

Conference on Thermal Issues in Machine Tools - PROGRAM -

March, 21st to 23rd, 2018
Dresden



The conference is organized by the Collaborative Research Centres/Transregio 96 (CRC/TR 96) and the Institute of Machine Tools and Control Engineering of the Technische Universität Dresden and the European Society for Precision Engineering and Nanotechnology (euspen).
The conference is friendly supported by the International Academy for Production Engineering (CIRP) and the Deutsche Forschungsgemeinschaft (DFG).

We are pleased to invite you to the 1st Conference on Thermal Issues in Machine Tools, which will be held in Dresden, Germany from March 21 to 23, 2018.
The conference is a great opportunity for experts from academia and industry, to present and discuss their findings in the field of thermal modeling and optimal thermal design of machine tools on a high scientific level.
The conference intends to stimulate and support development and knowledge transfer in this field.
The purpose of the 2-day conference is to bring together members of companies and researchers for a mutual exchange of experience and knowledge.

Organisation committee

Prof. Dr.-Ing. Steffen Ihlenfeldt (chairman)
Prof. Dr.-Ing. Christian Brecher (co-chairman)
Prof. Dr.-Ing. Matthias Putz (co-chairman)
David Billington (co-chairman)

ARRAZOLA P.-J., Mondragon Unibertsitatea, Faculty of Engineering, Manufacturing Mechanical and Manufacturing Department
BIERMANN D., TU Dortmund, Institute of Machining Technology
BLEICHER F., TU Wien, Institute für Production Engineering and Laser Technology
BUDAK E., Sabanci University, Faculty of Engineering & Natural Sciences
DENKENA B., Leibniz Universitaet Hannover, Institute of Production Engineering and Machine Tools
DROSSEL W.-G., Fraunhofer Institute for Machine Tools and Forming Technology IWU
HOREJŠ O., Czech Technical University in Prague, Department of Production Machines and Equipment, RCMT
JEDRZEJEWSKI J., Wroclaw University of Technology, Faculty of Mechanical Engineering
KNAPP W., Engineering Office, Schleithelm
LAW M., Indian Institute of Technology, Kanpur, Department of Mechanical Engineering,
MÖHRING H.-C., University of Stuttgart, Institute for Machine Tools
MORIWAKI T., Setsunan University, Faculty of Engineering
NEUGEBAUER R., Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V.
ÖZEL T., Rutgers State University of New Jersey, Manufacturing Automation Research Lab
URIARTE L., IK4 Tekniker
VALASEK M., Czech Technical University in Prague, Faculty of Mechanical Engineering
WEGENER K., ETH Zurich, Institute of Machine Tools and Manufacturing
WERTHEIM R., Fraunhofer Institute for Machine Tools and Forming Technology IWU
ZÄH M., Technical University of Munich, Institute for Machine Tools and Industrial Management

21th March

08:00 PM

Get together

22th March

9:00 AM - 10:30 AM

Opening Session

11:00 AM - 1:00 PM

Session 1: Holistic modeling strategies

Session 2: Design of thermal robust machine tools

Session 3: Approaches considering environmental conditions

Session 4: Thermal robust sub-assemblies

Session 5: Approaches considering cutting processes

Session 6: Thermo-energetic analysis and modelling, shown by the example of spindles

Evening Event

7:00 PM

23th March

8:30 AM - 10:30 AM

Session 7: Control-integrated correction of thermal displacements

Session 8: Technical and analytical measurement issues

Closing Session

Guided tour of the institute's test facilities

11:00 AM - 12:30 PM

2:00 PM - 4:00 PM

Welcome

- S. Ihlenfeldt, Institute of Machine Tools and Control Engineering, TU Dresden

Greetings

- G. Rödel, Vice-rector for Research, TU Dresden
- D. Billington, Executive Director, EUSPEN
- R. Franke, Director, Office of Economic Development, City of Dresden

Keynotes

- **Cognitive supported production systems - Drivers and Chances**
R. Neugebauer, Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V.
- **Thermo-energetic design of machine tools**
C. Brecher, CRC/TR 96

Efficient modelling and computation of structure-variable thermal behaviour of machine tools

S. Schroeder^a, A. Galant^a, B. Kauschinger^a, M. Beitel-schmidt^b

^a Institute of Machine Tools and Control Engineering, TU Dresden

^b Institut of Solid Mechanics, TU Dresden

Parameter identification software for various thermal model types

B. Hensel^a, S. Schroeder^b, K. Kabitzsch^a

^a Institute of Applied Computer Science, TU Dresden

^b Institute of Machine Tools and Control Engineering, TU Dresden

Minimising thermal error issues on turning centre

M. Mareš, O. Horejš, J. Hornych

Research Center of Manufacturing Technology RCMT, Czech Technical University in Prague

The methods for controlled thermal deformations in machine tools

A. P. Kuznetsov^a, H.-J. Koriath^b, A. O. Dorozhko^{ab}

^a Moscow State University of Technology „STANKIN“

^b Fraunhofer Institute for Machine Tools and Forming Technology IWU, Dresden

Efficient FE-modelling of the thermo-elastic behaviour of a machine tool slide in lightweight design comprising plugged aluminium plates braced with tie-rods

C. Peukert^a, J. Müller^a, M. Merx^a, A. Galant^a, A. Fickert^a,

B. Zhou^a, S. Städtler^a, S. Ihlenfeldt^a, M. Beitel-schmidt^b

^a Institute of Machine Tools and Control Engineering, TU Dresden

^b Institut of Solid Mechanics, TU Dresden

Development of a dynamic model for simulation of a thermoelectric self-cooling system for linear direct drives in machine tools

E. Uhlmann^a, L. Prasola, S.Thom^a, S. Salein^a, R. Wiese^b

^aInstitute for Machine Tool and Factory Management, TU Berlin

^bBeuth University of Applied Science, Berlin

System modelling and control concepts of different cooling system structures for machine tools

J. Popken, L. Shabi, J. Weber, J. Weber

Institute of Fluid Power, TU Dresden

The electric drive as a thermo-energetic black box

S. Winkler, R. Werner

Chair of Electrical Power Conversion Systems and Drives, Chemnitz University of Technology

Thermal error compensation on linear direct drive based on latent heat storage

I. Voigt^b, S. Winkler^a, R. Werner^a, A. Bucht^b, W.-G. Drossel^b

^aChair of Electrical Power Conversion Systems and Drives, Chemnitz University of Technology

^bFraunhofer Institute for Machine Tools and Forming Technology IWU, Dresden

Industrial relevance and causes of thermal issues in machine tools

M. Putz^{ab}, C. Richter^b, J. Regel^a, M. Bräunig^a

^aInstitute for Machine Tools and Production Processes, Chemnitz University of Technology

^bFraunhofer Institute for Machine Tools and Forming Technology IWU, Chemnitz

**Clustering by optimal subsets to describe environment
interdependencies**

J. Glänzel^a, R. Unger^b, S. Ihlenfeldt^{ac}

^a Fraunhofer Institute for Machine Tools and Forming
Technology IWU, Chemnitz

^b TU Chemnitz, Faculty of Mathematics

^c Institute of Machine Tools and Control Engineering,
TU Dresden

Using meta models for enclosures in machine tools

F. Pavliček^a, D. P. Pamies^a, J. Mayr^b, S. Züst^a, P. Blaser^a,
P. Hernandez Becerro^b, K. Wegener^{ab}

^a Institute of Machine Tools and Manufacturing,
ETH Zurich

^b Inspire AG, Zurich

**Model order reduction of thermal models of machine
tools with varying boundary conditions**

P. Hernández-Becerro^a, J. Mayr^a, P. Blaser^b, F. Pavliček^b,
K. Wegener^b

^a Inspire AG, Zurich

^b Institute of Machine Tools and Manufacturing,
ETH Zurich

**Effectiveness of modelling the thermal behaviour of the
ball screw unit with moving heat sources taken into
account**

J. Jedrzejewski, Z. Kowal, W. Kwasny, Z. Winiarski
Wroclaw University of Science and Technology

**Influence of humidity on the dimensional stability of
natural granite in comparison to thermal effects**

E. Relea, L. Weiss, K. Wegener

Inspire AG, Zurich

**Analyzing and optimizing the fluidic tempering of machine
tool frames**

A. Hellmich, J. Glänzel, A. Pierer

Fraunhofer Institute for Machine Tools and Forming
Technology IWU, Chemnitz

**Simulation and analysis of the thermal behavior of a
spray-cooled forming tool**

J. Hepke, C. Obernaus

ESI ITI GmbH

Thermo-mechanical interactions in hot stamping

L. Penter^a, N. Pierschel^b

^a Institute of Machine Tools and Control Engineering,
TU Dresden

^b Fraunhofer Institute for Machine Tools and Forming
Technology IWU, Chemnitz

Experimental analysis of the heat flux into the grinding tool in creep feed grinding with CBN abrasives

C. Wrobel, D. Trauth, P. Mattfeld, F. Klocke
Laboratory for Machine Tools and Production Engineering,
RWTH Aachen University

Development of multidimensional characteristic diagrams for the real-time correction of thermally caused TCP-displacements in precise machining

M. Putz^{ab}, C. Oppermann^a, M. Bräunig^b

^aFraunhofer Institute for Machine Tools and Forming Technology IWU, Chemnitz

^bInstitute for Machine Tools and Production Processes, TU Chemnitz

Measurement of near cutting edge temperatures in the single point diamond turning process

E. Uhlmann^{ab}, D. Oberschmidt^b, S. Frenzel^a, J. Polte^b

^aInstitute for Machine Tool and Factory Operation, TU Berlin

^bFraunhofer Institute for Production Systems and Design Technology IPK

Experimental investigation of heat flows during milling processes through infrared thermography and inverse modelling

T. Helmig^b, T. Augspurger^a, Y. Frekers^b, B. Döbbeler^a, F. Klocke^a, R. Kneer^b

Laboratory for Machine Tools and Production Engineering,
RWTH Aachen University

Institute of Heat and Mass Transfer, RWTH Aachen Univer.

Thermally induced displacements of machine tool structure, tool and workpiece due to cutting process

O. Horejš, M. Mareš, J. Hornych

Research Center of Manufacturing Technology RCMT,
Czech Technical University in Prague

A new calibration approach for a grey-box model for thermal error compensation of a C-Axis

C. Brecher, R. Spierling, M. Fey
Laboratory for Machine Tools and Production Engineering,
RWTH Aachen University

Investigation of passive torque of oil-air lubricated angular contact ball bearing and its modelling

J. Kekula, M. Sulitka, P. Kolář, J. Shim, P. Kohút
Faculty of Mechanical Engineering FS, Czech Technical University in Prague

Cooling strategy for motorized spindle based on energy and power criterion to reduce thermal errors

A. Mathur, S. Grama, A. N. Badhe
Dr. Kalam center for innovation, India

Cooling potential of heat pipes and heat exchangers within a machine tool spindle

B. Denkena, B. Bergman, H. Klemme, D. Dahlmann
Institute of Production Engineering and Machine Tools,
Leibniz Universität Hannover

Thermal issues in machine tools for worldwide utilization

Ö. S. Ganiyusufoglu
Shenyang Machine Tool (Group) Co., Ltd.

Structure model based correction of machine tools

X. Thiem, B. Kauschinger, S. Ihlenfeldt
Institute of Machine Tools and Control Engineering,
TU Dresden

**Optimal temperature probe location for the
compensation of transient thermal errors**

G. Aguirre, J. Cilla, J. Otaegi, H. Urreta
IK4-IDEKO, Spain

**Adaptive learning control for thermal error compensation
on 5-axis machine tools with sudden boundary condition
changes**

P. Blaser^a, J. Mayr^b, F. Pavlicek^a, P. Hernández-Becerro^b,
K. Wegener^a

^a Institute of Machine Tools and Manufacturing,
ETH Zurich

^b Inspire AG, Zurich

**Hybrid correction of thermal errors using temperature
and deformation sensors**

C. Naumann^a, C. Brecher^d, C. Baum^d, F. Tzanetos^b,
S. Ihlenfeldt^c, M. Putz^a

^a Fraunhofer Institute for Machine Tools and Forming
Technology IWU, Chemnitz

^b Fraunhofer Institute for Production Technology IPT,
Aachen

^c Institute of Machine Tools and Control Engineering,
TU Dresden

^d Chair of Machine Tools, Laboratory for Machine Tools and
Production Engineering, RWTH Aachen University

**Optimal sensor placement based on model order
reduction**

P. Benner^a, R. Herzog^b, N. Lang^b, I. Riedel^b, J. Saak^a

^a Max Planck Institute for Dynamics of Complex Technical
Systems, Computational Methods in Systems and Control
Theory, Magdeburg

^b Research group Numerical Mathematics (Partial
Differential Equations), Chemnitz University of Technology

**Workpiece temperature measurement and stabilization
prior to dimensional measurement**

N. S. Mian, S. Fletcher, A. P. Longstaff
University of Huddersfield

**Measurement of test pieces for thermal induced
displacements on milling machines**

H. Höfer, H. Wiemer
Institute of Machine Tools and Control Engineering,
TU Dresden

**Model reduction for thermally induced deformation
compensation of metrology frames**

J. v. d. Boom
ASML Netherlands B.V., The Netherlands

Local heat transfer measurement

A. Kuntze, S. Odenbach, W. Uffrecht
Institute of Fluid Mechanics, TU Dresden

Compensation and evaluation of thermal errors of 5-axis machine tools

J. Mayr, M. Wiesner, P. Blaser, T. Tiberini, S. Böhl,
K. Wegener
Institute of Machine Tools and Manufacturing, ETH Zurich

Characterization of the thermo-elastic state of machine tools by thermography and photogrammetry

M. Riedel^a, J. Deutsch^b, J. Müller^b, S. Ihlenfeldt^a
^a Fraunhofer Institute for Machine Tools and Forming
Technology IWU, Dresden
^b Institute of Machine Tools and Control Engineering,
TU Dresden

Self-optimizing machine tools - a vision based on the digital twin

S. Ihlenfeldt
Institute of Machine Tools and Control Engineering,
TU Dresden

Conclusion

S. Ihlenfeldt, Institute of Machine Tools and Control
Engineering, TU Dresden

“Research live” in the IWM

Experimental Machine „MAX“

- photogrammetric measurement of thermal influences on machine tools
- structure based compensation of thermal effects

Technology Demonstrator „FELIX“

- double-ball-bar based measurement and evaluation of the volumetric accuracy of multi-axis machine tools under operational conditions
- thermography of machine tool structures
- structure integrated force measurement

Technology Demonstrator „MiniHex“

- 3D/5D extrusion printing using parallel-kinematics

Control Lab

- structure based modelling and model reduction methods
- correction of thermal errors and compensation of thermal effects integrated into an industrial control

Cardboard Cup Production Line

- technology data management
- machine learning algorithms for production systems
- Cyber-physical production Systems

Optional

- Visiting the Fraunhofer Institute for Machine Tools and Forming Technology IWU, Dresden

Registration

online: <http://conference2018.transregio96.de>

Registration fee: 480 EUR incl. VAT

Additional Information

Website: <http://conference2018.transregio96.de>

Conference-email: conference2018@transregio96.de

Conference Venue

Innside Dresden

01067 Dresden

Salzgasse 4



Conference Language

English

Accommodation

The participants are kindly asked to book their accommodation by themselves. Dresden has a huge variety of pleasant Hotels. We recommend for your own comfort the conference Hotel Innside Dresden which you can book through the following link

<http://meetings.melia.com/en/ConferenceonThermalIssue sinMachineTools2018.html>

Conference supporting program

- 21th March from 8:00 PM: Get together in hotel „Innside“
- 22th March from 7:00 PM: Evening event in restaurant „Italienisches Dörfchen“

