

## **Multi-million pound grant boosts Ink-jet research For immediate release**

It may sound like science fiction, but industry could soon be producing complex electronics and hi-tech gadgetry simply by pressing the print button.

A consortium, led by the University of Cambridge, has been awarded a multi-million pound grant to investigate how ink-jet print technology could revolutionise manufacturing processes.

The group, headed by Professor Ian Hutchings of the Institute for Manufacturing (IfM), has been awarded £5m by the Engineering and Physical Sciences Research Council (EPSRC).

The consortium comprises collaborators from two other Cambridge departments, the Universities of Durham and Leeds, and a group of nine companies which include the major UK players in the ink-jet sector.

The £5m award, with additional funding from industry, will support a five-year programme of research to study the formulation, jetting and deposition of specialist printing fluids, and develop an overall process model. This work will improve the robustness of industrial ink-jet printing and help companies develop new applications for the technology.

Ink-jet technology involves the generation, manipulation and deposition of microscopic drops of liquid under digital control.

The speed and quality of its printing have allowed ink-jet to dominate the home PC printing market, and the fact that the process can be 'scaled up' means it is moving into the professional printing sector too.

What makes ink-jet so fascinating is that the same technology that is used for printing pictures and text can also be used to manufacture high-value, high precision products such as flat-panel displays, printed electronics, and photovoltaic cells for power generation.

But as Professor Hutchings, head of the IfM's Production Processes Group, explained, these exciting possibilities may only be fully realised if we have a better understanding of the science.

"In many ways the development of ink-jet technologies for industrial applications has moved ahead of our understanding of the basic science, and that is what the new research programme will tackle.

"By extending the existing benefits of ink-jet methods to attain the speed, coverage and material diversity of conventional printing and manufacturing systems, we can transform ink-jet from its present status as a niche technology into a group of mainstream processes, with the UK as a major player.

"But in order for this transformation to happen, we need a much better understanding of the science underlying the formation and behaviour of very small liquid drops at very short timescales, and to widen the range of materials which can be manipulated in this way. "

Cambridge was the home to some of the earliest work on ink-jet printing at Cambridge Consultants in the 1970s, and the East of England now contains a cluster of world-class companies exploiting this technology.

The city also houses the Ink-jet Research Centre which was set up in 2005 within the IfM to study generic scientific problems of ink-jet printing.

Notes to editors:

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### **1. The Institute for Manufacturing**

The University of Cambridge's Institute for Manufacturing (IfM), is a division of the Department of Engineering. The IfM brings together expertise in management, economics and technology to address the full spectrum of industrial issues. Its activities integrate research and education with practical application in companies, providing a unique environment for the creation of new ideas and approaches to modern industrial practice.

The IfM works closely with industry, at a regional, national and international level, providing strategic, technical and operational expertise to help companies to grow and to become more competitive. This work brings benefits to both parties. Industry receives practical solutions based on the latest applied research. The university receives live feedback to help set the agenda for new research.

### **2. Professor Ian Hutchings**

Professor Ian Hutchings is the GKN Professor of Manufacturing Engineering in the University of Cambridge. He is also a Fellow of St John's College. His research interests which involve extensive collaboration with industry, have included many aspects of tribology (the study of friction and wear), and most recently, the science and technology behind ink-jet printing. He is the author of a widely-used textbook, 'Tribology: Friction and Wear of Engineering Materials' published in 1992, and numerous journal and conference papers. He is a Fellow of the Royal Academy of Engineering. He has been Chairman of St John's Innovation Centre Ltd. since 1996.

### **3. Consortium members:**

Academic partners:

Professor Ian Hutchings and Dr Graham Martin, University of Cambridge: Department of Engineering

Professor Malcolm Mackley, University of Cambridge: Department of Chemical Engineering  
Professor John Hinch, University of Cambridge: Department of Applied Mathematics and  
Theoretical Physics  
Professor Jas Pal Badyal and Professor Colin Bain, University of Durham: Department of  
Chemistry  
Dr Oliver Harlen, University of Leeds: Department of Mathematics;  
Professor Simon Biggs, University of Leeds: Institute of Particle Science and Engineering  
Dr Mark Wilson, University of Leeds: School of Mechanical Engineering;

**Industrial partners:**

Cambridge Display Technology Ltd, Domino UK Ltd, FFEI Ltd., Inca Digital Printers Ltd,  
GlaxoSmithKline, Linx Printing Technologies plc, Sericol Group Ltd, Xaar plc, Sun Chemical Ltd.

**4. The Ink-jet Research Centre**

The Ink-jet Research Centre (IRC) was established in March 2005, strongly supported by a group of UK companies, to carry out research into the generic science which underlies this important new technology. The Centre is part of the Institute for Manufacturing in the Engineering Department of the University of Cambridge. The IRC employs experts in ink-jet technology, fluid mechanics, visualisation, analysis and computation to study jet and drop creation, drop flight and drop/surface interaction. The Centre also has interests in the application of ink-jet to fabrication, the printing of functional materials and biological components. Staff at the IRC collaborate closely with colleagues in other disciplines, elsewhere in Cambridge and in other universities. The Centre has developed very high resolution (temporal and spatial) imaging techniques along with image and data analysis methods, and these studies, combined with rheological measurements and computational fluid dynamics, provide a rich insight into ink-jet performance and the behaviour of these complex systems.