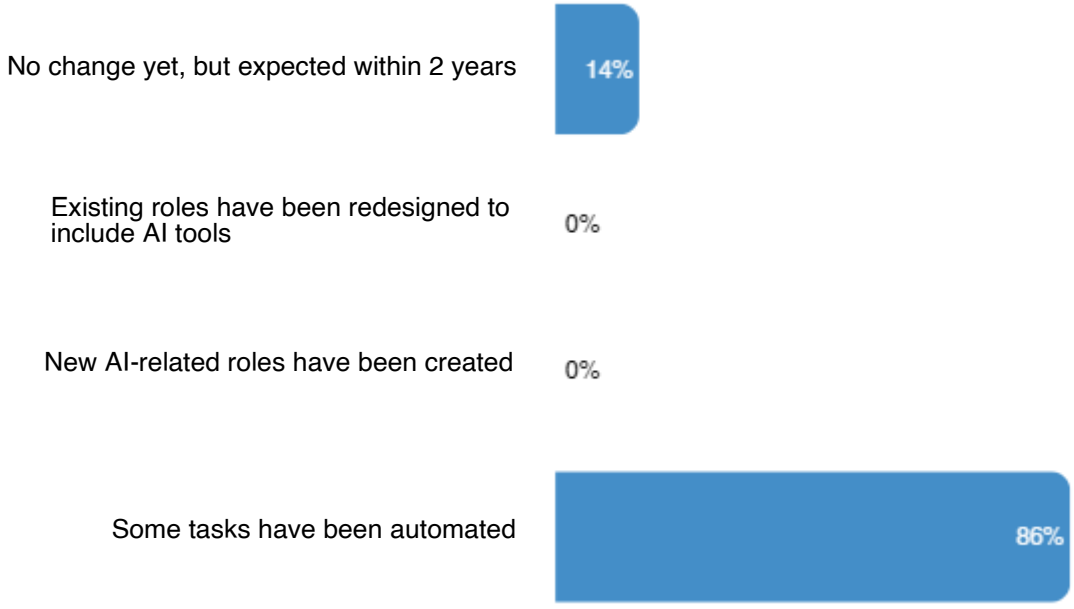
Where change has happened, it's narrow and task focused. Of those reporting an impact, 86% say some tasks have been automated, while none have redesigned roles to include AI tools and none have created new AI-specific jobs. Another 14% expect change soon, but for now, AI is trimming repetitive tasks rather than reshaping entire roles.

Examples include:

- Maintenance engineers supported by predictive analytics
- Quality inspectors moving from manual checks to exception management
- Planners using AI-supported scheduling tools

New hybrid roles are also emerging, where AI enabled tools and systems are becoming a part of a role particularly at technician level, such as AI System Integrator or AI Quality Assurance data-enabled operatives, and AI system supervisors.

CHART 4. FROM TASK AUTOMATION TO WORK REDESIGN: HOW AI IS CHANGING JOBS



Source: Make UK, AI and jobs and skills position paper, 2026

This pattern tells us two things. First, adoption is practical and incremental, starting with easy wins in admin and back-office work. Second, the next phase will be more complex, moving from isolated automation to work redesign, where responsibilities shift and new skills become essential. Incrementally, we will see a growing demand for data literacy, oversight skills, and governance know-how, alongside technical expertise that consist of domain knowledge with data capabilities.

Manufacturers who have adopted new technologies are seeing clear shifts in day-to-day roles across their businesses. While dedicated “AI-specific” job titles are not appearing, new tasks, requirements, and expectations within existing roles are rapidly emerging, meaning AI is increasingly woven into jobs rather than creating entirely new ones. For example, a traditional maintenance engineer role has evolved into a Digital Maintenance Engineer, who not only services equipment but also works directly on the line, interpreting the real-time data the machinery produces to prevent downtime and optimise performance. In HR, Learning & Development teams now use AI-enabled tools to design tailored training more quickly and effectively, while Health & Safety managers are using AI to draft and update policies with greater accuracy and consistency. Across the organisation, providing employees with AI tools is helping them work more efficiently, make better decisions, and focus on higher-value tasks.

Repetitive and rules-based activities are increasingly automated, while skilled roles are augmented.

SKILLS GAPS

Skills shortages remain the most consistently cited barrier for businesses to grow and that includes effective AI adoption:

- Over half of manufacturers identify skills and capability gaps as their main constraint on using AI effectively
- Shortages are most acute at technician and operator level, not just among advanced data scientists
- Many firms report low confidence in their internal data and digital maturity, particularly SMEs

Crucially, survey data shows that firms lacking basic digital skills and data capability are far less likely to move beyond AI pilots or see productivity gains.

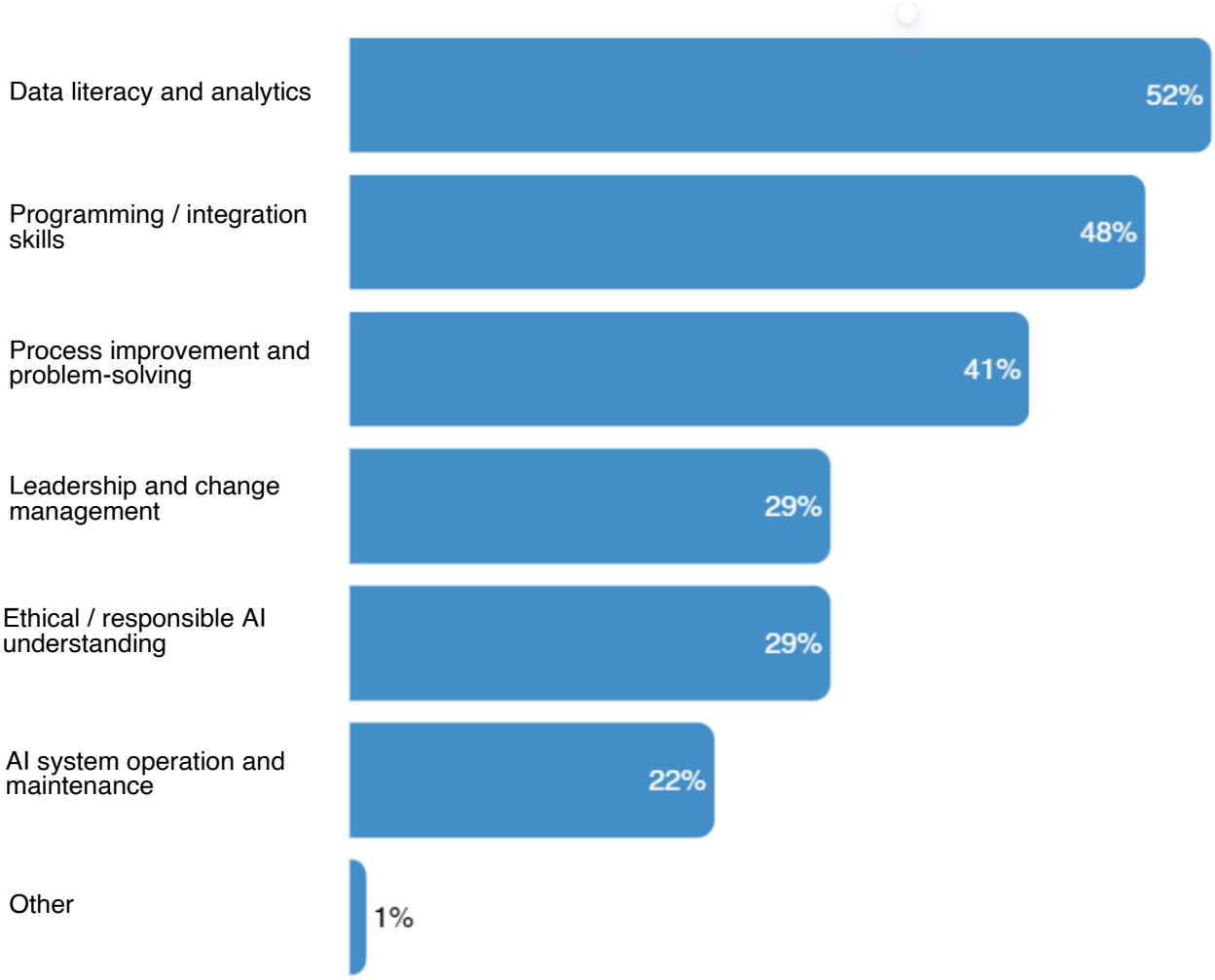
This reinforces that the challenge is systemic: without strong foundations, advanced AI skills alone will not deliver value

SKILLS FOR AI AND MANUFACTURING WORKFORCE

The findings of our survey of Make UK members consistently point to skills as a major barrier to adoption. Key gaps include:

1. **Digital foundations** – data literacy, cyber awareness, and basic systems integration
2. **Technical and technician skills** – automation, robotics, and AI-enabled maintenance
3. **Advanced AI and data skills** – applied engineers rather than purely academic specialists
4. **Governance and oversight skills** – understanding risk, validation, and responsible use

CHART 5. MOST IMPORTANT SKILLS AS BUSINESSES ADOPT AI



Source: Make UK, AI, jobs and skills survey 2026

Manufacturers are prioritising broad, adaptable capabilities over niche coding. Data literacy and analytics lead at 52%, closely followed by process improvement and problem-solving at 48%, skills that turn AI outputs into better decisions and workflows. Leadership and change management sit at 41%, signalling the shift from pilots to organisation-wide adoption. Operational know how matters too: AI system operation and maintenance and ethical/responsible AI understanding are each at 29%. Deep technical programming and integration ranks lower at 22%. In short, firms want people who can read the data, improve processes, and lead change then layer in technical depth as they scale.

Survey data shows that firms with weaker digital foundations are significantly less likely to see returns from AI investment, reinforcing that skills and organisational readiness must develop together.

HOW MANUFACTURERS ARE SUPPORTING THE NEED FOR AI SKILLS

Manufacturers are taking early steps to build the skills needed for AI adoption, but most efforts remain informal and fragmented. Many businesses have started with awareness activities such as webinars, seminars, and networking groups, while others rely on peer support and ad-hoc experimentation with tools like Copilot and ChatGPT. A smaller number are introducing structured learning through online courses, CPD programmes, and university partnerships, alongside leadership and change management training for managers. Some firms are engaging external consultants, creating super-user pools - identifying, training, and supporting a small group of advanced users within an organisation and strengthening governance and IT security. Overall, the focus is on laying foundations rather than delivering large-scale, role-specific training, with technical and data skills expected to follow as adoption scales.

The next step is clear: manufacturers need to move from scattered initiatives to coordinated programmes that embed data literacy, ethical AI understanding, and leadership capability across the workforce, turning awareness into practical skills that drive productivity and competitiveness.

BARRIERS TO BUILDING AI SKILLS, WHAT'S REALLY IN THE WAY

Our results point to a practical bottleneck rather than a lack of interest. The biggest constraint is time: half of companies (50%) say staff don't have time to train. Almost as significant is uncertainty about what "good" looks like: 49% struggle to identify the right skill standards. Cost matters but is secondary at 26%, and limited access to relevant courses is lower still at 19% suggesting content exists but isn't clearly mapped to roles or business needs. 12% of manufacturers stating local issues like competing priorities or change fatigue.

Taken together, this says the barrier isn't the market for courses; it's clarity and capacity. Without a simple, role-based definition of the skills required and protected time to learn, teams default to ad-hoc awareness sessions that don't translate into on-the-job capability. That also explains why cost isn't the top complaint: it's hard to justify spend when the target skills aren't defined and the time to apply them is scarce.

or this reason, we recommend that Skills England, in partnership with industry begin to set role-specific, applied AI skill standards for a handful of priority roles (e.g., production engineer, planner, buyer, line supervisor) with clear proficiency levels and the tasks each level enables.

WHAT NEEDS TO CHANGE - MAKE UK'S CALLS FOR ACTION

1. **Government and Skills England should ensure that AI skills provision is clearly defined, employer-facing and aligned with applied, jobs embedded learning, reflecting how AI is adopted in real manufacturing settings.**

- Strengthen Made Smarter and other advanced tech adoption schemes with hands on AI expertise.
- SMEs need practical help - this should include AI readiness checks, cyber and data guidance, help identifying use cases, support with procurement, and coaching to move from pilots to full rollout. Some of this could be delivered through AI tools themselves (e.g., automated benchmarking, personalised guidance, or digital road mapping tools) to make support scalable for smaller firms.
- Create nationally recognised AI Skill Standards for manufacturing.
- With half of firms unsure what skills they need, Government should define clear, job specific competency frameworks for operators, technicians, engineers, supervisors, and managers.
- Add manufacturing as a dedicated sector in the AI Skills Hub.
- As a core pillar of the UK's industrial strategy, manufacturing needs tailored access to AI training and practical learning. Including the sector formally in the Hub will ensure firms get the skills support they need to deploy AI safely, boost productivity, and strengthen supply chains.
- Back flexible training models that work for factories.
- Since time is the biggest barrier to upskilling, Government should support modular, shift friendly, bite sized learning aligned with real production schedules.
- Embed responsible AI adoption as standard.
- All guidance should require transparency, workforce involvement, commitments to job quality, and strong data governance practices.

2. Education and training providers must deliver manufacturing specific, deployment led training

- Curriculum review: explicitly future-proofing, not reform for reform's sake
- This review should focus on future job roles and work redesign, ensuring qualifications remain relevant as AI becomes embedded across manufacturing operations.
- Careers advice should support young people, existing workers and career-changers, reflecting Skills England's emphasis on workforce transition as well as entry.

Manufacturers need training that fits the factory floor, including:

- Real manufacturing case studies
- Role based, modular content
- Alignment to specific AI use cases
- Integrated cyber, data governance, and change management content

Training already exists, but providers must make it practical, trusted, and directly linked to real factory needs.

3. What manufacturers should do themselves

Our survey findings point to clear, actionable steps:

- Build foundation skills for everyone, especially data literacy, problem solving, and responsible AI basics.
- Link training directly to real projects, not treat it separately.
- Put governance and capability building in place early so adoption is safe and effective.
- Involve the workforce openly and transparently to build trust and ensure uptake.

4. How Make UK will act on these findings

Make UK will:

- Drive its new Working Group on AI Skills & Adoption, mapping the AI ecosystem, showcasing practical SME adoption paths, and working closely with Professor Chris Dungy, National AI Champion for manufacturing.
- Work with the DBT AI Champion to turn member evidence into a national adoption offer focused on deployment, not experimentation.
- Develop practical tools for members, including readiness checklists, responsible AI principles, and real operational case studies.

CONCLUSION

AI is not a silver bullet for UK manufacturing. Its impact depends on people, processes, and trust. Evidence shows that without strong foundations and workforce engagement; AI investments fail to deliver and can damage confidence.

A balanced approach that supports productivity while strengthening skills, job quality, and long-term competitiveness offers the best route forward.

ANNEX

1. UK DEFINITIONS

Artificial Intelligence (AI) can be defined in many ways. However, within this guidance, we define it as an umbrella term for a range of algorithm-based technologies that solve complex tasks by carrying out functions that previously required human thinking. Decisions made using AI are either fully automated, or with a 'human in the loop'. As with any other form of decision-making, those impacted by an AI supported decision should be able to hold someone accountable for it.[7]

In comparison, the EU defines an AI system as a *machine-based system* designed to operate with varying levels of autonomy and adapt after deployment. It infers from inputs to generate outputs, such as predictions, content, recommendations, or decisions, that can influence physical or virtual environments.

The key elements specified are:

- Machine-based
- Varying autonomy
- Post-deployment adaptiveness
- Explicit or implicit objectives
- Inference from inputs
- Generation of outputs
- Capacity to influence environments[8]

2. KEY DEVELOPMENTS TO WATCH IN 2026

- **AI legislation delayed, but direction of travel clearer**: A comprehensive AI Bill has been deferred, with legislation likely announced around King's Speech (expected May 2026). The UK continues to favour a sector-led, principles-based approach rather than an EU-style horizontal AI Act.
- **Shift from safety to security**: The AI Safety Institute has become the **AI Security Institute**[9], with a sharper focus on national security, cyber risk and criminal misuse of AI.
- **AI Growth Labs and sandboxes**: New AI regulatory sandboxes are rolling out in 2026, including for advanced manufacturing, allowing supervised real-world testing of AI while maintaining core protections such as worker safety and intellectual property.[10]
- **Growing emphasis on trust and assurance**: Government and regulators are advancing work on AI assurance, testing, auditing and governance, signalling rising expectations around transparency and accountability even in the absence of new laws.[11]

[7] Definitions I ICO
[8] EU Artificial Intelligence Act, Article 3: Definitions I EU Artificial Intelligence Act
[9] The AI Security Institute (AISI)
[10] AI Growth Lab - GOV.UK
[11] For organisations I ICO

3. SCAN - PILOT - SCALE

The "scan–pilot–scale"[12] approach in AI adoption means identifying promising AI use cases, testing them in small, controlled pilots to gather evidence, and then expanding only the successful solutions across the business.

1. Scan – Find the Right Opportunities

This means spotting the factory processes where AI could save the most time, money or waste. Typical places to scan include unplanned downtime, scrap and waste, energy use, production scheduling bottlenecks, and improving data access where information is locked in machines or spreadsheets.

What this looks like in manufacturing:

- **Process Walkthroughs:** Meet with production, maintenance and quality teams to find high-loss or high-value steps.
- **Technology Scanning:** Keep an eye on new industrial AI tools on the market (e.g., predictive maintenance, demand forecasting, visual inspection).
- **Supplier Partnerships:** Speak directly with OT/AI vendors and startups to understand what's coming and influence tools to fit factory needs.

2. Pilot – Test in a Controlled, Safe Environment

Once opportunities are identified, run small, tightly scoped trials on a single line, cell, machine or production area. Key principles are to keep pilots contained to one area before expanding, involve operators and maintenance early to build trust and uncover real-world issues, and carry out safety and OT checks to ensure the pilot does not disrupt operations or compromise safety.

Manufacturing-friendly practices:

- **Rapid Prototyping:** Combine internal engineering/IT expertise with external AI specialists to build quick proofs of concept.
- **Fail-Fast Approach:** Start pilots quickly and stop them if they don't deliver measurable value.
- **Data Foundations:** Ensure pilot areas have clean, secure, accessible data from sensors, machines, MES/ERP systems.

3. Scale – Roll Out What Works Across the Factory

Only expand AI solutions once a pilot has proven clear value. Scaling means creating standardised data models across sites, setting clear governance for how AI is monitored and owned, using a repeatable approach for deployment and training, and proving the solution at one site before rolling it out more widely.

Supporting activities:

- **Central Support and Funding:** Provide dedicated resources so successful pilots are not stuck in "pilot purgatory."
- **Standardised Tech Stack:** Build or buy an AI architecture that can be reused across lines, shifts and sites.
- **Interoperability:** Use modular, open or reusable components so tools can be easily deployed across different production environments.

[12] This approach reflects the framework being taken forward by the UK Government to support AI adoption, with further detail to be set out in the forthcoming AI Adoption Plan.

4. HOW BUSINESSES SHOULD BE PREPARING NOW

Area of focus	What's changing	What businesses should do now
1. Data governance	Businesses face greater scrutiny over where AI training data comes from, with clearer expectations around data provenance, consent and documentation. Data quality is increasingly seen as the foundation for scaling AI beyond pilots.	Map data sources used in AI tools, including third-party systems, and put clear data governance processes in place to support future scaling.
2. Transparency and oversight	Even without new regulation, organisations are being pushed towards explainable AI-driven decisions, human oversight in high-impact use cases (such as HR, planning and quality control), and clearer internal accountability for AI systems.	Assign clear internal ownership for AI (for example, an AI lead or steering group) and ensure AI-driven decisions can be explained to workers, customers and regulators if required.
3. Moving from pilots to scale	Many firms remain stuck in pilots. Policy attention is shifting to how businesses move from experimentation to real adoption, particularly in production and supply chains where complexity and cost are higher.	Invest in integration with legacy systems, build internal capability; people, skills, structures and plan early for change management and workforce engagement.
4. Skills and workforce engagement	Increased focus on trust, safety and worker impact means businesses will be expected to demonstrate responsible deployment. Risks of workforce anxiety and skills obsolescence are growing, especially in administrative and planning roles.	Involve workers early, invest in upskilling alongside new technology, and use AI to augment roles rather than focusing solely on cost reduction.
5. Regulatory sandboxes and pilots	AI Growth Labs and regulatory sandboxes offer opportunities to test higher-impact AI in a supervised environment, engage early with regulators, and help shape future policy based on real-world evidence.	Monitor opportunities to participate in sector pilots, particularly when exploring AI in production, energy optimisation or supply chains.

Make UK, The Manufacturers' Organisation, is the representative voice of UK manufacturing, with offices in London, every English region and Wales. Collectively we represent over 20,000 companies of all sizes, from start-ups to multinationals, across engineering, manufacturing, technology and the wider industrial sector. Everything we do – from providing essential business support and training to championing manufacturing industry in the UK and internationally – is designed to help British manufacturers compete, innovate and grow. From HR and employment law, health and safety to environmental and productivity improvement, our advice, expertise and influence enables businesses to remain safe, compliant and future-focused.

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