15th CIRP Conference on Modelling of Machining Operations
Karlsruhe, Germany
June 11 - 12, 2015

Preliminary Program of the Conference
• **Travelling to Karlsruhe by road, or rail:**
Karlsruhe is located on a major road and rail intersection and can be reached quickly and easily from all directions via the A 5, A 8, or A 65 motorways to all parts of the city.

Trams or buses provide your connection to the city centre (from main train station to “Konzerthaus” take bus 10).

• **Travelling to Karlsruhe by air:**
Karlsruhe/Baden-Baden (approx. 30 minutes by car), the international airports of Stuttgart and Strasbourg (50–60 minutes by car). Or arrive at Frankfurt/Main international airport and take a high-speed train from the adjoining ICE station to Karlsruhe in exactly one hour.

• **Further Information**
  Conference venue [www.messe-karlsruhe.de](http://www.messe-karlsruhe.de)
  Public transport [www.kvv.de](http://www.kvv.de)

  Contact: info@cirp-cmmo2015.com
• Early registration and get together inside the „Konzerthaus“ (1) on June 10 starting 16:00
• Conference presentations in sub-level of (2) on June 11 - 12
• **Address:**
  Kongresszentrum Karlsruhe
  Karlsruher Messe- und Kongress-GmbH
  Festplatz 9
  76137 Karlsruhe
  Germany
“Integrative Computational Material Engineering (ICME) – Material's history effects Machining”
Dr.-Ing. Ulrich Prahl
Head of Material Simulation Group in Steel Institute at RWTH Aachen University, Germany

“Challenges and Opportunities of an NC-Machining Simulation in the Aircraft Industry”
Dr.-Ing., Dipl.-Inform. Tobias Surmann
Premium AEROTEC GmbH Germany

“Meanfield and micromechanics based modeling of metals”
Prof. Dr.-Ing. habil. Thomas Böhlke
Professor at the Institute of Engineering Mechanics, Chair for Continuum Mechanics, Karlsruhe Institute of Technology (KIT), Germany

„Advantages of virtual production“
Dipl.-Ing. (FH) Dipl.-Wirt.-Ing. (FH) Eberhard Beck
INDEX-Werke GmbH & Co. KG, Germany

“Atomistic simulation of machining: the origin of folding instabilities on polycrystalline metal surfaces”
Prof. Dr. Michael Moseler
Professor „Modelling and Simulation of Functional Nanosystems“ at Albert-Ludwigs-University, Freiburg, Germany

“t.b.d.”
Dr.-Ing. Wilfrid Polley
Daimler AG, Germany
15th CIRP Conference on Modelling of Machining Operations

Location: Karlsruhe Convention Centre
Festplatz 9 - 76137 Karlsruhe

PROGRAM OVERVIEW

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<td>Thermal effects in machining processes</td>
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<td>Dynamics and stability of machining</td>
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PROGRAM FOR ORAL PRESENTATIONS

Wednesday, June 10th afternoon

16:00 - 18:00 Early Registration & Get together
Konzerthaus (Festplatz 9 - 76137 Karlsruhe)
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<tr>
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<td>Opening Session</td>
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<tr>
<td>09:30 - 10:10</td>
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<tr>
<td>10:10 - 10:50</td>
<td>Integrative Computational Material Engineering (ICME) – Material's history effects Machining</td>
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<td>10:50 - 11:10</td>
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<td>11:10 - 11:30</td>
<td>Surface integrity</td>
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<td>11:30 - 11:50</td>
<td>Dynamics and stability of machining</td>
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<tr>
<td>11:50 - 12:10</td>
<td>Optimization of machining processes</td>
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<tr>
<td>12:10 - 12:30</td>
<td>Modelling of material behaviour</td>
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<td>13:50 - 14:30</td>
<td>Keynote Session 2</td>
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<td>14:30 - 15:10</td>
<td>Meanfield and micromechanics based modeling of metals</td>
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<td>15:10 - 15:30</td>
<td>Coffee break</td>
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### Thursday, June 11th morning

**8:00 - 9:00**
Registration

**9:00 - 9:30**
**Opening Session**

**9:30 - 10:10**
**Keynote Session 1**
Dr.-Ing. Wilfrid Polley, Daimler AG, Stuttgart, Germany

**10:10 - 10:50**
**Integrative Computational Material Engineering (ICME) – Material's history effects Machining**
Dr.-Ing. Ulrich Prahl, RWTH Aachen University, Aachen, Germany

**10:50 - 11:10**
**Coffee break**

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<td>11:10 - 11:30</td>
<td>Surface Layer Modification by Cryogenic Burnishing of Al 7050-T7451 Alloy and Validation with FEM-Based Burnishing Model</td>
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<td>11:30 - 11:50</td>
<td>Influence of the cutting tool compliance on the workpiece surface shape in face milling of workpiece compounds</td>
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<td>11:50 - 12:10</td>
<td>Mold manufacturing optimization: a global approach of milling and polishing processes</td>
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<td>12:10 - 12:30</td>
<td>Prediction of Residual Stresses after Laser-assisted Machining of Inconel 718 Using SPH</td>
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<td>12:30 - 12:50</td>
<td>Springback in metal cutting with high cutting speeds</td>
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<td>12:50 - 13:50</td>
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<tr>
<td>13:50 - 14:30</td>
<td>Challenges and Opportunities of an NC-Machining Simulation in the Aircraft Industry</td>
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<td>14:30 - 15:10</td>
<td>Meanfield and micromechanics based modeling of metals</td>
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<td>15:10 -15:30</td>
<td>Coffee break</td>
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<td>Time</td>
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<tr>
<td>15:30 - 15:50</td>
<td>Effects of Sequential Cuts on Residual Stresses when Orthogonal Cutting Steel AISI 1045 M.N.A. Nasr</td>
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<td>Considering the Influence of Minimum Quantity Lubrication for Modelling Changes in Temperature, Forces and Phase Transformations during Machining P. Bollig, C. Faltin, R. Schießl, J. Schneider, U. Maas, V. Schulze</td>
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<td>Effect of rake angle on strain field during orthogonal cutting of hardened steel with c-BN tools Th. Baizeau, S. Campopascio, G. Fromentin, F. Rossi, G. Poulichon</td>
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<td>Energy-based approaches for multi-scale modelling of material loadings during Electric Discharge Machining (EDM) F. Klocke, S. Schneider, S. Harst, D. Welling, A. Klink</td>
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<td>15:50 - 16:10</td>
<td>An analytical model of residual stress for flank milling of Ti-6Al-4V X. Huang, X. Zhang, H. Ding</td>
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<td>Simulation of MQL Deep Hole Drilling for Predicting Thermally Induced Workpiece Deformations D. Biermann, H. Blum, J. Frohne, I. lovkov, A. Rademacher, K. Rosin</td>
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<td>Influences of micro mechanical property and microstructure on performance of machining high chromium white cast iron with cBN tools Ling Chen, Jinming Zhou, Volodymyr Bushiya, Jan-ERIC Stahl</td>
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<td>Multiphysics Simulation of the Material Removal in Jet Electrochemical Machining M. Hackert-Oschtzchen, R. Paul, M. Kowalick, A. Martin, G. Meichnser, A. Schubert</td>
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<td>A solid modeler based engagement model for 5-axis ball end milling I. E. Yigit, S. Ehsan Layegh K., I. Lazoglu</td>
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<td>16:30 - 16:50</td>
<td>Surface roughness modelling in face milling C. Fehlō, B. Karupsczechowski, J. Kundrák</td>
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<td>Cryogenic milling of Aluminium-lithium alloys: thermo-mechanical modelling towards fine-turning of part surface residual stress X. Zhang, H. Mu, X. Huang, Z. Fu, D. Zhu, H. Ding</td>
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<td>Analysis and modelling of the contact radius effect on the cutting forces in cylindrical and face turning of Ti6A4V titanium alloy T. Dorlin, G. Fromentin, J.-P. Costes</td>
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<td>CFD simulation of the Abrasive Flow Machining process E. Uhlmann, C. Schmiedel, J. Wendler</td>
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<td>16:50 - 17:10</td>
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<td>17:10 - 17:30</td>
<td>Evaluating Residual Stresses Induced by Drilling of Ti-6Al-4V Alloy by Using an Experimental-Numerical Methodology J. Nobre, J. C. Outeiro</td>
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<td>Experimental Study and Modeling of Steady State Temperature Distributions in Coated Cemented Carbide Tools in Turning A. Thakare, A. Nordgren</td>
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<td>Cutting simulation of titanium alloy drilling with energy analysis and FEM T. Matsumura, S. Tamura</td>
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<td>Predictive modelling of cutting force and its influence on surface accuracy in ultra-high precision machining of contact lenses O.A. Olufayo, K. Abou-El-Hossein</td>
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<td>An analytical model of the temperature distribution in the chip breakage location of metal cutting operations F. Klocke, D. Lung, D. Veselovac, S. Buchkremer</td>
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<td>Analytical Modelling of Milling Forces for Helical End Milling Based on a Predictive Machining Theory Z. Fu, W. Yang, X. Wang, J. Leopold</td>
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<td>17:50 - 18:10</td>
<td>Experimental Study and Modeling of Machining with Dry Compressed Air, Flood and Minimum Quantity Cutting Fluid Cooling Techniques M. Ravi Sankar, S.K. Choudhury</td>
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<td>The mechanics of cutting: In-situ measurement and modelling M. Abouridouane, F. Klocke, D. Lung, D. Veselovac</td>
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<td>Sensitivity Analysis of Cryogenic Cooling on Machining of Magnesium Alloy AZ31B-O M. N.A. Nasr, J.C. Outeiro</td>
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<td>Modelling of grain motion for three-body abrasion I. Loesch, O. Riemer</td>
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<td>19:00 - 19:30</td>
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### Keynote Session 3

**8:00 - 8:45** Advantages of virtual production  
Dipl.-Ing. (FH) Dipl.-Wirt.-Ing. (FH) Eberhard Beck, INDEX-Werke GmbH & Co. KG, Esslingen, Germany

**8:45 - 9:30** Atomistic simulation of machining: the origin of folding instabilities on polycrystalline metal surfaces  
Prof. Dr. Michael Moseler

**9:30 - 9:50** Coffee break

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<td>Wear and Built up Edges</td>
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|               | Determination of the Thermal Load Distribution in Internal Traverse Grinding using a Geometric-Kinematic Simulation  
|               | Parameter identification for finite element based models in dry machining applications  
|               | The development of dislodgement free diamond electroplated wheel for engineering ceramic grinding processes  
|               | A Meta-model framework for Grinding Simulation  
|               | Modelling of vibration assisted machining f.c.c single crystal  
|               | A new method to determine material parameters from machining simulations using inverse identification  
|               | Heat Flux in Cutting: Importance, Simulation and Validation  
|               | Prediction of temperature induced shape deviations in dry milling  
|               | Predictive modeling of surface roughness in grinding  
|               | Characterization of the cutting forces generated during the gear hobbing process: Spur gear  
| 10:10 - 10:30 | Characterization and modelling of the rough turning process of large-scale parts: tribological behaviour and tool wear analyses  
|               | Parameter identification for finite element based models in dry machining applications  
|               | Characterization of the cutting forces generated during the gear hobbing process: Spur gear  
|               | Discrete Element Modelling of Drag Finishing  
|               | Inverse Determination of Constitutive Equations and Cutting Force Modelling for Complex Tools Using Oxley’s Predictive Machining Theory  
| 10:30 - 10:50 | A Combined Empirical and Numerical Approach for Tool Wear Prediction in Machining  
|               | Prediction of temperature induced shape deviations in dry milling  
|               | Predictive modeling of surface roughness in grinding  
|               | Characterization of the cutting forces generated during the gear hobbing process: Spur gear  
| 10:50 - 11:10 | Influence of the built-up edge on the stress state in the chip formation zone during orthogonal cutting of AISI1045  
|               | Development and validation of a hybrid model for the prediction of shape deviations in dry machining processes  
|               | Analysis of Measured and Predicted Residual Stresses Induced by Finish Cylindrical Grinding of High Speed Steel with CBN Wheel  
|               | On the Analytical Representation of Chip Area and Tool Geometry when Oblique Turning with Round Tools. Part 1: Chip Area Parameters under Variation of Side and Back Rake Angle  
|               | On the Analytical Representation of Chip Area and Tool Geometry when Oblique Turning with Round Tools. Part 2: Variation of Tool Geometry along the Edge Line  
| 11:10 - 11:30 | Comparative analysis of PCD drill designs during drilling of CFRP laminates  
|               | Analytical Modelling Methods for Temperature Fields in Metal Cutting based on Panel Method of Fluid Mechanics  
|               | Analysis of Process Forces for the Precision Honing of Small Bores  
|               | On the Analytical Representation of Chip Area and Tool Geometry when Oblique Turning with Round Tools. Part 2: Variation of Tool Geometry along the Edge Line  
| 11:30 - 11:50 | Lunch break                                                                                 |

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Friday, June 12th morning
## Friday, June 12th afternoon

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<td>13:00 - 13:20</td>
<td>Monitoring and Diagnostics</td>
<td>Thermal effects in machining processes</td>
<td>Dynamics and stability of machining</td>
<td>Modelling of material behaviour</td>
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<td>Orthogonal cutting process modelling considering tool-workpiece frictional effect</td>
<td>Experimental and analytical investigation of workpiece thermal load during external cylindrical grinding</td>
<td>Computerized Simulation of Interference in Thread Milling of Non-Symmetric Thread Profiles</td>
<td>Numerical model of machining considering the effect of MnS inclusions in an austenitic stainless steel</td>
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<td>13:40 - 14:00</td>
<td>Development of a Discrete Event Model for energy and resource efficient Milling</td>
<td>Enhanced Machinability of Ti-5553 Alloy from Cryogenic Machining: Comparison with MQL and Flood-cooled Machining and Modeling</td>
<td>Axis position dependent dynamics of multi-axis milling machines</td>
<td>Multi-physics modelling in machining OFHC copper – coupling of microstructure-based flow stress and grain refinement models</td>
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<td>14:00 - 14:20</td>
<td>Modelling of part distortion due to residual stresses relaxation: An aeronautical case study</td>
<td>A novel simulation approach to determine thermally induced geometric deviations in dry gear hobbing</td>
<td>Analysis of cutting stability in vibration assisted machining using an analytical predictive force model</td>
<td>Finite element simulation of semi-finishing turning of Electron Beam Melted Ti6Al4V under dry and cryogenic cooling</td>
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<td>14:20 - 14:40</td>
<td>Predictive Modelling and Optimization of Machining Parameters to Minimize Surface Roughness using Artificial Neural Network Coupled with Genetic Algorithm</td>
<td>Analysis of the thermal impact on gamma titanium aluminate by grinding with internal coolant supply based on experimental investigation and transient thermal simulation</td>
<td>Modeling and cutting path optimization of shallow shell considering its varying dynamics during machining</td>
<td>Modeling and Simulation of Machining-Induced Surface Integrity Characteristics of NiTi Alloy</td>
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<td>14:40 - 15:00</td>
<td>Multipoint recursive sequential three-point method for on-machine roundness measurement</td>
<td>Modelling and Experimental Investigation of Cutting Temperature when Rough Turning Hardened Tool Steel with PCBN Tools</td>
<td>3D Finite Element Modeling of Holder-Tool Assembly for Stability Prediction in Milling</td>
<td>N. Grossi, F. Montevecchi, A. Scippa, G. Campatelli</td>
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<td>15:00 - 15:30</td>
<td>Closing Session</td>
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