



mtc

Manufacturing
Technology Centre

INSPIRING

Great British Manufacturing

The image is a detailed architectural line drawing of a large, open-plan office space. The drawing is oriented vertically, with the top of the image showing the ceiling structure and the bottom showing the floor. The office is filled with various pieces of furniture, including desks, chairs, and storage units. There are several people depicted working at their desks. The drawing is rendered in a clean, minimalist style with black lines on a white background. A solid teal-colored rectangle is overlaid on the left side of the image, partially obscuring the drawing. The text "FROM CONCEPT..." is written in a bold, black, sans-serif font across the middle of the image, overlapping both the teal rectangle and the drawing.

**FROM
CONCEPT...**



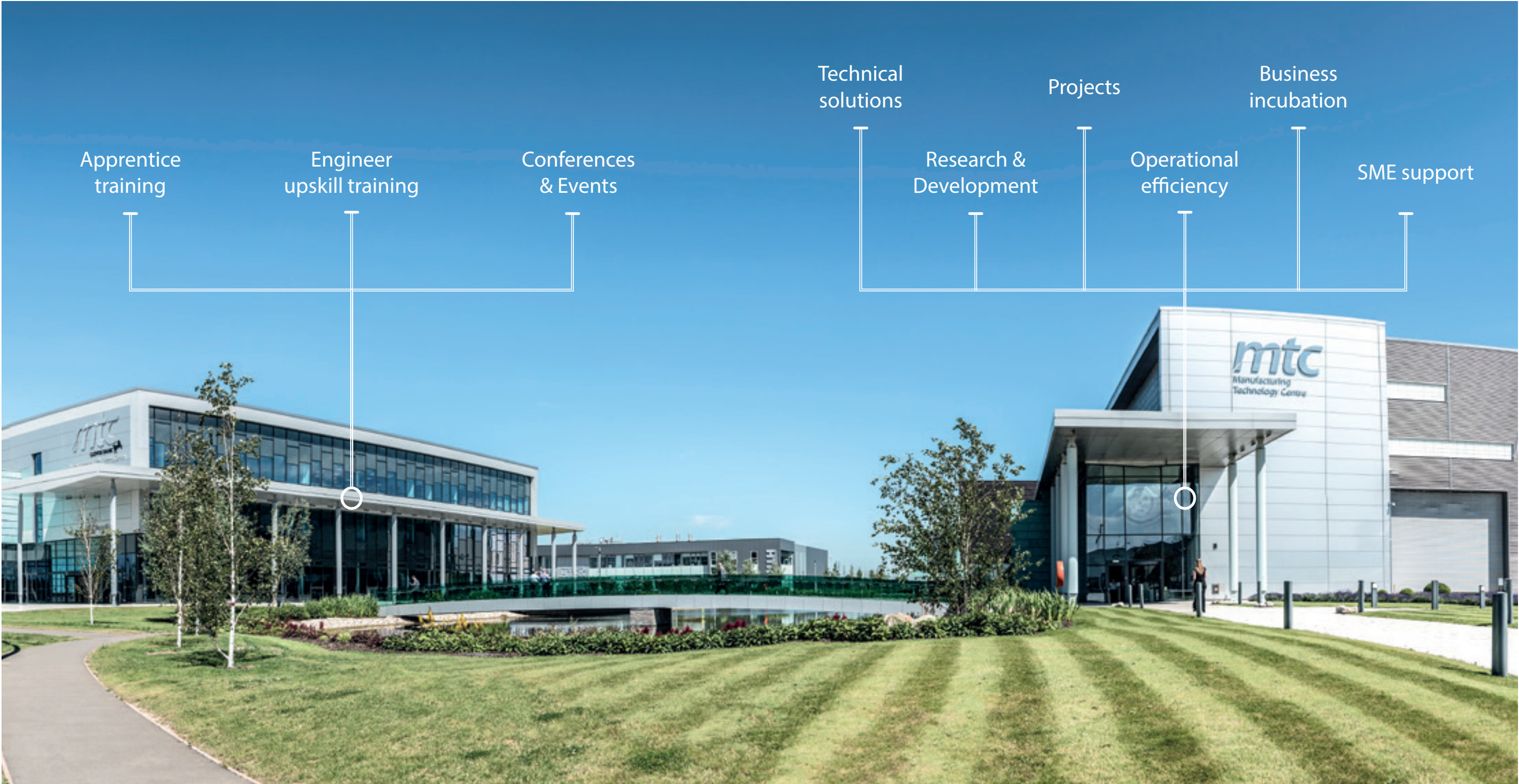
FROM
CONCEPT...
TO REALITY



TO REALITY

The Manufacturing Technology Centre

Our mission is to generate rapid and sustainable growth by delivering integrated manufacturing system solutions.



Our background

The Manufacturing Technology Centre (MTC) was established in 2010 as an independent Research & Technology Organisation (RTO) with the objective of bridging the gap between academia and industry – often referred to as ‘the valley of death’*. It represents one of the largest public sector investments in UK manufacturing and, after four years of planning and a 16 month build, the facility opened at Ansty Park in Coventry at the end of 2011. In December 2011, there were 16 industrial members, 44 staff and just a few key pieces of equipment in the ‘workshop’.

Over the next five years the MTC’s rapid growth has seen the expansion of our campus with the build of three more facilities, including the opening of the National Centre for Additive Manufacturing. Our role has also increased to cover not only R&D but Training, Advanced Manufacturing Management and Factory Design. We now have over 500 talented employees working with us.

During this time we have helped hundreds of companies across a range of industries and around 100 of them have become members of the MTC.

*See page 12



Our founders

The MTC was founded by four forward thinking institutions: The University of Birmingham, Loughborough University, the University of Nottingham and TWI.

The initial vision required significant commitment from industry, excellent facilities, access to state-of-the-art equipment, machinery and technology and, most importantly, high calibre people committed to improving the competitiveness of UK manufacturing.

Industrial input was vital to its success, and significant commitment and support from the first three industrial members: Rolls-Royce, Aero Engine Controls and Airbus was instrumental in the design and initial direction of the MTC.

UNIVERSITY OF
BIRMINGHAM

Loughborough
University

The University of
Nottingham
UNITED KINGDOM • CHINA • MALAYSIA

TWI

The significant progress and expansion of the Manufacturing Technology Centre over the last five years demonstrates the vital role it is playing in spearheading the development and demonstration of new high value manufacturing processes and technologies. It forms an integral part of the world-class network of seven centres in the High Value Manufacturing Catapult.

Simon Edmonds
Director of Manufacturing and Materials
at Innovate UK



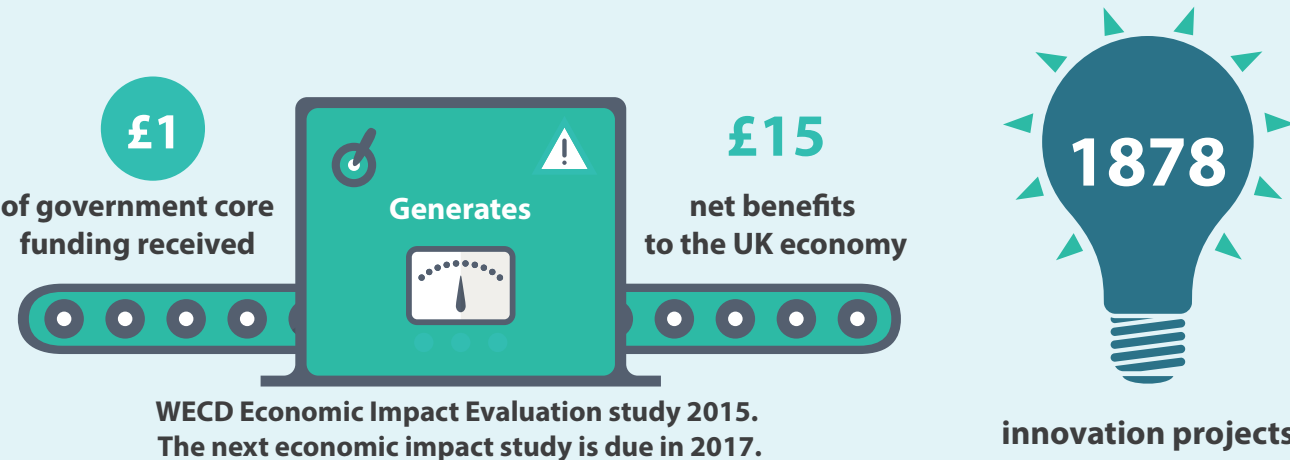
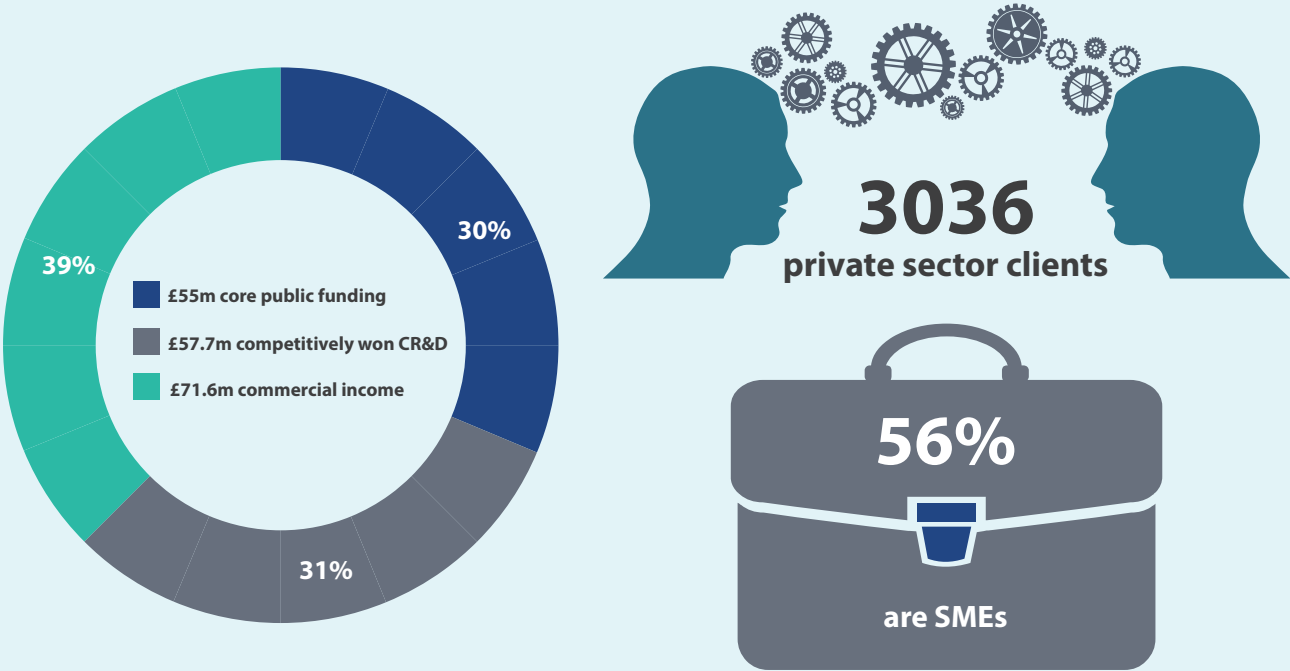
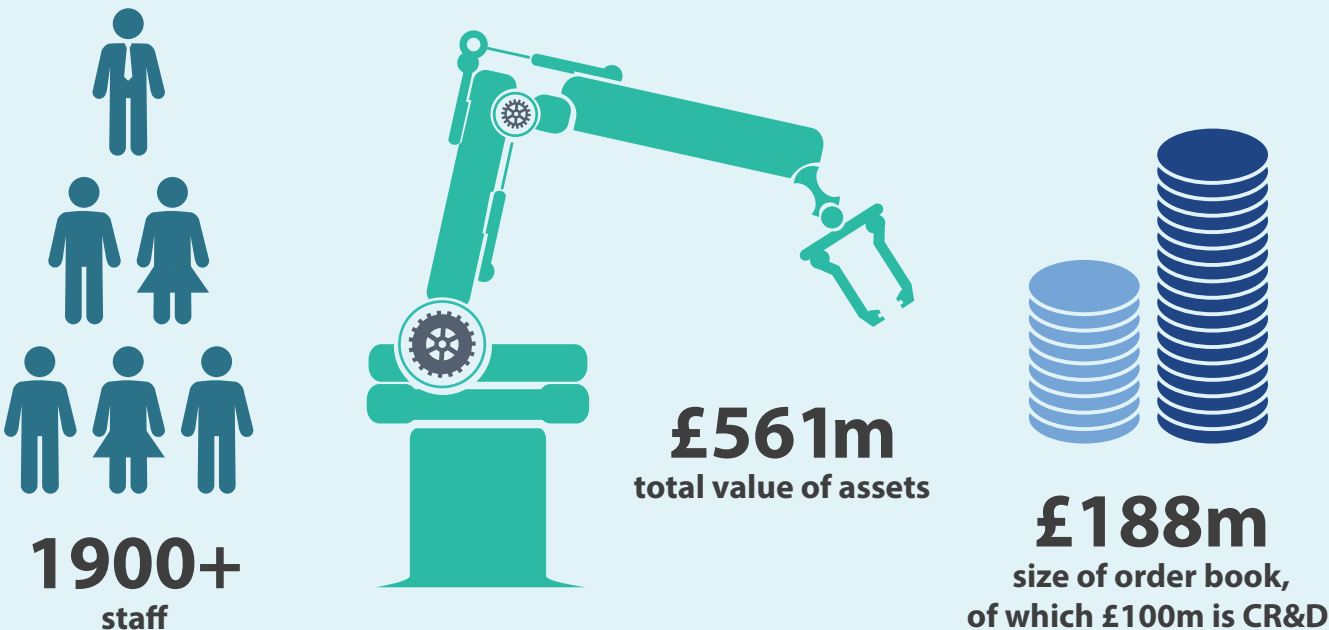
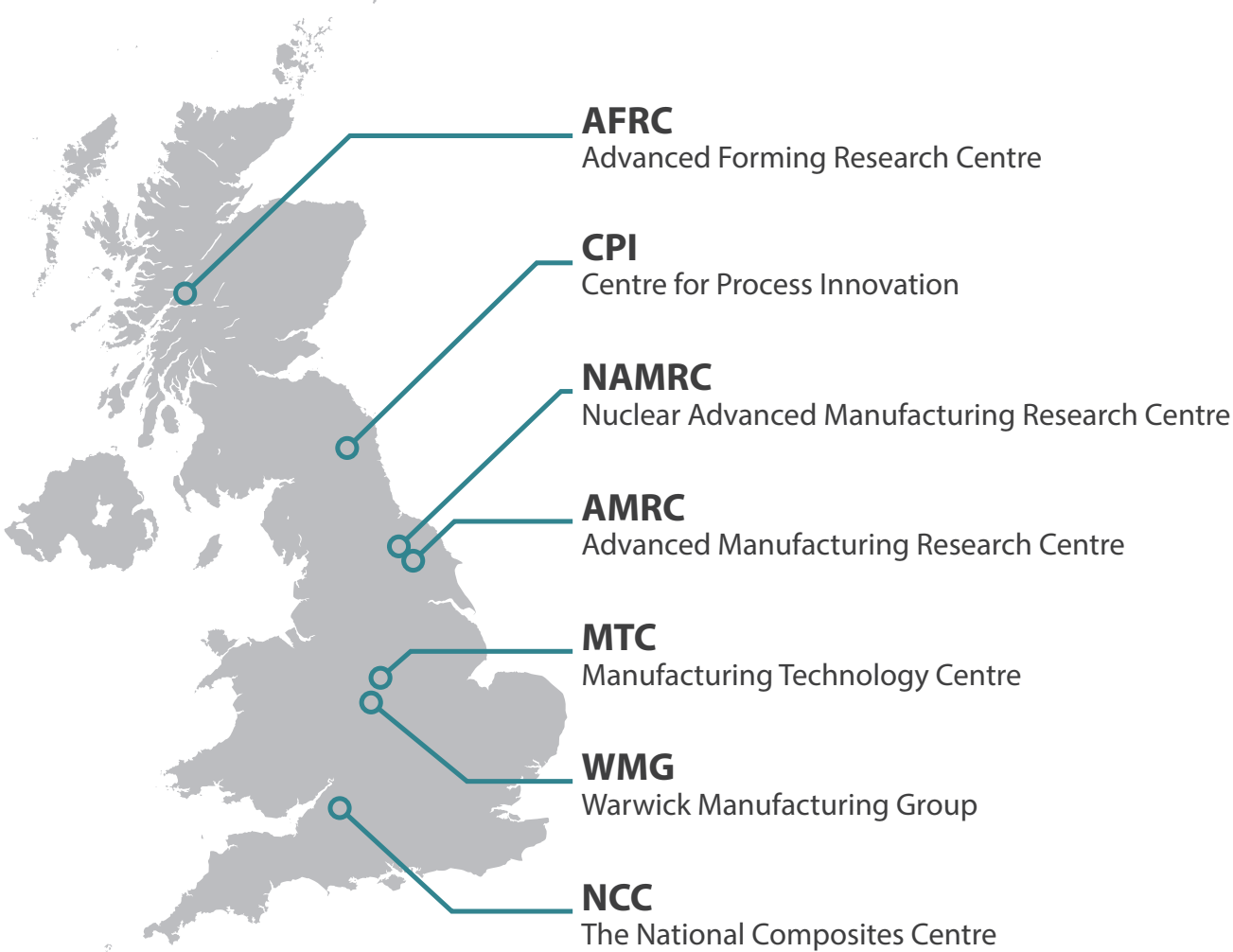
Innovate UK

The Catapult network



The MTC is part of the High Value Manufacturing Catapult (HVMC), which is sponsored by Innovate UK.

The HVMC is the catalyst for the future growth and success of advanced manufacturing in the UK. It consists of seven Technology and Innovation centres across the UK and its vision is to work with companies of all sizes to bridge the gap from concept to commercialisation. All the centres offer access to leading edge equipment, expertise and an environment for industry collaboration.



We're bridging the 'valley of death'

The MTC's primary focus is to ensure that great ideas become reality and don't fall into the manufacturing abyss known as the 'valley of death'.

We achieve this by providing the very best innovative manufacturing processes and technologies, drawing on the skills and expertise of our engineers and by having access to some of the most advanced manufacturing equipment in the world.

The MTC is there every step of the way, from experimental research to applied research and finally to implement this into industry and make the entire process run smoothly.

Our approach ensures rapid and sustainable growth for the businesses we work with, by delivering end-to-end manufacturing systems solutions and reducing the risk from the manufacturing processes and equipment investment.

			MTC R&D focus			MTC Operational Efficiency focus			
Experimental research			Applied research			Technology implementation			
MRL*	1	2	3	4	5	6	7	8	9
Universities						Industry			

* Manufacturing Readiness Levels provide common terms to broadly define manufacturing process capability, from concept to commercial production.

We help you commercialise your technology and bring it to market. The MTC R&D typically operates in the area of MRL 4 to 6.



Our clear vision is to inspire Great British manufacturing, on the global stage

We will continually work to:

- 1

Accelerate the UK's industrial growth
- 2

Deliver innovation
- 3

Change the way businesses compete
- 4

Create and embed future skills
- 5

Maximise synergies within supply chains

The MTC provides integrated manufacturing system solutions for customers large and small, across sectors as diverse as automotive, aerospace, rail, informatics, food & drink, construction/civil engineering, electronics, oil & gas and defence.

We can help companies manufacture faster, at a consistently higher quality and lower cost, in an agile environment in partnership with industry and academia.

We continually encourage young people into exciting careers in engineering, to develop and embed technologies that will impact UK industry for years to come.

Our facilities provide a fantastic environment for the development and demonstration of new technologies on an industrial scale, offering flexibility to our growing membership, clients and research partners.

All of us at the MTC are passionate about manufacturing in the UK and strive to help companies improve their efficiency and productivity.

Dr Clive Hickman
Chief Executive, the MTC



Who we work with

The MTC is an open access centre and we have a flexible approach to working with companies of all sizes – from SMEs to Tier 1s and large OEMs.

We have a unique environment, as we bring together the country's leading academics, engineers and industry professionals.

This combination allows customers to develop new manufacturing processes in an industrial setting without the constraints of a commercial production environment.

Our services range from bespoke consultancy support on a single project to design and proof of complete production cells. We can even manage the factory implementation of the final solution and train the relevant engineers on site. There are also membership options for those businesses looking for a longer term relationship.

Our tailored service is designed to meet the needs of individual companies allowing us to offer the right solution for both members and non-members.

Dearman is striving to grow rapidly from an innovative start-up to a global player. The MTC is helping enormously with that journey.

Toby Peters
CEO, Dearman



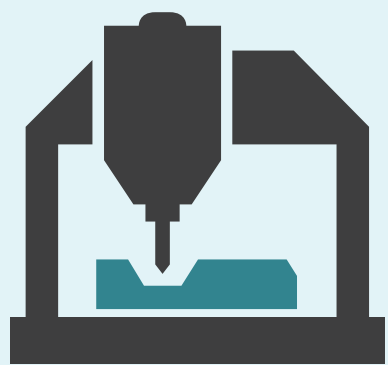
Our technical solutions

The majority of our customers' challenges fall into one of the following three categories:

Manufacturing system solutions

The MTC blends a range of services and world-leading technologies to provide a holistic approach to solving your challenges, providing the most progressive, productive outcome for your business.

We are passionate about developing tomorrow's industrial solutions and deploying new technologies on to the factory floor today.



They want to make something

- at a lower cost
- better quality
- quicker
- in higher volume
- they've never made before



They want to assemble something

- at a lower cost
- with better quality
- quicker
- in higher volume
- they've never assembled before



They want to use data more effectively for

- improved design
- better quality
- efficient logistics
- new business models

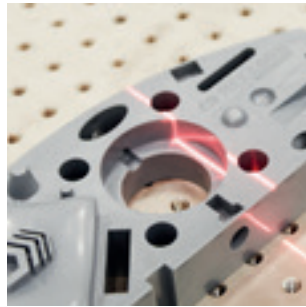
Our technology themes

The MTC has a range of technology themes that are an integral part of our Core Research Programme. These technologies are often combined to create the best possible outcome for our customers' challenges.



Design and Simulation

The MTC develops, validates and applies advanced simulation capability as a catalyst for gaining insight into step-changing manufacturing processes and products. State-of-the-art software on our high performance computer can optimise solutions in an immersive, virtual environment. The results will underpin business decisions, reducing cost and time, whilst improving the quality of novel products and processes.



Metrology and NDT

Our key drivers for inspection technology are greater quality assurance, an increasing geometric complexity of components and pressure for faster, more accurate processes. Also the demand for high value-add data and the move towards high product-variant manufacturing lines. Our research is carried out in a comprehensively equipped laboratory, supported by a rich membership of equipment suppliers across a wide range of manufacturing sectors.



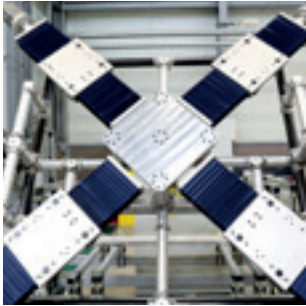
Robotics and Autonomous Systems

Our industry-leading team specialise in the automation of manufacturing processes in a novel and collaborative way. We understand the challenges faced by industry when trying to deliver increased productivity, while de-risking your next automation investment. We focus on robotics related technology areas - mechanics, control, software and mechatronic design processes.



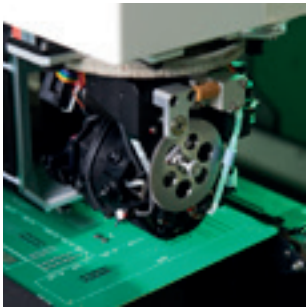
Manufacturing Informatics

The MTC has a UK leading team driving the national strategy on digital manufacturing and providing capability to help UK plc reap the benefits of the Fourth Industrial Revolution through the use of data. The key areas of work are decision support systems, connectivity and intelligent technologies to enable autonomy. We will help release the potential of data to drive benefits in UK value chains.



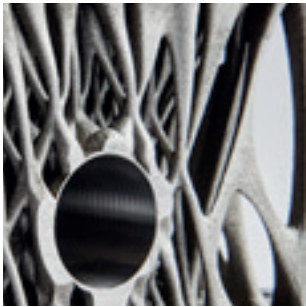
Advanced Tooling and Fixturing

We are working on the next generation of tooling and fixturing technologies to develop: reconfigurable fixtures which can be quickly altered manually or by NC control to accommodate similar products and reduce change over time; embedded sensing systems to provide feedback for adaptive processes; lightweight tooling and fixtures for large structures and lightweight end effectors to enable automation and reducing design time using parametric and knowledge-based design techniques.



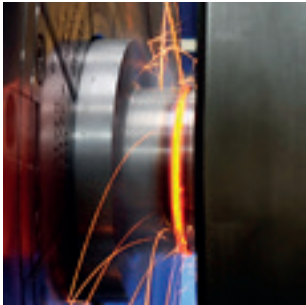
Electronics Manufacturing

We enable manufacturing efficiencies through improved design and a reduction in the risk of adopting new technologies in materials and processes. We also contribute to the automation of test and verification for electronics assembly. We focus on advancing best practices for PCB assembly, manufacturing for high reliability electronics, packages for advanced semiconductor and SMART packaging. The facilities include a fully equipped SMT line with a proof of concept demonstrator.



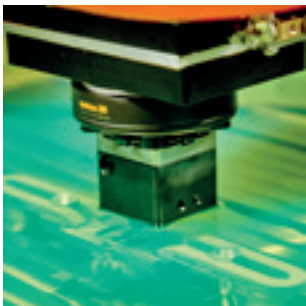
Additive Manufacturing

The MTC is home to the National Centre for Additive Manufacturing. The centre provides a unique facility enabling companies to assess and develop the end-to-end capability of additive manufacturing processes, from powder characterisation to fully finished high integrity components in a risk free, independent environment.



High Integrity Fabrication

We deliver innovative solutions to overcome industrial welding challenges such as joining dissimilar and difficult to join materials. Both fusion and solid welding technologies are applied in combination with in-process monitoring, metrology, and automation to deliver complete welding systems that prove joining process capability before industrial adoption.



Non-Conventional Machining

The MTC develop, optimise and deploy advanced manufacturing technologies into a range of demanding industrial applications. Our core competencies are in flexible and automated post processing for additive manufacturing, surface engineering (functional and smart surfaces), adaptive laser cleaning for high-value components and high-precision robotic laser processing.

We're bringing solutions to life

We're constantly involved in large scale projects that take bright ideas, convert those into viable processes that can be transferred into industry, and ultimately improve UK productivity.

Our project partners can push the boundaries of innovation, testing the practical applications in our workshop.

The success of hybrid manufacturing technology has extended far beyond its original focus. In addition to remanufacturing, this approach also embraces automated inspection, multi-material deposition and adding key features onto existing parts.

Jason Jones
CEO, Hybrid Manufacturing Technologies Ltd



Hybrid Manufacturing Technologies (HMT)

At the MTC we can create non-mainstream machine solutions that improve productivity and eliminate risk to operators. By understanding the current state of technology and the route to future industrialisation, we can help to deploy novel machine technologies, de-risk the process of producing prototype one-off machines and define the route to large scale production.

This was proven following the completion of an Innovate UK funded RECLAIM project (Remanufacture of high value products using a combined laser cladding, inspection and machining system), where a member of the consortium patented the new technology created and consequently formed Hybrid Manufacturing Technologies (HMT).

With the co-operation of the MTC and other partners, HMT launched at the EMO event in 2014, where it was awarded with the prestigious Best Multifunction Machine prize.

HMT are now a thriving independent business and other R&D companies are also pushing the technique with positive results being achieved.



The joint development of the wax cell with the MTC was fundamental to the successful start-up of the Advanced Blade Casting Facility in Rotherham.

George Durrant, Engineering Programme Manager,
Rolls-Royce Advanced Blade Casting Facility



Rolls-Royce – automation of wax pattern production

The MTC worked with Rolls-Royce to develop a fully automated system to manufacture wax patterns for the single crystal turbine blade casting process. The full system needed to be deliverable into the new Advanced Blade Casting Facility in Rotherham as soon as it opened.

Our solution was to work collaboratively and build the full system in a temperature controlled area, with access limited to just the project team. We performed metrology at many stages to find issues and root causes of any variabilities. A 24 hour per day, five day production demonstration system was then trialled.

The outcome was a fully proven system delivered on time into the new factory. A potentially difficult process has been taken from being fully manual to totally automated and the Advanced Blade Casting Facility is now the world-leading turbine casting facility.

This created clear benefits for the client:

- An 8-1 reduction in assembly lead time
- Process variability dramatically reduced
- Significant reduction in ramp up time for new factory
- Operators trained at MTC during factory build
- IT systems debugged before installation in factory

We're improving business performance

The MTC recognises that businesses do not stand still in an ever competitive environment. The MTC is able to offer a range of services to accelerate business performance with a dedicated team of experts in its Business Launch Centre (BLC).

Operational Efficiency

Our experienced team can directly assist manufacturers to improve operational efficiency – quality, cost and delivery performance.

They have the expertise to identify which of the latest manufacturing technologies are right for you and implement the adoption of these, without disrupting your current operations.

The MTC offers a complimentary full day review/line walk to manufacturers of all sizes from SMEs to OEMs. This can identify opportunities for cost saving, de-risking and accelerating the introduction of technology and improved processes into your business.

Business Incubation

The MTC is a unique technology incubator for start ups, SMEs or other businesses needing to build their first 1 to 100 market seeding products in a de-risked environment.

We provide a one-stop-shop for companies seeking help with prototype design optimisation, flexible production space, manufacturing technicians and product build, together with business strategy and help with Government grant applications.

We can also help to move costs from fixed to variable, accelerate time to market and de-risk seeding venture capital and other investment in innovation.



SME REACH

The goal of this programme is to help SMEs across the UK supply chain increase productivity using the latest manufacturing technology.

To achieve this, the MTC has developed more than 100 'value accelerators' across a broad spectrum providing expert know-how. This includes toolkits, methodologies and transferable best practices to achieve the desired result.

These are aimed at the SME that wants to:

- improve productivity
- reduce costs
- embed innovation
- de-risk the use of technology

For every day of support an SME invests in an eligible project – the REACH programme will fund another day*.

A selection of businesses that have already benefited:



* Terms & conditions apply, please contact us for details.



We're inspiring tomorrow's engineers

Developing the engineers and technicians of the future and redressing the skills gap in the High Value Manufacturing sector is a key priority. The Lloyds Bank Advanced Manufacturing Training Centre is at the forefront of providing the skills and experience for the next generation to capitalise on the technologies of tomorrow.

This is achieved via our advanced engineering apprenticeship programme, which provides a unique career opportunity. In addition to basic engineering skills, it provides our apprentices with extensive training in the MTC's technology themes used in our Core Research Programme.



We're seeding UK employers with future skills

Our apprentices are developed for the needs of UK manufacturing businesses today - and to support your future technology aspirations.

Our programme is different from other schemes, as we reduce the risk and cost of recruiting, employing, training and developing the apprentice before placing them in UK businesses.

This means we deliver business-ready apprentices who are committed to developing their careers in engineering and with the skills to make an immediate impact.

Our investment in these impressive facilities is just one of the ways we are supporting manufacturing in closing the skills gap. We are confident that the centre will develop the next generation of world-leading engineers and reassert the UK's engineering prowess.

Tim Hinton
Managing Director of Mid Markets and SME,
Lloyds Banking Group



Engineer upskilling courses

To ensure manufacturing engineers and technicians are armed with the latest skills, we offer a comprehensive range of technical courses to keep them up-to-date with the latest innovations.

- Our unique insight into the very latest technologies, techniques and processes enables us to design and deliver highly relevant training programmes
- The very best engineers working in collaboration with our training team create highly effective and efficient training programmes (including blended learning programmes where appropriate)
- Where appropriate, our courses are accredited with nationally recognised bodies and are regularly reviewed to stay ahead of technological advances.



Graduate training

We know that for a Graduate to maximise their potential, it is vital that they have the hands-on skills that are an essential enabler for any Engineer; this embeds comprehension of the impact of design features and how a design will be manufactured.

Our modular* training programme provides the core skills and best practice in key areas such as; geometric tolerancing, turning, milling, assembly and welding. All the skills are applied in a practical project of volume production, requiring consideration of design for manufacture and production.

**The programme is designed in a modular form, allowing customers to select from a menu of 5-day modules which are pertinent to adding value to their business.*



We can even host your events

The impressive MTC campus is an incredible venue for meetings, conferences and events.

Stylish and state-of-the-art, we offer an extensive range of conference and event facilities.

From a flexible and creative environment to celebrate successes, launch new products or share knowledge, to versatile spaces catering for everything from small meetings to larger functions – the MTC team will ensure your event is a memorable one.



The MTC's conference facilities deliver to a very high standard for senior visits and customer events, in a professional environment that complements the site's pioneering research and development. With a dedicated catering service of the highest standard, as well as purpose designed meeting spaces, this is a conference facility set apart from many others.

Alan Pardoe
Partnership Manager, Rolls Royce



Contact us

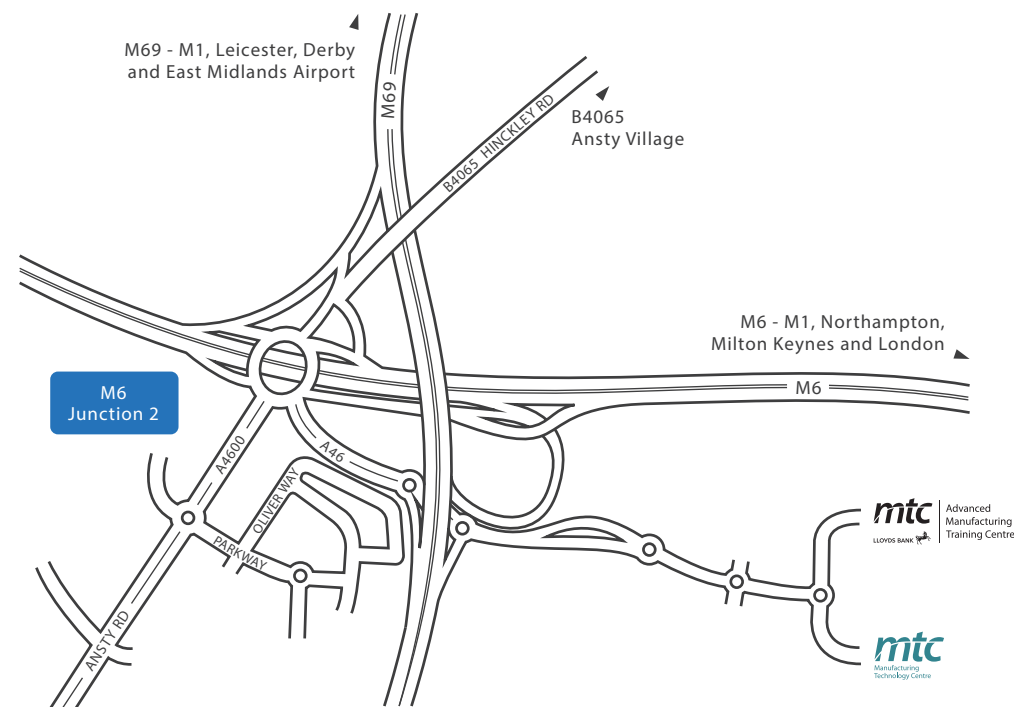
If you have any questions we'd like to hear from you.

Whether you're interested in working with us, for us or would simply like to know more about the MTC, don't hesitate to get in touch.

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cATAPULT
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