5G-encode

What is 5G-ENCODE?

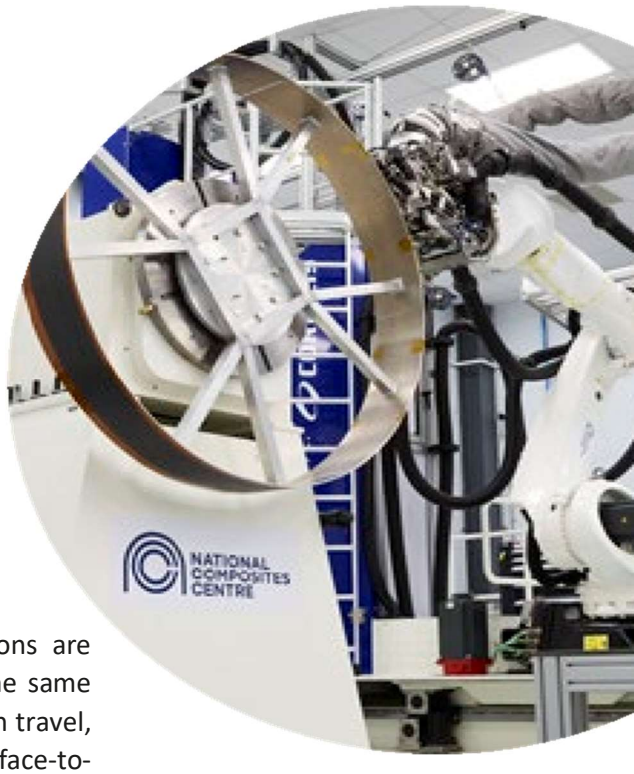
A pioneering, £9 million project making the benefits of 5G a reality for UK manufacturers.

5G-ENCODE is the UK's largest trial of industrial 5G and one of the UK Government's biggest investments in 5G for manufacturing to date. Part of the Department for Digital, Culture, Media, and Sport's 5G Testbed and Trials Programme, it has been set up to establish sustainable business cases and value propositions for the application of 5G technology in manufacturing.

Supercharging remote learning with 360° video streaming in VR powered by 5G

Using 5G to provide distance learning trainees with a real-world experience

This case study outlines how businesses can improve efficiency and trainee satisfaction of in-house training. As part of 5G-Encode, the National Composites Centre created an immersive and interactive 360° video streaming VR solution over a 5G mobile network. The project was successful in showing that through this technology, distance learning trainees can now have an experience more akin to that of on-site with the trainer, with 91% of participants indicating the new 5G solution was a remote learning enhancement. This was largely due to the greater bandwidth and faster download speeds achieved leading to improved viewing quality.



The Industry Challenge

For effective training and education in the workplace, training sessions are typically hosted in person, with the trainer and trainees together in the same demonstration space. However, this scenario can become expensive with travel, facilities, and accommodation costs. The impact of COVID-19 has made face-to-face training even more challenging, if not impossible for companies to deliver during national lockdown.

While current distance learning options are already available, and internet-based courses and systems to support students offer a solution, the capability to engage effectively with the trainer and deliver more practical aspects of a course is difficult. More immersive distance learning solutions are proposed to address this industry challenge.

Use case areas

Augmented/Virtual Reality (AR/VR) to support design, manufacturing and training

Monitoring and tracking of time sensitive assets

Wireless real-time in-process monitoring and analytics

Who is involved?

The 5G-ENCODE Project is a £9 million collaborative project aiming to develop clear business cases and value propositions for 5G applications in the manufacturing industry. The project is partially funded by the Department for Digital, Culture, Media and Sport (DCMS), of the UK government as part of their 5G Testbeds and Trials programme.

The project consortium, **led by Zeetta Networks**, brings together leading industrial players (e.g., Siemens, Toshiba, Solvay), a Tier 1 operator (Telefonica), disruptive technology SMEs covering all aspects of network design, deployment, and applications (Zeetta Networks, MatiVision, Plataine), a world-leading 5G network research group (High Performance Networks Group in the University of Bristol) and the NCC representing the high value manufacturing industry.

The key objective of the 5G-ENCODE project is to demonstrate the value of 5G on industrial use cases within the composites manufacturing industry.

About the use case

This 5G-ENCODE use case explored the use of some of the latest 360° video streaming technology, 5G connectivity and VR headgear to demonstrate a fully immersive remote learning solution for the workplace. The project focussed on the delivery of a practical demonstration for the manual layup of carbon composite materials which is part of the National Composites Centre's, 'Introduction to Composites' training course. The main challenge was to effectively digitise the content to facilitate the same or better knowledge transfer to the trainees.

Testing the use case

The immersive remote learning solution was trialled in two phases, in order to gauge the performance improvements of the 5G network against an already proven and tested one – i.e., 4G LTE. The use case setup used was consistent across the two phases as follows:

- A 360 ° camera live streaming at 4K video quality was capturing the course demonstration and feeding the footage to a central server which shares it across the trainee VR headsets. The video feed allows each individual trainee to independently pan around the demonstration giving them flexibility to explore the training material from different angles.
- The live stream also included a 2-way audio channel which could be accessed through the VR headset and enables the trainee to open a dialog with the remote trainer to ask for further information and clarify training material during delivery.

Phase 1: 4G baseline

After setting up the use case at the NCC, tests were completed in July 2021 using 4G LTE connectivity. Feedback was captured from the trainees at the trial to gauge user experience and network metrics were measured to quantify the connectivity performance. While the users acknowledged the potential and the novelty features of the service, the 4G network was not capable of delivering the necessary quality of service, with poor network performance and picture quality negatively impacting the end user experience.

Phase 2: 5G test

In November 2021, the use case was trialled for a second time at Millennium Square in Bristol where the connectivity was upgraded to a 5G network with the support of the team from Smart Internet Lab, University of Bristol. The demonstration was carried out over 2 days to 20 participants. The user feedback presented 91% agreement that the use case showed an immersive enhancement to conventional remote learning solutions, thus indicating that end user experience had improved significantly. The network performance improvements of 5G over 4G were considerable with download speeds exceeding 700 megabits per second and latency of only 3 milliseconds measured. This significantly increased viewing quality and improved participant engagement and satisfaction. The immersive technologies used in this report are shown to be an effective option for distance learning when paired with a reliable, high-performance network as offered by 5G technology.

Get in touch

If you would like to learn more about 5G-ENCODE and how you could get involved.

visit our website

www.5g-encode.com

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