Robotics and automated guided vehicles

Benchmarking the future standard

5G Case Study

Benchmarking the future of manufacturing at the Manufacturing Technology Centre

West Midlands Combined Authority
Department for Digital, Culture, Media & Sport
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MIDLANDS ENGINE
HM Government
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Synopsis

The Manufacturing Technology Centre (MTC) in Coventry, is trialling a purpose-built private stand-alone 5G network aimed at helping manufacturers to boost resilience and productivity through innovation.

In partnership with WM5G, the MTC is launching its 5G capability along with technology partners Worcestershire 5G (W5G) and BT.

The private network is being installed at the MTC's manufacturing research facility at Ansty Park.

The connected facility at the MTC will allow manufacturers of all sizes to explore the benefits of 5G in manufacturing and inspire to scale up the development of use cases within and outside shop floor environments.

A live 5G-connected robotics demonstrator will also come on stream and give interested businesses insights into how 5G can boost their productivity through connected digital innovation for flexible manufacturing.

The short-term ambition is to prove the suitability and advantages of 5G services in the adoption of industrial digital technology and implementation of robotics in production environments, providing a benchmark for the future of 5G in manufacturing.

Problem

In many production environments, components of varied sizes and shapes are produced and need to be measured and checked to meet design tolerances. Traditional in-person inspections can be timely, are prone to human error and are not seamlessly recorded.

Automating inspection processes requires the equipment to be sufficiently flexible and intelligent to meet-on time quality assurance needs and maximise utilisation of costly inspection equipment.

Solution

A 5G-enabled system featuring automated logistics, robotics and vision inspection to serve one or several production lines with varied inspection requirements.

An autonomous mobile robot will transport components across the factory to and from a fully automated visual inspection cell where a high definition camera mounted on a robot arm will capture the product from all sides and a vision software will check against component design specifications.

The autonomous mobile robot will re-orientate to assist the operation and a safety laser scanner will be used for safe process execution.

By communicating with each other through 5G, speedy visual inspections will check each component meets specification before autonomously delivering them to a following stage in the process based on the inspection outcomes.

Benefit

The 5G private network allows for the implementation of an intelligent, highly flexible inspection solution, able to measure and analyse varied products at ‘any time’, by providing:

- Robust network coverage for workshop-wide navigation of mobile robots compared to Wi-Fi
- Reliable wireless connectivity to control and automate information exchange
- Management of high volumes of inspection image data through wireless and remote computing
- Best latency for wireless safety control of the inspection cell
- Remote execution of the automated vision inspection software application from the edge

There is future potential for the technology to enable other flexible and intelligent processes, such as automated exchange of information of automated logistics robots with production equipment.

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As well as establishing a long-term showcase facility to demonstrate best practice and the capabilities of 5G in manufacturing, MTC’s first 5G-enabled use case will provide valuable insights into safe and intelligent modular automation in state-of-the-art production lines for the smart factory.

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Alejandra Matamoros, MTC

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We are looking forward to working with the MTC as our strategic triallist to prove and share the benefits of connected manufacturing with SMEs. The MTC has been leading the way in exploring new manufacturing technologies such as robotics, digitalisation and intelligent automation for a long time.

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Robert Franks, West Midlands 5G

A 5G testbed at the MTC

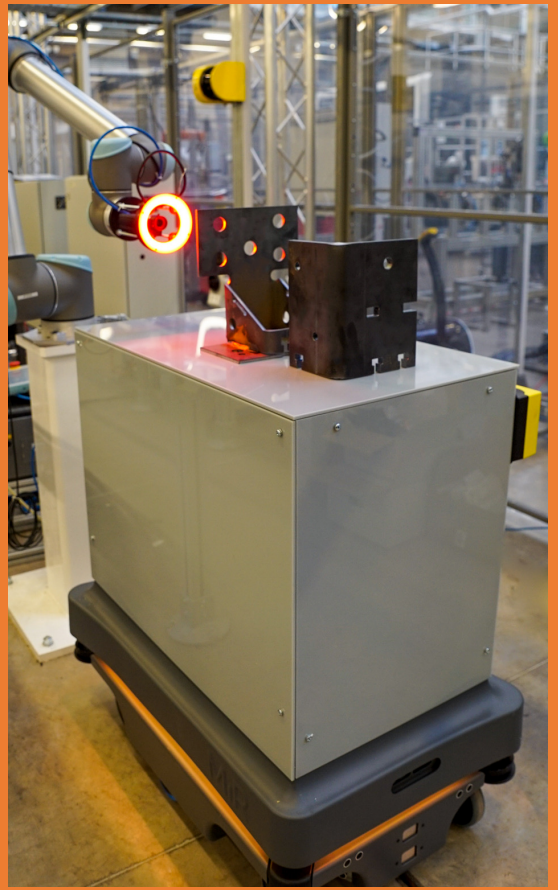
The developing use case aims to prove the benefits that 5G services can have on the adoption of robotics and industrial digital technology to innovate in production environments through an experimental demonstrator. Demonstration of these 5G capabilities also seeks to enable new forms of thinking when addressing problems in manufacturing and broader production systems, and will provide a benchmark for the future of 5G manufacturing.

The first live trial at the facility will see two robots simultaneously and autonomously operating to deliver an inspection task – adding value through increasing quality and efficiency of a factory operation. MTC members are closely following the development of the use case through the MTC Core Research Programme, and will be invited to validate the value of the use case and the 5G capabilities explored through this application.

The longer-term aim is to develop a series of 5G use cases bringing 5G connectivity, skills, and applications to the MTC research and innovation programmes, supporting its SME Technology Transformation programmes and offering a testbed environment for their wider customer and partner base.

In particular, the MTC's SME Digital REACH programme offers SMEs guidance and support to increase productivity through the introduction and adoption of digital manufacturing technology.

With higher speeds, greater capacity, and shorter response times, 5G can unlock the potential of these technologies in a way not currently possible through conventional connectivity. The MTC workshop will be a functioning facility able to showcase this and serve as a testbed environment.



Takeaways

Sustain

Development of future proof use cases that benefit from sophisticated data capture enabled by 5G - to address today's industrial needs by accessing capability being built through 5G testbeds such as MTC's.

Learnings

Using a private high-performance wireless network allows for secure and reliable data sharing among production technology in solutions with flexible requirements. WM5G and the MTC with their 5G collaborators are able to support the development of new use cases that demonstrate the value 5G can provide to the manufacturing industry using MTC's testbed environment..

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