

E-book



Factory of the Future

Achieving digital excellence
in manufacturing, today



Table of Contents

01 /

Transforming manufacturing
beyond Industry 4.0

03 /

Connecting specialists
in new ways across the
organization

05 /

From our factory to your
factory of the future

02 /

Empowering digital leaders
in manufacturing

04 /

Developing a truly
customer-centric
manufacturing process

06 /

Learn more

01 /

Transforming manufacturing beyond Industry 4.0

A look at the pioneers who are making
the factory of the future a reality today

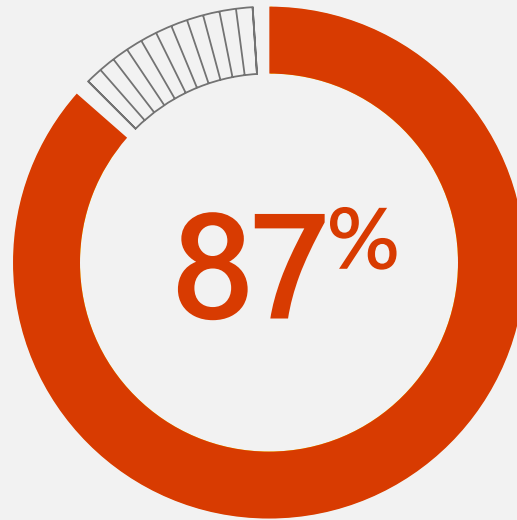
Far from just a concept based on longstanding aspirations of Industry 4.0, the factory of the future means going beyond the walls of production to optimize digital operations and transform the entire connected manufacturing ecosystem.

Where we once imagined a factory focused on the digital, robot-driven production floor, reality has transcended the factory floor to include the entire manufacturing ecosystem—connecting employees, processes, machines, data, and customers—far beyond what was once envisioned.

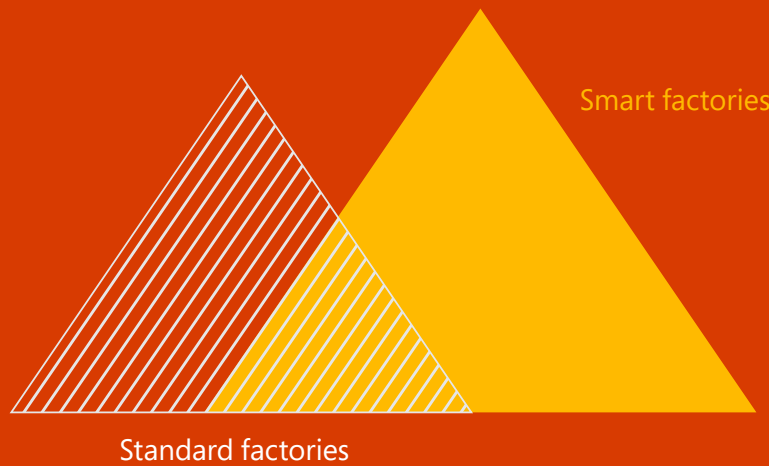
Among enterprise manufacturers, 87 percent say they have at least one IoT project in the learning, proof of concept, purchase, or use phase.¹ And manufacturers who have implemented smart factories are seeing 17-20% productivity gains.²

The “factory of the future” does involve machines, products, and factories. But contrary to past fears of automation and robots replacing people, the factory of the future is actually empowering people, including:

- **Manufacturing business leaders** using data from hyperconnected networks to develop customized, meaningful products and services
- **Factory workers** using continuous insights to predict and prevent machine failures and improve operational effectiveness
- **Customers** providing real-time usage data and experiential sentiment to inform how manufacturers innovate to support valuable experiences



Enterprise manufacturers who
have at least one IoT project¹



17-20%

Productivity gains²



Our challenge in the coming years is to manufacture more aircraft faster, and for that, we need to enable our workers to be much better equipped and to be much more effective in what they do. We need to raise the bar.

Jean-Brice Dumont

*Executive Vice President of Engineering,
Airbus*

02 /

Empowering digital leaders in manufacturing

Connected intelligent machines and IT systems provide continuous insights, enabling manufacturing leaders to make better informed decisions with objective, up-to-date market data; manage inventory in near-real time; and revise processes and drive new innovations to meet demand. Such hyperconnected networks of free-flowing data will enable manufacturers to work with shorter lead times, forge a tighter link between supply and demand, develop new business models as market demand and opportunities arise, and accelerate new product introductions to market.

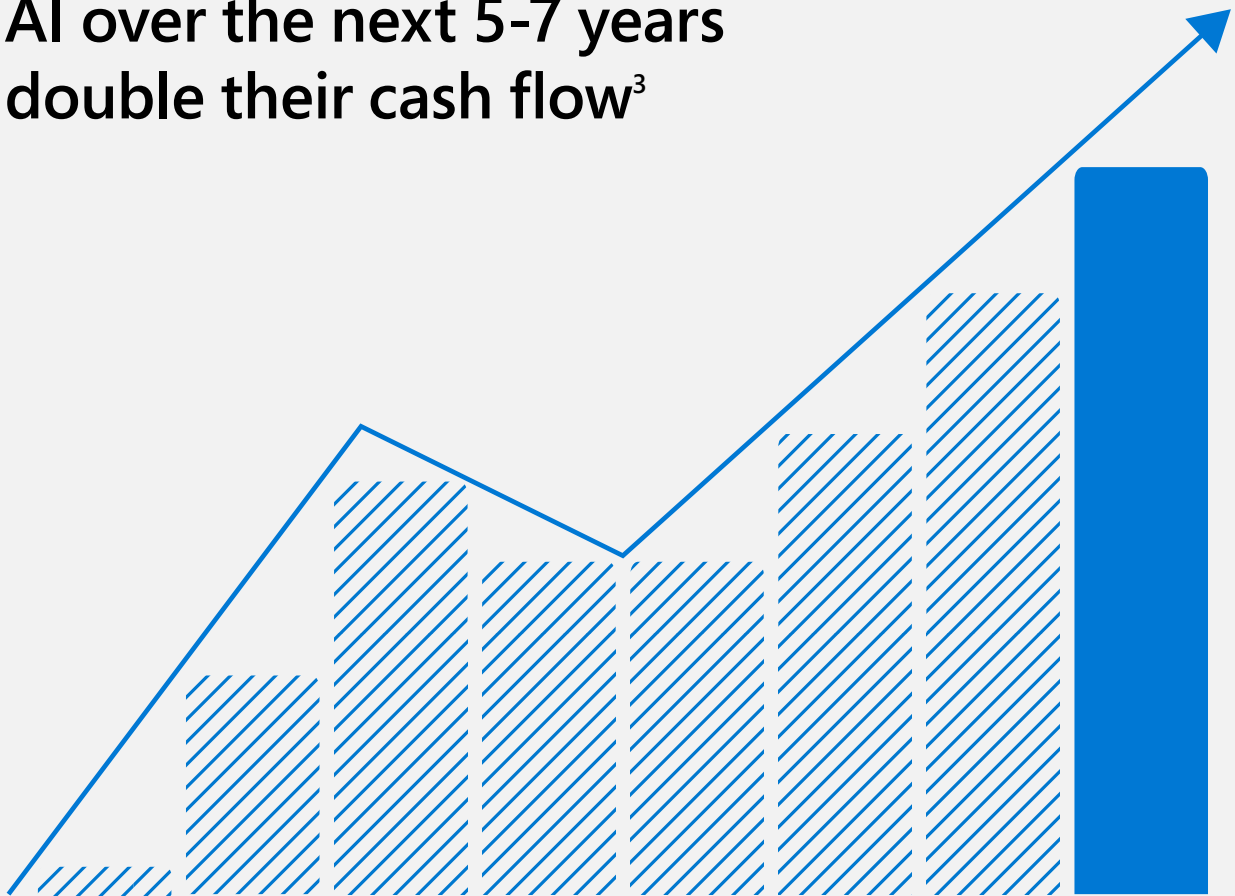
McKinsey estimates that 50 percent of companies that embrace AI over the next 5–7 years may double their cash flow.³

Empowering manufacturing leaders hinges on supporting real-time insights, and one way Microsoft enables this is [Remote Monitoring](#). Developed for the Microsoft Azure platform, Remote Monitoring enables manufacturers to make targeted improvements to business processes by getting real-time use, performance, and asset health updates from nearly anywhere, and use that data to optimize performance securely, anticipate problems and solutions, and boost customer satisfaction.

The result? Improved visibility to support proactive response across the business; the ability to make targeted improvements to business processes to save time, money, and resources; and new business insights to spot trends and opportunities to advance the business.

50%

of companies that embrace
AI over the next 5-7 years
double their cash flow³





The ability to automate these transactions across thousands of machines and countless miles is transformational for this industry. Now all parties involved can have immediate electronic records of transactions, real accountability in these remote locations, immediate awareness for maintenance and diagnostics, and new levels of information about every transaction.

Doug Weber

*Business Manager – Remote Application Monitoring,
Rockwell Automation*

03 /

Connecting specialists in new ways across the organization

Today, immersive human-to-machine collaboration and advanced analytics are enabling specialists—from R&D, to the production floor, to logistics and supply chain management—to prototype new designs faster and more affordable, build more useful products faster, and continually support meaningful customer experiences. In fact, 85 percent of manufacturing executives expect human-to-machine-centric environments to be commonplace by next year,⁴ with an estimated 40 percent of operational processes being self-healing by 2022.²

One technology at the heart of this vision is the digital twin, which enables manufacturers to simulate and iterate through the end-to-end stages of design, production, and service with a digital representation of the plant floor, supply chain, and product lifecycle.

Gartner estimates that, by next year, there will be more than 20 billion connected sensors and endpoints, and that digital twins will exist for potentially billions of things. And by 2021, half of the large industrial companies will use digital twins, resulting in those organizations gaining a 10 percent improvement in effectiveness.⁵

What used to be considered technologically abstract or out of reach is now tangible and available, supporting advanced problem-solving and reasoning with machines, simultaneous work across virtual and physical models, and effective cross-team collaboration on a global scale.

Microsoft is redefining the digital twin through [HoloLens 2](#), which allows users to interact with and improve full-scale models in immersive mixed reality. Now, manufacturing teams can create safe and flexible holographic training scenarios in the real world, give clients 3D prototypes to visualize and inspect, and identify and address problems before work starts. Processes that once took weeks can now take days through this reduction in physical prototyping.



Temperature



Output





With Immersive Competency, technicians can easily take a new or refresher training in a safe environment just before doing a procedure. For a critical task that might only be done every two or three years, this focused training model is ideal.

Vincent Higgins

*Director of Technology and Innovation,
Honeywell Connected Plant*

04 /

Developing a truly customer-centric manufacturing process

While factory workers, machines, processes, data, and other elements of production support smart factories, empowering transformative customer experiences is truly at the heart of the factory of the future. An estimated 86 percent of buyers will pay more for a better customer experience and greater transparency.⁶

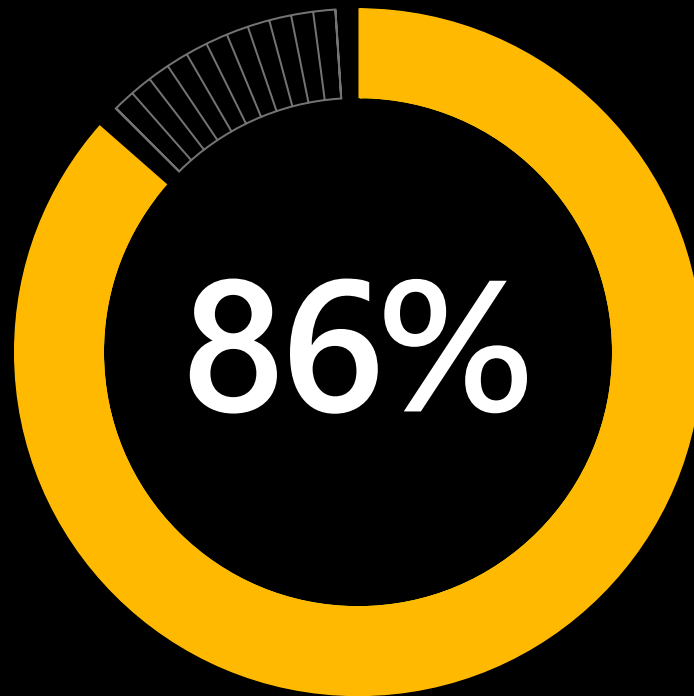
The desire to adapt to quickly-evolving customer demands is nothing new, except now technology trends such as AI and IoT are being adopted and integrated into ways that finally deliver on this real-time, customer-centric vision.

One example of how the customer experience is being completely transformed by these advancements is Predictive Maintenance, in which manufacturers

boost equipment reliability and stay ahead of the unexpected issues that can easily derail production. By capturing customer sentiment, usage, and other data and analyzing it with machine learning algorithms, manufacturers can gain the insight to fine-tune processes and make modifications that improve product quality and increase customer satisfaction.

Going forward, IoT-driven data and AI will bring new levels of performance insight directly from customers for customer-driven product design and faster innovation cycles.

**Buyers who pay more
for a better customer
experience and greater
transparency⁶**





The Microsoft Azure platform makes it a lot easier for us to deliver on our vision without getting stuck on the individual IT components. We can focus on our end solution and delivering real value to customers rather than on managing the infrastructure.

Richard Beesley

*Sr. Enterprise Architect – Data Services,
Rolls-Royce*

05 /

From our
factory to
your factory
of the future



Through a robust technology platform, preconfigured solutions, and longstanding experience as both a services provider and manufacturer, Microsoft is empowering humans to capitalize on the unprecedented opportunities of the factory of the future in three fundamental ways.

First, empowering organizations to achieve breakthrough productivity with intelligent, mixed reality, and cognitive services by bringing together humans, machines, and AI.

Second, building broader ecosystems through partnerships that include telecommunications, network, hardware, and software partners.

And third, delivering a highly-flexible, robust software platform that allows the hyperconnected world to operate in hybrid models, supporting IoT, people, and services working together.



Jabil has seen at least an 80 percent accuracy rate in the prediction of machine processes that will slow down or fail.

Clint Belinsky

*Vice President of Global Quality,
Jabil*

06 / Learn more

To learn more about Microsoft smart factory solutions and the growing number of manufacturers innovating with them:

→ Explore solutions for [intelligent manufacturing](#)

This e-book is based on Microsoft analysis of third-party data.
Sources include:

¹Hypothesis Group: IoT Signals: Summary of Research Learnings. 2019

²IDC FutureScape: Worldwide Digital Transformation 2017 Predictions
Jan 2017 Doc # US42259317 Web Conference By: Michael Versace.

³McKinsey: Digital Manufacturing Capturing Sustainable impact at scale.
June 2017

⁴Eric Schaeffer et al., Machine Dreams: Making the most of the connected
industrial workforce. Accenture. February.

⁵Gartner: Gartner Identifies the Top 10 Strategic Technology Trends for
2019. 2018

⁶Walker, Customers 2020: A Progress Report, Undated <https://www.walker-info.com/knowledge-center/featured-research-reports/customers2020-1>

© 2019 Microsoft Corporation. All rights reserved.

This document is provided "as is." Information and views expressed in this document, including URL and other internet website references, may change without notice. You bear the risk of using it. This document does not provide you with any legal rights to any intellectual property in any Microsoft product. You may copy and use this document for your internal, reference purposes.