



IC2 CONFERENCE

28 September 2012

hosted by Grundfos

The industrial conference will present results from a large EU project funded by the European Commission (NMP-2009-4.0-5) focusing on
INNOVATIVE AND KNOWLEDGE-BASED TOOLING INDUSTRY
with contributions also from representatives from the industry.

Location	Grundfos A/S, Poul Due Jensen Academy Poul Due Jensens Vej 7 DK-8850 Bjerringbro
Time	9:30-16:00
Registration	Sign in by email to Lone Larsen, DTI at lel@dti.dk or phone +45 72201571
Deadline	Monday 24.09.2012 at the latest

New production methods and organizational models enabling competitive injection moulding in Europe

A pre-request for competitive injection moulding in Europe is the ability to produce new and better performing injection moulding tools as well as shortening the time from concept to products. The industrial conference presents a tooling concept based on CNC machining combined with additive manufacturing. The tools are protected with new coatings with embedded sensors providing on-line monitoring. The value chain is structured through new organizational and business models.



Programme - 28 September 2012

09:30-10:00 Registration, coffee and networking

10:00-10:20 An introduction to the EU project IC2 - Intelligent and Customized tooling



Lars Tore Gellein, Coordinator of the IC2 project, SINTEF Raufoss Manufacturing AS, Norway
A broad overview of the IC2 project is presented as an introduction to the subsequent, more focused presentations given by other representatives from the consortium. The introduction will focus on the main idea behind the project and the expected outcome of the well-balanced and strong IC2 consortium.

Lars Tore Gellein graduated from the Norwegian University of Science and Technology in Trondheim, Institute of Engineering Cybernetics (MSc in 2004). He worked for Kongsberg Automotive AS (traineeship, production engineer and R&D-manager) for some years before he started working as a researcher at SINTEF in 2008. He presently works as Research Director for the Production Technology department at SINTEF Raufoss Manufacturing AS.

10:20-10:40 Hybrid Manufacturing – combining subtractive and additive manufacturing techniques

Klas Boivie, SINTEF, Norway



State-of-the-art additive manufacturing (AM) of metallic materials has enabled the production of industrial grade tooling with conformal cooling channels, which brings significant improvements of e.g. process cycle times and the quality of the final product. However, the production of tool inserts by AM is most often far from being rapid and the cost is usually considerably higher than for conventionally produced inserts. A combination of AM with CNC milling in a hybrid process route allows for the most advantageous production of the parts and features of the insert geometry. However, the combination of fundamentally different process principles increases the number of process steps, where different requirements must be fulfilled to prepare for the following process step. IC2 WP4 is developing a more integrated solution to hybrid manufacturing where a metallic powder bed AM machine is combined with a conventional 5-axis CNC milling machine to form a hybrid manufacturing cell.

Klas Boivie, has a M.Sc. in materials' science and received a Doctorate in additive manufacturing technology at The Royal Institute of Technology (KTH) in Stockholm 2004. After two years as a Post-Doc at the Norwegian University of Science and Technology, he is presently employed as a Senior Researcher at SINTEF Raufoss Manufacturing AS in Trondheim.

10:40-11:00 Electrically insulating coatings for sensor embedding and protective coatings with tailored slip properties

Bjarke Holl Christensen, Danish Technological Institute, Denmark



Electrically insulating coatings are of vital importance for sensor embedding in surfaces of injection moulding tools to become a reality. Different approaches to obtain insulating coatings based on various techniques will be presented and results will be discussed. To protect the embedded sensors from damage, wear-protective coatings can be made. In addition to the wear protection, these coatings must also ensure good slip properties between the mould and the produced parts. Examples of good wear-protective coatings will be given.

Bjarke Holl Christensen, finalized in 2008 his PhD in physics from the University of Aarhus. Since then he has been working at the Tribology Centre at Danish Technological Institute, where he has been working as a specialist on coating development for various applications.

11:00-11:20 Fabrication of surface embedded sensors – gaining knowledge from the mould

Tommy Schönberg, Acreo, Sweden



On-line feedback in real time from industrial processes is very useful for optimizing parameters such as cycle times, throughput and quality assurance of the fabricated products. It is also crucial for optimizing the moulding tools. Today there is a wide range of discrete sensors available on the market. For situations where these kinds of sensors are not enough, the IC2 project is developing a method of fabricating sensors directly on the surface of the tool part creating intelligent tool parts with surface embedded sensors.

Tommy Schönberg has been working with MEMS based sensors and actuators for 10 years both in industry and at the research institute Acreo. He has a MSc degree in Electrical Engineering from the Royal Institute of Technology.

11:20-11:40 Industrial demonstrators - an instrumentality to shift R&D results into real business processes.
Dr. Martin Geiger, Corp, Germany



The main reason for companies to participate in R&D projects is to achieve an advantage in competition by the use of innovative and economical technologies and methods. Therefore, it is important to test and evaluate the R&D results with regard to real-life business situations. Important tools for these evaluations are industrial demonstrators located at the industrial partners' plants. The presentation will show the method of such industrial demonstrators and some examples, where the later industrial use of IC2 R&D results will be illustrated.

Dr. Martin Geiger is working as a consultant in Rapid Product Development (RPD) as a freelancer. Starting in 1991, he worked 6 years as senior researcher in the field of RPD at Fraunhofer IPA and 4 years at DaimlerChrysler AG. In 2001, he created his own company Coachulting and coordinates industrial knowledge networks and consults companies in knowledge management and process optimisation in RPD. Furthermore, he is R&D coordinator at cirp in a side job.

11:40-12:00 Practical challenges in advanced injection moulding.

Lars Stenerud, Plasto AS, Norway



Plasto, as one of the SMEs in IC2, will give examples of typical challenges that they are facing in advanced plastic moulding. The main focus will be on an industrial case that is used as a demonstrator in the IC2 project. The case is related to a product that features several thin, critical sections which are moulded by deep crevices in the tool inserts.

Lars Stenerud is Managing Director and one of the owners of Plasto AS, a leading Norwegian plastic moulding company. In addition he holds several key positions related to Norwegian manufacturing and education, such as chairman of the Board of SFI Norman - an eight year research program, board member of The Faculty of Engineering Science and Technology at The Norwegian University of Science and Technology (NTNU), as well as Norwegian representative in the Manufature High Level Group. He has his master degree from NTNU.

12:00-13:00 Lunch

13:00-13:20 High performing surfaces and new ways of polishing

Peter Falk, Polérteknik, Denmark



The challenges that a small company is facing when participating in a large EU project and how to transform input from the project into tangible and profitable results at the involved SMEs. Examples of results, benefits and future prospects as a result of participation in EU-projects will be exemplified.

Peter Falk is an experienced consultant working with business development, process optimization and making ideas to a profitable business. Specialized in helping SMEs. Peter represents Polérteknik and Recon, two SMEs in the IC2 project.

13:20-13:40 New business opportunities in the tooling sector – impact of new technologies on the value chain

Stephan Schüle, University of Stuttgart – Institute for Human Factors and Technology Management, Germany



New technologies like hybrid manufacturing, surface embedded sensors or wear-resistant coatings will enable new business opportunities for toolmakers and their suppliers but also change the way of collaboration in the value chain. The presentation will give first insight into new business models in the tooling sector based on different workshops with IC2 end-users.

Stephan Schüle is a mechanical engineer graduated at the University of Stuttgart. He is employed at the Institute for Human Factors and Technology Management at the University of Stuttgart. Presently, he works on different research and consulting projects in the area of innovation and technology management.

13:40–14:00 Sirris - Smart Coating Application Lab



Ine Truijen, Sirris

Sirris is the R&D centre for the technological and engineering industry in Belgium. Sirris has established a Smart Coating Application Lab with a group specialised in PVD technology. Sirris closely collaborates with other knowledge centres and universities enabling companies to choose judiciously from the wide range of available coatings and production processes. Sirris have initiated a strategic direction of establishing a Smart Coating Application Lab. An introduction will be given to the Smart coating Lab and the services and current hot topics will be addressed.

Dr. Ine Truijen works since 2011 at Sirris on several PVD research and industrial projects focused on industrial applications. She obtained a PhD in Inorganic Chemistry on water based sol-gel research for photovoltaic applications at Hasselt University in cooperation with IMO, VITO and VUB.

14:00–14:20 High tech production at Grundfos



Johnny Overgaard, Grundfos A/S

Examples of new production technologies will be given and the procedure for implementing new production technologies at Grundfos will be discussed.

Johnny Overgaard, Department Head, TC Development, is responsible for implementation and development of new production technologies at Grundfos

14:20–14:40 Manufuture: What will the production and value chain look like in Europe in the future



Jesper de Claville Christiansen, Aalborg University, Denmark

New materials challenges manufacturing processes and required skills at R&D level. Results obtained in the finished EU project NANOTOUGH will be presented and the research plans for the future project EVOLUTION will show what might expect as state of the art technology of the European car industry 2025.

Jesper de Claville Christiansen is Professor on Aalborg University in Materials Science and Technology and Scientific Coordinator for Large EU FP-7 research projects like NANOTOUGH and EVOLUTION focusing mainly on the European car and Aviospace industry. Other activities comprise several national projects in close collaboration with Danish industry.

14:40–15:15 The value chain – discussion on next generation of moulds, requirements, specifications etc. facilitated by



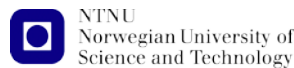
Claus Henriksen, the Danish Plastics Federation and Jesper de Claville Christiansen, Department of Mechanical and Manufacturing Engineering, Aalborg University, Denmark, who will discuss how the Danish industry looks at the constraints and demands to the mould and tool producers. Flexibility will be a keyword in the coming years.

15:15–16:00 Guided tour at Grundfos production facilities by *Johnny Overgaard, Grundfos A/S*

IC2 PROJECT

The project Intelligent and Customized tooling, in short IC2, addresses the tool cost and the time-to-customer as well as quality, performance and higher value-added tools utilizing a combination of: (i) hybrid manufacturing, (ii) surface embedded sensors, (iii) wear-resistant coatings with friction control and, (iv) novel organizational and business models. IC2 is focused on injection moulding tools, where research and technology developments are made into real demonstrators.

A clear success of the FP7 project, IC2, is to bring demonstrators into real applications, meeting industrial demands in actual production lines. It is therefore of utmost importance to match specifications as seen by e.g. Danish companies.



IC2 PROJECT PARTNERS

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