INTERNATIONAL CONFERENCE ON COMPETITIVE MANUFACTURING

COMA’13
The Challenge of Green Manufacturing

Final Programme

JANUARY 30 – FEBRUARY 1, 2013
STELLENBOSCH, SOUTH AFRICA

Organised by
Department of Industrial Engineering
Stellenbosch University
ACKNOWLEDGEMENTS

Sincere thanks to our distinguished supporters and sponsors, whose generosity made possible the success of this Conference.
Conference Chair  
Van der Merwe, A.F. Stellenbosch University, South Africa

Co-Chair  
Dimitrov, D. Stellenbosch University, South Africa

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Basson, A. Stellenbosch University, South Africa  
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Kals, H-JJ. University of Twente, The Netherlands  
Karpuschewski, B. Otto von Guericke University, Magdeburg, Germany  
Klocke, F. RWTH Aachen, Germany  
Kochan, D. APT, Germany  
Kruith, J-P. KULeuven, Belgium  
Laubscher, R. University of Johannesburg, South Africa  
Levy, G.N. IP Leiria, Portugal  
Lien, T.K. University of Science and Technology, Norway  
Lutters, E. University of Twente, The Netherlands  
Monostori, L. SZTAKI, Hungary  
Neugebauer, R. Technical University of Chemnitz, Germany  
Ni, J. University of Michigan, USA  
Pfeifer, T. RWTH Aachen, Germany  
Scheffer, C. Stellenbosch University, South Africa  
Schreve, K. Stellenbosch University, South Africa  
Schutte, C. Stellenbosch University, South Africa  
Sihn, W. TU Vienna, Austria  
Stich, V. RWTH Aachen, Germany  
Teti, R. University of Napoli, Italy  
Van Houten, F.J.A.M. University of Twente, The Netherlands  
Von Leipzig, K. Stellenbosch University, South Africa

Organizing Committee  
Dimitrov, D.  
Schutte, C.  
Treurnicht, N.  
Visser, T.  
Von Leipzig, K.

Rationale  
In a small world where trade is the new global driving force conquering countries and continents alike, international competitiveness is becoming the ultimate challenge of the new millennium. It requires high quality products manufactured with state-of-the-art technologies at low cost under the assumption of highly efficient operations management as well as clear corporate goals and strategy. This in turn is based on improved engineering training and education, relevant applied research and an active interaction between academia and industry.

The International Conference on Competitive Manufacturing (COMA '13) is taking place for the fifth time. The main objective of the conference is to present recent developments, research results and industrial experience related to the improvement of competitiveness in the field of manufacturing. A further objective of the conference is to be a generator of innovative ideas and fruitful collaboration both locally and abroad.

Topics  
The following areas are relevant to the conference theme:


Operations Management: Factory Planning, Production Planning and Control, Logistics, Modelling and Simulation, Scheduling, ERP-Applications, Supply Chain Management.

**TUESDAY, January 29, 2013**

15:30 – 18:00  **Registration**  
Wallenberg Centre  
(Stellenbosch Institute for Advanced Study, STIAS), Marais Street

18:00 – 20:00  **Conference Reception**  
Wallenberg Centre (STIAS)

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**WEDNESDAY, January 30, 2013**

07:30 – 09:00  **Registration**  
Wallenberg Centre

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Location</th>
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</table>
| 09:00 | **Introduction**  
Dr AF van der Merwe, Conference Chair  
*Stellenbosch University, Stellenbosch, South Africa* | Auditorium 1        |
| 09:05 | **Welcome of Guests**  
Prof HR Botman, Rector and Vice-Chancellor  
*Stellenbosch University, Stellenbosch, South Africa* | Auditorium 1        |
| 09:15 | **Welcome Address**  
Mr A Künne  
*Minister, Economic & Global Issues  
German Embassy Pretoria* | Auditorium 1        |
| 09:30 | **5th COMA – A Glance Back and Future Outlook**  
D Dimitrov, Conference Co-Chair  
*Stellenbosch University, Stellenbosch, South Africa* | Auditorium 1        |

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Wallenberg Centre (STIAS)
**WEDNESDAY, January 30, 2013**

**Plenary Session**
**The Challenge of Green Manufacturing**
Session Chair: Prof TE Cloete

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>09:40</td>
<td>Green Manufacturing as Innovation Driver for Business Excellence</td>
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<tr>
<td></td>
<td>H-J Bullinger</td>
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<td></td>
<td>Fraunhofer-Gesellschaft for Promotion of Applied Research, Munich, Germany</td>
</tr>
<tr>
<td>10:20</td>
<td>Factors Shaping Global Sustainable Manufacturing</td>
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<tr>
<td></td>
<td>J Ni</td>
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<td></td>
<td>Manufacturing Research Centre, University of Michigan, United States</td>
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</table>

**PLENARY SPEAKERS**

**Professor Dr.-Ing. habil. Prof. e.h. mult. Dr. h. c. mult. Hans-Jörg Bullinger** began his career at Daimler-Benz, before commencing study in mechanical engineering at the University of Stuttgart, wherefrom he also obtained his PhD degree in manufacturing. After two years lecturing at the University of Hagen, Dr. Bullinger was appointed professor at the University of Stuttgart. Besides his role as chairman of the University, Professor Bullinger was also director of the Institute for Human Factors and Technology Management (IAT) and the Fraunhofer-Institute for Industrial Engineering (IAO). From October 2002 until October 2012 he was President of the Fraunhofer-Gesellschaft, Corporate Management and Research and alternates afterwards to the Senate of Fraunhofer. During his rich career Prof. Bullinger was responsible for many applied research projects in the field of design and manufacturing. Much of his experience was gained working on projects abroad; he was often invited to lectures in the United States, Japan, Korea, China, India, Australia and South America. Professor Bullinger was awarded many high prestigious distinctions such the Commander’s Cross of the Order of Merit and later the Knight Commander’s Cross of the Order of Merit of the Federal Republic of Germany. He holds also a number of honorary degrees from various universities and published more than 1,000 articles and books on industrial engineering, technology and innovation management. Currently Professor Bullinger is Chairman of the «Industry-Science Research Alliance», the Advisory Board of the German Federal Government for implementation of its high-tech strategy.

**Professor Jun Ni, PhD** is the Shien-Ming Wu Collegiate Professor of Manufacturing Science and Professor of Mechanical Engineering at the University of Michigan, USA. He serves as the founding Dean of the University of Michigan – Shanghai Jiao Tong University Joint Institute located in Shanghai, China since 2006. He is the director of the S. M. Wu Manufacturing Research Center and the co-director of a National Science Foundation sponsored Industry/University Cooperative Research Center for Intelligent Maintenance Systems at the University of Michigan. He also serves as the Deputy Director for US-China Clean Energy Research Consortium – Clean Vehicle Center. Since 2010, Dr. Ni has been invited to participate in the Future of Manufacturing task force of the World Economic Forum and serves as the Vice Chair of the Global Agenda Council on Advanced Manufacturing. Selected honors and awards that Professor Ni received include the 2013 SME Gold Medal Award from Society of Manufacturing Engineers, 2011 Magnolia Gold Medal from Shanghai Government, 1994 Presidential Faculty Fellows Award from President Bill Clinton. He is Fellow of the American Society of Mechanical Engineering (ASME), Fellow of the Society of Manufacturing Engineers (SME), Fellow of International Society for Nanomanufacturing (ISNM), Fellow of International Society of Engineering Asset Management.
### Session A1

**Product Modelling and Design Conceptualisation**  
*Session Chair: Prof H Kals*

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speakers</th>
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</table>
| 11:30 | Ambiguity and Uncertainty of Requirements in Product Development                          | E Lutters, F van Houten  
*University of Twente, Enschede, The Netherlands*  |
| 11:50 | Production-Oriented Modular Platform Design                                                | G Schuh, S Rudolf, J Arnoscht  
*WZL, Aachen University of Technology, Germany*  |
| 12:10 | Feature Based Reverse Engineering of Compressor Blades                                      | K Schreve  
*Stellenbosch University, South Africa*  |
| 12:30 | A Hi Fambeni (LetsGo!) Proof of Concept for Hydrogen Mobility in Rural Areas              | B Bond  
*IAT, Tshwane University of Technology, South Africa*  |

**13:00 – 14:00**:  
**LUNCH BREAK**

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### Session B1

**Advances in Forming**  
*Session Chair: A Göschel*

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<tr>
<th>Time</th>
<th>Title</th>
<th>Speakers</th>
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</table>
| 11:30 | Rolling Processes for Gear Manufacturing – Potentials and Challenges                        | M Milbrandt, M Lahl, U Hellfritzsch, A Sterzing, R Neugebauer  
*Fraunhofer IWU, Chemnitz, Germany*  |
| 11:50 | Manufacturing Flexibilisation of Metal Forming Components by Tailored Blanks               | M Merklein, M Lechner  
*Institute of Manufacturing Technology, University of Erlangen-Nuremberg, Germany*  |
| 12:10 | Simulating an Innovative Austenitization Process Developed for Hot Stamping               | A Bester, S Meinel, R Müller, R Neugebauer  
*Chemnitz University of Technology, Germany  
Fraunhofer IWU, Chemnitz, Germany*  |
| 12:30 | Manufacturing of Geared Sheet Metal Components by a Single-stage Sheet-bulk Metal Forming Process | T Schneider, M Merklein  
*Chair of Manufacturing Technology, University of Erlangen-Nuremberg, Germany*  |

**13:00 – 14:00**:  
**LUNCH BREAK**
### WEDNESDAY, January 30, 2013

**Session A2**  
**Auditorium 1**  
**Track:** Innovative Tooling Design and Manufacture  
**Session Chair:** Prof D Dimitrov

<table>
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<tr>
<th>Time</th>
<th>Session</th>
<th>Details</th>
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</table>
| 14:00  | Session Keynote: Innovative Manufacturing Technologies - Success Factor for Modern Tool and Die Making | T Bergs  
*Fraunhofer Institute for Production Technology, Aachen, Germany* |
| 14:30  | Added Value in Tooling for Sheet Metal Forming through Additive Manufacturing | B Mueller, R Hund, R Malek, M Gebauer, S Polster, M Kotzian, R Neugebauer  
*Fraunhofer IWU Chemnitz, Germany*  
*BRAUN CarTec GmbH, Schwalbach, Germany*  
*Volkswagen AG, Wolfsburg, Germany* |
| 14:50  | Ultra-High Precision Machining of Modified High Strength Aluminium for Optical Mould Inserts | K Abou-El-Hosseinz, J Neethling, O Olufayo  
*Nelson Mandela Metropolitan University, South Africa* |
| 15:10  | Gripping Technology for Carbon Fibre Material | J Fleischer, A Ochs, F Förster  
*Institute of Production Science, wbk*  
*Karlsruhe Institute of Technology, Karlsruhe, Germany* |
| 15:30 – 16:00 | **TEA/COFFEE BREAK** | |

### WEDNESDAY, January 30, 2013

**Session C1**  
**Auditorium 2**  
**Product Design and Development**  
**Session Chair:** Prof A Basson

<table>
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<tr>
<th>Time</th>
<th>Session</th>
<th>Details</th>
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</table>
| 14:00  | Appropriateness of Life Cycle Assessments for Product/Packaging Combinations | E Lutters, EJ Oude Luttikhuis, ME Toxopeus, R ten Klooster  
*University of Twente, Enschede, The Netherlands* |
| 14:20  | The Design of Reconfigurable Manufacturing Systems for Product Mass Customisation | J Padayachee, G Bright  
*University of KwaZulu-Natal, Durban, South Africa* |
| 14:40  | Architecture for Building Web-Based Communication in Reconfigurable Manufacturing Systems (RMS) | AH Tseumogne Noumodje, K Mpofu, NS Tlale  
*Tshwane University of Technology, Pretoria, South Africa*  
*Anglo American, South Africa* |
| 15:00  | Creating a Flexible and Dynamic Map of Dutch Research in Design | W Dankers, E Lutters  
*University of Twente, Enschede, The Netherlands* |
| 15:30 – 16:00 | **TEA/COFFEE BREAK** | |
## Session B2 | Auditorium 1

**Track:** Innovative Tooling Design and Manufacture  
**Session Chair:** Prof D Dimitrov

### 16:00
**Session Keynote:** Tooling - a Critical Component of the South Africa Manufacturing Industry  
B Williamson, D van Dyk  
*Toolmaking Association of South Africa*

### 16:30
Methodology for Adaptive Management of Internal Value Creation Depth in the Tool and Die Industry  
G Schuh, K Kuhlmann, N Komorek, B Schittny  
*Laboratory for Machine Tools and Production Engineering (WZL), RWTH Aachen University, Germany*

### 16:50
New Developments in Efficient Energy Use by New Tooling Concepts for Composite Materials  
J Dietrich, D Kochan, Ch. Schütze  
*University of Applied Sciences Dresden, Germany*

### 17:10
The importance of modern material characterisation methods in energy efficient sheet metal forming process development  
P Weigel, A Bester, M Demmler, R Müller  
*Fraunhofer IWU Chemnitz, Germany*  
*Chemnitz University of Technology, Germany*

## Session C2 | Auditorium 2

**Session Chair:** Prof CJ Fourie

### 16:00
**Session Keynote:** Intelligent Maintenance Systems for Competitive Manufacturing  
J Ni  
*Manufacturing Research Centre, University of Michigan, USA*

### 16:30
Factory Planning Scrum: Integrative Factory Planning with Agile Project Management  
A Kampker, A Meckelnborg, P Burggräf, T Netz  
*RWTH Aachen University, Aachen, Germany*

### 16:50
Remote Machine Tool Control and Diagnostic Based on Web Technologies  
G M Martinov, A B Ljubinov, L I Martinova, A S Grigoriev  
*Moscow State Technological University STANKIN, Russian Federation*

### 17:10
Production Flow Control Using Biased Minimum Feedback  
A J Walker, G Bright  
*University of KwaZulu-Natal, South Africa*
**Plenary Session**

**Auditorium 1**

**Resource Efficient Products and Processes**

**Session Chair:** Prof FJAM van Houten

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**09:00**

**Resource Efficiency - Innovations in Production Engineering to Meet Challenges of the Future**

F Klocke  
*Fraunhofer Institute for Production Technology (IPT), Aachen, Germany*

**09:40**

**Metal Forming – Challenges from a Green Perspective**

A Sterzing, R Neugebauer, W-G Drossel  
*Fraunhofer Institute for Machine Tools and Forming Technology (IWU), Chemnitz, Germany*

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**10:20**

**Additive Manufacturing – Close to Industrial Break Trough - Challenges in Research and Applications**

G N Levy  
*Centre for Rapid and Sustainable Product Development (CDRsp), Polytechnic Institute of Leiria (IPL), Portugal*

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**11:00 – 11:30**  
**TEA/COFFEE BREAK**

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**PLENARY SPEAKERS**

**Professor Dr-Ing. Dr-Ing. E.H. Fritz Klocke** studied manufacturing engineering at the Technical University of Berlin, where he also obtained his engineering doctorate in 1982. Thereafter he took leading technical management positions in industry. In 1995 he was appointed Professor of Manufacturing Technology at the Aachen University of Technology and Head of the Chair of Manufacturing Technology and Co-director of the Laboratory for Machine Tools and Production Engineering (WZL), as well as Director of the Fraunhofer Institute for Production Technology (IPT) in Aachen. In 1995 he was awarded the Otto-Kienzle Memorial Coin by the Manufacturing Engineering University Group. In 2006 he received an honorary degree from the University of Hannover, followed in 2009 by another honorary degree from University of Thessaloniki, as well as in 2010 from Keio University. He is Fellow of the International Academy for Production Engineering and served in 2007/8 as its president. Professor Klocke is member of the advisory board of numerous institutions and companies.

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**Dr – Ing Andreas Sterzing** graduated in 1995 at the Chemnitz University of Technology with a MSc degree in Machine Tool Design, and in 2005 he obtained his doctorate in technical sciences. He started his career as a research engineer at the Fraunhofer Institute for Machine Tools and Forming Technology (IWU). In 2002 he became Group Leader Hydroforming and later Head of Department for Sheet Metal Forming. In 2008 Dr Sterzing was appointed Chief Engineer for Production Technologies. Currently he is Division Director “Bulk Metal Forming” at the Fraunhofer IWU Chemnitz.

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**Professor Dr Sc Gideon N. Levy** studied at the Technion (Israel Institute of Technology), Haifa, where in 1972 he also obtained his PhD degree. Thereafter he took leading positions in R & D departments of various renowned companies in Switzerland. In 1997 he became Head of Department Mechatronics Systems and later Head of the Institute for Rapid Product Development (RPD) at the University of Applied Sciences St. Gallen (FHS), Switzerland. Recently he moved to the Centre for Rapid and Sustainable Product Development at IP Leiria, Portugal. Prof. Levy’s career is devoted mainly to advance R&D in Mechanical/Electronic/ Manufacturing, specializing primarily in Electro- Physical & Chemical Processes. He holds 30 patents and is, among others, Fellow of CIRP (International Academy for Production Engineering) and Fellow of SME (Society of Manufacturing Engineers, Dearborn, USA). Professor Levy has been awarded the AMUG “Dinosaur” Award, the SME RTAM’s 2008 Industry Achievement Award, the Industrial and Academic Career Award in Virtual and Rapid Prototyping (Leiria, Portugal). In 2008 he was elected among the Top 25 Most Influential People in Rapid Prototyping and Additive Manufacturing.
## Session C3: Operations Planning
**Auditorium 1**

**Session Chair:** Prof V Stich

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
</tr>
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<tbody>
<tr>
<td>11:30</td>
<td>Energy Sensitive Digital Planning and Simulation</td>
<td>M Putz, A Schlegel, J Stoldt, C Schwerma, T Langer</td>
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<tr>
<td></td>
<td><em>Fraunhofer IWU, Chemnitz, Germany</em></td>
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<tr>
<td>11:50</td>
<td>Resource Consumption Calculation Tool to Enhance Efficiency in Production Processes</td>
<td>R Schmitt, G Schuh, M Hienzsch, T Kühn, N Komorek</td>
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<td></td>
<td><em>Chair of Metrology and Quality Management</em></td>
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<td><em>Chair of Production Engineering</em></td>
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<td><em>RWTH Aachen University, Aachen, Germany</em></td>
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<td><em>Vienna University of Technology / Fraunhofer Austria, Vienna, Austria</em></td>
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<td><em>TU Dortmund University, Dortmund, Germany</em></td>
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<tr>
<td>12:30</td>
<td>Flexible Planning Method for Manufacturing Resources Based on Process-graphs</td>
<td>D Bähre, P Steuer, M Swat, K Trapp</td>
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<td><em>Saarland University, Saarbrücken, Germany</em></td>
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<td></td>
<td><em>Center for Mechatronics and Automatization, Saarbrücken, Germany</em></td>
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### 13:00 – 14:00 **LUNCH BREAK**

## Session B3: Machining of Advanced Materials
**Auditorium 2**

**Session Chair:** Prof J Dietrich

<table>
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<tr>
<th>Time</th>
<th>Title</th>
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<tr>
<td></td>
<td><em>Fraunhofer IPT, Aachen, Germany</em></td>
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<tr>
<td>11:50</td>
<td>A Process Planning Framework for Milling of Titanium Alloys</td>
<td>D Dimitrov, PJT Conradie, G Oosthuizen</td>
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<td><em>Stellenbosch University, South Africa</em></td>
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<td><em>University of Johannesburg, South Africa</em></td>
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<tr>
<td>12:10</td>
<td>Residual Stress Depth Profiling of Commercially Pure Titanium Subjected to High Speed Machining Using Dispersive Diffraction</td>
<td>N Janse van Rensburg, DM Madyira, RF Laubscher, GA Oosthuizen</td>
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<td></td>
<td><em>University of Johannesburg, South Africa</em></td>
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<tr>
<td>12:30</td>
<td>Knowledge-based Engineering: An effective method for knowledge processing</td>
<td>Y Mvudi, JHC Pretorius, L Pretorius</td>
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<td></td>
<td><em>University of Johannesburg, University of Pretoria, South Africa</em></td>
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### 13:00 – 14:00 **LUNCH BREAK**
<table>
<thead>
<tr>
<th>Time</th>
<th>Session A3: Bio-Manufacturing</th>
<th>Time</th>
<th>Session C4: Green and Efficient Logistics</th>
</tr>
</thead>
</table>
| 14:00 | Session Keynote: Additive Manufacturing for Biomedical Applications  
P Bastolo  
*Polytechnic Institute of Leiria, Leiria, Portugal* | 14:00 | Logistics-oriented Production Scheduling in the Automotive Industry to Improve Outbound Logistics  
D Palm, W Sihn  
*Fraunhofer Austria Research GmbH, Vienna, Austria* |
| 14:30 | Precision- and Micro-manufacturing for Implants  
A Schubert, J Schneider, J Edelmann, S Groß, G Meichsner  
*Fraunhofer IWU, Chemnitz, Germany*  
*Saxony University of Technology, Chemnitz, Germany* | 14:20 | System Dynamics Simulation for Strategic Green Supply Chain Management  
M Mutingi, C Mbohwa, S Mhlanga, H Mapfaira  
*University of Botswana, Botswana*  
*University of Johannesburg, South Africa* |
| 14:50 | Advances in Customised Medical Prostheses through Additive Manufacturing with an Emphasis on Hip Replacement and Cervical Implants  
D Dimitrov, M Bezuidenhout, G Marcantonio  
*Laboratory for Rapid Product Development, Stellenbosch University, South Africa* | 14:40 | A Framework for Developing Performance Measurement Systems for “Green” Supply Chain Management strategies  
M Mutingi, S Mhlanga, C Mbohwa, H Mapfaira  
*University of Botswana, Botswana*  
*University of Johannesburg, South Africa*  
*University of South Africa, South Africa* |
| 15:10 | Reverse Engineering the Human Knee  
J van der Merwe, C Scheffer, DJ van den Heever, PJ Erasmus  
*Biomedical Engineering Research Group, Stellenbosch University, South Africa*  
*Knee Clinic, Stellenbosch MediClinic, Stellenbosch, South Africa* | 15:00 | Performance Measurement System for Efficiency of Intralogistics-Systems – a Practical Proposal  
G Bandow, A Wötzell, K-Y Man  
*University of Applied Sciences and Art, Dortmund, Germany*  
*TU Dortmund University, Germany* |
| 15:30 – 16:00 | TEA/COFFEE BREAK | 15:30 – 16:00 | TEA/COFFEE BREAK |
### Session B4

**Advances in Metrology and Inspection**

**Session Chair:** Prof K Schreve

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
<th>Institution</th>
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<tbody>
<tr>
<td>16:00</td>
<td>Flexible Measurement System for Modern Automobile Production</td>
<td>S Pretorius, KH du Preez, T van Niekerken</td>
<td>Nelson Mandela Metropolitan University, Port Elizabeth, South Africa</td>
</tr>
<tr>
<td>16:20</td>
<td>Genetic Algorithm for Artificial Neural Network Training for the Purpose of Automated Part Recognition</td>
<td>T van Niekerken</td>
<td>Nelson Mandela Metropolitan University, Port Elizabeth, South Africa</td>
</tr>
<tr>
<td>16:40</td>
<td>Investigation of Incorporating an Unmanned Land Vehicle for Inspection in Manufacturing Environments</td>
<td>A Chikwanha, R Stopforth</td>
<td>University of KwaZulu-Natal, Durban, South Africa</td>
</tr>
<tr>
<td>17:00</td>
<td>Application of a Camera for Measuring Robot Position Accuracy</td>
<td>TV Light, IA Gorlach, A Schönberg, R Schmitt</td>
<td>Nelson Mandela Metropolitan University, South Africa</td>
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<td>Aachen University of Technology, Aachen, Germany</td>
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### Session B5

**Micro - Manufacturing**

**Session Chair:** Dr AF van der Merwe

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<th>Time</th>
<th>Title</th>
<th>Authors</th>
<th>Institution</th>
</tr>
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<tbody>
<tr>
<td>16:00</td>
<td>Session Keynote: Micro-Manufacturing - Technologies for Microparts and Functionalized Surfaces</td>
<td>A Schubert</td>
<td>Chemnitz University of Technology, Chemnitz, Germany</td>
</tr>
<tr>
<td>16:30</td>
<td>Polyurethane Micro-gripper Utilizing Van-der-Waals’ Forces in Micro-assembly</td>
<td>S Matope, AF van der Merwe, T Dirkse van Schalkwyk, S Read, M Arderne, M Mueller</td>
<td>University of Stellenbosch, South Africa Chemnitz University of Technology, Chemnitz, Germany</td>
</tr>
<tr>
<td>16:50</td>
<td>Handling Robots for High-volume Micro-assembly – an Economic and Technological Comparison of Different Kinematic Principles</td>
<td>M Müller, S Read, S Matope, AF van der Merwe, V Wittstock, R Neugebauer</td>
<td>Chemnitz University of Technology, Chemnitz, Germany Stellenbosch University, South Africa</td>
</tr>
<tr>
<td>17:10</td>
<td>Micro-Milling of Bipolar Plates</td>
<td>T Dirkse van Schalkwyk</td>
<td>Department of Industrial Engineering, Stellenbosch University, South Africa</td>
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**19:30 - 24:00**

**Conference Gala Dinner**

**Neethlingshof Estate**

**Guest Speaker**

**Prof. Eugene Cloete**  
(Vice-Rector Research and Innovation)
FRIDAY, February 1, 2013

**Plenary Session**

The Way Forward
Session Chair: Prof W Eversheim

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30</td>
<td>CT Metrology for Engineering and Manufacturing</td>
<td>J-P Kruth (KU Leuven, Belgium)</td>
</tr>
<tr>
<td>09:10</td>
<td>Soul vs Science: The Story of Being Globally</td>
<td>A van der Merwe</td>
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<td></td>
<td>Competitive in a South African Context</td>
<td>Mercedes-Benz South Africa</td>
</tr>
<tr>
<td>09:50</td>
<td>Research at Fraunhofer - Selected Chances and</td>
<td>A Göschel, R Neugebauer</td>
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<td></td>
<td>Challenges for the Future</td>
<td>Fraunhofer-Gesellschaft for Promotion</td>
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<tr>
<td></td>
<td></td>
<td>of Applied Research, Munich, Germany</td>
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<tr>
<td>10:30</td>
<td><strong>TEA/COFFEE BREAK</strong></td>
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**PLENARY SPEAKERS**

**Professor Dr. Ir. Jean-Pierre Kruth** obtained his PhD degree at KU Leuven, Belgium, in 1979 and worked in various industrial research organisations in Belgium and abroad before being appointed in 1987 on a full time position at the same university. He is full professor at KU Leuven and is responsible for Production Engineering research and education at the division PMA (Production engineering, Machine design and Automation) of the Department of Mechanical Engineering. He is, among others, Fellow of CIRP (International Academy for Production Engineering) and Fellow of SME (Society of Manufacturing Engineers, Dearborn, USA). He is also founding board member of several companies: MATERIALISE N.V., METRIS N.V. (now Nikon Metrology N.V.) and LayerWise N.V. Professor Kruth has been awarded among others the F.W. Taylor Medal (CIRP), the Knight of the Laser Technology award (Erlangen, D), the Industrial and Academic Career Award in Virtual and Rapid Prototyping (Leiria, Portugal) and the International (Senior) Freeform and Additive Manufacturing Excellence Award (FAME), Austin, Texas, USA.

**Mr Arno van der Merwe** obtained in 1994 his BSc degree in Industrial Engineering from Stellenbosch University. He started his career as an industrial engineer at the Mercedes-Benz plant in East London. In 1997 he was appointed Logistics Material Supply Manager and 2001 Senior Manager for Manufacturing Systems. In 2005 he was selected for senior development program at IMD in Lausanne, focussing on managing complexity. Thereafter he served as Assembly Manufacturing Manager. In 2007 he started successfully the vehicle export program to the United States. In recognition of sustained product quality excellence Mr Van der Merwe received various awards for continues improvement culminating in 2010 with the JD Power Platinum award for the best plant in the world supplying passenger cars into the American market. In 2011 he was appointed as Site Leader and Vice President Manufacturing for the Mercedes Benz East London plant.

**Mrs Angela Göschel** graduated in 1985 from the Dresden University of Technology with a degree in Mechanical Engineering. From 1985 to 1991 she worked as an engineer for technological project planning in the automotive industry. After several years employment with an international acting consulting firm she joined the Fraunhofer Institute for Machine Tools and Forming Technology (IWU) Chemnitz/Dresden in 2000, where she worked until September 2012 in different positions, most recently as Chief Engineer for Research Management and International Affairs. In October 2012 she started her work as Chief Expert of the President's Office at the Fraunhofer Headquarter in Munich.
### Session A4  
**Auditorium 1**

#### Advances in Electro-Physical and Chemical Processes

**Session Chair:** Prof D. Kochan

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speakers</th>
<th>Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:00</td>
<td>Additive Manufacturing of Gradient and Multi-material Components</td>
<td>M Karg, T Laumer, M Schmidt</td>
<td>Friedrich-Alexander-Universität Erlangen-Nürnberg</td>
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<td></td>
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<td></td>
<td>SAOT Erlangen Graduate School in Advanced Optical Technologies, Erlangen, Germany</td>
</tr>
<tr>
<td>11:20</td>
<td>Screw Extrusion Based 3D Printing, a Novel Additive Manufacturing Technology</td>
<td>H Valkenaers, F Vogeler, A Voet, J-P Kruth</td>
<td>KU Leuven, Belgium</td>
</tr>
<tr>
<td>11:40</td>
<td>Additive Manufacturing and Design Strategies for Customized Jewellery Production</td>
<td>T Ferreira, HA Almeida, I Campbell, PJ Bartolo</td>
<td>Polytechnic Institute of Leiria, Portugal</td>
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<td>Loughbrough University, UK</td>
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<tr>
<td>12:00</td>
<td>New Developments in Electron Beam Application for Rapid Manufacturing</td>
<td>J Dietrich, G Eckhart, Th. Müller, J Schulze, M Steinhauser</td>
<td>University of Applied Science, Dresden, Germany</td>
</tr>
<tr>
<td>12:20</td>
<td>Study of Pulse Electrochemical Machining of Nickel-Cobalt Ferrous Alloy</td>
<td>D Bähre, O Weber, A Rebschläger, P Steuer</td>
<td>Saarland University, Saarbrücken, Germany</td>
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<td></td>
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<td>Center for Mechatronics and Automation, Saarbrücken, Germany</td>
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**12:40 – 13:40**  
**LUNCH BREAK**

### Session C5  
**Auditorium 1**

#### Enterprise Design and Integration

**Session Chair:** Prof N du Preez

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speakers</th>
<th>Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:00</td>
<td>A Tool for Preparing Trans-National Access to High Level Visualisation Facilities</td>
<td>W Dankers, E Lutters</td>
<td>University of Twente, Enschede, The Netherlands</td>
</tr>
<tr>
<td>11:20</td>
<td>Enterprise Integration Triangle – a Framework for Innovating Complex Systems in the Manufacturing and Service Industries</td>
<td>G Gundergan, B Ansorge, A Buschmeyer, V Stich</td>
<td>FIR at RWTH Aachen University, Aachen, Germany</td>
</tr>
<tr>
<td>11:40</td>
<td>Potentials and Barriers of Technology Deployment in Services</td>
<td>V Stich, A Schmitz-Urban, B Brenken</td>
<td>FIR at RWTH Aachen University, Aachen, Germany</td>
</tr>
<tr>
<td>12:00</td>
<td>Why the S in BRICS? : A Production Engineering Perspective</td>
<td>AF van der Merwe, L Nyanga, HJJ Kals</td>
<td>University of Stellenbosch, South Africa</td>
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<td></td>
<td>University of Twente, Enschede, The Netherlands</td>
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<tr>
<td>12:20</td>
<td>Usability and Learnability of Graphical Notation Systems in Process Modelling Languages</td>
<td>K Arning, M Ziefle, E-M Jakobs</td>
<td>RWTH Aachen University, Aachen, Germany</td>
</tr>
</tbody>
</table>

**12:40 – 13:40**  
**LUNCH BREAK**
## Session B6

**Intelligent Manufacturing**  
Session Chair: Prof T van Niekerk  

<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
<th>Authors</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>13:40</td>
<td>Case Study Based Comparison of Life Cycle Analyses within Metal Manufacturing in the Automotive Industry</td>
<td>F Klocke, B Döbbeler, M Binder, D Lung</td>
<td>Aachen University of Technology, Aachen, Germany</td>
</tr>
<tr>
<td>14:00</td>
<td>Design of Manual Assembly Systems Focusing on Required Changeability</td>
<td>B Baudzus, M Krebs, J Deuse</td>
<td>TU Dortmund University, Germany</td>
</tr>
<tr>
<td>14:20</td>
<td>A Dynamic Simulation of a Lean and Agile Manufacturing System</td>
<td>M Mutingi, C Mbohwa, S Mhlanga</td>
<td>University of Botswana, Botswana University of Johannesburg, South Africa, National University of Science and Technology, Zimbabwe</td>
</tr>
<tr>
<td>14:40</td>
<td>Comparison of IEC 61499 and Agent Based Control for a Reconfigurable Manufacturing Subsystem</td>
<td>C Mulubika, AH Basson</td>
<td>Stellenbosch University, South Africa</td>
</tr>
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</table>

### Time Table

| Time          | 15:00 – 15:30 | T E A / C O F F E E B R E A K |

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## Session A5

**Innovative Manufacturing Approaches**  
Session Chair: Prof I Gorlach  

<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
<th>Authors</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>13:40</td>
<td>Study of Pulse Electrochemical Machining Characteristics of Spheroidal Cast Iron Using Sodium Nitrate Electrolyte</td>
<td>O Weber, D Bähre, A Rebschläger</td>
<td>Center for Mechatronics and Automatization, Saarbrücken, Germany</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Saarland University, Saarbrücken, Germany</td>
</tr>
<tr>
<td>14:00</td>
<td>Combined Laser Beam Braze-Welding Process for Fluxless Al-Cu Connections</td>
<td>T Solchenbach, P Plapper</td>
<td>University of Luxembourg</td>
</tr>
<tr>
<td>14:20</td>
<td>Defining the Optimal Beam Hardening Correction Parameters for CT Dimensional Metrology Applications</td>
<td>Y Tan, K Kiekens, F Welkenhuysen, J-P Kruth, W Dewulf</td>
<td>International University College Leuven, Belgium</td>
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<td></td>
<td>KU Leuven, Belgium</td>
</tr>
<tr>
<td>14:40</td>
<td>Manufacturing Challenges for Custom Made Solar Vehicles in South Africa</td>
<td>P Janse van Rensburg, W Hurter, N Janse van Rensburg, G Oosthuizen</td>
<td>University of Johannesburg, South Africa</td>
</tr>
</tbody>
</table>

### Time Table

| Time          | 15:00 – 15:30 | T E A / C O F F E E B R E A K |

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### Session C6
**Auditorium 1**

**Innovation and Strategy in Production**

**Session Chair:** Prof C Schutte

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>15:30</td>
<td>Method to Quantify Value Added and Employment Effects of Technology Shifts</td>
<td>W Sihn, H Gommel Fraunhofer Austria Research GmbH, Vienna, Austria Vienna University of Technology, Vienna, Austria</td>
</tr>
<tr>
<td>15:50</td>
<td>The Relationship between an Innovation Strategy and a Technology Strategy</td>
<td>BR Katz, ND du Preez, CSL Schutte Stellenbosch University, South Africa</td>
</tr>
<tr>
<td>16:10</td>
<td>Competitive Strategies for Value Creation During Disruptive Innovations</td>
<td>A Kampker, P Burggräf, C Deutskens, C Niebuhr RWTH Aachen University, Aachen, Germany</td>
</tr>
<tr>
<td>16:30</td>
<td>Technological Capital Management as an Instrument of Industrial Enterprise Innovative Development</td>
<td>SN Grigoriev, JY Yeleneva, VN Andreev Moscow State Technological University “STANKIN”, Russian Federation</td>
</tr>
<tr>
<td>16:50</td>
<td>The Knowledge Cube – A Universal Framework to Describe all Knowledge Items</td>
<td>G Pretorius, N du Preez Stellenbosch University, South Africa</td>
</tr>
</tbody>
</table>

### Session B7
**Auditorium 2**

**Intelligent Production Systems**

**Session Chair:** Prof G Bright

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>15:30</td>
<td>Enhancing the Accuracy of a CNC Machine using Artificial Neural Networks</td>
<td>M Simpson, IA Gorlach, MC du Plessis Nelson Mandela Metropolitan University, Port Elizabeth, South Africa</td>
</tr>
<tr>
<td>15:50</td>
<td>Decentralized CNC Automation System for Large Machine Tools</td>
<td>SN Grigoriev, GM Martinov Moscow State Technological University “STANKIN”, Russian Federation</td>
</tr>
<tr>
<td>16:10</td>
<td>Volumetric Geometric Accuracy Improvement for Multi-Axis Systems Based on Laser Software Error Correction</td>
<td>SN Grigoriev, VI Teleshevsky, VA Sokolov Moscow State Technological University “STANKIN”, Russian Federation</td>
</tr>
<tr>
<td>16:30</td>
<td>Acoustic Emission Monitoring in Ultra-High Precision Machining of Rapidly Solidified Aluminium</td>
<td>OA Olufayo, K Abou-El-Hossein Nelson Mandela Metropolitan University, Port Elizabeth, South Africa</td>
</tr>
<tr>
<td>16:50</td>
<td>Investigating the effects of composite materials in solar cell encapsulation</td>
<td>W Hurter, G Oosthuizen, N Janse van Rensburg University of Johannesburg, South Africa</td>
</tr>
</tbody>
</table>

**17:15** **CLOSING ADDRESS**

Dr AF van der Merwe