Tutorials

Tuesday 9 May 2017
Building 50

Prior to the Conference on 9 May, three half-day tutorials given by the world-leading researchers are planned, especially for young engineers and students. The topics are very relevant to CIRP STC Dn's research activities.

Attendees should report to the registration desk in Building 50 where tutorial materials and instructions will be given.

11:30–13:00	Registration		
	Room one	**Room two**	**Room three**
13:00–17:30	**Tutorial one**	**Tutorial two**	**Tutorial three**
	Axiomatic design: An introduction and perspectives with recent advances	An introduction to the basic tools and ideas of TRIZ	Application of augmented reality in complex industrial settings
18:00–20:00	Welcome Drinks at Cranfield Management Development Centre (CMDC)		

Tutorial one
Axiomatic design: An introduction and perspectives with recent advances

Professor Christopher A. Brown
Professor of Mechanical Engineering
Worcester Polytechnic Institute,
Worcester, Massachusetts, USA

In 1983 Brown earned his PhD at the University of Vermont where he learned about Axiomatic Design from Nam Suh. He then spent four years as a scientific collaborator in the Materials Department at the Swiss Federal Institute of Technology. For two years he was a senior research engineer designing product and processes at Atlas Copco's European research center. Since the fall of 1989 Chris has been on the faculty at WPI. Chris has published over a hundred articles on axiomatic design, sports engineering, manufacturing processes, and surface metrology. He has patents on a fractal method for characterising surface roughness, an apparatus for friction testing, and on sports equipment. He teaches grad courses on axiomatic design of manufacturing processes, and on surface metrology, and an undergraduate course on the technology of alpine skiing. He also consults, and teaches courses, for industry on axiomatic design and on surface metrology.

Fundamental principles of Axiomatic Design (AD) are reviewed, with insights and perspectives of over 30 years of teaching and practice. This should be of interest to beginners and to all levels of users. The latest methods for using AD, qualitatively and quantitatively, for selecting the best design solutions and for fostering innovations are presented. AD, originating with Nam Suh at MIT in the late 1970s, contends that all good designs comply with two axioms: maintaining independence of the functional elements and minimising information content. AD can add value and reduce costs in designs and in the design process. Emphasis is placed on techniques for decomposing design problems into valid, corresponding functional and physical hierarchies, and using metrics, to facilitate rigorous application of the axioms. This tutorial is intended for design practitioners and students, who might have never used Axiomatic Design, or who would like a fresh perspective. It would also be useful for people who would like to see this approach to teaching AD.

Tutorial two
An introduction to the basic tools and ideas of TRIZ

Dr. Tom H.J. Vaneker
University of Twente, The Netherlands,
Boardmember of the European TRIZ Association

Topics
- History, typical use and basic principles of TRIZ
- Case studies and industrial examples
- Practical session one: TRIZ for problem solving
- Practical session two: TRIZ for innovation forecasting

Tutorial three
Application of augmented reality in complex industrial settings

Dr. John Ahmet Erkoyuncu
Through-life Engineering Services Centre,
Cranfield University

Dr. John Erkoyuncu is a Lecturer in Service Simulation and Visualisation. John is the Deputy Director of the Through-life Engineering Services Centre.

Samuel Court
Through-life Engineering Services Centre,
Cranfield University

Samuel Court is a Software Development Engineer and Lab Manager in the Operations Excellence Institute.

This session will be divided into two sections, where the first part will focus on augmented reality (AR) demonstrations with cutting edge hardware (e.g. HoloLens, NViz), and software on a variety of applications ranging from aerospace, defence, rail and healthcare sectors. This session will also involve a presentation of an overview of the applications in AR.

The second part of the session will focus on a workshop that aims to design a new AR application in industrial maintenance following guidelines that the research team provides. This will involve setting out a scenario, functional requirements, hardware and software options available, human skills and roles, etc.