

Innovative Manufacturing Research Centres

Centres of excellence working
across the breadth of
manufacturing research
to support the future of
UK Manufacturing.

The Engineering and Physical Sciences Research Council has invested over £100 million in 16 key centres of manufacturing research to strengthen and expand partnerships between leading researchers, industry and other stakeholders.

THE BATH INNOVATIVE DESIGN AND MANUFACTURING RESEARCH CENTRE (IdMRC)

The IdMRC is a £7.4m centre which undertakes world-leading research into the design and manufacture of machines, systems and processes. The Centre is unique in combining a design focus with a strong emphasis on manufacture in a closely integrated group. The context of the Centre's work is:

- globally distributed design and manufacture of complex products and processes
- the move from test based (physical prototypes) to simulation based (virtual prototypes) engineering
- the importance of verification and validation
- the movement towards sustainable engineering practice
- the key importance in engineering of knowledge and information management.

The Bath IdMRC's mission is to develop tools, methods and knowledge, underpinned by appropriate theory and fundamental research, to support engineering enterprises in these new circumstances. In particular, the focus of the Centre is on whole life design information and knowledge management, and on improving the design of machines, processes and systems, especially through design search, manufacturing interoperability and integrated metrology.

**Director: Professor Chris McMahon, email: enscam@bath.ac.uk
Website: www.bath.ac.uk/eimrc/**

CAMBRIDGE ENGINEERING DESIGN CENTRE

The Cambridge Engineering Design Centre (EDC) undertakes innovative research to create understanding, methods and tools that will contribute to improving the design process. This will be achieved through fundamental and applied research, knowledge transfer, and promotion of the importance of effective engineering design.

Major research themes include:

- Knowledge Management: Capture, Storage and Retrieval of Design Rationale.
- Process Management: Modelling the Design Process.
- Change Management: Modelling Change in Products.
- Computational Design: Integrated Optimisation Methods and Tools.
- Healthcare Design: Design for Patient Safety.
- Inclusive Design: Countering Design Exclusion.
- Design Practice: Understanding and Comparing Practice.
- Service Design: Integrated Product and Service Design.

The IMRC grant value is £6.5m, representing about 40% of the EDC's research income.

**Director: Professor John Clarkson, email: pjc10@eng.cam.ac.uk
Website: www-edc.eng.cam.ac.uk/**

CAMBRIDGE IMRC-INSTITUTE FOR MANUFACTURING

The IMRC at Cambridge University's Institute for Manufacturing draws from the expertise of established research centres and groups to tackle emerging industrial themes and strengthen their combined research programme, encompassing research into manufacturing management and production technologies. The manufacturing management themes are: structuring and managing international supply networks, rapid technology acquisition and deployment, and manufacturing knowledge and communication. The production technology themes are: flexible and reconfigurable production processes, high value technical innovations (enabling the production of innovative high value products through new technologies), and sustainable and responsive production. Consultation, collaboration and networking activities with industry and other research groups ensures that all themes address the predicted needs of the UK manufacturing sector. Over 200 researchers, at all levels and from a range of disciplines, work in the Institute for Manufacturing, with over 20 companies engaged through the £7m IMRC grant.

**Director: Professor Mike Gregory, email: mjg@eng.cam.ac.uk
Website: www.ifm.eng.cam.ac.uk/imrc/**

CARDIFF INNOVATIVE MANUFACTURING RESEARCH CENTRE

The mission of Cardiff University IMRC is to assist in the recovery of the UK manufacturing sector through the provision of sustainable solutions, achieved via research in the critically interrelated areas of business change, logistics and advanced manufacturing technologies. CUIMRC is the result of a collaboration between members of three of Cardiff University's leading research teams, the Lean Enterprise Research Centre, the Logistics Systems Dynamics Group and the Manufacturing Engineering Centre. The centre's £3.25m grant (£4m with industrial contributions) supports the work of over 30 researchers at all levels covering a wide ranging mixture of both business and engineering expertise and also includes visitors from collaborating institutions both in the UK and from overseas. While the original focus of the centre was primarily geared towards the economic aspects of sustainable manufacturing, CUIMRC is increasingly expanding its activities to include the environmental and social elements too.

**Director: Professor Peter Hines, email: hinespa@cf.ac.uk
Website: www.cuimrc.cf.ac.uk/**

CRANFIELD IMRC

The Cranfield IMRC is a £9.2m centre which funds research projects in all three schools. The IMRC focuses its research in two themes; manufacturing technology (moving UK manufacturing up the value chain) and product/ service systems (creating added value by packaging manufactured products and services together). The IMRC sits across the three schools of the university and has 35 academic staff and 35 postdoctoral research staff. The IMRC plays a leading role in shaping manufacturing research in the university and identifying key technologies that will be needed in the next 10 - 15 years. The manufacturing technology theme includes research into precision technologies (such as ultra precision machining and superabrasive turning) and materials processing (including activities in pipeline welding and lightweight composite structures). The Product/Service Systems theme looks at identifying the need to explore practices, decision processes and the manufacturing environment. Cranfield IMRC has excellent links with industry and across academia.

**Director: Professor David Stephenson, email: d.j.stephenson@cranfield.ac.uk
Website: www.cranfield.ac.uk/imrc/**

HEALTH AND CARE INFRASTRUCTURE RESEARCH AND INNOVATION CENTRE (HaCIRIC)

HaCIRIC (Health and Care Infrastructure Research and Innovation Centre), is a unique collaborative venture by Imperial College and the universities of Salford, Loughborough and Reading to create an £11m research centre. It has been fostered by a grant of £7.2m from EPSRC. The Centre has been established to create a unique resource of skills and knowledge to inform the development of policy and practice for the provision of strategically critical healthcare facilities and infrastructure for the next 20 years and promote innovation in healthcare infrastructure for the 21st century. Ensuring the investment in infrastructure is right for emerging forms of care delivery requires careful planning and innovative approaches, but this has proved a major challenge for policy makers and the care services; HaCIRIC will tackle these challenges. The research programme includes major new research projects designed to improve the way healthcare buildings are planned, designed, procured and delivered, and research on the likely impact of innovative new approaches to this for the NHS and social care system.

**Director: Mr Oliver Wells, email: o.wells@imperial.ac.uk
Website: www.haciric.org/**

IMPERIAL INNOVATION STUDIES CENTRE (ISC)

The Innovation Studies Centre (ISC) at Imperial College London is undertaking a £3.27m, five-year research programme examining the nature and impact of innovation processes and how scientific and engineering potential can be unlocked for future prosperity. Innovation is the lifeblood of almost every business and ISC's work seeks to develop and improve the innovative capability of UK-based firms. Our aim is to improve innovative performance, by finding better ways to develop and exploit new ideas. The Centre was established as the Built Environment Innovation Centre (BEIC). Whilst maintaining its strong focus on design, engineering and construction in the built environment, it has expanded rapidly to encompass innovation in engineering, science and technology-based industries. Research is organised in four themes covering the lifecycle of the innovation process, from knowledge creation to commercialisation:

- Knowledge for innovation.
- Visualisation and design.
- Project business.
- Transfer and adoption.

The Centre works closely with a small number of strategic partners including Arup, Atkins, Willmott Dixon, Laing O'Rourke plc, and is extending its collaborative relationships with firms including QinetiQ, IBM, GSK and BP. In the first three years of its activity, ISC has raised additional core funding from industry and sponsors of more than £8m.

**Director: Professor David Gann, email: d.gann@imperial.ac.uk
Website: www.3.imperial.ac.uk/innovationstudies**

INNOVATIVE CONSTRUCTION RESEARCH CENTRE (ICRC)

The Innovative Construction Research Centre (ICRC) at Reading University comprises a £3.7m, five-year programme of research aimed at enhancing the contribution of the built environment to society at large and the broader competitiveness of the UK economy. The primary research focus is the strategic interface between client organisations and the process and product of construction. A socio-technical systems perspective is adopted that combines engineering research methods with those derived from the social sciences. The ICRC is committed to working collaboratively with leading players in the UK construction sector to encourage the development of a knowledge based industry responsive to change. The aim is to foster innovation, human resource development and an investment in advanced technology. At the centre of the ICRC vision is the through life integration of design, construction and facilities management. The ICRC research portfolio is structured around six inter-connecting themes: Integration of design, construction and facilities management; Knowledge management and organisational learning; Human resource management and the culture of the industry; Innovative procurement; Innovation in through-life service delivery; and Construction sector competitiveness.

**Director: Professor Stuart Green, email: s.d.green@reading.ac.uk
Website: www.icrc-reading.org/**

INNOVATIVE ELECTRONICS MANUFACTURING RESEARCH CENTRE

The leMRC is focused on research in electronics manufacturing and has partners throughout the electronics manufacturing value chain. The leMRC is a distributed research activity which is open to new participants. The administrative hub is based at Loughborough University, with the executive function shared by the Universities of Bath, Brunel, Greenwich, Lancaster, Loughborough, Sheffield and Strathclyde. The research projects supported by the leMRC's £5.45m budget encompass a range of research themes: agile enterprises; sustainable products, manufacturing and the environment; challenging environments-new application areas; manufacturing business processes; design for X, materials, and manufacturing processes and technology. Through these projects over 100 researchers working at all levels are supported at 20 academic institutions, with over 50 companies involved as partners on these projects. The advantage of open nature of the leMRC is that it allows the most appropriate groups to do the research of relevance to an industry which has become very diverse.

**Director: Professor Paul Conway, email: p.p.conway@lboro.ac.uk,
Website: www.lboro.ac.uk/research/iemrc/**

INNOVATIVE MANUFACTURING RESEARCH CENTRE (IMRC) FOR BIOPROCESSING

The University College London Bioprocessing Centre has a £5.5m portfolio of projects concerned with creating new ways of proceeding faster from discovery to bioprocess. This has become especially critical for the new generation of complex pharmaceuticals which embrace human proteins and are likely to include in the future human genes and cells.

Because of the extraordinarily rigorous safety trials applied to new medicines, over 90% of candidates fail. This makes it unrealistic to run large-scale manufacturing trials until very late in development and increasingly these trials are proceeding with difficulty and delay. Given that a new drug only generates enough to repay the £0.5 billion of development cost during the short period of exclusivity, any such delay is serious as the irreversible loss of financial return is typically £1-3 millions per day. The UCL approach uses micro biochemical engineering studies and models of the whole bioprocess. Together these can predict performance in some cases and identify critical process issues with others. In this way the development team can go to the pilot plant with insight so that a few highly focused trials can be planned.

**Director: Professor NJ Titchener-Hooker, email: nigelth@ucl.ac.uk
Website: www.ucl.ac.uk/biochemeng/industry/imrc.htm**

LOUGHBOROUGH INNOVATIVE MANUFACTURING AND CONSTRUCTION RESEARCH CENTRE

The key objectives of this £18m EPSRC funded Centre is to:

- define and develop high quality research projects that meet the needs of industry, its clients and customers, and enhance the knowledge base
- forge close partnerships with existing and new industrial collaborators in addressing their core technical and business needs
- disseminate research findings widely and to actively engage in technology transfer to industry
- collaborate with other cognate research groups in the UK in order to collectively advance UK manufacturing and construction engineering
- strengthen and exploit established links with other leading international research groups.

The Centre has been structured into three research units (Construction, Product Customer Interface and Manufacturing) working across five research programmes (Transforming Organisations, High Value Assets, Healthy & Secure Future, Next Generation Technologies, Customised Products).

**Director: Professor Phill Dickens, email: p.dickens@lboro.ac.uk
Website: www.lboro.ac.uk/imrc/**

MULTIDISCIPLINARY ASSESSMENT OF TECHNOLOGY CENTRE FOR HEALTH (MATCH)

MATCH is a 5-year, £3.6m research collaboration between five universities (Birmingham, Brunel, KCL, Nottingham & Ulster). MATCH aims to transform the medical devices sector through better decision making, so that companies bring better products to market more quickly and less expensively. MATCH is also influencing policy and providing the NHS with better methods for buying technology.

While a major theme of MATCH lies in making economic evaluation available to companies and to procurement agencies, it also focuses strongly on eliciting and articulating user needs in a way that will influence design. Finally, MATCH aims to integrate the user and economic perspectives into viable business strategies. Interest in MATCH is rising at present. The current position is that there are more than 20 MATCH Partners (SMEs to global giants), companies that have contributed a total of more than £400k in cash. A similar amount has been committed by the regional development agency, Invest NI. MATCH is also sponsored by the NHS through the NPSA and PaSA with commitments above £300k.

**Director: Professor Terry Young, email: Terry.Young@brunel.ac.uk
Website: www.match.ac.uk**

NOTTINGHAM IMRC (NIMRC)

NIMRC's distinctive strength is developing knowledge driven manufacturing to create high value products, new methods, materials, processes and systems. NIMRC has three research themes in this £9.9m centre; advanced manufacturing technology, lightweight structures manufacturing and responsive manufacturing enterprise. The advanced manufacturing technology research theme focuses on delivering next generation manufacturing technologies for market driven, cost efficient, environmentally friendly production. The key research activities are metal forming, precision engineering and intelligent and reconfigurable activities.

The lightweight structures manufacturing theme investigates the manufacturing technology and engineering science of lightweight structures including polymers, composites, and lightweight metals and alloys. Current research focuses on the automated manufacture of large compliant structures, lightweight automotive structures, low pressure processing and textile composite manufacture and performance. The responsive manufacturing enterprise theme builds on Nottingham's strengths in production planning and control, supply chain analysis and responsive manufacturing.

**Director: Professor Nabil Gindy, email: nabil@nottingham.ac.uk
Website: <http://nimrc.nottingham.ac.uk/index.htm>**

SALFORD CENTRE FOR RESEARCH AND INNOVATION (SCRI) IN THE BUILT AND HUMAN ENVIRONMENT

The Salford Centre for Research and Innovation (SCRI) is undertaking a £4.9m, five-year programme of construction and built and human environment research. The Centre brings together a diverse group of leading international academics from the schools of the Built Environment, Computing, Science and Engineering, and Art and Design. SCRI's mission is to be recognised as one of the leading multidisciplinary centres in the built and human environment nationally and internationally, in order to deliver a construction industry that is valued by society. Research themes cover issues related to process, people, IT and integration. SCRI collaborates closely with more than 60 national and international companies and institutions, representing all elements of the supply chain. The Centre develops industry relevant and appropriate research-based processes, management and operational frameworks, and Information Technology solutions in a holistic, multidisciplinary, integrating and inclusive manner.

**Director: Professor Ghassan Aouad, email: G.Aouad@salford.ac.uk
Website: www.scri.salford.ac.uk**

SCOTTISH MANUFACTURING INSTITUTE

The SMI, based in Heriot-Watt University, has a £4.2m portfolio of projects aimed at delivering high impact research in innovative manufacturing through a multidisciplinary team incorporating expertise in digital tools, microsystems and photonics. This IMRC is pivotal partner in the research pooling activities taking place in Scotland and is involved in two of the grand challenges projects, Knowledge and Information Management and 3D Mintegration, leading the latter. The SMI has 12 active academic researchers, with over 30 postdoctoral researchers and postgraduate students. The portfolio of research being undertaken by the SMI runs from projects on the capture/retrieval/visualisation of 3D data, the development of microengineered devices, through to laser micromachining of optics and ceramics to give some examples. Some 30 companies and other partners participate in these projects and training activities, the benefit of which is most clearly demonstrated by the contributions they make to the activities of the SMI, which can be valued at over £3.5m.

**Director: Professor Julian Jones, email: j.jones@hw.ac.uk
Website: www.smi.hw.ac.uk/**

WARWICK INNOVATIVE MANUFACTURING RESEARCH CENTRE (WIMRC)

The aim of the £8m EPSRC funded Warwick IMRC to be a centre of research excellence, demonstrating an ability to innovate, influence and perform in manufacturing research internationally at the highest academic level by applying competencies in cross disciplinary research in manufacturing technology and operations, materials, business processes and related management activities to enhance the competitiveness and effectiveness of organisations within the specific sectors of intelligent and eco-friendly vehicles (IEV) and lean healthcare (LH).

WIMRC is currently funding a number of scoping and feasibility projects as part of an initiative to identify and define suitable research projects to be supported by future EPSRC IMRC funding.

**Director: Dr Ken Young, email: K.W.Young@warwick.ac.uk
Website: go.warwick.ac.uk/wimrc**



EPSRC invest over £600 million a year in research and postgraduate training in engineering and physical sciences so the UK will be prepared for the next generation of technological change.

Who we are

We are the UK's main agency for funding research in engineering and the physical sciences – from maths to materials science, and from information technology to structural engineering.

Investment in research and training must produce the knowledge and expertise the UK needs to maintain its technological leading edge.

To achieve this, we support:

- **research areas** that are of interest to a particular industry; and
- **people** who are crucial to the success of the UK's research and industrial competitiveness.

IMRCs are awarded 5 year grants within which researchers have the flexibility to shift resources internally to reflect changing priorities and their research aims.

We are an independent organisation funded by the Government.

You can find out more by visiting our website

www.epsrc.ac.uk

