

Case Study

Rolls-Royce aero-engine discs

Our groundbreaking manufacturing techniques are helping Rolls-Royce transform the production of components for some of the world's most advanced passenger jets.

The expertise of engineers from our Advanced Manufacturing Research Centre (AMRC) with Boeing has enabled our industry partner, Rolls-Royce, to reduce the production time and increase performance when manufacturing key components, called aero-engine discs.

In parallel with this research activity, Rolls-Royce has identified a need for a new disc production facility, using the pioneering manufacturing techniques developed by the AMRC.

The new Rolls-Royce advanced aerospace disc manufacturing facility in Washington, Tyne and Wear is valued at £100m investment and will have the capacity to manufacture 2,500 fan and turbine discs a year. These discs will feature in a wide-

range of Trent aero engines including the world's most efficient aero engine the Rolls-Royce Trent XWB.

Aero-engine discs are at the heart of the modern jet engine. They hold the turbine or fan blades in place, and operate under extremes of stress and temperature. Consequently, they require materials such as titanium and nickel super alloys.

Machining of titanium and nickel super alloy discs is traditionally difficult, and requires complex manufacturing process. AMRC engineers used simulation tools to guide the fixture design and machining strategy, whilst research has enabled them to choose optimal parameters for the machining of the titanium and nickel super alloy discs.

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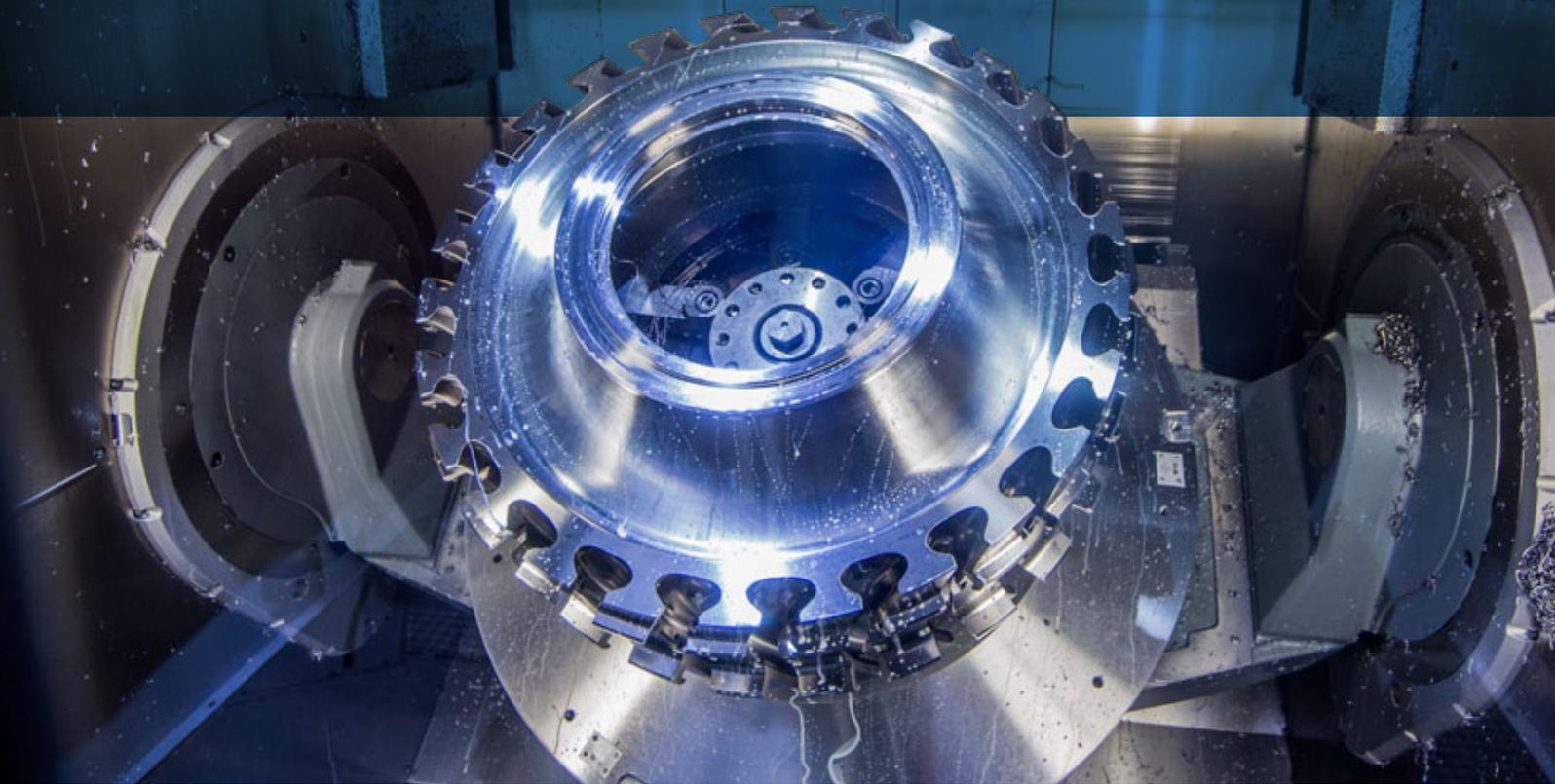


AMRC have reduced the time it takes to manufacture each disc by **50%**



The breakthroughs in machining time and accuracy have made UK manufacture for Rolls-Royce completely competitive.

Dick Elsy, Chief Executive of the High Value Manufacturing Catapult.



Researchers at the AMRC also devised a methodology for optimising the machining of the discs which has led to a reduction in production time and an increase in performance.

When linked with other pioneering manufacturing techniques, including the introduction of robotics and automation, the manufacturing techniques developed by the AMRC have reduced the time it takes to manufacture each disc by 50%. The AMRC expertise has also produced a step-change improvement in component performance.

Steven Halliday, AMRC relationship manager at Rolls-Royce, emphasises the benefits of working with the AMRC on the development of manufacturing technologies.

He said: "The manufacture of full scale demonstrator components at the AMRC validated the new approach in readiness for the launch of our new high technology disc factory near Newcastle. I am confident that the methodology developed through this project can now be used and applied to similar complex process challenges."

Dick Elsy, Chief Executive of the High Value Manufacturing Catapult adds, "The breakthroughs in machining time and accuracy have made UK manufacture for Rolls-Royce completely competitive."

"The biggest anchor point for innovation in the UK is knowledge. If we develop the knowledge here, it acts as the main binder to lock high value manufacturing into the UK."

Talking about the success of the AMRC, Adrian Allen OBE, commercial director of the University of Sheffield AMRC with Boeing, said: "Our research is embedded in industrial partnerships. We have global companies such as Rolls-Royce coming here, and partnering with us on major projects; companies that have gone on to fundamentally change the way they go about their business, based on our data and research."