

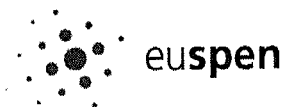
LASER METROLOGY AND MACHINE PERFORMANCE VIII

8th International Conference and Exhibition on
Laser Metrology, Machine Tool, CMM & Robotic
Performance

Lamdmap 2007

Hosted by:

Organised by:



TIB/UB Hannover
131 035 657

89



CONTENTS

Conference Keynotes

- Review on Micro Mechanical Manufacturing Processes 2
(Abstract)
O. Riemer

Session A: Machine Tool and CMM Performance Evaluation Methods

- Characterisation of dynamic errors of an ultra precision machine tool 4
P. Morantz, X. Luo, P. Shore
- Evaluation Method for Characteristics of Thermal Deviation with Patterned Spindle Speed Test on Machine Tool 14
S. Yagyu, S. Shimizu and N. Imai
- Test piece for testing simultaneous 5-axis machining 24
S. Bossoni, J. Cupic
- Ball bar measurement of five-axis conical movement 34
K. Matano, Y. Ihara
- Measurement variability with CMM's in industry; a case study 44
F. Aggogeri, E.M. Barini, E. Gentili, R. Levi
- Uncertainty and Capability analysis performed on a CMM 54
F. Aggogeri, E. Gentili, M. Mazzola
- Structural analysis of a large moving gantry milling machine including its work support system and foundation 63
A Myers, S M Barrans, DG. Ford
- Theoretical and Experimental Approach for the Evaluation of Structural Dynamics of CNC Machine Tools 73
C Pislaru, DG. Ford, MHN Widiyanto, A Myers

Session B: Novel Machine Tool Technologies

- | | |
|--|-----|
| Ultra precision 5 axes hard milling machine
<i>Bert de Veer</i> | 83 |
| Advanced materials application for novel light-damped
machine tools structures
<i>A. Merlo, D. Ricciardi</i> | 89 |
| The Precessions Polishing and Hybrid Grolishing Processes -
Implementation in a novel 1.2m Capacity Machine Tool
<i>D.D. Walker, R.Evans, S. Hamidi, R. Freeman, R. Morton, D.
Riley, G. McCavana, J. Simms, S. Wei, G. Yu</i> | 99 |
| Rule Based Feed Rate Optimisation for Machine Tools
<i>M.Hadorn, Ch. Jäger, M.Steinlin</i> | 109 |

Session C: Machine Systems for Micro-fabrication

- | | |
|--|-----|
| Recent Advances in Ultrafast Laser Micromachining Systems
for Material Micromanufacturing
<i>D.M. Karnakis, V.Mortimer and MRH Knowles</i> | 120 |
| Practical Consideration for 4-Beam Laser Interference
Lithography Process
<i>A.A. Fahmy, Jin Zhang, Xiangwei Wang, M. Packianather,
Changsi Peng, Chunlei Tan and Yury K. Verevkin</i> | 130 |
| Strategies for laser milling with microsecond pulses
<i>P V Petkov, T. Dobrev, D. T. Pham and S. S. Dimov</i> | 140 |
| A Precision Embossing Mechanism for the Creation
of Microstructures
<i>T. M. Joyce</i> | 149 |
| Micro EDM - identification and analysis of two sources of
natural tolerance
<i>A. Ivanov, C. Ferri, A. Petrelli</i> | 159 |

Micro structuring by ultra short pulsed laser ablation
Juergen Fleischer, Sebastian Haupt 169

A novel voice coil motor stage for inspecting and repairing
FPD 175
*Soo-Hun Lee, Seong-Min Lee, Bong-Suk Kim, Kihyun Kim,
Dae-Gab Gweon and Moon G. Lee*

Session D: Metrology Applications to Improve Manufacturing Performance and Industrial Inspection

Straightness and squareness errors' development due to
thermal effects 186
O. Svoboda and Wang

Static R-test: allocating the centreline of rotary axes of machine
tools 196
G.H.J. Florussen, H.A.M. Spaan

The Thermal Behaviour of Machine Tools: The Controlled Heat
Stabilization Approach 203
Hornych, Horejš

Machine tool calibration: Geometric test uncertainty depends
on machine tool performance 211
B. Bringmann, W. Knapp

Calibration of hybrid kinematics with a 1-DOF gauge 221
Berend Denkena, Hans-Christian Möhring

Session E: Precision and Ultra Precision Machining Technologies

Diamond machining of diffractive optical patterns by using a
nanometer-stroke 232
Fast Tool Servo
E. Brinksmeier, R. Gläbe, B. Lünemann

Profiled Surface Aerostatic Bearings <i>S.M. Barrans, S. Yao, P Charlton</i>	242
A new model for surface roughness evolution in the Chemical Mechanical Polishing (CMP) process <i>G. Savio, R. Meneghello, G. Concheri</i>	252
Precision balancing in ultraprecision diamond machining <i>E. Brinksmeier, R. Gläbe, A.Krause</i>	262
The significance of sample preparation when testing surface coatings for orthopaedic implants <i>P. Knox, P. Charlton, T. Laoui, G. Pearce, L. Blunt</i>	270
Comparison of the subsurface damage induced when precision grinding ULE [®] and Zerodur [®] surfaces <i>X.Tonnellier, P.Shore, P.Morantz, A.Baldwin, R.Evans[†], D.D.Walker^{††}</i>	279
A PC-Based Control System for Multiple-Axis Micro/Nano Machining: Control Architecture and Implementations <i>Mohd Khalid Mohd Nor, Dehong Huo, Kai Cheng</i>	289
Modelling and Simulation of the Micro Milling Process <i>M. S. Hong, H. S. Jung</i>	299

Session F: Machine Condition Monitoring

A Simple Method for Thermal Error Correction of a Grinding Machine <i>Mike Pierse</i>	310
Hardware-in-the-loop Implementation of Modern CNC Machine Tool Feed Drive Models <i>C Pislaru, DG. Ford, MHN Widiyanto, AP Longstaff, A Myers</i>	319

Session G: Surface Texture, Dimension and Form Metrology Techniques

Actively stabilised optical device for potential on-line assessment of surfaces in ultra precision manufacturing <i>Xiangqian Jiang, Kaiwei Wang</i>	330
Sphericity Measurements with High Data Density and High Coverage <i>C. Maul</i>	339
A Compact 6 D.O.F Geometric Error Measurement System with PSDs for Long Travel Range in mMT <i>Seol-Ryung Kwon, Jae-Ha Lee, Seung-Han Yang</i>	347

Session H: Standards for Geometric Product Specification, Machine Calibration and Uncertainty

Calibration of a 3D- ball plate <i>T. Liebrich, B. Bringmann, W. Knapp</i>	358
Analysis of CMM measurements of hole plates in interlaboratory comparisons <i>A.B. Forbes</i>	368
A method and apparatus for the calibration of the angular displacement of an object about a rotary axis like the axis of a rotary table <i>Reginald Galestien</i>	378

Session I: Artificial Intelligence in Manufacturing

Applications of Intelligent Sensor Monitoring for Machining Processes <i>T. Segreto, R. Teti</i>	388
Optimal task scheduling for Coordinate Measuring Machines	400

E. Xidias, P.Zacharia and N.Aspragathos

Petri net-based Approach for Web Service Automation Resource Coordination 410

J. Marco Mendes, Paulo Leitão, Armando W. Colombo, Francisco Restivo

Preliminary design using the Bees Algorithm 420

D.T.Pham, M. Castellani, A.Ghanbarzadeh

Using the Bees Algorithm to schedule jobs for a machine 430

D.T. Pham, E. Koç, J.Y. Lee, J. Phrueksanant