James Watt Institute for High Value Manufacturing

HERIOT WATT UNIVERSITY

# TECHNICAL PROGRAMME

# Agile Manufacturing

8th July 2011

**Postgraduate Centre,** Heriot Watt University, Edinburgh

**08.15** REGISTRATION & COFFEE

**09.00** *Welcome*
**Prof Denis Hall** (HW-IMRC Director)

**09.10** *Introduction to Annual Conference*
**Professor Steve Chapman** (Principal and Vice Chancellor HWU Edinburgh)

**09.20** *Future Direction James Watt Institute for High Value Manufacturing*
**Prof Marc Desmulliez** (JWI Director, HWU)

## SESSION ADVANCED ROBOTICS

**09.35** **KEYNOTE I** *Versatile automated gauging – a new approach to component inspection*
**Dr Kevyn Jonas** (Renishaw Plc)

**10.05** *Free Form Shape Measurement*
**Dr Yvonne Huddart** (Renishaw Plc) and **Prof Andrew Moore** (HW-IMRC Investigator)

**10.25** **KEYNOTE II** *On the Use of UNDERACTUATION IN adaptive Robotic Grasping*
**Prof Clément Gosselin** (Laval University Canada)

**10.55** COFFEE BREAK

## SESSION ADDITIVE TECHNOLOGIES

**11.20** **KEYNOTE III** *Additive Manufacturing – exploring the low carbon potential and the move to multifunctionality*
**Prof Richard Hague** (Loughborough University)

**11.50** *YAGboss - Laser based micro-processing of metal surfaces*
**Dr Stephanie Giet** (HW-IMRC Research Associate)

**12.10** *Knowledge-based Rapid Prototyping*
**Dr. Theo Lim** (HW-IMRC Investigator)

**12.20** **Poster 'Trailer' Session (1 minute per person)**

**13.00** LUNCH AND POSTER SESSION + Demonstrations

## SESSION ENGAGEMENT WITH INDUSTRY

**14.30** *How Industry can Interact with JWI*
**Prof Duncan Hand** (Acting Head of EPS)

**14.50** *Discussion on Industry club - The Multi partner Strategic Alliance:*
**Prof Marc Desmulliez** (HW-IMRC) and **Mr Gordon Winton** (IPE HWU)

**15.10** *Wrap-up and Networking*
**Prof Denis Hall** (HW)

**15.15** COFFEE AND TEA

# Versatile automated gauging – a new approach to component inspection

**Dr Kevyn Jonas**
Director & General Manager
Automation and Measurement Products Division,
Director of Renishaw Advanced Materials
Renishaw plc

**Abstract:**
Reacting to part design changes is a challenge faced by custom gauge users in manufacturing. Hard gauges are designed and built to measure specifics; when the design of the part to be measured changes the associated gauge requires a level of re-engineering or even re-invention. This re-design period can be a substantial bottleneck to a manufacturer. A more 'Agile' approach is to design a versatile gauging system that can react to part design changes very quickly. Moreover, if this versatile gauge were able to be re-configured to not only react to minimal design changes but rather to complete part changes, then a new process control methodology can be realised in the factory. Multiple gauges could serve multiple manufacturing lines and throughput in each tuned to suit variable demand. Gauging and fixturing budgets can be optimised in step with the efficiency improvements made on the manufacturing lines employing them.

## Short Biography

Dr Kevyn Jonas has a PhD in Mechanical Engineering from Cranfield University specialising in hydrodynamic lubrication in rolling element bearings. He graduated from Loughborough University with an honours degree in mathematics in 1993, and following studying for the PhD joined Renishaw Plc in 1997. After holding several positions in Renishaw including Special Projects Manager he is now Director and General Manager of the newest product division in Renishaw specialising in Automation and Measurement products. Dr Jonas is also Director of Renishaw Advanced Materials.

Over the past 5 years Dr Jonas has sponsored numerous collaborative projects with many universities including with Heriot-Watt University as part of a Strategic Alliance of which he is a founding steering committee member.

EQUATOR™
the versatile gauge™

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# Additive Manufacturing – exploring the low carbon potential and the move to multifunctionality

**Professor Richard Hague**
Loughborough University

**Abstract:**
Recent research activity at Loughborough University has shown the very real potential of Additive Manufacturing (AM) to substantially reduce the carbon footprint of manufactured components in aerospace and automotive applications. This presentation will give the latest results of the ongoing ATKINS TSB project that has so far yielded significant findings in areas of process development, materials, design optimisation and business re-orientation for Selective Laser Melted titanium and aluminium components. Additionally, an introduction to the newly awarded EPSRC Centre for Innovative Manufacturing in Additive Manufacturing will be given, detailing the new Centre's focus on exploiting the design freedoms inherent in AM for the direct "printing" of electro-optical interconnects within additively manufactured constructs for the direct production of ready assembled systems.

## Short Biography

Richard is Director of the EPSRC Centre for Innovative Manufacturing in Additive Manufacturing and Head of the Additive Manufacturing Research Group at Loughborough University and has been working in the AM field for 18years. He has a background of undertaking large multi-disciplinary, multi-partner research projects and his research interests are focused on AM specific processes, materials and design / design systems across a wide spectrum of industrial sectors. Richard is Chair of the International Conference on Additive Manufacturing and a main Committee member of the ASTM F42 AM Standards initiative.


# On the use of underactuation in adaptive robotic grasping

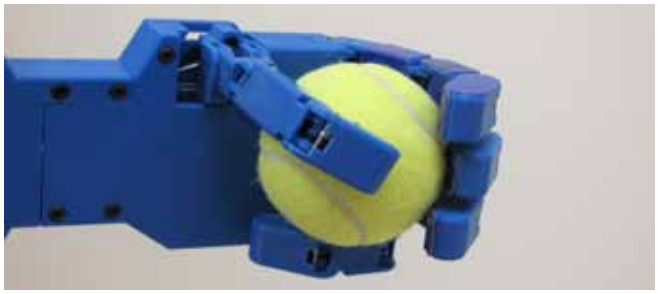
**Professor Clément Gosselin**
Laval University Canada

**Abstract:**
The capability to grasp a variety of objects is a highly desirable feature for adaptive robots. Indeed, developing versatile robotic hands has been considered a key milestone of robotics science for several decades. Numerous research initiatives addressed this difficult challenge and a large number of prototypes have been built. Among other approaches, underactuation has attracted significant attention and has led to several successful prototypes, including commercially available robotic hands. In the current state of technology, underactuation can perhaps be considered one of the most promising avenues for the development of effective and versatile robotic hands.

This presentation will summarize some of the research work on underactuated grasping that has been completed in the Laval University Robotics Laboratory over the past two decades. First, underactuation will be discussed as a fundamental paradigm and its application to grasping will be briefly reviewed. Examples of successful designs of underactuated hands developed at Laval will then be used to highlight the characteristics that make underactuated hands effective. These examples pertain to applications in space robotics, in the handling of hazardous materials, in anthropomorphic robotics and in prosthetics. Finally, current trends and challenges will be analysed in order to provide insight into future research directions.

## Short Biography

Clément Gosselin completed his Ph.D. degree in Mechanical Engineering at McGill University, Montréal, Canada, in 1988 and received the D.W. Ambridge Award from McGill for the best thesis in Physical Sciences and Engineering. He then accepted a fellowship from the French Government in order to pursue work at INRIA, Sophia-Antipolis, France for a year. He joined Université Laval, Québec, Canada, in 1989, where he founded the Robotics Laboratory and became a full Professor in 1997. He has been holding a Tier 1 Canada Research Chair in Robotics and Mechatronics since 2001. His research interests include parallel mechanisms, robotic hands and human-robot cooperation. His work in these areas has been the subject of two books, several patents and numerous publications in international journals and conferences. He has so far supervised more than 80 graduate students and he has collaborated with many industrial partners including GM, CAE, MDA, IREQ and UKAEA. Professor Gosselin has been an associate editor of the ASME Journal of Mechanical Design, the IEEE Transactions on Robotics and Mechanism and Machine Theory. He is a fellow of the ASME and a senior member of the IEEE. Among other distinctions, he received the I. Ω. Smith award from the Canadian Society of Mechanical Engineering in 1993, the ASME Mechanisms and Robotics Committee Award in 2008 and he was appointed Officer of the Order of Canada by the Governor General in 2010. He has been active in research on underactuated robotic hands for two decades.



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