UNIVERSITY OF BIRMINGHAM | Business with Birmingham

Advanced and Digital Manufacturing

At the University of Birmingham, we carry out internationally leading research in advanced manufacturing, material processing, modelling and simulation, and casting. We have dedicated research centres and state-of-the-art equipment and facilities to enable the translation of our research from the lab to market-ready technologies and products that meet the demands of the manufacturing industry.

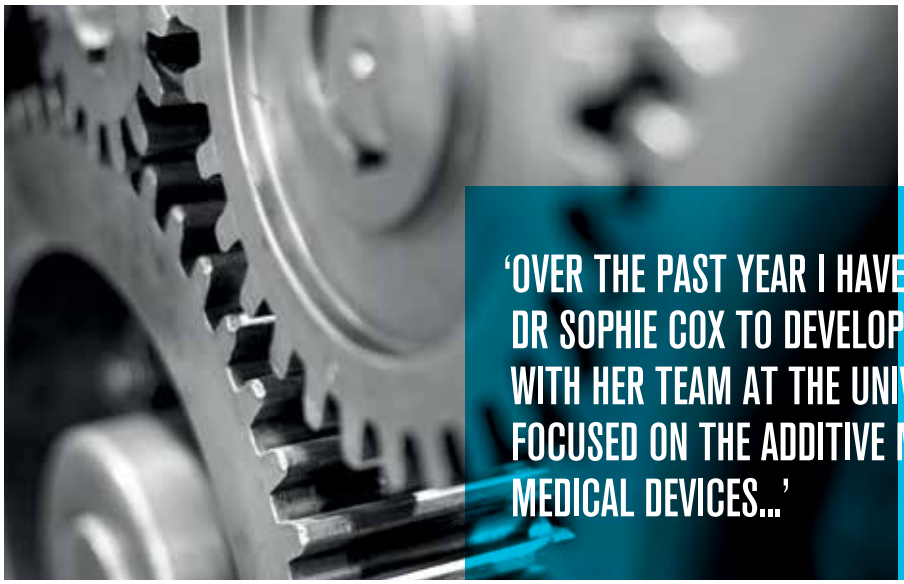
We have collaborated with leading industry partners to secure high-value grants from funding bodies such as the Engineering and Physical Sciences Research Council (EPSRC), Innovate UK, EU and RAEng, which has led to exceptional research projects with direct industrial contracts and knowledge transfer programmes.

Our expertise

- Materials research and processing
- Laser processing
- Micro manufacturing
- 3D and additive manufacturing
- Casting
- Modelling and simulation
- Digital manufacturing

Success and impact

- Our High Temperature Research Centre (HTRC) is a £60 million joint venture between the University of Birmingham and Rolls-Royce with a purpose-built facility. The 5,800sqm centre enables the scale-up of research and experimentation to deliver rapid high-quality product and process innovation, and is a unique casting, design, simulation and advanced manufacturing research facility.
- We are using our outstandingexpertise in robotics to develop safe and efficient techniques for disassembling and recovering batteries and other energy technologies.
- The University's Machining Research Group (MRG) has built one of the most comprehensive research laboratories in any UK academic institution with an equipment base of approximately £2.5 million. Some of our industrial projects include working with major Original Equipment Manufacturers (OEM) and first-tier supplier companies, such as Rolls-Royce, Airbus, GKN Aerospace, and Doncasters.
- The Quantum Technology Hub and Advanced Materials and Processing Laboratory have been working with Magnetic Shields Limited to develop a 3D printing route to manufacture magnetic shields for quantum sensors. Research so far has demonstrated a two-fold improvement in magnetic shielding effects compared with conventionally processed shields, while enjoying a significant degree of design flexibility.



'OVER THE PAST YEAR I HAVE WORKED CLOSELY WITH DR SOPHIE COX TO DEVELOP A STRATEGIC PARTNERSHIP WITH HER TEAM AT THE UNIVERSITY OF BIRMINGHAM FOCUSED ON THE ADDITIVE MANUFACTURE OF CUSTOM MEDICAL DEVICES...'

(CONTINUED OVERLEAF)

Advanced and Digital Manufacturing

...IN OUR EXPERIENCE, CO-CREATION OF INNOVATIONS BETWEEN ACADEMIC, INDUSTRIAL AND CLINICAL PARTNERS CREATES AN ENVIRONMENT WHERE SOCIOECONOMIC IMPACTS MAY BE REALISED THAT IMPROVE PATIENT LIVES.'
BRYAN AUSTIN, DIRECTOR AND GENERAL MANAGER DENTAL PRODUCTS, RENISHAW

Key projects

3D additive manufacturing capability: In collaboration with M&I Materials, Professor Moataz Attallah has developed an innovative technology to 3D print tungsten collimators via Selective Laser Melting (SLM). This technology can have many applications from aerospace to nuclear and medicine. The findings of this significant project were the subject of a patent application, which was assigned to M&I Materials.

Reuse and Recycling of Lithium Ion batteries (ReLiB): Funded by the Faraday Institution and EPSRC, the University of Birmingham is leading ways in which spent lithium batteries can be reused and recycled. The project explores how automation and robotics can sort batteries for second life applications; and if unsuitable, recycle 100% of the battery. Reusing and recycling battery materials will make better use of global resources, improve the stability of our energy networks and ultimately increase the impact of batteries in improving air quality and decarbonisation.

Centre for Custom Medical Devices: The University of Birmingham has collaborated with Renishaw to establish the Centre for Custom Medical Devices. The Centre contains state-of-the-art metal additive manufacturing equipment allowing for the design, manufacture and evaluation of 3D printed metal implantable medical devices. The capability provided by the Centre has been used to further grow the impact of our additive manufacturing healthcare projects, generate a pipeline of collaborative research projects with Renishaw and others, and allow the cultivation of new industrial partnerships with support from the Healthcare Technologies Institute and the Medical Devices Testing and Evaluation Centre.

High throughput integrated technologies for multimaterial functional Micro Components (HINMICO): Funded by the European Community's Seventh Framework Programme (FP7 NMP), and in collaboration with other research partners, this project aims to develop and optimise the manufacturing processes for the mass production of multi-material functional miniaturised components. The objective is to reduce manufacturing costs up to 40% by producing high-quality multi-material micro-components, with the possibility of developing additional functionalities, through more integrated, efficient and cheaper process chains.

Net shape manufacture of Ni Superalloy engine casing (NESMONIC): Funded by Clean Sky, this project is a research-collaboration with other industrial partners, including the High-Value Manufacturing Catapult. It aims to manufacture static engine components from IN718 using Net Shape Hot Isostatic Pressing of powder (NSHIP). The NSHIP of powder has the potential to revolutionise the production of complex high-performance aerospace parts enabling significant improved buy-to-fly ratios, which lead to cost savings as well as environmental benefits.

Automated Manufacturing Process Integrated with Intelligent Tooling Systems (AUTOMAN): This project aims to develop the world's first fully reconfigurable tooling system with in-process sensing and adaptation capability. This advanced system will incorporate pins that are actuated so that their lengths can be automatically adjusted during forming to enable more precise control of the process. It will include sensors and on-line modelling, metrology and reverse engineering to ensure the production of accurate and defect-free panels.

Getting in touch:

To learn more about engaging with the University please contact:

Alasdair Maclachlan, Business Engagement Partner
College of Engineering and Physical Sciences,
University of Birmingham

Mobile: +44 (0)7920 878578
Email: a.maclachlan@bham.ac.uk
Website: www.birmingham.ac.uk/partners
Twitter: @UoBBWB

Designed and printed by
UNIVERSITY OF BIRMINGHAM | creativemedia