

# AMRC

ADVANCED MANUFACTURING  
RESEARCH CENTRE



The place where  
**digital meets manufacturing**

[amrc.co.uk](http://amrc.co.uk)

## The AMRC collaborates with public and private sector partners to:

- Create step changes in productivity
- Upskill the workforce of tomorrow
- Provide i4.0 leadership across manufacturing
- De-risk the adoption of i4.0
- Accelerate innovation in industrial digital technologies
- Remove barriers to effective adoption



**The AMRC is a network of world-leading research and innovation centres working with advanced manufacturing companies around the globe. We transform industrial and economic performance by making step changes in productivity, increasing competitiveness, developing new products and processes and training new talent and skills.**

In addition to supporting high-value manufacturing companies – such as Boeing, McLaren, Airbus, BAE Systems and Rolls-Royce – we are trusted advisors to national governments, helping shape and implement national economic and industrial policy around Industry 4.0 (i4.0) and sustainable energy.

Our manufacturing expertise spans machining, hi-tech assembly and automation, augmented and virtual reality, robotics, casting, welding, additive manufacturing, composites, design, structural testing and training for the aerospace, automotive, energy, medical and other high-value manufacturing sectors.

More recently the AMRC has begun applying that expertise to the construction sector, where advanced manufacturing techniques are now being seen as essential to increasing capacity, overcoming skill shortages and shortening lead times.





# Digital manufacturing

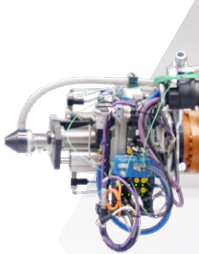
AMRC Factory 2050 is home to our Integrated Manufacturing Group (IMG) whose work spans robotics and automation, integrated large volume metrology, digitally assisted assembly and manufacturing informatics. The Group is developing ways of meeting demand for high variation and mass customisation, intelligent machines and process that monitor and optimise their operations, techniques to shorten lead times and ramp production up and down rapidly, ways of handling and making sense of big data, human machine collaboration and techniques for digitally assisted assembly.

We are leaders in the development of augmented reality solutions with smart connected tools and devices, used for complex assemblies where automation is not applicable. We are equally adept in integrated large volume metrology – including the design, development and process improvement of inline inspection and verification techniques used during the manufacture of large components and complex assemblies.

Our research into the smart applications of robotics and automation have led to partnerships with the leading names in aerospace and defence. A collaboration with

BAE Systems has de-risked a major robotics investment for the company and is now on the way to achieving significant, six figure cost savings for the company. We are working with our composites team to find new ways of using robots to work with novel materials in a way that has never been done before.

We are also at the forefront of manufacturing informatics, integrating sensor and measurement systems, data collection, analytics, visualisation and decision making to drive step changes in the manufacturing processes.





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# Machining

Developing innovative techniques and optimised processes for machining high-performance materials, the AMRC's Machining Group has been the engine room of some of our most transformative improvements in productivity and quality, with truly step change advances in aerospace machining for the likes of Rolls-Royce and Boeing. We achieved 50% productivity increases in the manufacture of Rolls-Royce's discs, which made it economic for the company to invest in excess of £200 million in an advanced production plant in the North of England.

We are now developing sophisticated digital simulation tools that integrate the different aspects that affect machine tool and machining performance, the result of which will be significant reductions in energy consumption; reduce machine tool life cycle costs, with a reduction of O&M costs in the range of 25%; getting production processes that work as planned faster; and first-time-right part manufacturing.

# Casting



The AMRC has one of the most advanced titanium melting facilities in Europe. We broke new ground recently with the largest ceramic shell titanium casting ever created from a single pour in Europe. The news sent a clear message that the UK is now open for business for large-scale titanium casting.

With global capacity for titanium castings of this size particularly scarce there is a clear need for this kind of capability and our research and development will underpin the ability for the UK to remain competitive in a global market. We are now looking to improve capability and technology to enable more complex, higher integrity components to be designed for manufacture with improved metallurgical quality and increased dimensional accuracy.



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Image: DMG MORI

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# Composites

Masters in lightweighting, our composite team have unrivalled capabilities that include weaving, microwave curing and machining. They have taken the AMRC's expertise with metals into the almost weightless world of carbon fibre composite materials which are increasingly used in aerospace, marine, automotive and other high-value industries. It is this skill that was key to luxury, high-performance sports car manufacturer McLaren Automotive setting up a new production plant close to the AMRC.

As we move rapidly towards fully electric vehicles, the lightweighting talents of the AMRC will be critical to the motor and – in time – the aerospace industry. Our research focuses on automated production, machining, advanced curing, novel materials and processing and the development of hybrid parts which combine high-performance metals and composites in a single structure.

# AMRC Training Centre



Our pioneering apprentice Training Centre was established to train the next generation of world leading engineers.

Our centre provides advanced apprenticeship and higher-level skills training, foundation courses leading to higher-level qualifications up to doctorate and MBA level and a range of courses for continuing professional development for more than 250 companies in the UK. It also provides expertise to enable other organisations around the world to develop their own centres and courses.





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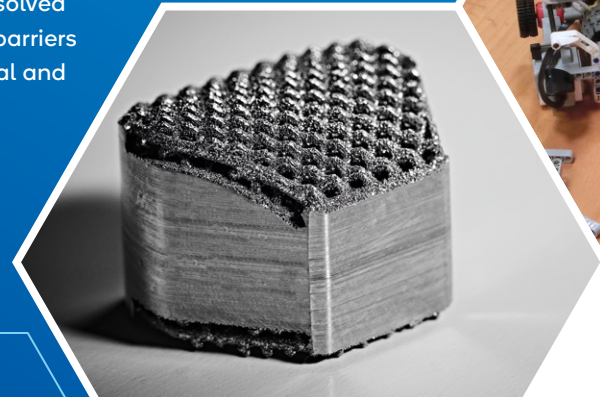
# Design and Prototyping and Medical AMRC

The Design and Prototyping Group, which includes the Medical AMRC, develop everything from conceptual designs, to fully functional prototypes for industry across a variety of high-value advanced manufacturing sectors. The group develop designs to meet the requirements of current and next generation manufacturing processes by pushing the limits of technology. This is applied to create market leading products and opportunities that enable customers to keep their competitive edge.



## National Metals Technology Centre (NAMTEC)

As the metals research group of the AMRC, NAMTEC's work in powder metallurgy is focused on materials and processes for metal additive manufacturing. Our work in powder metallurgy is focused on addressing some of the fundamental unresolved issues associated with powder metallurgy processes and materials; reducing barriers to mass adoption of metal additive manufacturing such as cost of raw material and variation in powder performance.



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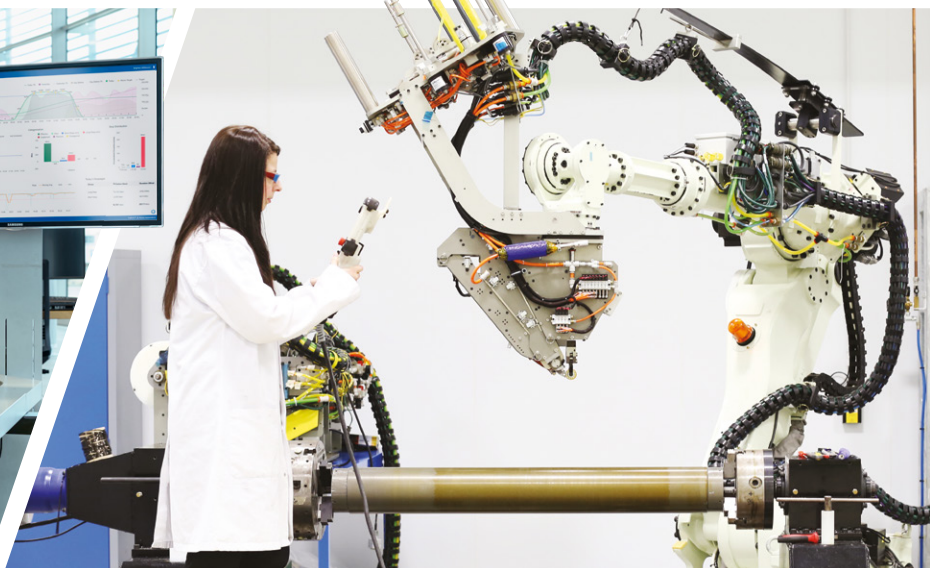


To find out more about how we can help your business, contact

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**CATAPULT**  
High Value Manufacturing

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