

5G Factory of
the Future

**The future
is now...**



Introducing 5G Factory of the Future

5G Factory of the Future is an open-access industrial testbed that aims to find new and more efficient ways of manufacturing to help lead industry towards a smarter, safer and more sustainable future.

Our project aims to demystify 5G for the manufacturing sector and work towards developing the smart factory of the future, today.

This ground-breaking project will unlock the potential of 5G technology by:

- Improving productivity and efficiency
 - Connecting workers, machinery, supply chain and product
 - Using agile, connected digital infrastructure to improve production processes, worker safety, quality control and much more.
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What is the 5G Factory of the Future?

5G Factory of the Future (5G-FoF) is a ground-breaking project led by the University of Sheffield Advanced Manufacturing Research Centre (AMRC).

Industry leaders and academics are joining forces to solve key challenges in deploying 5G technology by testing use cases in a real-life factory environment. Together we're creating a powerful testbed for trialling new ways of manufacturing, from factory floor to supply chain and everything in-between.

We aim to share our learnings and support businesses to innovate and sharpen their competitive edge by using 5G technology.

5G-FoF will drive innovation across the North of England and beyond by:

- Promoting joint projects and new product development
- Encouraging collaborative research and innovation
- Supporting joint ventures with industrial partners
- Hosting discussion forums
- Creating a regional business support hub.

How is it funded?

The 5G Factory of the Future programme was awarded £9.5m by the Department for Digital, Culture, Media and Sport (DCMS), which includes match funding from industry.

It is part of the government's £200m investment in 5G testbed facilities across the country.

Who is involved?

Our programme has major global partners in BAE Systems and IBM, along with communications provider aql, specialist Lancashire-based firms MTT and Miralis, and Digital Catapult.



Where is it based?

5G-FoF has its primary base at AMRC North West, a purpose-built £20m applied research centre on the Samlesbury Enterprise Zone in Lancashire, at the heart of the largest cluster of aerospace production in the UK. It will also have a significant footprint at BAE Systems' site in Warton and at the AMRC's Factory 2050 facility in Sheffield.

Why 5G?

With 5G, we finally have a way to make digital manufacturing a realistic prospect. By accelerating adoption of Industry 4.0 technologies – using 5G to move manufacturers into the digital fast lane – UK businesses have an opportunity to not just survive, but to thrive.

Until now, digital connectivity simply hasn't been able to deliver this sort of impact for the manufacturing industry. Wi-Fi, 4G and wired solutions each lack at least one of the fundamental capabilities of mobility, bandwidth, latency or the security needed to be truly useful on an industrial scale.

5G has opened the door to a whole host of possibilities for manufacturing — closed loop control, tool automation, troubleshooting using augmented reality, remote asset monitoring, digital twins, fully wireless factories and much more.

5G-FoF offers a live test environment where this technology can be put through its paces, as well as showing businesses how they can innovate and sharpen their competitive edge using 5G.

What next for 5G-FoF?

To enable testing in a live environment, we've integrated our computing capabilities with a 5G network — a significant achievement and a huge milestone for 5G in the UK.

Having the network and compute functions tightly coupled in this way is a distinguishable feature of 5G networks and so far, has only been described in textbook configurations. At last, it is a reality, and means we can begin to stress test our first batch of use cases to harness more data about how 5G can support manufacturing businesses.

It's an exciting time for the 5G-FoF programme, and we're looking forward to working with businesses in Lancashire and the wider North as our testbed moves into the next phase.

Visit the 5GFoF website at: **5GFoF.co.uk**



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Key themes relevant to our audiences



01.

Regional impact Regional audience

5G-FoF is a huge investment in the Lancashire region and is expected to strengthen the manufacturing industry in the North. For SMEs in the North West of England, this means an incredible opportunity to explore the possibilities of 5G is now right on the doorstep.

The initiative is expected to drive skills and innovation in the local area, supporting productivity and economic growth across the north. Its primary base is at Samesbury Enterprise Zone, a developing centre of excellence for advanced engineering and manufacturing related companies.

5G-FoF aims to collaborate with local businesses to help them build a smarter, more sustainable and ultimately more successful future.

02.

Transformational impact of 5G on businesses Business Audience

5G-FoF will demonstrate how 5G technology can be used to improve efficiency, productivity, and sustainability in a live manufacturing setting.

Benefits include:

- Better insights
- Lower costs
- Higher margins
- Improved quality
- Reduced time to market
- Faster delivery times.

5G-FoF offers a practical way for businesses to learn more about how this technology can be used. With each use case, we gather more information about the complexities and benefits of deploying 5G technology in a manufacturing environment and how this can translate into improvements for business.

03.

How 5G-FoF is innovating Academic Audience

5G-FoF now has a leading-edge Nokia standalone private network, integrated with IBM's Hybrid Cloud Data and AI platform, live at AMRC North West. This is the first across the manufacturing testbeds within the government's £200m 5G Testbed and Trials programme and is a significant step forward for 5G manufacturing in the UK.

The University of Sheffield AMRC North West has also designed and built a novel, native 5G sensor to unlock the low-latency and productivity potential of 5G in manufacturing. There is nothing like this available in the manufacturing sector.

It is a fully integrated 5G device that can be connected to anything on the shop floor, from machines, sensors, automation and robots, to building management systems; bringing the physical elements of a factory floor even closer to intelligent, computational units by weaving an invisible, cyber-physical fabric necessary to achieve the vision of Industry 4.0 and beyond.

Developing this solution in-house allows us full control over network performance, so we can deploy 5G connectivity directly onto machines, robots, PLCs, sensors and devices without any 'middle-man' technology such as USB, Ethernet or Wi-Fi.

This means we can maintain end-to-end connection latency at the minimum possible levels — crucial for manufacturing as the sooner any deviation from plan is observed, the faster the issue can be rectified, minimising cost, rework and waste.

04.

Is 5G safe? General Public Audience

Yes, 5G is safe. Many studies from leading organisations including the World Health Organisation, Public Health England and the UK Health Protection Agency have shown comprehensively that 5G is not harmful to public health.

Unlike gamma rays, x-rays and ultraviolet radiation from the sun, 5G operates at a wavelength that does not produce enough energy to cause cell damage at the very moderate levels it is used at.

Public Health England guidance:

- **Mobile phone base stations: radio waves and health**
- **5G technologies: radio waves and health**

5G and other health claims

- **Vodafone: 5G and everything you need to know**
- **Cancer Research: Do mobile phones cause cancer?**
- **Ofcom EMF measurements (highest level recorded 1.5% of the relevant level)**
- **Coverage on new ICNIRP 2020 Guidelines which cover 5G**

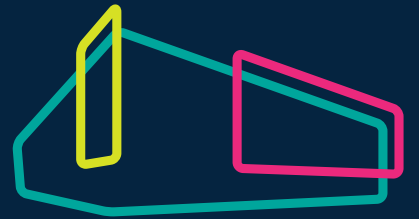
05.

Is 5G secure? Manufacturing Audience

There are many advantages for 5G when it comes to security.

5G offers enhanced user authentication and stronger data encryption, which makes it more difficult for bad actors to intercept. Because 5G is largely cloud and software-based it's easier to monitor the network for potential threats. 5G also enables 'network slicing', splitting functions into smaller virtual networks that can be managed according to required levels of security.

Our 5G network at Samlesbury is also running on a standalone secure network for additional peace of mind.



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Quotes



- “ This project shows the power of industrial collaboration and the benefits of long-term relationships with pioneer companies who are embracing smart technologies to give the UK, the North and Lancashire a competitive advantage in an uncertain and challenging world.
- “ There are so many possibilities for innovation and productivity improvements that 5G can open up. The digital twin work strand will enable reconfigurable assembly lines, while the high-level monitoring of machines and shop floors will allow partners to develop, integrate and test products-as-services previously limited by bandwidth/latency.
- “ The use of 5G connected sensors in the chain of custody system work stream will help make UK manufacturers more resilient to blockages and breaks in extended supply chains, by enabling tracking across different business/supply-chain, improving on-time delivery and dramatically reducing lost assets and cost, improving productivity.”

Ben Morgan, Research Director, University of Sheffield AMRC

- “ The 5G Factory of the Future testbed is a real opportunity for AMRC to set a benchmark for UK manufacturing, helping companies of all sizes to understand and adopt 5G so they can unlock the huge benefits of Industry 4 digital technologies and start to make smart factories a reality.
- “ 5G enables us to deliver the promise of the smart factory. Improved latency means systems can work together and robots can work collaboratively. Improved bandwidth allows remote lineside support and digital instructions to be streamed to operators on shop floors – all at a speed and volume we couldn't before. It has the power to transform UK manufacturing, making it smarter and more sustainable.”

Rab Scott, Head of Digital, University of Sheffield AMRC

“ This is a big vote of confidence in Lancashire and the North West and a potential game changer for the region. Lancashire is home to leading global businesses in the advanced manufacturing sector: aerospace, automotive and energy. While the region’s manufacturing has high levels of economic activity, it lags behind the rest of the North West and the UK in productivity.

“ This investment will change that. It will enable Lancashire’s manufacturers to close the productivity gap with the implementation of 5G technologies, the adoption of which will be de-risked and fine-tuned at the AMRC which is part of the High Value Manufacturing Catapult network of research centres.”

Melissa Conlon, Commercial Director, AMRC North West

BAE SYSTEMS

“ The 5G research and development test bed will support the development and growth of our new intelligent, smart factory which is applying game-changing technologies to the defence sector. The 5G Factory of the Future programme will drive forward holistic connectivity and unlock the potential of industrial digitalisation.

“ It will define a new paradigm for how future factories will operate enabling connectivity and business agility both across manufacturing operations and beyond, into the supply chain. The transformative potential of 5G technology will be developed and demonstrated via a strong consortium, including the UK Catapult Network and the BAE Systems Factory of the Future to advance manufacturing on the UK’s next generation combat aircraft system, Tempest.”

Andy Schofield, Programme Technology Integration Manager



“ IBM hopes to inspire manufacturers at whatever stage they find themselves in their journey towards industrial digitization. Specifically, IBM will demonstrate how industry leading technologies in hybrid cloud and AI can accelerate digital investments.

“ IBM is providing the platform which underpins Factory of the Future. Using data and integration tools delivered in an open, hybrid multi-cloud fashion, the platform will accelerate the way data can be accessed, analysed, shared and used to predict outcomes in manufacturing.”

Euan Pirie, Industrial Sector Technical Leader, IBM



“ 5G technology is going to be crucial to realising Industry 4.0, which will in itself become a catalyst for reducing carbon emissions, particularly within supply chains. Working alongside a strong consortium of veteran innovators, we are delighted to play our part in the testbed for what will spark a radical evolution in UK history.

“ Our role in the 5G Factory of the Future project is in designing a game-changing chain of custody system that takes advantage of 5G sensor technology. The system will allow dynamic monitoring of the quality of goods coming into factories and warehouses.

“ The resulting solution of the 5GFoF chain of custody project will allow manufacturers visibility on the quality of goods arriving to them, whilst offering the earliest detection of any issues that could otherwise cause delays and disruptions to overall productivity.”

Will Maden, Research Director, Miralis

“ Digital Catapult is leading the technical 5G integration work in typical operational processes, enabling manufacturers to build the business case for 5G adoption. Through this, we will learn and demonstrate how well advanced digital technologies perform with a 5G connection, and the route for its adoption at scale in factories.

“ By leveraging digital infrastructure advances delivered through 5G, this project will provide key learnings on how manufacturing operations and supply chains can be transformed to improve efficiency, resilience and sustainability. We are excited to be working with real manufacturers to test 5G’s capability and address barriers to adoption.”

Charles Turyayenda, Senior 5G Technologist, Digital Catapult



“ We believe collaboration will drive 5G to become a powerful intervention to support the next generation of real-time technologies and applications. The 5G-FoF project is part of that intervention and aqi is dedicated to identifying the synergies and learnings between the partners that will make 5G an impactful tool for the future manufacturing industry.

“ aqi has been building the underlying set of capabilities to enable projects like 5G-FoF since 2015. We’ll be delivering the 5G network that will enable better manufacturing work practices through increased connectivity and bandwidth. The industrial digitalisation of the manufacturing industry will be driven by 5G and is soon to become a reality.

“ With a next-generation, secure, low-latency 5G network in place, manufacturers will experience increased levels of real-time data sharing to enable them to effectively manage workflows that will reduce costs, improve productivity and increase output. More effective workflows will also encourage better energy usage helping to reduce the manufacturing industry’s impact on the environment.”

Professor Adam Beaumont, Founder and Chairman, aqi

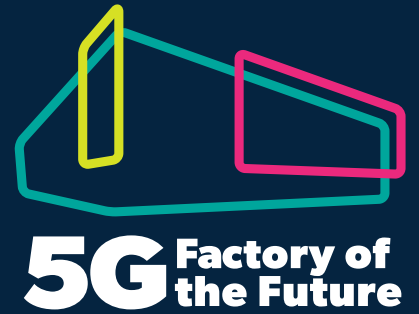
Useful Links

5G-FoF Assets

Image Bank

Video Bank

**If you have a press enquiry or require the 5G-FoF logo, visual identity or press photography, please contact:
5gfof@amrc.co.uk**





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5GFoF.co.uk