The Innovative Manufacturing Research Conference

Scottish Manufacturing Institute

The Second annual conference of the Scottish Manufacturing Institute (SMI) provides both an overview of SMI research activities in the three main theme areas of areas of Digital Tools, Micro-mechanical Systems (MEMS) & Photonics based Manufacturing Technologies, and invited presentations from leading international figures in relevant manufacturing technologies. It also provides a forum for leading international academics and industrialists to share knowledge and experience.

To facilitate effective dialogue, Poster Presentations will be the main vehicle for showcasing SMI research; conference attendees are also invited to submit contributed poster papers (see below).

Launched in 2003 with a £4.2 million Grant from EPSRC and financial support and active collaboration from industry, the SMI is based at Heriot-Watt University's Riccarton Campus in Edinburgh. It is one of the centres funded by EPSRC for manufacturing research in the UK and the only Innovative Manufacturing Research Centre (IMRC) in Scotland. The SMI is themed around three areas crucial to future manufacturing innovation: **Digital Tools**, **Micro-mechanical Systems (MEMS)** & **Photonics-based Technologies**. The SMI Conference offers opportunities to learn about academic research at the frontiers in each of these areas.

Programme

Tuesday 27 June 2006

19.30	**RECEPTION***
20.00	**DINNER***

*Scholar Restaurant, Hugh Nisbet Building, Heriot-Watt University, Edinburgh Campus.

Wednesday 28 June 2006

08.45	**REGISTRATION AND COFFEE**

Room EM1.83**, Earl Mountbatten Building, Heriot-Watt University, Edinburgh Campus.

09.25 (EM1.82)**	**Welcome:** Professor Julian Jones (Director, SMI)

** **Room Abreviations:** HW Computing & Electrical Engineering Crush Area (HW Comp/Elec Crush Area). HW Earl Mountbatten Building (EM1.82). HW Earl Mountbatten Building (EM1.83).

09.30-10.15	First Speaker (EM1.82)** **Dr Willem Bronsvoort**
10.15-11.00	Second Speaker (EM1.82)** **Prof Stewart Williams**
11.00	**COFFEE** (EM1.83)**
11.20-12.05	Presentations by SMI research team (EM1.82)**
12.05-13.00	Brief overview from presenter of each poster session (EM1.82)**
13.00-14.30	**POSTER SESSION AND LUNCH**

Posters manned from 13.30-14.30 (HW Comp/Elec Crush Area)**

Examples of posters are listed below:

Laser Joining in Micro-Manufacture

Photometric Stereo for Mass Use

Stress Engineering

CO_2 Laser Smoothing of Silica

Short Pulsed Laser Micromachining of Industrial Ceramics

TTOM Awards-supporting University to SME Technology Transfer

Fibre Optic Delivery for High Power CO_2 Lasers

RADIKAL Team: A one-stop shop for building collaborations between academic researchers and Scottish companies

Laser Forming of Aerospace Alloys

14.30-15.15	Third Speaker (EM1.82)** **Prof Deepak Uttamchandani**
15.15-16.15	Laboratory visit**
16.15	**CLOSE**

OVERVIEW OF CONFERENCE

The conference offers a good opportunity to gain an overview of SMI research activities in the three main themes of Digital Tools, MEMS and Photonics based manufacturing technologies.With invited presentations from leading figures. It also provides a forum for leading academics and industrialists to share knowledge and experience. To facilitate effective dialogue, poster presentations will be the main vehicle for show-casing SMI research, conference attendees are also invited to submit contributed posters.

09.30 Speaker 1:
Dr Willem Bronsvoort

Dr Willem F. Bronsvoort is associate professor CAD/CAM at the Faculty of Electrical Engineering, Mathematics and Computer Science of Delft University of Technology, The Netherlands. His main research area is feature modelling, in particular semantic, multiple-view and freeform feature modelling. He has published numerous papers in international journals, books and conference proceedings, is on the editorial board of several journals, and has served on many program committees of conferences.

ABSTRACT:
DEVELOPMENTS IN FEATURE MODELLING

Feature modelling is nowadays the predominant way of product modelling, in which geometric and functional information is stored in a single product model. The basic concepts of feature modelling in general, and the state of the art in commercial feature modelling systems, will be presented first. This will be followed by an overview of four major developments that solve shortcomings in such systems.

First, in semantic feature modelling, it is possible to more adequately specify and maintain the meaning of features. Second, in multiple-view feature modelling, there is a specific feature model for each product development phase. Third, in collaborative feature modelling, teams of users can collaborate on the development of a product with full feature modelling functionality. Fourth, in freeform feature modelling, features with freeform shapes are made available. Some other developments are mentioned as well.

10.15 Speaker 2:
Professor Stewart Williams

Prof Stewart Williams accepted a Chair in Welding Science and Engineering and joined the Welding Engineering Research Centre at Cranfield University as Director in 2005.

Professor Williams has a degree in physics and studied in laser physics for his PhD. He has 23 years experience in industrial research. Initially for a small company building lasers systems. He then ran a group at the corporate research centre of BAE Systems (formerly British Aerospace) working on a wide range of laser processes for manufacturing applications. This included welding, surface treatments, marking, drilling and cutting. This work was later extended to friction stir welding, arc welding processes, stress engineering and process modelling.

Areas of expertise: welding, laser processing, additive manufacture, modelling and stress engineering.

ABSTRACT:

LASER HYBRID LASER-ARC PIPELINE WELDING USING A HIGH POWER FIBRE LASER

Installation of new pipelines is predicted to grow at a rapid rate and there is a high demand to improve the productivity of girth welding. Laser and hybrid laser-arc welding using a fibre laser offers significant potential due to the very small footprint and high overall efficiency. Through various optimisations good quality root pass welds could be made at a welding speed of 4 m/min. Results of this study and assessment of the benefits of the fibre laser will be discussed.

14.00 Speaker 3:
Professor Deepak Uttamchandani

Prof Deepak Uttamchandani is Professor of Microsystems Engineering. He was awarded a PhD in 1985 from University College London where his research was in the field of frequency modulated semiconductor laser radar and their applications to optical sensor networks. In 1986, he joined the Department of Electronic and Electrical Engineering, University of Strathclyde as a Lecturer. His research interests were initially in optical and fibre-optic sensors and systems. Since the late 1980s he has been growing research in the field of microtechnology including: techniques for the characterisation of micromechanical properties of materials; optically excited microresonator sensors; commercial-foundry-centred microfabrication of MEMS in polysilicon and silicon-on-insulator, MEMS design, excimer laser micromachining applications and radio-frequency (RF) MEMS. He has edited 2 books, guest-edited 2 journals and authored/co-authored around 200 publications. He is Founding Editor and Editor-in-Chief of the recently launched Micro & Nano Letters journal published by the IET.

ABSTRACT:

EXPERIENCE WITH COMMERCIAL FOUNDRY MEMS

Commercial foundry supplied MEMS offers a low-cost entry into the MEMS domain, and opens up the field of MEMS to research groups who are not equipped with expensive in-house microfabrication facilities. This talk will share the speaker's experience of using foundry MEMS to undertake research projects in the fields of optoelectronic and RF devices, and will give examples of how "post-processing" can be applied for value addition to foundry MEMS devices.

Due to the limited number of places, (100 at conference and 80 at meal), early registration is requested. Completed registration forms should be returned to d.j.nisbet@hw.ac.uk.

If you require any further information please contact: David Nisbet at d.j.nisbet@hw.ac.uk