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Bremer Institut für
angewandte Strahltechnik

The
Bremen
ProductionDays

2nd International Conference on
New Forming Technology

2nd ICNFT

Metal Forming, Cutting, Joining
and Metals Plasticity



Deutsche
Forschungsgemeinschaft
DFG



Bremen

20 – 21 September 2007

Conference Chair:

Prof. F. Vollertsen, Bremen, Germany

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Prof. K. Weinmann, Berkeley, United States of America

Preface

Dear Colleagues,

The production of metallic parts for capital and consumer goods is dominated by metal forming and metal cutting. Processes of both groups are based on plastic deformation of the work piece material. This common feature is the bracket for the presentations at the 2nd ICNFT, which therefore include also joining by forming like friction stir welding (FSW) or clinching.

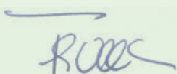
It is a precondition for the development of new technologies to understand the meaning of the elementary plastic processes. This is also of huge interest, if processing windows have to be expanded to more complex, more precise or smaller geometries, as it is done in micro and precision manufacturing. The aim of the 2nd ICNFT is to exchange results from recent research and development in this area. Therefore, questions like size effects (which occur, when the work piece size is scaled down), questions of process stability (which is important for economical industrial application), material behaviour (this includes complex material behaviour during hot pressing of sheet metal, but also tribological aspects), development of new processes and application studies will be discussed.

The 2nd ICNFT with nearly 80 presentations in 10 sessions documents the recent advances in these fields, including the contributions from DFG Priority Programme SPP 1138 (Modelling of scaling effects on manufacturing processes).

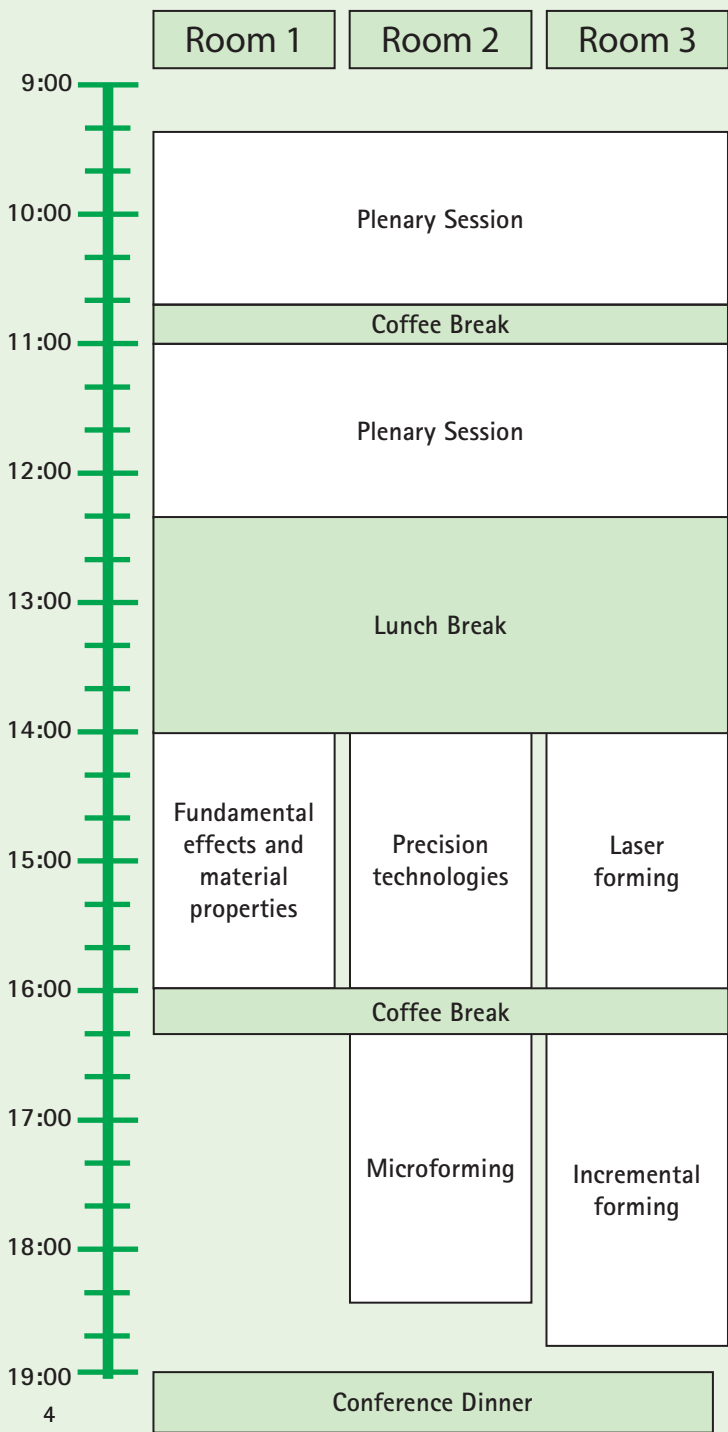
In this context, I would like to thank all members of the International Scientific Committee and the Editorial Board for their support in attracting contributions and reviewing papers according to CIRP regulations. Moreover, I would like to thank all colleagues who are acting as session chairs or presenters as well as all those many who have contributed to 2nd ICNFT "behind the curtain".

Finally, I am wishing you - aside from new insights - many fruitful discussions and a pleasant and successful stay in Bremen!

Yours faithfully,



Prof. Dr.-Ing. Frank Vollertsen



	Room 1	Room 2	Room 3
9:00	Advanced processing	Joining by forming	Size effects in forming processes
10:00			
11:00	Coffee Break		
12:00	Advanced processing	Size effects in cutting processes	Size effects in forming processes
13:00	Lunch Break		
14:00	Advanced processing	Size effects in cutting processes	Size effects in forming processes
15:00			
16:00			
17:00			
18:00			

Plenary Session

09:15	Opening Remarks F. Vollertsen ¹ ¹ BIAS Bremer Institut für angewandte Strahltechnik, Bremen, Germany
09:20	Innovative Processes in Tube Hydroforming and Applications S. Yuan ¹ ¹ School of Materials Science and Engineering, Harbin Institute of Technology, Harbin, China
10:00	Warm and hot stamping of ultra high strength steel sheets using rapid resistance heating K. Mori ¹ ¹ Department of Production Systems Engineering, Faculty of Engineering, Toyohashi University of Technology, Toyohashi, Aichi, Japan
10:40	Coffee Break
11:00	New Developments in Incremental Sheet Forming G. Hirt ¹ , J. Ames ¹ , M. Bambach ¹ , S. Ziegler ¹ ¹ Institute of Metal Forming, RWTH Aachen University of Technology, Aachen, Germany
11:40	On the numerical simulation of FSW processes L. Fratini ¹ , G. Buffa ¹ ¹ University of Palermo, Palermo, Italy
12:10	Concluding remarks F. Vollertsen ¹ ¹ BIAS Bremer Institut für angewandte Strahltechnik, Bremen, Germany

Notes

Fundamental effects and material properties

14:00	Conditioning friction characteristics using surface micro-geometries B. Mohid ¹ ¹ University of Strathclyde, Glasgow, Scotland
14:20	Roughness evolution on free surfaces of micro materials with strain rate sensitivity at large strains in dieless forming T. Furushima ¹ , Sergei Alexandrov ² , Ken-ichi Manabe ¹ ¹ Department of Mechanical Engineering, Tokyo Metropolitan University, Tokyo, Japan ² Institute for Problems in Mechanics, Russian Academy of Sciences, Russia
14:40	Formability created by the Bauschinger effect? W. C. Emmens ¹ , A. H. van den Boogaard ² ¹ CORUS RD&T, IJmuiden, Netherlands ² University of Twente, Enschede, Netherlands
15:00	Experimental and simulative investigation of deep drawing limits for TRIP steels J. Danzeisen ¹ , M. Merklein ² , K. Roll ¹ ¹ DaimlerChrysler AG, Sindelfingen, Germany ¹ Chair of Manufacturing Technology, University Erlangen-Nuremberg, Germany
15:20	Texture component crystal plasticity FE-simulation of the forming of a textured copper sheet I. Tikhovskiy ¹ , D. Raabe ¹ , F. Roters ¹ ¹ Max-Planck-Institut für Eisenforschung, Department of Microstructure Physics and Metal Forming, Düsseldorf, Germany

Notes

Precision technologies

14:00	<p>Precision Cutting Processes for the Manufacture of Micro Molds E. Brinksmeier¹, R. Gläbe¹, O. Riemer¹, S. Twardy¹ ¹Laboratory for Precision Machining, University of Bremen, Bremen, Germany</p>
14:40	<p>Experiment Study on Cold Sizing of Spur Gear B.-h. Zhang¹, Z.-m. Zhang¹ ¹Department of Materials Science and Engineering, North University of China, Taiyuan, China</p>
15:00	<p>Influence and process limits with rotary swaging B. Kuhfuss¹, V. Piwek¹ ¹University of Bremen, Bremen, Germany</p>
15:20	<p>Characteristics of Tube Bending by MOS Bending Machine M. Murata¹, T. Kuboki¹, K. Takahashi¹ ¹University of Electro-Communications, Tokyo, Japan</p>
15:40	<p>Precise Control of Thickness in New Tube-Extrusion Method with Tapered Mandrel T. Kuboki¹, T. Makiyama², M. Murata³ ¹University of Electro-Communications, Tokyo, Japan ²Hitachi Limited, Yokoyama, Japan ³University of Electro-Communications, Tokyo, Japan</p>
16:00	Coffee Break

Micro forming

16:20	<p>Precision tooling technologies for micro forming H.N. Hansen¹, M. Arentoft² ¹Department of Manufacturing Engineering and Management, Technical University of Denmark, Lyngby, Denmark. ²IPU Manufacturing, Lyngby, Denmark</p>
17:00	<p>Versatile Micro Forming Press H. Schulze Niehoff¹, F. Vollertsen¹ ¹BIAS Bremer Institut für angewandte Strahltechnik, Bremen, Germany</p>

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|-------|---|
| 17:20 | Compound Fabrication and assembly of Micro Double Gears Utilizing Precision Micro Forming
J. Xu ¹ , C. J. Wang ¹ , D. B. Shan ¹ , B. Guo ¹
¹ School of Material Science and Engineering, Harbin Institute of Technology, China |
| 17:40 | Development of Two Innovative Rolling Processes for the Production of Defined Riblet Structures in Consideration of Common Fluid Dynamic Requirements
F. Klocke ¹ , B. Feldhaus ¹ , G. Hirt ² , M. Thome ² , S. Klumpp ³ , W. Schröder ³
¹ Laboratory of Machine Tools and Production Engineering RWTH Aachen, Chair of Manufacturing Technology, Aachen, Germany
² Institute of Metal Forming RWTH Aachen, Aachen, Germany
³ Chair of Fluid Mechanics and Institute of Aerodynamics RWTH Aachen, Aachen, Germany |

Notes

Laser forming

14:00	<p>Laser bending of thin metal sheet plate using a low output power laser based scanning system C. P. Vásquez Ojeda¹, J. Ramos-Grez¹ ¹Pontificia Universidad Católica de Chile, Mechanical and Metallurgical Engineering Department, Santiago, Chile</p>
14:20	<p>Edge Effects in Laser Bending of Metal Plates Z. Mucha¹, M. Zawiliński¹ ¹Center for Laser Technology of Metals, Kielce University of Technology & Polish Academy of Sciences, Kielce, Poland</p>
14:40	<p>Simplified Finite Elements Model for Laser Forming B. Callebaut¹, S. Masselis², A. Van Bael^{3,4}, J.-P. Kruth¹, J.R. Duflou¹ ¹K.U.Leuven, Heverlee, Belgium, ²WTCM, Heverlee, Belgium, ³K.U.Leuven, Heverlee, Belgium, ⁴Limburg Catholic University College, Diepenbeek, Belgium</p>
15:00	<p>Laser Beam Forming of Complex Aluminum Fuselage Structures T. Hornfeck¹, J. Silvanus², M. F. Zaeh¹ ¹Institute for Machine Tools and Industrial Management, Technische Universität München, Garching, Germany ²EADS Innovation Works Germany, Munich, Germany</p>
15:20	<p>Thermal Induced Prestressing for the Distortion Manipulation of Steel Components T. Pretorius¹, G. Habedank¹, J. Woitschig¹, F. Vollertsen¹ ¹BIAS Bremer Institut für angewandte Strahltechnik, Bremen, Germany</p>
15:40	<p>Laser straightening of ship structures M. Koerdt¹, J. D. von Beren¹, M. Schilf¹, F. Vollertsen¹ ¹BIAS Bremer Institut für angewandte Strahltechnik, Bremen, Germany</p>

Incremental forming

16:20	<p>Incremental Forming with Dynamic Heating Support J.R Duflou¹, B. Callebaut¹, J. Verbert¹, M. Vanderhasten², L. Rabet² ¹Katholieke Universiteit Leuven, Department of Mechanical Engineering, Heverlee, Belgium ²Royal Military Academy, Dept of Civil and Materials Engineering, Brussels, Belgium</p>
17:00	<p>Single Point Incremental Forming using a Dummy Sheet M. Skjoedt¹, M. B. Silva², N. Bay¹, P. A. F. Martins², T. Lenau¹ ¹Technical University of Denmark, Department of Manufacturing Engineering and Management, Lyngby, Denmark ²IDMEC, Instituto Superior Tecnico, TULisbon, Lisboa, Portugal</p>
17:20	<p>Single point incremental forming with a rigid tool and a water jet A. Petek¹, B. Jurisevic¹, K. Kuzman¹, M. Junkar¹ ¹Chair of Manufacturing Technologies and Systems , Faculty of Mechanical Engineering, University of Ljubljana, Ljubljana, Slovenia</p>
17:40	<p>Driving as an Incremental Forming Technology for Individualized Sheet Metal Products D. Scherer¹, H. Hoffmann¹, B. Lohmann², T. C. Lueth³, M. Golle¹, S. Weber³, Z. Yang², M. Markert³ ¹Technische Universität München, Institute for Metal Forming and Casting, Garching, Germany ²Technische Universität München, Institute of Automatic Control, Garching, Germany ³Technische Universität München, Institute of Micro and Medical Device Technology, Garching, Germany</p>

18:00 Geometrical study and basis for the analysis of localized-incremental forging processes by FEM
M.A. Sebastián¹, A.M. Camacho¹
¹National Distance University of Spain, Department of Manufacturing Engineering, Spain

18:20 Fast simulation method of sheet forming by plasma jet usage
M. Grden¹, T. Pretorius¹, J. Woitschig¹, F. Vollertsen¹
¹BIAS Bremer Institut für angewandte Strahltechnik, Bremen, Germany

Notes

Advanced processing

09:00	<p>Potentials And Limits of Temperature-Supported Forming Operations in Car Manufacturing – A Comparison of Process Chains</p> <p>R. Neugebauer¹, A. Göschel¹, F. Schieck¹, A. Sterzing¹</p> <p>¹Fraunhofer Institute for Machine Tools and Forming Technology IWU, Chemnitz, Germany</p>
09:40	<p>Basic investigations on hot sheet metal forming of quenchenable high strength steels</p> <p>M. Geiger¹, M. Merklein¹, J. Lechler¹, Fr.-W Bach², R. Springer², M. Kleiner³, W. Homberg³, A. Brosius³, H. Karbasian³, H. Hoffmann⁴, H. So⁴.</p> <p>¹Chair of Manufacturing Technology, University Erlangen-Nuremberg, Germany ²Department of Material Science, Leibniz University Hannover, Garbsen, Germany ³Institute of Forming Technology and Lightweight Construction, University Dortmund, Dortmund, Germany ⁴Institute of Metal Forming and Casting, Technical University Munich, Garching, Germany</p>
10:00	<p>Components with optimized properties due to modification of thermo-mechanical process design for press hardening</p> <p>M. Maikranz-Valentin¹, K. Bergmann¹, U. Weidig¹, K. Steinhoff¹</p> <p>¹Chair of Metal Forming Technology, University of Kassel, Kassel, Germany</p>
10:20	<p>Hydroforming of Curved Tubular Components with Polygonal-sections</p> <p>C. Han¹, S.-J. Yuan¹</p> <p>¹School of Materials Science and Engineering, Harbin Institute of Technology, Harbin, China</p>
10:40	<p>Coffee Break</p>

11:00	<p>Investigations on Double Sheet Hydroforming with Counterpressure M. Cojutti¹, M. Merklein¹, M. Geiger¹ ¹Chair of Manufacturing Technology LFT, Erlangen-Nuremberg, Erlangen, Germany</p>
11:20	<p>Improvement of Formability and Mechanical Properties of Cast Aluminium Alloy in Hot Shear Spinning M. Ishiguro¹, K. Mori², Y. Isomura² ¹Department of Mechanical Engineering, Toyama National College of Technology, Toyama, Japan ²Department of Production Systems Engineering, Faculty of Engineering, Toyohashi, University of Technology, Aichi, Japan</p>
11:40	<p>Increase in Wall Thickness at Inner Corner of Multi-stage Stamping of Wheel Disk by Locally Thick Blank C. J. Tan¹, K. Mori¹, Y. Abe¹ ¹Department of Production Systems Engineering, Faculty of Engineering, Toyohashi, University of Technology, Aichi, Japan</p>
12:00	<p>Influence of Deep Rolling and Cutting on the Surface and Subsurface Properties of Magnesium Alloys B. Denkena¹, P. Alpers¹, A. Lucas¹ ¹Institute of Production Engineering and Machine Tools, Leibniz Universität Hannover, Garbsen, Germany</p>
12:20	<p>Lunch Break</p>
14:00	<p>Cold roll forming of laser perforated metal sheets for micro sieve production M. Baumeister¹, K. Dickmann¹, F. Vollertsen² ¹Laser Center University of Applied Sciences Muenster, Steinfurt, Germany ²BIAS Bremer Institut für angewandte Strahltechnik, Bremen, Germany</p>
14:20	<p>New Developments in Tool Design for the Pulsed Magnetic Cutting of Aluminum Sheet Metal E. Uhlmann¹, K. Damavandi¹, N. Bayat¹ ¹Technical University Berlin, Institute for Machine Tools and Factory Management, Department of Machine Tools, Berlin, Germany</p>

14:40

On the Improvement of Density Distribution in Metal Powder Compaction for Aluminum Powder

H. C. Baek¹, C. H. Lim¹, C. W. Park¹, Y. H. Kim¹

¹ERC/NSDM, School of Mechanical, Engineering, Pusan National University, Pusan, South Korea

Notes

Joining by forming

09:00	<p>Laser-assisted Friction Stir Welding of dissimilar steel and aluminum alloys A. Giera¹, M. Merklein¹, P. Baumeister¹ ¹Chair of Manufacturing Technology, Friedrich-Alexander-University of Erlangen-Nuremberg, Erlangen, Germany</p>
09:20	<p>Fundamental Investigations on Friction Stir Knead Welding D. Contorno¹, V. Fonti¹, A. Giera², L. Fratini¹, M. Merklein² ¹Dipartimento di Tecnologia Meccanica, Produzione e Ingegneria Gestionale –Università di Palermo, Palermo, Italy ²University of Erlangen-Nuremberg, Chair of Manufacturing Technology, Erlangen, Germany</p>
09:40	<p>Flat-clinch connection – a new connection with plane surface of die side F. Riedel¹, M. Todtermuschke¹, B. Awiszus², U. Beyer² ¹Fraunhofer Institute for Machine Tools and Forming Technology (IWU), Chemnitz, Germany ²Chemnitz University of Technology, Institute of Virtual Manufacturing Technology, Chemnitz, Germany</p>
10:00	<p>Joining of Aluminium Alloy Sheets by Aluminium Alloy Self-Piercing Rivet Y. Abe¹, T. Kato², K.-i. Mori¹ ¹Department of Production Systems Engineering, Toyohashi University of Technology, Aichi, Japan ²Department of CAE, Nippon POP Rivets and Fasteners Ltd, Aichi, Japan</p>
10:20	<p>Characteristics of composite extruded tubes for joining by electromagnetic compression M. Marré¹, P. Barreiro², M. Schomäcker¹, A. Brosius¹, V. Schulze², A. E. Tekkaya¹, D. Löhe² ¹Institute of Forming Technology and Lightweight Construction, Universität Dortmund, Dortmund, Germany ²Institute of Materials Science and Engineering I, University of Karlsruhe, Karlsruhe, Germany</p>
10:40	<p style="text-align: center;">Coffee Break</p>

Size effects in cutting processes

11:00	<p>Modelling, Simulations and experimental Verification of Size Effects in Burr Formation M. Dix¹, J. Leopold², R. Neugebauer¹ ¹Institute for Machine Tools and Production processes IWP ²Fraunhofer Institute for Machine Tools and Forming Technology IWU, Chemnitz, Germany</p>
11:20	<p>Analysis of Tool Influences on Downscaled Milling Processes P. Kahnis¹, K. Weinert¹ ¹Department of Machining Technology, Dortmund, Germany</p>
11:40	<p>Influence of the Cutting Edge Geometry on the Chip Formation in Machining B. Denkena¹, R. Clos², P. Veit², V. Jivishov¹, R. Meyer¹ ¹Institute of Production Engineering and Machine Tools, Leibniz Universität Hannover, Garbsen, Germany ²Institute of Experimental Physics, Otto von Guericke - Universität Magdeburg, Magdeburg, Germany</p>
12:00	<p>Size effects of the tool edge radius on specific cutting energy and chip formation in drilling F. Klocke¹, K. Gerschwiler¹, M. Abouridouane¹ ¹Chair of Manufacturing Technology, WZL, Aachen University, Aachen, Germany</p>
12:20	<p>Lunch Break</p>
14:00	<p>Size effect at chip formation in 100Cr6 R.Clos¹, S.Radoch¹, U. Schreppel¹, P. Veit¹, V. Jivishov², B. Denkena² ¹Institute of Experimental Physics, Otto von Guericke – Universität Magdeburg, Magdeburg, Germany ²Institute of Production Engineering and Machine Tools, Leibniz Universität Hannover, Garbsen, Germany</p>
14:20	<p>Influence of the Rake Angle on the Chip Formation in Form Turning Processes B. Denkena¹, D. Boehnke¹, J. Köhler¹ ¹Institute for Production Engineering and Machine Tools, Leibniz Universität Hannover, Garbsen, Germany</p>

14:40	<p>Theoretical Study of the Influence of a PVD Hard Coating on the Dynamic Properties of the Micro Drilling Process K. Bobzin¹, R. Nickel¹, D. Parkot¹, V. Hurevich¹ ¹RWTH Aachen University, Surface Engineering Institute, Aachen, Germany</p>
15:00	<p>Scaling of the milling process of tungsten-copper-composites – experimental and numerical research E. Uhlmann¹, M. Graf von der Schulenburg¹ ¹Institut für Werkzeugmaschinen und Fabrikbetrieb, Technische Universität Berlin, Berlin, Germany</p>
15:20	<p>Influence of multiple machining steps on the specific cutting force and surface characteristics in micro cutting J. Kotschenreuther¹, H. Autenrieth², M. Weber³, J. Fleischer¹, V. Schulze², D. Löhe², P. Gumbsch³ ¹Institute of Production Science (wbk), University of Karlsruhe (TH), Karlsruhe, Germany ²Institute of Materials Science and Engineering I (iwkl), University of Karlsruhe (TH), Karlsruhe, Germany ³Institute of Reliability of Systems and Devices (izbs) University of Karlsruhe (TH), Karlsruhe, Germany</p>
15:40	<p>Grind-strengthening of low carbon steels E. Brinksmeier¹, N. Bleil¹ ¹Foundation Institute for Materials Science, Bremen, Germany</p>

Notes

Size effects in forming processes

09:00	<p>Tribological size effects in deep drawing Z. Hu¹, H. Schulze Niehoff¹, F. Vollertsen¹ ¹BIAS Bremer Institut für angewandte Strahltechnik, Bremen, Germany</p>
09:20	<p>Size effect on friction and yielding in wire flat rolling K. van Putten¹, M. Franzke¹, G. Hirt¹ ¹Institute of Metal Forming - RWTH Aachen University, Aachen, Germany</p>
09:40	<p>Finite element calculation of surface evolution considering grain size and crystallographic texture effects P. Groche¹, R. Schäfer¹ ¹Institute for Production Engineering and Forming Machines, Darmstadt, Germany</p>
10:00	<p>Size dependent Material Law of W/Cu Composites and Steel X2CrNiMo 17-12-2 S. Ataya¹, M. Korthäuer², E. El-Magd¹ ¹Department of Materials Science, Aachen University, Aachen, Germany ²Espera-Werke GmbH, Duisburg, Germany</p>
10:20	<p>Size and Time dependent Flow Stress and Failure Behaviour of metallic Materials at High Strain Rates N. Herzig¹, L.W. Meyer¹, T. Halle¹, S. Raschke¹ ¹Chemnitz University of Technology, Materials and Impact Engineering, Chemnitz, Germany</p>
10:40	<p>Coffee Break</p>
11:00	<p>Micromechanical and macroscopical hardening modeling as basis for the realistic simulation of sheet forming processes with complex strain-path changes V. Levkovitch¹, B. Svendsen¹ ¹Department of Mechanical Engineering, University of Dortmund, Dortmund, Germany</p>

11:20	<p>Microstructural evaluation of Fe-3%Si and Cu deformed in deep drawing using local curvature analysis and orientation gradient Mapping (OGM) M. Henning¹, H. Vehoff¹ ¹Universität des Saarlandes, Werkstoffwissenschaften und Methodik (WWM), Saarbrücken, Germany</p>
11:40	<p>Advanced approach to evaluate local deformation behavior at microscale S. Geißdörfer¹, U. Engel¹ ¹Chair of Manufacturing Technology, University of Erlangen-Nuremberg, Erlangen, Germany</p>
12:00	<p>Size effects in Micro forming assisted laser M. Pé¹, C. García¹, R. Ortubay¹, W. Tato¹ ¹University of Mondragon, Manufacturing Department, Mondragón, Spain</p>
12:20	<p>Lunch Break</p>
14:00	<p>Modelling of Size Effects for Scaled Laser Beam Forming J. Sakkiettibutra¹, T. Pretorius¹, F. Vollertsen¹ ¹BIAS Bremer Institut für angewandte Strahltechnik, Bremen, Germany</p>
14:20	<p>Laser-assisted micro forming with laser structured sapphire dies M. Terzi¹, K. Samm², F. von Scotti¹, J. Quintanilla Sanchez², A. Ostendorf², J. Wulfsberg¹ ¹Laboratory of Production Engineering, Helmut-Schmidt-University, University of the Federal Armed Forces Hamburg, Hamburg, Germany ²Laser Zentrum Hannover e.V., Hanover, Germany</p>
14:40	<p>Scaling Effects in the Miniaturization of the Deep Drawing Process H. Justinger¹, G. Hirt¹ ¹Institute of Metal Forming, RWTH Aachen University, Aachen, Germany</p>
15:00	<p>Investigation of Springback Behaviour in an Automotive Fuel Tank by Geometrical Scaling R. Govindarajan¹, A. Brosius¹, A. E. Tekkaya¹ ¹Institute of Forming technology and Lightweight construction, Dortmund, Germany</p>

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| 15:20 | Finite-Element-Analysis of Bulk Metal Forming Processes Considering Size-Effects
B.-A. Behrens ¹ , H. Conrads ¹ , A. Hundertmark ¹
¹ Institute of Metal Forming and Metal Forming-Machines (IFUM), Garbsen, Germany |
| 15:40 | Down-scaling of electron beam brazing for micro forging tools
Fr.-W. Bach ¹ , K. Möhwald ¹ , Th. Hassel ¹ , T. Heidenblut ¹
Institut für Werkstoffkunde, Leibniz Universität Hannover, Hannover, Germany |

Notes

General Information

Bremen, home to the world famous Town Musicians, puts itself on the map as the pulsating, multifaceted heart of North West Germany. A popular hive of heritage, science, high technology and space industry keeps up breathtakingly pacy innovations. The 1,200 year old Hanseatic city has a unique quality that ensures a metropolitan city experience like no other.

Bremen – City of Science

Bremen is shaped by stunning engineering, spanning ship building, aircraft construction, space station assembly and space propulsion systems. Space industry divisions that make Bremen the most significant centre of aerospace development in Germany include EADS SPACE, OHB System AG and ZARM drop tower.

Currency

The German currency is the EURO, made up of 100 Cent. Foreign currency can be exchanged for local money at banks, post offices and exchange offices, according to the valid rates of exchange. All major credit cards are widely accepted throughout Germany, from hotels and restaurants to small shops and gas stations.

Electricity

220 V, 50 Hz , two pin plugs

Climate

In September, the temperature in Bremen will normally range between 10 °C at night und up to 22 °C daytime. Although it is mostly sunny, some light rain may occur.

Excursions

On Wednesday, 19 September 2007, a technical excursion to local aerospace companies will be offered. This will be free of charge for the participants. Further information will be available though the conference website.

Registration

For the purpose of registration, please use the enclosed registration form and fax to: +49 421 218 5063 or see www.bias.de/icnft.

Participation fees

Participation fee	Participant without presentation	Participant with presentation
Full Congress (APT '07 Et 2 nd ICNFT)	EUR 900	EUR 780
International Conference on Applied Production Technology (APT '07), Sep. 17–19, 2007	EUR 550	EUR 490
2 nd International Conference on New Forming Technology (2 nd ICNFT), Sep. 20–21, 2007	EUR 450	EUR 395

The fees include attendance to the conference selected, one copy of the proceedings of the conference and coffee breaks. For APT '07, lunch on Sep. 17 and 18, 2007 as well as a welcoming reception on Sep. 17, 2007 and the conference dinner on Sep. 18, 2007 are included. For ICNFT, lunch on Sep. 20 and 21, 2007 as well as the conference dinner on Sep. 20, 2007 are included.

Payment

Please make your payment in EURO to:
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Cancellation Policy

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Contact

Prof. Dr.-Ing. F. Vollertsen, Conference Chair

2nd ICNFT Conference Office

c/o

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