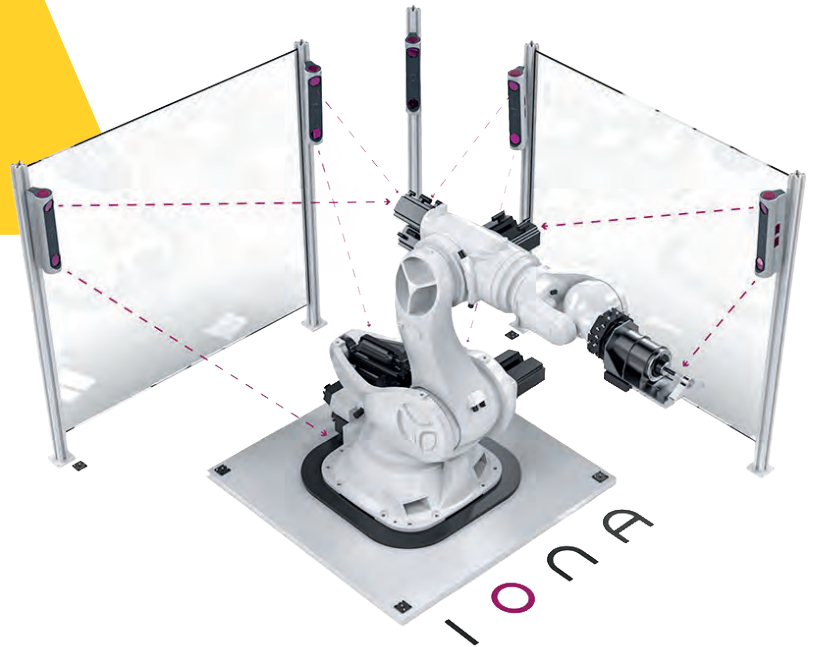




## **CASE STUDY:**

**INSPHERE'S IONA system  
delivers industry-leading accuracy  
in composite material deposition**

# INSPHERE'S IONA system delivers industry-leading accuracy in composite material deposition using the NCC Smart Factory Industrial Test Bed



The National Composites Centre (NCC), the UK's world leading research and development centre focused on Composites, Digital Engineering and Sustainability, selected INSPHERE to be a participant in the NCC Smart Factory Innovation Hub (SFIH) programme.

Providing the company with access to a state-of-the-art, secure 5G enabled virtual and physical test bed and sandpit environment, the NCC helps organisations to test quick-fire projects and early-stage technologies in a secure, industry-like environment with expert support and skills.

The newly launched IONA system was installed in the NCC's Smart Factory Innovation Hub Test Bed which concentrates on the Automated Preforming Cell (APC). An Industry 4.0, state-of-the-art facility for automation of the preforming process of composite component manufacture, it is capable of developing complex geometries in a fully automated process to create fast, highly repeatable composite parts.

The IONA system is a scalable network of sensors providing metrology-grade positional data of automated manufacturing processes. The high quality, metrology-grade data generated, can be used to improve the accuracy and performance of manufacturing robots, enabling new processes to be automated and efficiencies realised.



## The Challenge

IONA faced an industry challenge to solve the issue of increasing the level of accuracy of robots within high-performance manufacturing. Typically, robots can achieve a tolerance from 2-5mm, which generates excess waste material and prolongs time to market.

The target measurement criteria set was to enable the INSPHERE system to achieve its potential of 0.2mm accuracy resulting in a significant reduction in scrappage, increasing sustainability in the composites manufacturing process.

## Innovation

The NCC Smart Factory Innovation Hub test bed offers the opportunity to explore the value proposition of digital transformation. Targeted towards manufacturers, technology organisations, SME's and academia, organisations can use existing cell hardware and/or provide their own technology which can be integrated and tested through industry use cases. Virtual access to the test bed allows the digital investigation of how technology can help to de-risk transformation projects and achieve efficiencies in manufacturing and across product, process and technology development.

As a network of sensors for real-time monitoring and the control of robot processes versus more commonly a single sensor, IONA offers live stream data whilst other systems are typically in an on/off state with no consistent confirmation about performance. Live data collected from IONA also enables robot paths to be updated periodically or in real-time. Used to correct the variation in part location, cell setup or inherent errors in the automated system it also creates an accurate digital twin of the manufacturing system, allowing the user to bring offline programmes online – seamlessly – without the need for manual intervention.



“...a network of sensors for real-time monitoring and the control of robot processes.”



“The results gained by INSPHERE from using the test bed have generated great experience in the installation and operation of the system.”

## Impact

Testing the IONA system within the SFIH consisted of monitoring the position and orientation of the end-effector or robotic arm, which captured the output in real time, three times per second. This is predicted to increase to more than 10 Hz by the end of the year. The results collected concluded that IONA achieved an accuracy rate of 0.2mm, as per the criteria set. Achieving higher levels of accuracy, and precise precision engineering within automated material deposition, robot CNC machining, and edge trimming operations, can deliver significant operational efficiencies, as well as benefiting the environment.

By using the NCC Smart Factory Innovation Hub Test Bed, INSPHERE's IONA system tracked the robotic arm in a real-time environment. The INSPHERE team were able to creatively innovate and to engage the robot in a sequence of poses to verify system performance. Comparing IONA with data from a stable reference network in the robot cell demonstrated that IONA performed accurately, which reduced robot positional errors by a factor of ten.

## Next steps

The next step for the NCC Smart Factory Innovation Hub Test bed is to help more companies such as INSPHERE drive their technology forward to make industry more efficient and develop sustainable methods of manufacturing and flexible, adaptive automation.

A system such as IONA could be used in the future to potentially streamline a wide range of composites manufacturing techniques including preforming, edge trimming and tooling manufacture, the type of technology that the test bed supports.

For INSPHERE, the trial proved product readiness of IONA and served as a critical milestone before launching a successful series of pilot trials and further installations in the UK, demonstrating IONA to be a robust and accurate tool for companies seeking to introduce advanced data-driven manufacturing. The team gained valuable experience integrating the hardware into a complex robot cell. Directly after the SFIH Pilot, Insphere successfully installed the first commercial pilot of IONA.

If you are interested in accessing one of our 5G, DETI, Quantum or Smart Factory industrial test beds, contact us by email: [digitalengineering@nccuk.com](mailto:digitalengineering@nccuk.com)



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