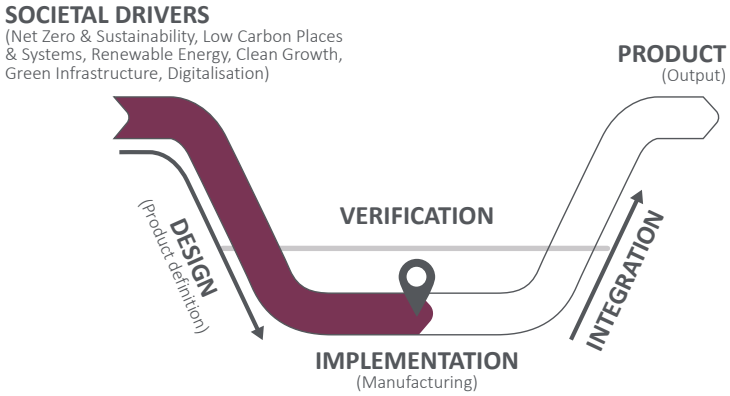
Bringing **digital visualisation** to the manufacturing process

CHALLENGE

To meet net zero targets, manufacturers need to reduce scrap and waste while making ever more complex products that employ advanced methods, using novel sustainable materials.

Traditional manufacturing processes rely heavily on experienced operators, where knowledge has developed over time using costly physical testing, driven by paper-based processes. As more novel materials and processes are introduced and the complexity of manufacturing tasks increase, new techniques are required which allow operators to gain this experience in an accelerated fashion with reduced physical testing.



The use of immersive technologies such as Augmented Reality (AR) and Virtual Reality (VR) to bring digital visualisation to manufacturing delivers a number of benefits including increased levels of safety, quality inspection and reduced error rates, while also providing visual instructions for manual assembly, maintenance and training. As a complimentary technology for production operators for example, it can assist with unfamiliar tasks, reducing the rework of complex product assembly, and can increase productivity in complex tasks.

RESULTS AND THE DIGITAL OPPORTUNITY

This research project will deliver a proof of concept system that guides the user through a specific manufacturing process using AR. Two use cases have been selected to demonstrate the chosen process and how the AR tools developed will be applied.

In the first use case, vacuum bagging a composite part is a specific process which entails the composite being sealed in a vacuum bag, ensuring that all air is evacuated, and the bag tightly sealed compacting the composite material. A digital workbench used by the production operator has been designed which incorporates a suite of 3D depth sensors, user tracking and machine vision cameras, complimenting a downward facing projector system to create a mixed reality work environment. This allows the operator to visualise virtual and real-world data, such that specific feedback can be provided through the projection system.

The second use case demonstrates how the principles and technologies in the first use case can be transferred to a new domain, agritech fruit picking. With a reconfiguration of the appropriate sensors, AR goggles provide feedback to the user (fruit picker) which details which fruit are ready to be picked.

In both use cases, the system developed incorporates real time object detection to identify objects in the scene, and where necessary, compare this with the expected position and feedback the error, or simply guide the user to a target position or part of the process.

This project, when fully complete will deliver a digital proof of concept demonstrator that will demonstrate the processes in operation.

Partners

UWE Bristol University of the West of England

NATIONAL COMPOSITES CENTRE