

STEM assets in the West Midlands innovation landscape

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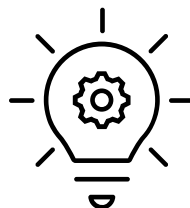
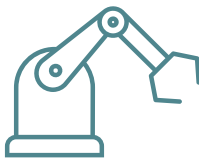
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Policy Briefing Series



Jan
2022

The Manufacturing Technology Centre

Robert Lynam, Dr Chloe Billing and Professor Simon Collinson

With special thanks to Clive Hickman and Neil Rawlinson.

The West Midlands Regional Economic Development Institute (WMREDI) is a consortium of organisations led by City-REDI at the University of Birmingham and includes the West Midlands Combined Authority (WMCA), the three Local Enterprise Partnerships, the GB Chamber of Commerce, the WM Growth Company, Birmingham City Council and the seven metropolitan Local Authorities. Our collective research agenda is to understand the relative impact of various interventions and investments for regional economic growth, sustainability and the reduction of social inequality in the West Midlands and the UK. This underpins policies to attract more public R&D investment in the region and apply this and other inputs to guide better growth in the region.

This policy briefing outlines findings from one of our WMREDI projects, focused on examining regional innovation ecosystems and the relationships between universities, local firms, entrepreneurship, innovation, technology transfer and knowledge exchange as contributors to different kinds of growth. We know that strong regional innovation systems underpin stronger economic growth pathways, tend to be more competitive and resilient, and tend to benefit both firms and local communities.

Introduction

The purpose of this briefing is to outline the existing knowledge in the public domain regarding the MTC case study and the next steps for our empirical research. The information cited here was collected via a search of the internet – specifically pertaining to the MTCs website, regional audits, impact studies and news articles – as well as an interview with MTC’s Chief Executive, Dr Clive Hickman. MTC is one of four case studies our empirical research will focus on, aimed at building an understanding of the specific regional contribution the fixed asset makes and the factors that constrain its innovation/productivity growth.

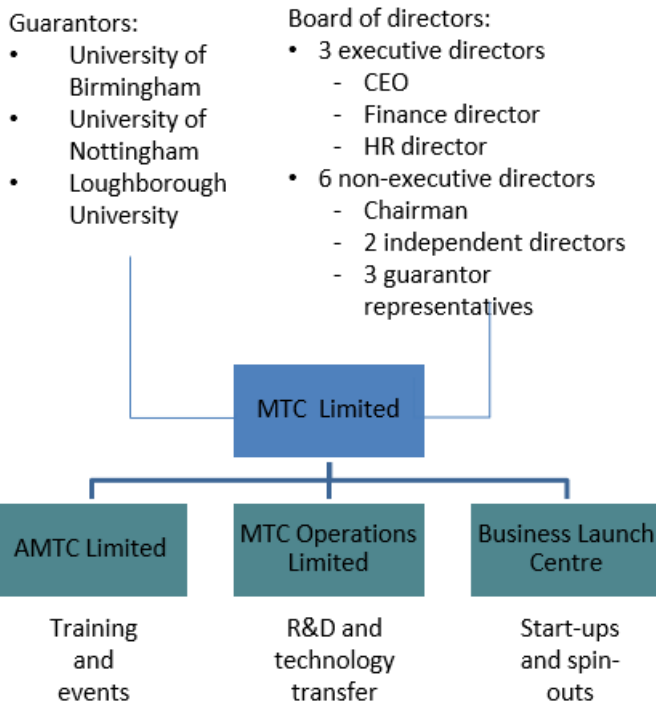
Overview

The Manufacturing Technology Centre (MTC) is an independent Research and Technology Organisation which was founded in 2010 by four institutions – Loughborough University, the Universities of Birmingham and Nottingham, and TWI – with the aim of bridging the ‘valley of death’ between academia and industry (the persistent gap in effective communication, collaboration, and knowledge transfer between the two distinct cultures). The centre develops innovative technologies, manufacturing processes and supply chain processes in partnership with a multitude of institutions of all sizes, ranging from SMEs to Tier 1s and large, national OEMs. Combining highly advanced manufacturing equipment and highly skilled engineers with leading expertise creates a high quality and agile but low risk environment for manufacturing innovation and development on an industrial scale. It functions as one of the seven High Value Manufacturing (HVM) Catapult Centres which work with industry to add value to, and thus increase the competitiveness of, private and public sector organisations. Since its inception, it has worked with and helped hundreds of companies – many of whom have become MTC members – manufacture more efficiently, cost effectively, and of higher quality.

Over its past decade of operation, MTC has seen tremendous growth in several areas. To the original facility based at Ansty Park in Coventry have been added a further three and it has expanded its location of operation to include Liverpool, Oxford, and the London Borough of Havering. In addition, its number of employees has risen from 1 to over 800 and its role has increased from R&D to encompass training, advanced manufacturing management as well as factory design.

Governance structure

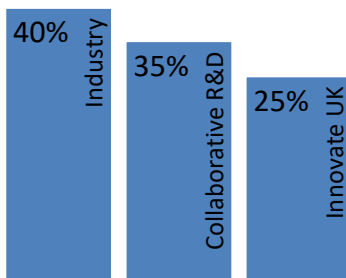
MTC Limited operates as a private company limited by guarantee, whose guarantors are its three founding universities. Its ten board members comprise a chief executive, three executive directors, three independent non-executive directors, and three non-executive directors representing the universities. The board presides over the strategy of its three independently-operating trading companies, each of which has its own separate board of directors: MTC Operations Limited, AMTC Limited, and the Business Launch Centre. MTC’s 3-6% annual profits are reinvested into the business given its absence of any shareholders.



Source: [MTC](#)

Funding

Funding is obtained through three main sources. Being one of the HVM Catapult Centres, it receives a core grant from Innovate UK, which provides around 25% of its income. Between 2010-2015, this totalled £44 million¹, and has since increased to £25 million a year. Around 35% of funding results from successful bids for collaborative R&D programmes such as the EPSRC and Horizon 2020. Up until 2017, the latter had awarded a total of €5 million in EU funding to the MTC for individual projects². The remaining 40% is provided by industry, such as £10 million from Lloyds Bank to support MTC's apprenticeship programme³.



MTC also operates a very successful private membership model of funding in which fee-paying companies commit to a long-term partnership. Part of these membership fees are match-funded by government to fund a Core Research Programme which has an annual budget of over £2 million and whose research outputs are shared. Membership is attractive to both technology end users as well as technology providers, providing a collective opportunity to network, showcase, form consortia, and bid for further R&D project funding. MTC can boast of having over 100 members, including global brands and organisations including Unilever, Rolls-Royce, BAE Systems and Siemens⁴. In 2020, MTC's consolidated profit and loss account sheets revealed a turnover of over £83 million for the previous financial year, with a profit of almost £3 million⁵.

¹ [A Science & Innovation Audit for the West Midlands](#), 2017, p. 25 ² [Ibid](#), p. 31 ³ [West Midlands Growth Company](#), 2019

⁴ [MTC](#) ⁵ [Companies House](#)

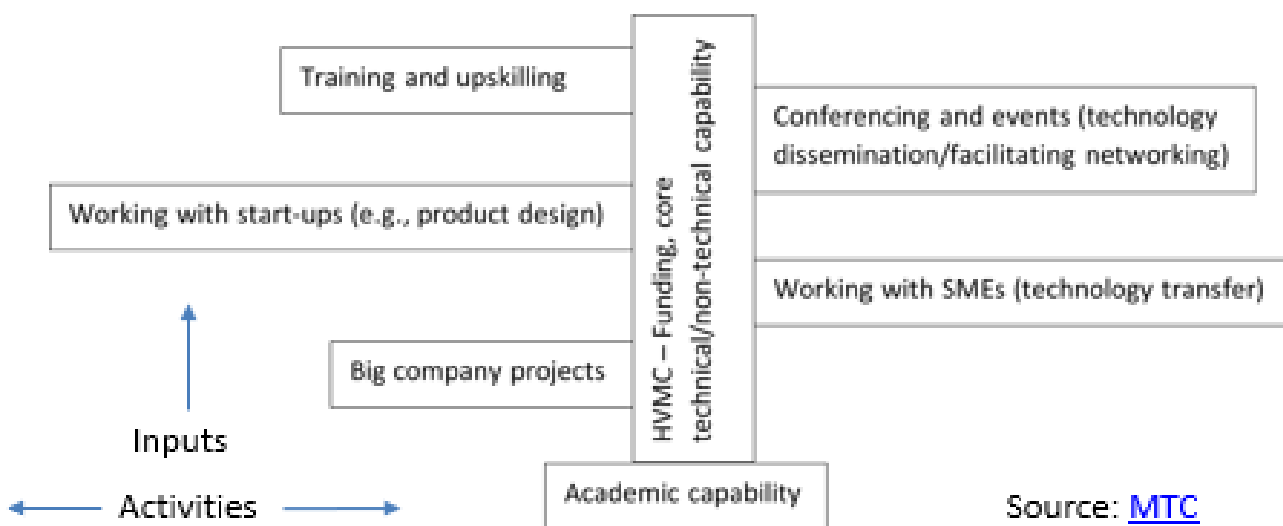
- 10 Years of experience
- £83 million annual turnover
- 7 facilities across 4 locations
- 3 Core challenges addressed
- 8 Key research areas
- 146 training courses provided
- From 1 to 800 employees
- 3 tier membership model
- Hundreds of clients helped
- Helping organisations from start ups to SMEs to organisations turning over £50 million

Activities

Its primary activities of providing integrated manufacturing bespoke advice and solutions to clients take place predominantly across eight diverse sectors, from aerospace to food and drink. Though specialising in digital manufacturing, additive manufacturing, automation and robotics, and intelligent automation, MTC's technological capabilities are far reaching. Together, its holistic blend of technologies equip the MTC with expertise in the three core technology areas of component manufacturing, assembly systems, and data systems, providing services to customers with challenges relating to production, assembly, and/or data insights. Two specific mechanisms through which businesses can receive support include the centre's Product Manufacturing Incubator, which helps convert ideas into marketable realities, and its Manufacturing Support Services, which helps tackle specific challenges SMEs face. The MTC is also able to provide additional support through Innovate UK's REACH funding, as well as access to all seven HVM Catapult Centres' equipment and expertise via the Made Smarter Factory Innovation Hub.

In addition to R&D, the MTC provides a large number of upskilling programmes. For already experienced individuals, it offers almost 146 training courses in order to stay up to date with the latest skills and knowledge, mostly relating to additive manufacturing and leadership and management, but also covering areas such as laser processing and digitalisation. For those at the start of their career in manufacturing, graduate development programmes are delivered with the aim of fast-tracking such individuals' experience and apprenticeship programmes are also offered for those without a degree. MTC is currently taking on over 200 such apprentices each year. As well as benefitting individuals, the training provided by MTC contributes to supplying a skills demand within the manufacturing sector.

MTC also organises and hosts regional, national, and international conferences worth £2-3 million each year. These events and workshops bring industry members together, providing them with a space to learn, network, showcase, and get inspired to think differently about solving problems.



Locations of operation

Liverpool Science Park, Liverpool –

Spearheads the Digital Manufacturing Accelerator as well as housing world-class facilities used to support skills, productivity and growth within the region and across the UK

Ansty Park, Coventry

– The location of MTC’s initial centre which opened in 2011, as well as three new subsidiary facilities: the National Centre for Additive Manufacturing, the Lloyds Bank Advanced Manufacturing Training Centre, and the Aerospace Research Centre



Culham Science Centre, Abingdon – Home to the Oxfordshire Advanced Skills state-of-the-art training centre which is managed by MTC Apprenticeships

Future Cube, Rainham – As the newest edition to MTC which opened in December 2021, this innovation centre provides equipment, insights, and solutions to London’s local manufacturing, construction, and logistics businesses

Source: [MTC](#)

Facilities – development and functionality

2011 – Manufacturing Technology Centre

Develops technology and systems required to aid the accelerated uptake of additive manufacturing. Its facilities are industrial scale and can be used to make a prototype or do an initial production run. Also home to the ESA AM Benchmarking Centre and is an ASTM AM Centre of Excellence.

2015 – Advanced Manufacturing Training Centre

Provides additional workshop and office space to continue to grow the large scale aerospace manufacturing R&D without restricting MTC's capacities in other sectors. Also home to the innovation and knowledge hub for metal additive manufacturing.

2019 – MTC Liverpool

A state-of-the-art training centre which helps engineers and technicians develop in demand industry skills in the high-value manufacturing sector. It replicates the upskilling provided at the AMTC through the use of some of the UK's most advanced equipment.

2021 – Future Cube

The 12,000m² purpose built facility represents one of the largest public sector investments in UK, having a total value of over £40 million.

2015 – National Centre for Additive Manufacturing

Represents a £36 million investment in training facilities, housing the latest technologies and equipment to support the development of engineers and technicians. Also contains events and conferencing facilities.

2015 – Aerospace Research Centre

This facility aims to support manufacturing growth and innovation within the North-West. Its location enables close collaboration with two of Liverpool's universities and its projects focus on measuring human responses and behaviour when working with advanced manufacturing processes.

2019 – Oxfordshire Advanced Skills centre

This brand new innovation centre supports local businesses in Greater London and the South-East, providing expertise and access to emerging technologies and digital processes.

Source: [MTC](#)

Capabilities – markets and research areas



Source: [MTC](#)

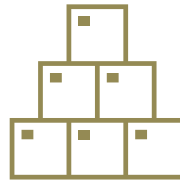
Capabilities – technical capacities and competences



Advanced Assembly



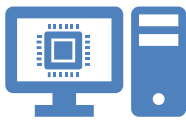
Additive Manufacturing



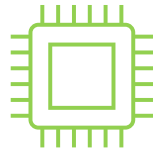
Composites



Design and Simulation



Digital Manufacturing



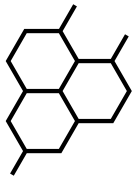
Electronics Manufacturing and Printable Electronics



Joining



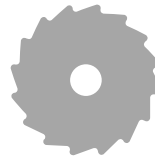
Manufacturing Informatics



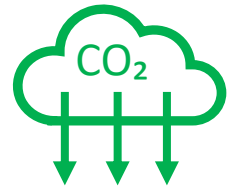
Materials Characterisation



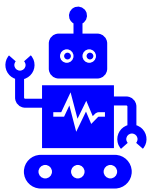
Metrology and NDT



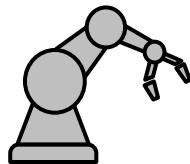
Non-conventional Machining



Resource Efficient and Sustainable Manufacturing



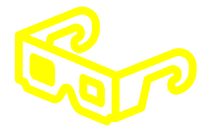
Robotics and Automation



Special Purpose Machines and Equipment



Tooling and Fixturing



Visualisation and Virtual Reality

Sources: [MTC](#) and [HVM Catapult](#)

Impact

When the MTC was established over ten years ago, economic impact assessments predicted huge potential. It was estimated that every pound invested in the centre would produce a £25 return for the region¹ and some estimates for overall return were as high as £46². Inward investment figures demonstrate the positive economic and social effects that Ansty Park has created, with a total of over £800m invested and 2750 jobs anticipated³.

Investor	Amount invested (millions)	Jobs created
AVL	£30	100
Fanuc	£20	20
London Taxi Company	£300	1000
HTRC	£40	100
Meggitt	£130	1000
DMG Mori	£1	50
IPG Photonics	£15	30
Rolls Royce	£250	
AWE	£6	60
Lloyds Bank	£10	400

Moreover, the most recent independent assessment was published in 2017 as a small part of a regional science and innovation audit which identified MTC as being one of four anchor institutions that support successful science and innovation in the West Midlands⁴.

However, given the challenges of accurately measuring MTC's total impact, its evaluation takes place at the HVM Catapult level alongside the other individual centres. Nevertheless, MTC has collated an evidence base of 59 case studies outlining some of the things that have been achieved on individual projects. Each of these document the respective challenge, its solution, as well as the subsequent outcome and industrial benefits. The selection can be found [here](#). The Construction Innovation Hub is one of the bigger ongoing R&D programmes projected to have a significant policy and social impact.

In action: aiding the development of social distancing technology

The impact of the Covid-19 pandemic critically affected the ability of many sectors to operate due to the UK's imposed social distancing requirements. This was especially the case in the construction sector, whose portfolio of new work fell by over a third. As many social distancing tracking technologies suffer from interference on construction sites, MTC worked as part of the Construction Innovation Hub in order to investigate potential alternatives that could be used in order to provide for an effective and safe return to normal working. Specifically, MTC identified viable Technology Readiness Level tracking technologies and evaluated their effectiveness in order to assist manufacturers in resolving issues which would prevent their successful implementation in the construction sector. It successfully identified four criteria for an ideal system, established potential sources of problems, as well as individual aspects which make technologies advantageous⁵.



¹ [University of Birmingham](#), 2009 ² [University of Birmingham](#), 2010 ³ MTC ⁴ [A Science & Innovation Audit for the West Midlands](#), 2017 ⁵ [West Midlands Growth Company](#), 2018 ⁶ [MTC](#)

Next Steps: Measuring impact

Impact addresses the ultimate significance and potentially transformative effects of an intervention. It seeks to identify social, environmental and economic effects of the intervention that are longer term. Beyond the immediate results, this criterion seeks to capture the indirect, secondary and potential consequences of the intervention.

Next Steps for our research on MTC:

This policy briefing, alongside a systematic review of the literature, provides a strong foundation for the next phase of our research.

This will involve a 'deep dive' case study on MTC, aimed at building an understanding of the specific regional contribution the fixed asset makes and the factors that constrain its innovation/productivity growth.

Our project will work to identify the size, scale, employment, turnover, and growth of MTC, in direct and indirect terms using proxy measures and multipliers.

We will then compare the commercial and non-commercial impacts of MTC, identifying any social/ environmental/ economic trade-offs. This impact analysis will help identify different forms of regional economic growth that can be attributed to university-related investments.

This will be achieved through interviews with key stakeholders, which will focus on:

- 'How' and 'in what way' MTC generates impact: exposing the relationship between inputs, activities, output, and outcomes, and considering their relative contribution alongside other factors and 'third mission' activities.
- The impact of MTC, beyond commercial / economic impacts: focusing on understanding the complete picture of value created by STEM assets, which can help inform funding strategies.
- The factors that constrain the innovation/productivity growth of these STEM assets and to what extent they are region or university specific. The impact of STEM assets will be dependent on their ability to overcome different local challenges in relation to the availability of specific kinds of skills, R&D assets, and infrastructure.