High Value Manufacturing Catapult

Annual Review 2022/23

CATAPULT
High Value Manufacturing

Powered by

Innovate UK

University of Sheffield AMRC Advanced Manufacturing Research Centre

cpi

mtc Manufacturing Technology Centre

National Composites Centre

NMIS National Manufacturing Institute Scotland

Nuclear AMRC

WMG The University of Warwick

2022/23 in numbers

We worked with...

5,810

companies (up 5%)

Including:

60%

were SMEs (3,496)

SME engagements:

5,193

(Up 18%)

2,805

commercial projects (up 27%)

434

collaborative R&D projects

952

engagements with UK academic institutions

3,735

people (up 11%)

22/23

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CEO's statement

I am incredibly proud of the HVM Catapult's continued growth in 2022/23. The sector has rebounded emphatically from the COVID-19 pandemic; last year we made great strides - at great pace - to build on this progress.

Our work has the potential to be transformative as the UK strives towards net zero. For example, we are working on carbon accounting standards so we can properly monitor the UK's progress in cutting emissions. We also lead the cross-Catapult Hydrogen Innovation Initiative which is accelerating the development of critical technologies and supply chains for the fast-growing hydrogen economy.

This year was one for reflection. We are acutely aware of the need to take stock of the progress made since we launched in 2011 and make sure that we continue to work as efficiently and sustainably as possible. I am extremely proud of the collaborative and open culture we have fostered at the HVM Catapult. Where colleagues have shared ideas for improvement, we have adopted these changes to benefit everyone at the Catapult.

Growth and transformation are, of course, not just important for the HVM Catapult, but the country as a whole. I was delighted to see progress in our regional levelling up developments. This included the partnership with Innovation Greater Manchester and Greater Manchester Combined Authority to provide a £1.7bn boost to the region's manufacturing sector and the new £98m flagship centre for Northern Ireland manufacturing. I am also helping to drive this important agenda across the UK as part of the Levelling Up Council. Manufacturing's importance to the future economy is exemplified by its inclusion in the Chancellor's five high potential industries.

We are determined to continue to grow as an organisation, support UK industry to thrive and make an impact on a national scale.

Katherine Bennett CBE

Chief Executive Officer,
HVM Catapult (2021-)

Chair's statement

This will be my final statement as Chair of the HVM Catapult. It is an opportunity to reflect, briefly, on the progress we have made over the past 12 months and my six years in post. It is also an opportunity for me to outline some of the opportunities we have for our future. In 2022/23, we delivered another set of fantastic results. We have broadened our supply base significantly in terms of business size and scope. Over 50% of the HVM Catapult's clients are SMEs, with our industry base encompassing life sciences and pharmaceuticals, energy, aerospace, automotive, large infrastructure projects, transportation and other sectors.

During the very early stages of the UK's fight against COVID-19, the HVM Catapult provided critical support to the Ventilator Challenge consortium. This Government-backed programme was hugely successful in designing, developing and producing ventilators for our NHS which saved thousands of lives at a critical time for the UK.

The HVM Catapult exists to support industry, academia and government in building business resilience. We consider not just what our clients in industry need now, but the skills they need for the future. Our centres continue to run apprenticeship programmes with a focus on providing a balanced and highly skilled workforce. Education is absolutely essential for developing the skills we need for the future and we work closely with the Department for Education on frameworks for industry-led skills development.

Resilience is built on collaboration. We continue to pool the incredible expertise across the HVM Catapult network and provide a more rounded solution for our clients. From Strathclyde to Bristol, Rotherham to Coventry, our regional bases draw on a wealth of knowledge and experience across the UK. Working closely together, the HVM Catapult and our seven centres will be more effective in building a stronger, more productive approach to innovation in manufacturing.

Manufacturing will continue to have a vital role in fuelling the growth of the UK economy, ensuring our nation remains competitive on the international stage. I have no doubt that the HVM Catapult will continue to be instrumental in supporting that trajectory.

Allan Cook CBE

Chair, HVM Catapult (2018- 2023)

To hear from the new HVM Catapult Chair, go to **page 38**

About the HVM Catapult

We bridge the gap between research, business and government.

What we do

The High Value Manufacturing Catapult is the strategic research and innovation hub for industry. Working through seven world-class centres of industrial research and innovation, we bridge the gap between research, business and government. We help companies commercialise great ideas by providing access to world-leading research, cutting-edge development facilities and sector-defining expertise that would otherwise be out of reach for many businesses in the UK. Our goal is to help the UK stay competitive in the global marketplace by empowering businesses to transform the products they sell, modernise their production methods and upskill their workforce.

Our vision

For the UK to boast a world-leading, agile, and innovation-driven industrial sector that continues to contribute more to the nation's economy, society and environment.

For researchers:

We serve as a central hub that brings together researchers and businesses, providing crucial insights into industry demands and technological gaps. These insights inspire new research in areas of significant potential growth for the UK.

For industrial partners:

We offer access to world-class facilities and expertise. We support companies of all sizes to scale-up, refine and apply manufacturing technologies, using our insight to help upskill their workforce and solve their business challenges.

For government:

We are a trusted partner in manufacturing innovation, driving inward investment towards historically challenged communities in the UK. This partnership enables us to help build the UK's production capacity, address industrial challenges directly and solidify the UK's position as a leader in global markets. Our work is helping the government achieve its environmental goals, driving us towards a greener future and promoting growth throughout the country.

COMPASS: Pointing to new opportunities for UK manufacturing

The University of Sheffield AMRC has secured £50m to establish Composites at Speed and Scale (COMPASS), a new research facility in Sheffield, which will enable a groundbreaking research programme with Boeing at the centre. The investment was announced in the summer by UK Chancellor Jeremy Hunt, as South Yorkshire was named as the first Government Investment Zone.

The AMRC won a £29.5m grant from the Aerospace Technology Institute (ATI) to support new capabilities, technologies and processes to reduce cost, waste, production time and associated carbon emissions. It also worked with regional stakeholders to secure a site and funding for the building, which is being jointly supported by the South Yorkshire Mayoral Combined Authority (SYMCA), Sheffield City Council, University of Sheffield and the HVM Catapult.

COMPASS is a major boost to aerospace research and development for the UK, helping solve the composites manufacturing challenges needed to meet future lighter commercial aircraft demand and help the aviation industry reach net zero.

It will be home to the AMRC's largest ever collaborative research and development programme which will be undertaken with founder and long-standing member Boeing, in partnership with Spirit AeroSystems and Loop Technology. It aims to de-risk and develop high-rate sustainable structures, with the potential to reduce large component process times from around 40 hours to four hours or less.

Together with our world-leading industry partners, this investment is poised to revolutionise aerospace manufacturing to meet global demand, while supporting vital jobs and growth in the UK."

Maria Laine, President of Boeing
UK, Ireland and Nordic region

University of Sheffield /AMRC Advanced Manufacturing Research Centre

Results

- COMPASS will provide UK industry with an open-access facility to develop, demonstrate, test and validate new composite manufacturing technologies and capabilities.

Benefits

- COMPASS will help to establish South Yorkshire as the leading R&D centre of excellence in the manufacture of composites at speed and scale, enabling future production capabilities that currently don't exist, alongside creating more jobs for the region.
- The new facility will fuel innovation through data sharing to help the wider business and research community develop solutions to unlock the value to become smarter and more productive.

Transforming the economy

We are proud of the work we do with our government partners to transform the economy and address key economic challenges. As we sit at the point where business, government and academia converge, we are in a unique position to assess the needs of both individual businesses and the wider economy. Our work continues to turn ideas into tangible results.

> **We are in a unique position to assess the needs of both individual businesses and the wider economy.**

Sustainability and net zero

One of our most important goals is to support the UK's transition to net zero, which is vital to secure our future. When the UK is capable of rapid decarbonisation, it will have a key advantage as we transition towards a low-carbon global economy. This is a wide-ranging objective, tackling issues from hydrogen and nuclear energy to transport electrification and low-carbon composites. The HVM Catapult is at the forefront of innovation in green technologies and carbon accounting standardisation, crucial for reaching net zero.

Levelling up and regional development

We want efficiency and sustainability improvements to be shared across the entire nation so we can all benefit from new technologies. The HVM Catapult is playing its part to invest throughout the UK, encouraging inward investment from multinational companies and supporting distribution of growth. Our centres act as innovation hubs that anchor regional industrial clusters around the country.

Improving public health

The HVM Catapult is immensely proud of its work during the vaccine and ventilator rollout while tackling the COVID-19 pandemic. Since the pandemic, improving public health is an increasingly important national priority. We help healthcare companies to bring effective new products to market and apply that insight in other sectors, supporting our collective health.

Hydrogen Innovation Initiative

Hydrogen Innovation Initiative

Hydrogen is critical for decarbonising the most challenging areas of the economy. The emergence of new global markets for low-carbon hydrogen presents a major economic opportunity for UK businesses, in line with the UK Government's ten-point plan for a green industrial revolution. To maximise this opportunity, we must build up the number and size of globally investible UK supply chain companies working on hydrogen technologies and engineering services. Together with our partners we have combined our collective strengths, capabilities, national locations and industrial reach to create the Hydrogen Innovation Initiative. This unique partnership is working with government, industry, academia and Innovate UK to create an investible, globally competitive hydrogen technology and services sector, here in the UK. Our mission is to accelerate the development of critical technologies and supply chains for the fast-growing hydrogen economy, supporting UK industry to anchor high-value jobs, boost resilience and drive decarbonisation.

Led by the HVM Catapult, the Catapult Network and its partners HII is working with industry to use innovation to build robust and resilient hydrogen technology supply chains in the UK and accelerating translational research to reach the government's target of producing up to 35% of the UK's energy from hydrogen by 2050.

University of St Andrews: Process rig for production of innovative heart treatment devices

Working collaboratively with the University of St Andrews, the MTC designed a system to enable the production of groundbreaking prototype medical devices.

The University of St Andrews had developed novel materials allowing the release of an active agent from the surface of medical devices. The agent can prevent problems such as blood clotting and spasm, which frequently occur when deploying medical devices inside blood vessels. The preparation of the devices requires a multistep process involving the application of vacuum, temperature and different gases at certain pressures. However, the pre-existing experimental rig only allowed for processing of single samples with a maximum length of 10cm. The primary goal for this project was to design and manufacture a test rig to process longer samples – in larger batches – to enable future scale-up of production. A unique challenge was presented in the requirement to deliver both vacuum and pressure capability within the same system, as well as ensuring the system was capable of handling potentially hazardous gases.

To address this challenge, the MTC captured the precise requirements for the rig (e.g. dimensions, materials) and its key process parameters (e.g. vacuum pressure, temperature) – before proposing concepts to deliver the process. It identified suppliers and worked with them to develop a custom process reactor system. Alongside this, the team designed and manufactured a number of additional elements such as a sample holder and control console. It also made the necessary modifications to the supplied process reactor to integrate with other systems, then conducted trials to ensure process integrity under operating conditions.

mtc Manufacturing Technology Centre

The MTC did an excellent job in designing and building a system that could cope with our requirements for vacuum and elevated pressure environments in our gas-based technology. The final result is an excellent step forward towards scaling up manufacture."

Prof Russell Morris,
University of St Andrews

Results

- The MTC harnessed its expertise in building specialised equipment to address the challenge of delivering a unique processing rig that could handle both vacuum and pressure. A custom system was designed using commercial off-the-shelf hardware where possible to reduce build costs and in-life servicing.
- The MTC used its expert network of consultants for vacuum technology and gas suppliers to inform the design and operation of the process.
- The MTC used its industrial knowledge to advise on commercialisation and production scale-up for future prototype medical devices.

Benefits

- The MTC was able to scale-up the capability and capacity of the system by using its industrial knowledge and expertise to develop a unique process rig enabling a step change in the development of prototype devices.
- It also enhanced flexibility in processing parameters (e.g. the range of temperature/gas pressure) to ascertain optimal processing conditions.

Vertical Aerospace: Lift-off for UK capabilities in urban air mobility composites

Vertical Aerospace is a UK pioneer in a growing urban air mobility (UAM) market, estimated to be worth £800bn by 2040. Its Electric Vertical Take-Off and Landing (eVTOL) aircraft, the VX4, is designed to transport a pilot and up to four passengers at 150mph with a range of around 100 miles, while producing minimal noise and zero in-transit emissions. Their challenge was an ambitious timeline to have the VX4 certified to the same standard as commercial airlines. This included delivering a propeller blade that met aerodynamic efficiency, noise, and mass requirements but with improved structural capabilities to tolerate bird strikes.

To de-risk production and certification, Vertical Aerospace relied on the experience of a world-class ecosystem of engineering experts, including the National Composites Centre (NCC), and Warwick Manufacturing Group (WMG) - two of the seven HVM Catapult centres.

Working with Vertical Aerospace, NCC's team of experts with backgrounds in aerospace, automotive, composites design and manufacturing, focused on the design and manufacture of components for the company's test flight programmes. This included working across the entire product development cycle to build the unique composite propeller blades, elements of the VX4 demonstrator airframe and battery development.

Vertical has chosen a strategy that gives us the lowest risk path to certification, and this includes leveraging on expertise and technologies from the most credible industry-leading partners and suppliers. Collaboration with the National Composites Centre's expert team has significantly contributed to the development of critical components in our aircraft, and de-risking our path to certification. Ultimately, our priority is to ensure the VX4 achieves the highest safety, reliability and performance standards."

Michael Cervenka, Chief Technology Officer, Vertical Aerospace

NATIONAL COMPOSITES CENTRE

Results

- NCC supported the development of Vertical Aerospace's original propeller blades, concentrating on the need to meet the bird strike and damage tolerance requirements. Adopting a design for manufacture approach, the team called on the latest digital design technologies to drive the development of new Generation 2 blades, which lead to novel internal blade architectures and the identification of the right manufacturing process.
- NCC supported the development of the company's airframe, proposing and assessing solutions to ensure this new class of aircraft was safe for the test pilot. Dynamic finite element modelling was used to simulate and predict the structural effects of emergency landing scenarios to support the airframe's crashworthiness.

Benefits

- NCC established a core competency in eVTOL blade and landing gear design, prototype, demonstration and supply chain industrialisation, with wider applications for this technology in sub-regional and regional aircraft.
- The project team is providing industry guidance to meet the future demands for UAMs. This ranges from the analysis, tools, production processes and materials to be further developed, to working out how to produce cost effectively, safely and at scale.

Unlocking industry potential

After another strong year in 2022/23, we want to keep up the momentum. We have four key goals for industry and are determined to build on the progress we have made on them next year.

01

Increase UK GVA: continue to increase economic output from manufacturing, one of the cornerstones of our economy.

02

Crowd in investment from the private sector: supporting the manufacturing sector all around the country, creating jobs and boosting regional economies.

03

Reduce carbon emissions: beginning with a standardised system of carbon accounting so our progress is measurable.

04

Increase R&D investment: to develop the new technologies that will be at the heart of the future economy.

Case study

Building a global carbon accounting framework

Manufacturing produces 40% of the UK's carbon footprint, yet the lack of a common accounting framework for corporates and products means the sector cannot properly track emissions. In partnership with four other Catapults, the HVM Catapult is leading the development of a universal methodology for measuring and reporting emissions, based on the Government's objectives for key metrics to be used.

'Scope 3' emissions - indirectly produced from processes such as early materials extraction and processing – present a particularly substantial problem and account for up to 90% of greenhouse gases. Tackling these is key to reach net zero. We are determined to work with Government departments, such as Energy Security and Net Zero and Business and Trade, to address this key issue and jointly develop universal standards.

Case study

Driving impact with our new Birmingham HQ

We are incredibly proud of the Catapult's reach across all nations and regions of the UK. We have world-class centres all around the country, with a presence in England, Wales, Scotland and Northern Ireland. This commitment to distributing growth and investment around the country is key to achieving the Government's levelling up objectives and ensuring no areas are left behind. In September 2022, the HVM Catapult reiterated this commitment by moving its HQ to Birmingham's leading digital and tech campus, Innovation Birmingham, part of the Bruntwood SciTech network .

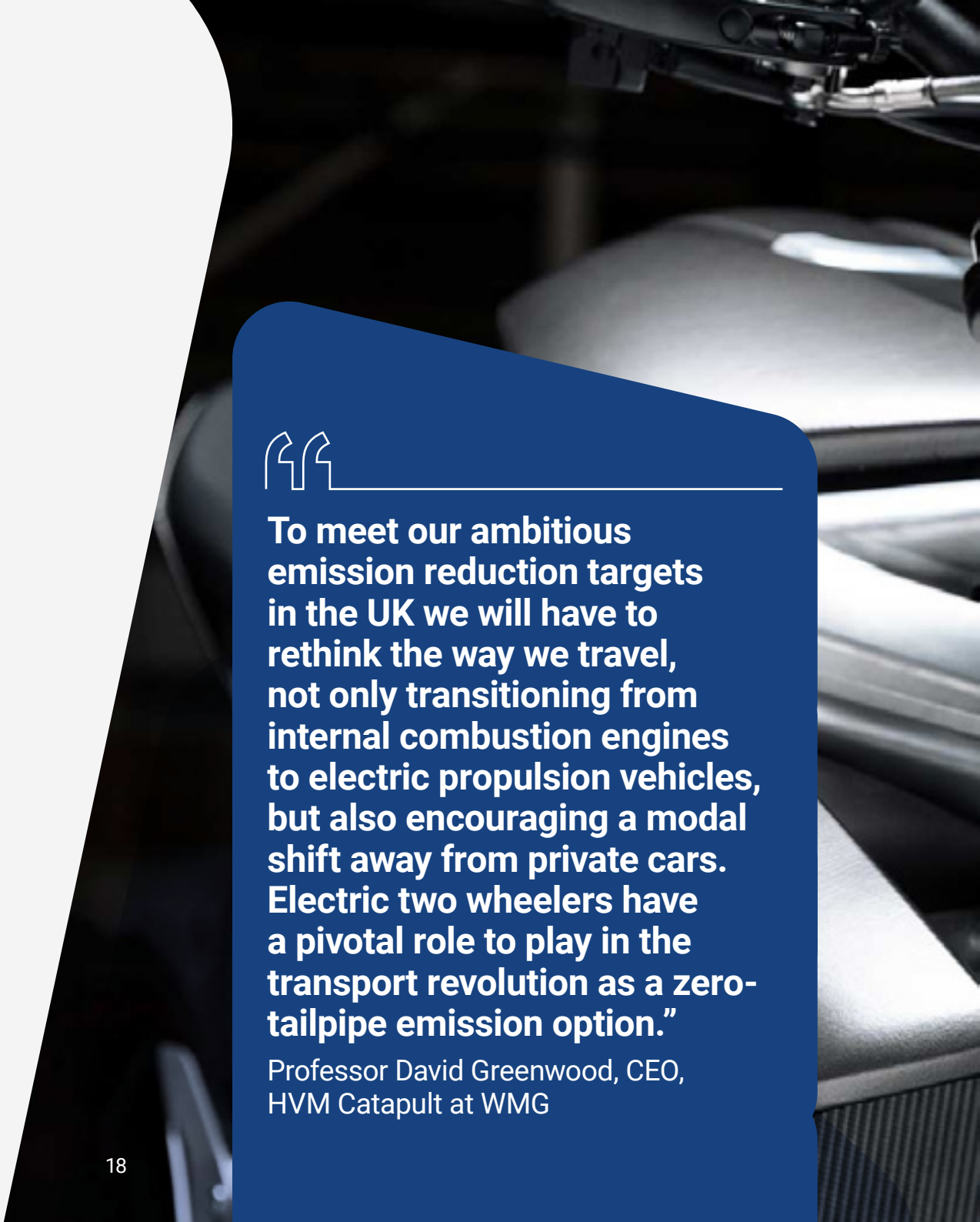
The West Midlands has substantial potential. The manufacturing sector supports 317,000 direct jobs in the region – the second highest in the UK and the 50 biggest manufacturing enterprises in the West Midlands are globally competitive and account for £3.5bn of gross value added per year. The average economic contribution (GVA) per job of these companies is 48% above the UK average for the sector.

However, the GVA per job of the region's manufacturing base is 10% below the UK average. By supporting smaller companies and enhancing regional supply chains through joint research and innovation – from simplifying production lines to developing more efficient technology – the HVM Catapult can help bridge that productivity gap. Reaching the national average would boost the regional economy by £1.5bn a year.

TE-1: Specialist electric motorcycle project

WMG's TE-1 electric development project was set up to create groundbreaking developments in specialist electric motorcycle engineering and innovative integrated technology design. The project provides an input into Triumph's future electric motorcycles, driving innovation, standards, capability, and new intellectual property, whilst enhancing the credibility and profile of British industry and design.

Completed in July 2022, the work was a four-way partnership between WMG, Triumph Motorcycles, Williams Advanced Engineering and Integral Powertrain Ltd e-Drive Division, funded by the Office for Zero Emission Vehicles through Innovate UK. WMG played a critical role in the project by providing electrification expertise and the critical vision to drive innovation through modelling and simulation based on future market needs.



"To meet our ambitious emission reduction targets in the UK we will have to rethink the way we travel, not only transitioning from internal combustion engines to electric propulsion vehicles, but also encouraging a modal shift away from private cars. Electric two wheelers have a pivotal role to play in the transport revolution as a zero-tailpipe emission option."

Professor David Greenwood, CEO, HVM Catapult at WMG

WMG
THE UNIVERSITY OF WARWICK

Results

- The final testing results demonstrated how the TE-1 prototype has delivered on all targets and objectives following an extensive live testing programme. This involved numerous assessments of the bike's performance on a rolling road as well as on track.

Benefits

- The project helped in the development of strong, commercially viable and sustainable partnerships with UK industry manufacturers and supply chains, whilst building expertise and capability within the UK workforce.

Problem solving for industry

As well as addressing national challenges, we work with thousands of companies each year to solve problems ranging from business growth and scaling to the development of new technologies and refining supply chains. We use our technological expertise and experience of working with over 30,000 companies to provide support to companies across the UK economy.

We help manufacturing companies to upskill their workforce, developing the right skills mix to stay competitive in the global marketplace.”

Workforce development

We help manufacturing companies to upskill and reskill their workforce, developing the right skills mix for business growth and to stay competitive in the global marketplace.

Supply chain development

We help manufacturing companies optimise supply chains for new and existing products and technologies. Improving supply chain resilience is crucial to support the widespread adoption of new technologies and develop a more adaptable economy.

Technology development

We help manufacturing companies take advantage of transformative new technologies and techniques so they can scale-up production, grow their business and better serve their customers.

Research

Our unique position at the juncture of businesses and researchers allows us to play a key role in encouraging research led by commercial demand. We help to apply this invaluable research in the thousands of projects to which we contribute each year.

AI6S: Simulations identify real savings for heat treatment users

Heat treatment is widely used in industry to improve the material performance and integrity of components produced by casting, forging and other forming processes. Heat treatment processes are energy intensive in their own right. Any errors can lead to the component being scrapped with heavy additional costs in time, money and emissions.

As part of a collaborative project called AI6S, the Nuclear AMRC focused on process simulation and verification, to support the development of machine-learning regression models for process optimisation. Training these models requires detailed data on how components behave under heat treatment, as well as information on process parameters, product quality and energy consumption.

The work forms part of a programme to develop process optimisation tools based on artificial intelligence and Lean Six Sigma practices to reduce the energy used in heat treatment.

Potential for 21,800 tonnes less CO2 emissions in the UK alone.

Results

- To understand the effect of heat treatment parameters on material integrity and performance, the researchers developed detailed simulations of typical products from two of the project partners.
- The Nuclear AMRC team carried out finite element simulation of the heat treatment process on these digital twins, with the results validated against physical test data from the industrial partners.
- The simulations allowed the researchers to collect the data needed to develop the models, without any interruption to the partners' production.

Benefits

- The simulations will help improve the efficiency of heat treatment processes – saving time, energy and money for industrial users.
- The partners estimate that the tools, if applied across a range of foundation industries, could reduce annual emissions by the equivalent of 21,800 tonnes of carbon dioxide in the UK alone.

Upskilling the workforce

As the UK transitions towards a low-carbon economy, we are increasingly dependent on new and innovative technologies. This shift is evident at all stages of the product lifecycle – from design through to the end user. With technologies filtering through into everyday usage, it is crucial to train technicians with the skills required to adopt and maintain them. The manufacturing sector has a key role to play in ensuring our nation is at the cutting edge of innovation, with all the technical skills required for the future.

The HVM Catapult continues to be at the forefront of this drive to restructure the economy. In March 2022, we completed the Department for Education-funded Emerging Skills Programme (ESP). The £1.3m project was focused on developing a national skill base in the technologies required for the increased usage of electric vehicles. These green skills are vital to reach the government's target of net zero by 2050, particularly in everyday areas such as electric vehicle manufacture. The project was a great success, delivering high-quality modular courses for both workers and trainers on a mass scale to prepare for rollout into the wider education system. The training was delivered free of charge and will provide a foundation for the automotive and other transport sectors to achieve net zero by 2050.

Even now that the training programme has ended, the ESP units continue to be available on the HVM Catapult website, where they can continue to drive progress in the UK's technical education system. The programme delivered more than 50 units covering electrification, digitisation, additive manufacture and advanced materials. The units can be used both as the basis of a standalone short course and as part of a longer programme of learning and qualification.

Workforce Foresighting Hub

Following the conclusion of the Emerging Skills Programme, the Catapult Network has been working closely with Innovate UK to develop the Workforce Foresighting Hub. This development and delivery programme, managed on behalf of Innovate UK, seeks to provide the process, insight and recommendations required for industry, policymakers and educators to adapt to continuing change. Employing global data and identifying future skills demands in the three critical areas of workforce, supply chain capability and technology, the Workforce Foresighting Hub helps employers and educators to understand what changes are needed to avoid a skills shortfall and lead future industry.

The Workforce Foresighting Hub, being delivered by MTC, aims to develop skills foresighting processes, tools and training and to support Catapults to deploy foresighting in their own organisations. It will also play a role in collecting and publishing workforce foresighting data and promoting foresighting as part of an overall skills value chain approach for the UK. The Workforce Foresighting Hub provides the HVM Catapult with the opportunity to bring greater expertise into technical education across Innovate UK's three impact domains of net zero, healthy living and agriculture and digital technologies. The objective is to use foresighting projects to develop recommendations in reports for action on workforce skills provision.

Science and innovation thrive on the knowledge and expertise of thousands of people across the country. Skills are a natural by-product and vice-versa.

Karen Green, Chief People and Skills Officer, HVM Catapult

Growing the Catapult

After a busy and exciting year, we are pleased to have been able to continue our growth. We have grown our team to 3,375 (up 11%), bringing in driven and talented colleagues at every level. We are particularly proud of our expansion this year, including opening new offices in Birmingham and Manchester.

Advanced Manufacturing Innovation Centre, Belfast

In November 2022, we announced the secondment of Chief Technology Officer, Sam Turner, to lead the launch of the £98m Advanced Manufacturing Innovation Centre at Queen's University Belfast. The flagship centre of Northern Ireland manufacturing will reinvigorate the region's industrial potential.

HVM Catapult Birmingham office

In September 2022, we moved our HQ to Innovation Birmingham, part of the Bruntwood SciTech network, and Birmingham's leading digital and tech campus. The move was welcomed by Andy Street, Mayor of the West Midlands, who described the HVM Catapult as a "brilliant sector catalyst".

HVM Catapult Manchester office

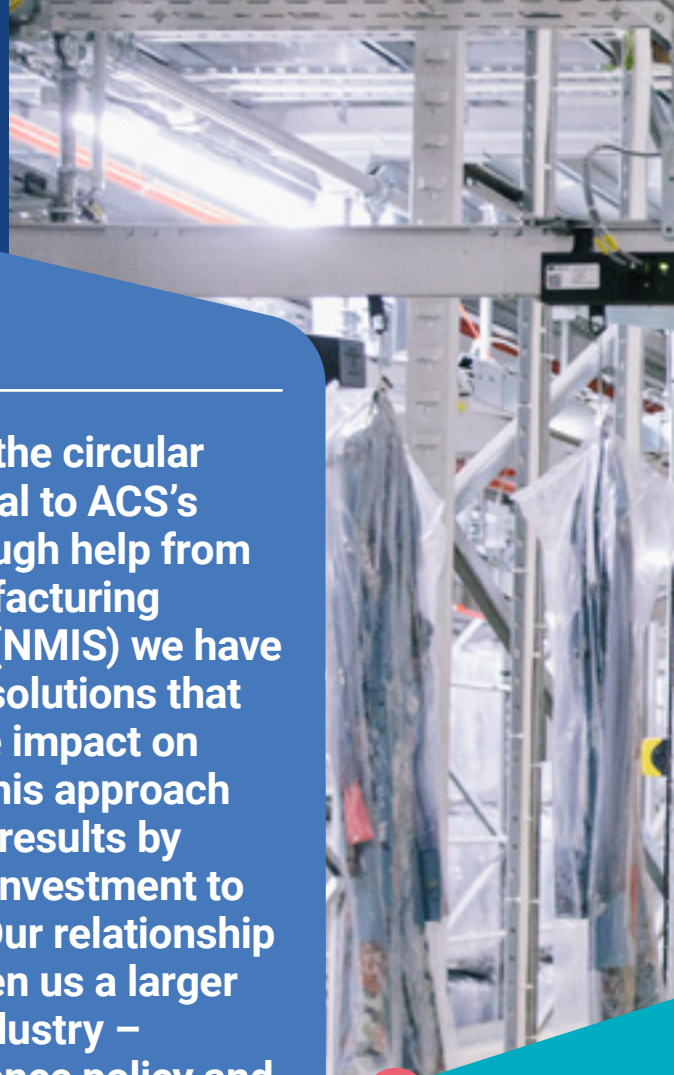
In August 2022, we opened a new office for the HVM Catapult with our centre, CPI, in Manchester. With a new connection to the region, the office will help to bridge the manufacturing output gap of £500m according to our research. Mayor of Greater Manchester, Andy Burnham said: "Increased R&D spending and more productive businesses can power the growth of our economy and level up the North."

Advanced Clothing Solutions: Helping SME to cut environment impact by 90%

The global clothing industry is estimated to be responsible for over 1.2 billion tonnes of CO2 every year.

Advanced Clothing Solutions (ACS) specialises in supporting retailers in embracing the circular economy by offering services to support the resale of used items, such as refurbishment and cleaning, photography, storage and shipping. Major brands like eBay are among ACS's customers. Aiming to lead by example and enhance its own sustainable credentials, ACS sought to implement effective emission reduction strategies.

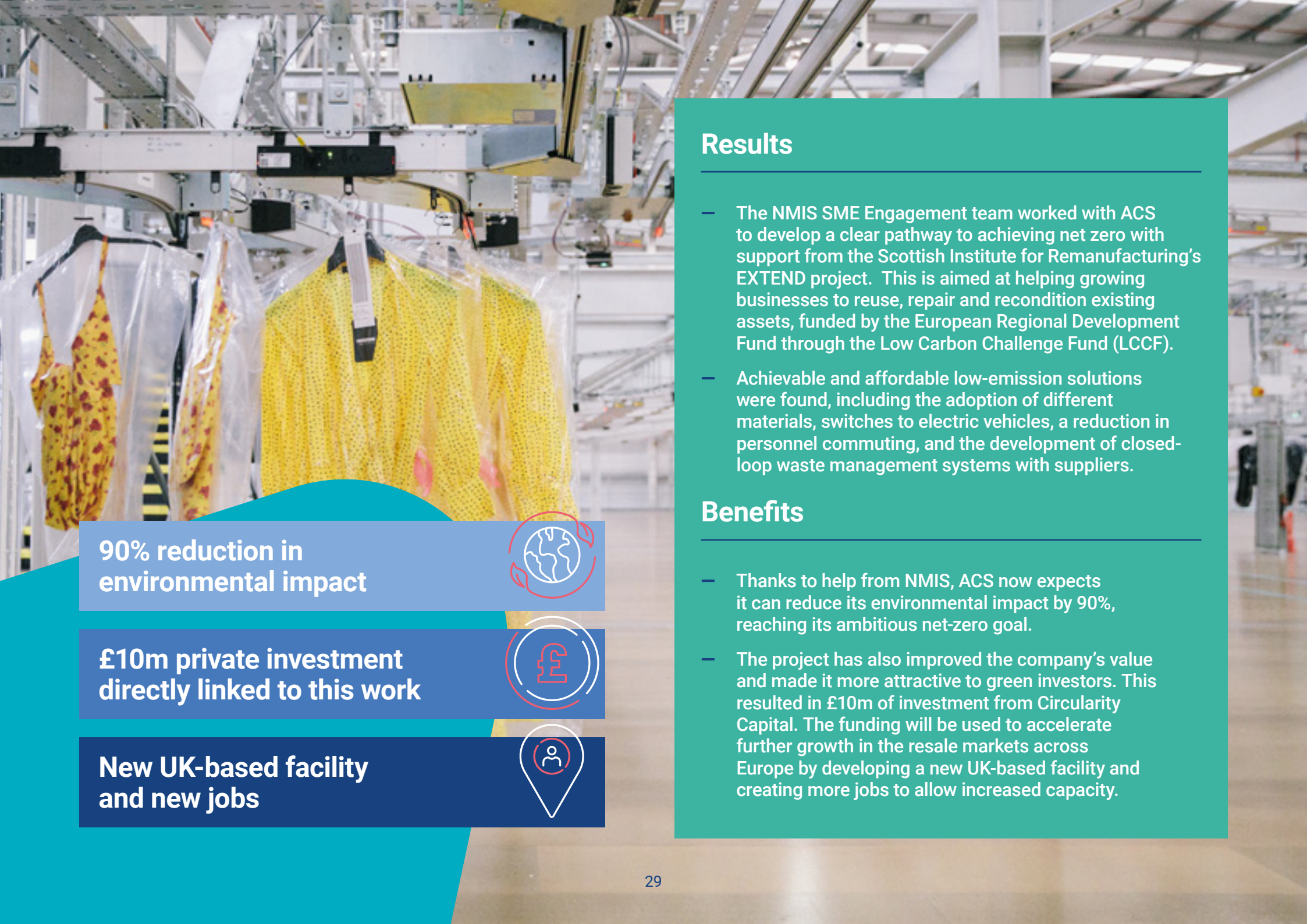
However, due to a lack of data, it could not quantify the current environmental impact of its processes and materials.
As part of a drive to achieve net-zero emissions in 2023 and make itself more attractive to green investors, NMIS helped ACS to conduct a carbon accounting exercise. NMIS explored data related to ACS's processes, consumable materials and other business-related activities.
After analysing factors such as materials usage and storage and how colleagues travel to work, each element was then categorised according to the greenhouse gas protocol.



Sustainability and the circular economy are central to ACS's core identity. Through help from the National Manufacturing Institute Scotland (NMIS) we have implemented real solutions that will have a tangible impact on how we operate. This approach has already driven results by helping us secure investment to keep us growing. Our relationship with NMIS has given us a larger voice within the industry – helping us to influence policy and others in the textiles industry to become more sustainable."

Michael Cusack,
Head of Sustainability, ACS

NMIS
National Manufacturing Institute Scotland



90% reduction in environmental impact

£10m private investment directly linked to this work

New UK-based facility and new jobs

Results

- The NMIS SME Engagement team worked with ACS to develop a clear pathway to achieving net zero with support from the Scottish Institute for Remanufacturing's EXTEND project. This is aimed at helping growing businesses to reuse, repair and recondition existing assets, funded by the European Regional Development Fund through the Low Carbon Challenge Fund (LCCF).
- Achievable and affordable low-emission solutions were found, including the adoption of different materials, switches to electric vehicles, a reduction in personnel commuting, and the development of closed-loop waste management systems with suppliers.

Benefits

- Thanks to help from NMIS, ACS now expects it can reduce its environmental impact by 90%, reaching its ambitious net-zero goal.
- The project has also improved the company's value and made it more attractive to green investors. This resulted in £10m of investment from Circularity Capital. The funding will be used to accelerate further growth in the resale markets across Europe by developing a new UK-based facility and creating more jobs to allow increased capacity.

Strategic imperatives

To support the commercialisation of new technologies and growth of the UK economy we focus on four strategic imperatives:

Enabling net zero

Our work is helping the UK secure its energy security by utilising low-carbon sources like hydrogen and nuclear to reduce emissions. We also support the development of common carbon accounting standards to measure environmental impact across all products consumed in the UK. We will help decarbonise all parts of the economy, from energy to production and the product lifecycle.

Supply chain transformation

Amidst global supply shocks, ensuring a secure supply of essential goods is paramount for the UK. We help companies of all sizes to re-shore production and transition to low-carbon markets, enhancing their competitiveness and cutting supply chain emissions. We also invest in innovations within the hydrogen, electrification and infrastructure sectors to shape the markets of the future.

Product lifecycle digitalisation

Digital technologies such as data analytics and AI drive tomorrow's markets and today's competitiveness. We empower customers to improve performance through intelligent data usage, design and networked supply chains. Our work promotes data-driven product design for sustainable materials and efficient processes throughout the entire lifecycle, while also advancing digital twin adoption for informed investment decisions across the sector.

Critical national infrastructure

Our national success relies on the interaction between physical and digital environments, which influences all economic activity. Manufacturing and high-value design impact every aspect of infrastructure, from gas pipes to data storage. We continue to introduce new standards and technologies to construction, enhancing energy efficiency, cost-effectiveness and reducing emissions. We will also continue to anchor emerging markets to UK industrial clusters and lead work in developing the UK's hydrogen infrastructure, from generation to storage and use, helping to seize the opportunity of global supply.

Chestnut Bio: Biodegradable plastics inspired by nature

Traditionally, single-use plastic guards and cable ties are used to protect newly planted tree saplings. Though essential, the environmental impact of these guards has long been a cause for concern due to their potential impact on the ecosystem.

At a time when the impact of climate change is front of mind, the agriculture and forestry industries need a solution that can help them move away from single-use plastics to bio-based biodegradable alternatives that can help them to achieve their net zero goals.

That's where Chestnut Bio comes in. CPI supported the North East based SME to develop a viable alternative to traditional cable ties using biopolymer formulations that naturally degrade.

Utilising formulation expertise, engineers were able to connect the dots between innovation and implementation – helping Chestnut Bio to improve performance while reducing manufacturing complexity.

The result is a genuine alternative to single-use plastics that can help to reduce the industry's environmental impact.

And that's just the beginning. Chestnut Bio is now working to widen its product portfolio, including the encapsulation of active ingredients. It is in discussions with major global players to supply plant-based biopolymer substitutes for current fossil fuel-based components to help these companies reduce their carbon footprints.

"We've got prototypes already, which is great. We just made our first sale and so we've gone from being a research and development company to a trading company, which is quite amazing."

Ian Edward Brown, Director, Chestnut Bio

cpi

Product trials are underway in 35 sites across the UK.

Results

- Design and production of bio-based cable tie prototypes and tree shelters.
- Development and testing of novel biopolymer formulations to assess performance and rate of biodegradability.
- Further collaborative development focusing on other biopolymer products that could replace current fossil fuel-based formulations.

Benefits

- Chestnut Bio has secured a patent for its novel biopolymer materials and is commercialising the developed materials.
- CPI's collaboration has enabled Chestnut Bio to move swiftly from a research-based start-up to a trading company with huge potential for commercial success – bridging innovation's so-called 'valley of death.'
- In 2023, product trials are underway in 35 sites across the UK, from the Orkneys to Cornwall. Meanwhile, Chestnut Bio has been granted a patent covering the technology and has made its first commercial sales.

From our inception to 2023

CATAPULT
High Value Manufacturing

Number of projects

12,582

(all collaborative R&D and commercial)

30,605

Companies worked with

17,573

SMEs worked with

38,066

SME engagements

In 2022/2023

We worked with...

5,810

companies (up 5%)

Including:

60%

were SMEs (3,496)

SME engagements:

5,193

(Up 18%)

2,805

commercial projects (up 27%)

434

collaborative R&D projects

952

engagements with UK academic institutions

3,735

people (up 11%)

Our resources

HVM Catapult income sources 2022/23

Core public funding	**£163m (36%)**
Competitively won collaborative R&D	**£131m (29%)**
Commercial income	**£152m (34%)**
Other income	**£4m (1%)**

Our sales order book

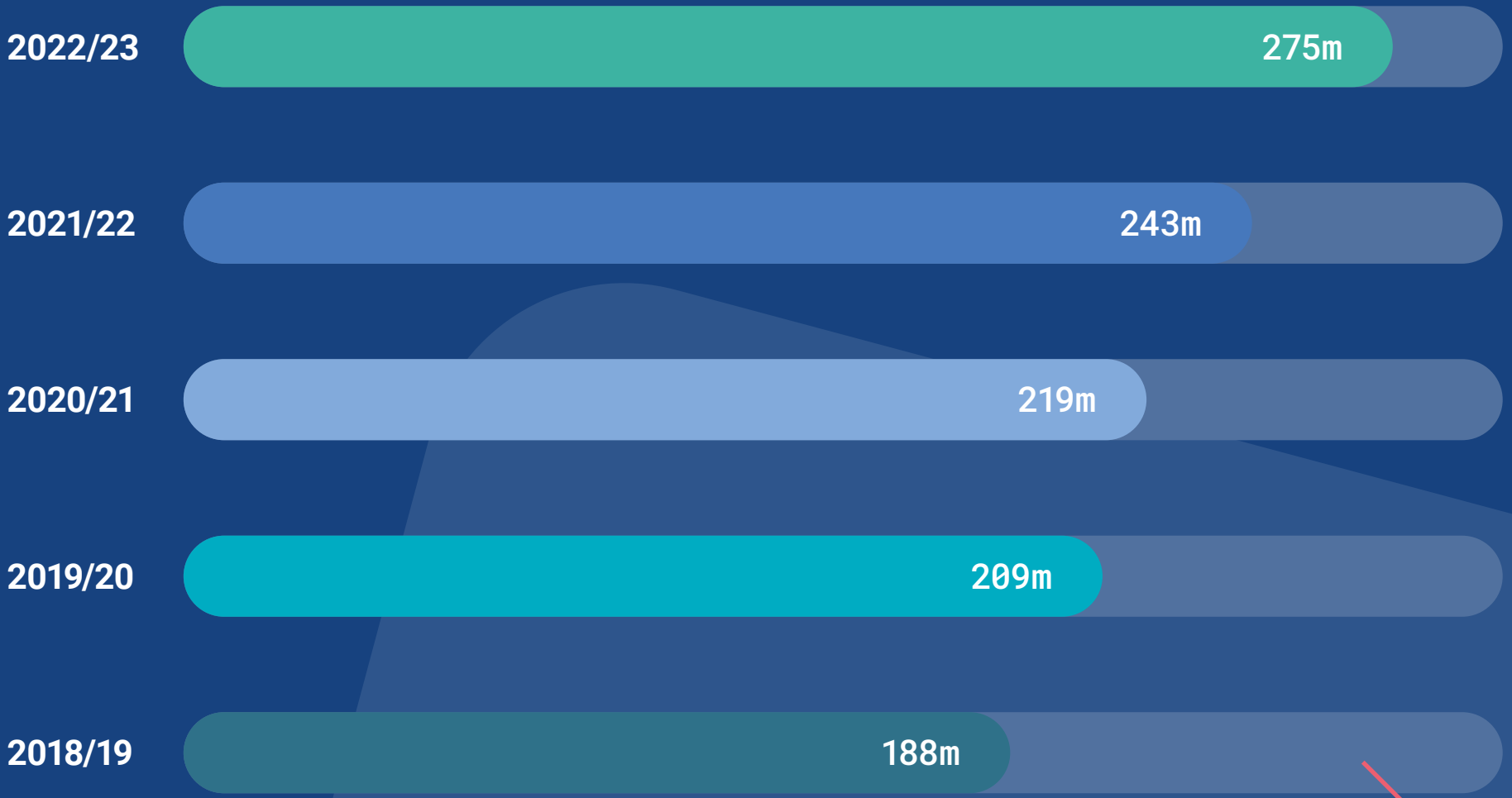
£231m

People (as FTEs)

3,735

up 11%

HVM Catapult collaborative R&D and commercial income*



* Excludes collaborative R&D in land and build

Enhancing UK competitiveness in manufacturing

I am thrilled to be starting this new role as Chair of the HVM Catapult. This is an extremely exciting time for the organisation and for UK manufacturing more broadly. It is a privilege to be stepping into this role at such a promising juncture.

Having spent over 35 years working across the biotech, fine chemicals and manufacturing sectors, I have first-hand experience of the industries that the HVM Catapult supports. I am also acutely aware of just how vital such support can be. I am deeply passionate about the industries the HVM Catapult's work spans and believe wholeheartedly in their capacity to fuel growth, provide highly skilled workers and breed innovation.

As Chair of the HVM Catapult, one of my top priorities will be ensuring that we continue to support UK manufacturers across every aspect of their businesses. Crucially, that means technical support, but also supply chain assistance, funding advice, and guidance on policy.

This 'whole-lifecycle' support is particularly critical for SMEs – a demographic of business that the HVM Catapult has always been instrumental in supporting. SMEs are hugely important to the UK economy. However, they are not always able to access the funding and support they deserve and require at the speed at which they really need it.

I regularly speak with UK founders and start-ups and I am always struck by the great sense of energy and excitement behind their ideas. SMEs are the lifeblood of innovation in the UK and it is absolutely vital that we leverage this enthusiasm in the right way. As HVM Catapult Chair, I will work hard to ensure that small companies are properly supported through the vital shift from research to commercialisation.

I am particularly passionate about helping businesses of all sizes not only exploit growth opportunities, but to meet their environmental goals too. These aims are not mutually exclusive. In fact, they go hand in hand. One of my main priorities as Chair will be to work with our centres and businesses to help them enhance productivity and cut costs, whilst minimising their environmental impact at the same time.

The UK has a great track record in many industries – with science a standout jewel in its crown. However, in others, it still lags behind its international peers – particularly when it comes to scaling up commercial research. As an organisation, we have incredible resources at our fingertips to support the UK in improving its global competitiveness. I intend to continue building on our excellent track record of UK R&D investment as incoming Chair – continuing to find new and innovative ways to enhance the UK's productive capacity.

From my time working at CPI – one of our seven HVM Catapult centres – I have seen first-hand just how valuable the support is that the HVM Catapult provides for businesses at the early stages of their life cycles. Utilising our network, expertise and resources to support and enhance UK competitiveness will be an ongoing priority for myself and the organisation. I am really looking forward to getting started.

Steve Bagshaw CBE

Chair, HVM Catapult (2023-)

I am passionate about helping businesses of all sizes not only exploit growth opportunities, but to meet their environmental goals too.

CATAPULT
High Value Manufacturing

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Our locations

Wherever you are in the UK, you will have access to manufacturing and engineering experts from anywhere in our network.