UNIVERSITY OF BIRMINGHAM

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Business with Birmingham
issue six

Unique research centre cleared for take off

University of Birmingham and Rolls-Royce announce new £60 million High Temperature Research Centre.

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Business with Birmingham

news

think advanced manufacturing

University of Birmingham and Rolls-Royce announce £60 million High Temperature Research Centre

The Chancellor, George Osborne, recently announced that the University of Birmingham and Rolls-Royce, the global power systems company, will be establishing a new £60 million High Temperature Research Centre. The Centre will help develop future generations of aero engines, making greener, more efficient air travel possible. Bringing together a leading global company with internationally recognised research groups at the Universtiy, this new centre builds on a longstanding successful collaboration between the two organisations.

The new Centre will be a unique casting, design, simulation and advanced manufacturing research facility. Focused initially on the key manufacturing areas of investment casting, design for manufacture and systems simulation, the Centre will then draw in additional research competencies related to these areas through wider industry and academic involvement.

Dr Hamid Mughal, Rolls-Royce, Executive Vice President, Manufacturing Engineering and Technology said:

'We are delighted to be extending our advanced manufacturing and design research capabilities with the proposed development of the High Temperature Research Centre. This type of industrial and academic collaboration plays a crucial role in enabling high quality product and process innovation. High temperature metallurgy and the related advanced manufacturing processes will give our customers more efficient products and we are very pleased to strengthen our strategic partnership with the University of Birmingham in this key area of research.'

Chancellor, George Osborne unveils landmark venture between the University of Birmingham and Rolls-Royce

A virtual world

Manufacturing businesses in the West Midlands now have the chance to try out and test new product prototypes and ideas through virtual simulation technology.

Use of the innovative technology on offer at the University of Birmingham and the Manufacturing Technology Centre in Coventry will help businesses save time and money with costly repeat experiments which normally go hand in hand with testing new ideas.

The new project called CASiM² (Centre for Advanced Simulation and Modelling for Manufacturing) is supported by £2.6 million from the European Regional Development Fund, which is managed by the Department for Communities and Local Government and matched through funding and staff skills by the University of Birmingham, the Manufacturing Technology Centre, Airbus and Rolls-Royce.

Communities Minister Baroness Hanham CBE said:

'In order for businesses to survive and thrive in the current economic climate, new ways of working that save time and money but still gain the results is key. This project will offer businesses the chance to try out new products and ideas in a cost effective, reliable and safe environment. I am pleased that we are able to provide support to a project that will be really beneficial to the future development of businesses in the West Midlands.'

The project will firstly help to raise awareness of the new technology on offer and the benefits it can bring to a business, followed by a demonstration of its capabilities.

The delivery of CASiM² brings together public and private sector organisations providing businesses who participate in the project access not only to the technology, but also valuable credibility from leading companies, Airbus and Rolls-Royce.

Stephen Burgess, Rolls-Royce Manufacturing Process and Technology Executive said:

'Advanced computational techniques delivering 'Virtual Manufacturing' capabilities continue to be increasingly important to Rolls-Royce as they enable evaluation, optimisation and verification of key manufacturing processes in a fraction of the time and cost of traditional experimental methods. CASIM² is a collaborative programme that will deliver essential modelling and simulation capability to UK 'High Value' manufacturers and their supply chains.'

Collaborative projects and partnerships

CASiM² project

Learn more
contact: j.woodward@bham.ac.uk

The new Centre will deliver world-class fundamental and applied research programmes focused around delivering underpinning casting and related materials research, radical manufacturing process improvements and predictive manufacturing process modelling, and the development of research into ICT tools to enhance product quality and production efficiency.

This new facility will be funded by a £40 million investment by Rolls-Royce plc matched by a £20 million investment from the Higher Education Funding Council for England (HEFCE), through the UK Research Partnerships Investment Fund. This major new public and private capital investment will provide a significant economic stimulus for the UK and new high skilled jobs. There is an expectation that an additional £10 million of private sector revenues through research programmes from the wider industrial base interacting will be possible over the first five years of operation.

Collaborative projects and partnerships

Learn more
Contact: s.b.taylor@bham.ac.uk

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think advanced manufacturing

Undercover agent

Spread of disease through contact is one of the most common modes of disease transmission and presents a massive global challenge to the health sector. Looking to help tackle this problem are researchers from the School of Metallurgy and Materials at the University of Birmingham, who have developed a long lasting anti-bacterial surface for stainless steel.

Until now attempts to make stainless steel with anti-bacterial properties have been unsuccessful. Previous work has most often involved the use of very thin implanted layers or soft polymer based coatings which have limited durability, leading to the antibacterial properties being short lived. These problems have now been overcome by development of a novel plasma surface alloying technique which incorporates silver or copper as the anti-bacterial agent along with nitrogen and carbon to form a hard wearing resistant surface case.

Professor Hanshan Dong, who has led the research at the University of Birmingham said:

'This novel alloying treatment not only improves wear resistance but also confers antibacterial activity to stainless steel surfaces. Tests have shown that the antibacterial properties of the stainless steel were still intact after surface treated instruments had been cleaned 120 times.'

As well as wide applications in the health sector for items such as medical instruments and hospital equipment, the technology could also have applications for the food sector both in food manufacture and on food preparation surfaces. The anti-bacterial technology could also be used for stainless steel knives and kitchen implements in both the catering industry and in the home.

New coat

Gas turbines have a wide range of uses and are found in power generation plants where they operate at high temperatures in corrosive conditions caused by the types of fuel used. Modern turbine blades are cast in super alloys optimised for mechanical integrity but prone to corrosion from fuel contaminants and combustion by-products. Protection from the harsh operating environment can be provided by a self-healing ceramic and metallic coating system. Bio-fuels are increasingly used in power generating turbines but are inherently 'dirtier' than fuel from mineral reserves. As use of these sustainable fuels increases, corrosion problems will increase, leading to higher maintenance costs.

Existing coating systems work well in aero-engines which operate at high temperatures and where an alumina protective oxide, grown from the metallic layer, seals the component. However, industrial gas turbines used in power generation operate at intermediate temperatures and with more corrosive environments and the oxide formed is not as effective. This leads to oxidation damage and a reduced service life. Now scientists, led by Professor Hugh Evans, at the University of Birmingham's School of Materials and Metallurgy have developed a new thermal barrier coating system specifically for industrial turbine blades which operate at intermediate temperatures in oxidising and corrosive environments.

Dr Mary Taylor one of the lead researchers on the project said:

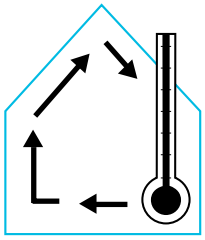
'The new bond coat is based on chromia forming materials that are more resistant to the corrosive elements in the dirty fuels typically used in industrial turbines. One of the key benefits of the new coating is that it can be applied more cost effectively than existing coating technologies.'

Technology and IP

Learn more
www.alta.bham.ac.uk
Contact: info@alta.bham.ac.uk

A snapshot of some of the technologies currently available from Alta Innovations, the University of Birmingham's technology transfer company.

think energy



Hot stuff!

A collaborative project between a West Midlands SME, Landy Vent, and the University of Birmingham has evaluated the performance of the Company's unusual heating system and provided some interesting results.

Landy Vent's new 'ECCO Stove' uses age old principles but is made with silicon carbide to maximise efficiency, create lower emissions and decrease running costs. The whole structure of the ECCO Stove features silicon carbide which enables very high temperatures to be reached in the combustion chamber (typically 900–1000°C). The benefit of using such material is that silicon carbide is able to reflect heat back into the fire chamber for higher burn temperature; absorb these extreme temperatures and then release the heat slowly. The heat conduction properties of silicon carbide are primarily used in electrical conductors and furnaces but have not been traditionally used in home heating systems. Landy Vent wanted to demonstrate the benefits of the ECCO Stove and approached the Manufacturing Advisory Service (MAS) for advice. MAS suggested that they talk to experts in thermofluids from the University of Birmingham.

Researchers from the University's department of Mechanical Engineering, Dr Raya Al-Dadah and Dr Saad Mahmoud, set about installing temperature measuring devices connected to dataloggers and continuously monitored the temperature in a two-storey 'test' cottage where the ECCO Stove had been installed. Of particular interest was the temperature distribution throughout the cottage, in various positions and levels, not just at the location of the stove. Both the ECCO Stove and a more conventional metal stove were tested consecutively with temperatures being logged every 10 minutes over a three day period in cold January.

The results showed that there was a greater reduction in the temperature difference with distance from the metal stove, indicating that the effect of the metal stove decreases with distance. This could be due to the innovative use of silicon carbide producing a lower thermal capacity than that of the metal stove. The larger thermal mass of the Ecco Stove allowed heat to be released more evenly and consistently allowing the stove to maintain uniform temperature throughout the building.

'Breaking into the established stove market with our new EccoStove has been a challenge and the results from this project with the University of Birmingham will certainly help to demonstrate the benefits that it can bring.'

David Ashmore
Managing Director, Landy Vent UK Ltd

Business engagement

Learn more
www.birmingham.ac.uk/partners
Contact: businessteam@bham.ac.uk

Getting a-head!

HEINEKEN are a major international brewer with many popular brands such as Heineken, Foster's and Bulmers Cider. Brewers are active in minimising their CO_2 emissions, including those from the fermentation process, and also in reducing the cost for disposal of process wastes such as spent grain or apple pomace. Researchers from the School of Biosciences and Chemical Engineering at the University of Birmingham teamed up with Heineken to investigate potential solutions for these issues.

An initial project looked into potential uses for the spent grain. Research found that it could be treated with hot compressed water to release fermentable sugars and demonstrated efficient bio-hydrogen production using these new sugars as the raw material.

A second project looking into brewery CO_2 showed that it can provide the carbon source for high-value edible microbes called Spirulina and that the Spirulina can share the same space as the hydrogen-producing bacteria using a new 'beam-sharing' technique. Before this discovery, the waste-to-hydrogen bioreactor and the CO_2-to-foodstuff bioreactor would have to take up separate spaces meaning that less could be achieved on limited available ground area, whereas 'beam-sharing' enables an integrated, efficient CO_2-abatement and waste-to-hydrogen system.

'We set out to investigate how we could reduce and utilise our CO_2 emissions in innovative ways. This work showed that the science and techniques were possible and we recognised the further potential for an integrated bioreactor to improve efficiency and reduce cost. At this early stage further development will be required to bring the bioreactor to market. I am grateful for the expertise at the University of Birmingham accessed through the SCRA Hydrogen Project, which highlighted the exciting potential.'

Richard Heathcote
Sustainable Development Manager
HEINEKEN UK Limited

*The Science City Research Alliance (SCRA) is a strategic union between two of the leading research universities in the Midlands, the University of Birmingham and the University of Warwick. The Alliance was formed under the Birmingham Science City initiative and has benefited from a multi-million pound investment by Advantage West Midlands (AWM) and the European Regional Development Fund (ERDF).

Science City Research Alliance (SCRA)

Learn more
www.birminghamsciencecity.co.uk/research-alliance
Contact: r.simpson.1@bham.ac.uk

think health

Commercialising IP from the University of Birmingham

Abingdon Health Ltd, a specialist medical diagnostics company, and the University of Birmingham have each committed £1 million of investment into their joint venture, Biosciences Ventures Limited, which is commercialising the intellectual property generated at the University in the field of medical diagnostics.

Bioscience Ventures is developing and marketing new diagnostics tools for conditions where there is currently an unmet medical need, focussing on therapeutic areas such as oncology and genetic diseases. It is also commercialising a proprietary platform technology with many potential applications including the detection of infectious diseases, drug testing and in veterinary medicine.

The funds will be used to invest in new opportunities within the University as well as accelerate the development of Bioscience Venture's existing companies including Serascience Ltd, which is developing point-of-care (near-patient) devices for the management of myeloma and related conditions, and Alta Bioscience Ltd which is expanding its speciality chemical synthesis and analysis services.

University of Birmingham spinout companies

Learn more
www.birmingham.ac.uk/partners
contact: d.coleman@bham.ac.uk

'This investment demonstrates both Abingdon's and the University's commitment to Bioscience Ventures and our confidence in its ability to create added value from this intellectual property. Through combining the University's world-class expertise and intellectual property with Abingdon's strong track record of commercialisation, we are creating a new range of products that address the growing demand for faster, simpler and more accurate diagnostic tools.'

Chris Hand, CEO of Abingdon Health

Measuring the flow

Paraytec is a UK based scientific instrument company manufacturing and distributing a range of products for pharmaceutical and biopharmaceutical applications.

They are constantly striving to build further capability into their instruments and one of the key problems they were facing was how to characterise the key attributes of biotherapeutic proteins whilst using extremely small volumes (10 microlitres or less) of what is a very high value material.

Usually the proteins are injected into, and driven by pressure, through a capillary, and their concentration profiles visualised at two windows. Analysis of these profiles yields some information about protein size and solution viscosity. Further development of the analysis techniques and application of mathematical modelling was expected to significantly improve the efficiency of measurements.

Working with researchers from the University's School of Mathematics, led by Dr Jamal Uddin, the Company embarked on a KTP project* which established a theoretical framework for the modelling of concentration-dependent effects under the flow conditions relevant to Paraytec's TDA200 instrument. The model provided a theoretical basis from which the extraction of concentration dependent parameters can be achieved.

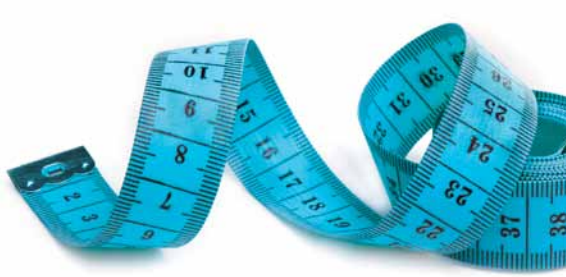
'We are delighted with the outcome of the project. We now have a sound theoretical model upon which to build further capability into our instrumentation. We have very much enjoyed working with the University of Birmingham and would recommend the shorter KTP approach to other companies.'

Professor David Goodall
CSO, Paraytec Ltd

* This project was part of the programme of industrial mathematics shorter KTPs managed by the Knowledge Transfer Network (KTN) for industrial mathematics. The KTN works to exploit mathematics as an engine for innovation. It is supported by the Technology Strategy Board, in its role as the UK's national innovation agency, and the Engineering and Physical Sciences Research Council, in its role as the main UK government agency for funding research and training in engineering and the physical sciences.

Knowledge Transfer Partnerships (KTP)

Learn more
www.birmingham.ac.uk/ktp
contact: ktp@contacts.bham.ac.uk



think business

University of Birmingham recognised for knowledge transfer excellence by the Lord Stafford Awards

Cllr James McKay – Cabinet Member for a Green, Safe and Smart City **Richard Bassett** – KTP associate, BUCCANEER project **Professor David Eastwood** – Vice-Chancellor, University of Birmingham **Professor Lawrence Young** – Pro-Vice Chancellor and Head of the College of Medical and Dental Sciences, University of Birmingham **Dr Chris Hand** – Executive Chairman, Bioscience Ventures

Pioneering joint venture company, Bioscience Ventures Ltd and an innovative partnership with Birmingham City Council which developed a climate modelling tool have both been recognised at the prestigious Lord Stafford Awards held on Thursday 15 November.

Bioscience Ventures collected the 'Open collaboration award' demonstrating impact from a University and business partnership. The University of Birmingham collaborated with commercial partner Abingdon Health Ltd to form a joint venture company called Biosciences Ventures Ltd. Bioscience Ventures was created to enhance and expand the commercial applications of IP created by the University and to move this IP up the value chain, providing an efficient alternative to the normal models for commercialising University IP (licensing or creating a spin-out) – see also separate story on page 6.

The award for Environment Sustainability went to the BUCCANEER project (Birmingham Urban Climate Change and Neighbourhood Estimates of Environmental Risk). The project, created as a KTP partnership with the University of Birmingham and Birmingham City Council, developed an interactive online tool for enhancing decision making amongst city planners, public health and developers to deliver a more sustainable future for Birmingham. For the first time decisions can be taken with consideration of the varying heat stress across the city caused by the urban heat island and the likely impacts of climate change up to 2100. Layers of socioeconomic and environmental vulnerability highlight areas of high risk to prioritise action. Thanks to the BUCCANEER, Birmingham will become an international expert in climate modelling.

Professor David Eastwood, Vice-Chancellor and Principal said:

'The Lord Stafford Awards pioneered championing the importance of collaborations between universities and industry. I am especially proud of the University of Birmingham's own record of success in supporting business growth and I am delighted that two of our innovative partnerships have been recognised this evening.'

Business engagement

Learn more
www.birmingham.ac.uk/partners
contact: businessteam@bham.ac.uk

Academics develop entrepreneurial ideas

Recognising the value of creating a thriving entrepreneurial culture to support its academic team to develop their innovative ideas and catch the eye of potential investors, the University of Birmingham has recently launched it's second Enterprising Birmingham competition.

The innovation competition is designed to highlight and reward researchers at the University who have identified a commercial opportunity based on their research. Shortlisted finalists, who have the chance to win a share of £24k in prize money to further develop their project, will be invited to present to a panel of expert judges at a showcase event on Tuesday 26 March.

The event will take place at the University's prestigious Business School and is expected to be a lively demonstration of the entrepreneurial spirit of the University of Birmingham. Organisations from both the public and private sector are invited to attend please register your interest using the details below.

With thanks to Enterprising Birmingham sponsors Deloitte, Marks and Clerk, MTC, Sandvik and Withers and Rogers

Enterprising Birmingham

Learn more
contact: c.mansell@bham.ac.uk

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We use our research expertise to solve tomorrow's problems today

Whether you are a large corporate organisation or a small business, and whether you require a short term solution or have a long term project in mind, you can tap into the world-class expertise at the University of Birmingham. Our five colleges, 3000 academic staff and leading-edge facilities can be accessed in the following ways:

Intellectual property licences
We have a varied portfolio of medical, biomedical, engineering and environmental patents available for licensing. So whether it's a life-changing vaccine or a piece of time-saving technology, our intellectual property could become your company's crowning glory.

Objective expert consultancy
We can send you the brightest minds from a wide range of scientific disciplines to help boost your organisation's knowledge and resources.

Collaborative projects and partnerships
We can work with you to develop strategic, collaborative partnerships involving other universities, businesses, public sector bodies, government and other funders to achieve a common and shared goal.

Contract R&D
Join forces with our researchers to work on your organisation's specific research and development needs.

Access to funding
We can help you navigate your way through the various funding opportunities available and find you a suitable academic partner to work with.

State-of-the-art equipment, testing wand analysis
Utilise our state-of-the-art scientific equipment or train members of your team on a particular technique. Our researchers are on hand to offer technical support, problem solving and help with product development.

Conferencing facilities
If you are hosting conferences, meetings or events, our Conference Park has first class facilities. The campus boasts its own art gallery, concert-hall and railway station all within minutes of Birmingham City Centre.

Continuing Professional Development (CPD)
We can train your key personnel through one of our Continuing Professional Development courses.

Knowledge Transfer Partnerships (KTP)
Enter a three-way knowledge transfer partnership with the University and a high calibre graduate to work on a project for a period of between 18 months and 3 years.

Student internships, placements and graduate recruitment
We offer a range of opportunities for you to promote your graduate and undergraduate vacancies to our students, from structured part-time work, internships and placements to graduate employment.

Business accommodation
If you are looking for office space to house your organisation Birmingham Research Park on the University campus offers purpose built accommodation for companies seeking to work in research, development and training.

Business engagement

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UNIVERSITY OF BIRMINGHAM

Edgbaston, Birmingham,
B15 2TT, United Kingdom
www.birmingham.ac.uk

Business Engagement
University of Birmingham
Edgbaston
Birmingham
B15 2SQ
Tel: +44 (0)121 414 3898
Fax: +44 (0)121 414 7151
businessteam@bham.ac.uk