

17th CIRP Conference on Modelling of Machining Operations 2019

Procedia CIRP Volume 82

Catcliffe, United Kingdom
13 – 14 June 2019

Editors:

**Erdem Ozturk
Tom Mcleay
Rachid Msaoubi**

ISBN: 978-1-7138-0094-1

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2019) The Authors, published by Elsevier B.V.
All rights reserved.

Printed with permission by Curran Associates, Inc. (2020)

For permission requests, please contact Elsevier B.V.
at the address below.

Elsevier B.V.
Radarweg 29
Amsterdam 1043 NX
The Netherlands

Phone: +31 20 485 3911
Fax: +31 20 485 2457

<http://www.elsevierpublishingsolutions.com/contact.asp>

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

| | |
|---|---|
| FOREWORD | 1 |
| <i>Erdem Ozturk, Tom McLeay, Rachid Msaoubi</i> | |

NUMERICAL AND ANALYTICAL MODELLING

| | |
|---|----|
| MECHANISTIC MODELLING OF WORN DRILL CUTTING FORCES WITH DRILL WEAR EFFECT COEFFICIENTS | 2 |
| <i>Ce Han, Ming Luo, Dinghua Zhang, Baohai Wu</i> | |
| A THREE DIMENSIONAL CALCULATION APPROACH FOR THE HEAT FLUX DENSITY DISTRIBUTION IN FACE MILLING | 8 |
| <i>L. Langenhorst, M. Cihan, J. Sölter</i> | |
| NUMERICAL SIMULATION AND VALIDATION OF MATERIAL LOADINGS DURING ELECTRICAL DISCHARGE MACHINING | 14 |
| <i>T. Bergs, S. Schneider, S. Harst, A. Klink</i> | |
| DEVELOPMENT OF A HYPERELASTIC CONSTITUTIVE MODEL BASED ON THE CRYSTAL PLASTICITY THEORY FOR THE SIMULATION OF MACHINING OPERATIONS | 20 |
| <i>H. B. Boubaker, C. Mareau, Y. Ayed, G. Germain, F. Guerin</i> | |
| REVISITING FLOW STRESS MODELLING FOR SIMULATING CHIP FORMATION OF CARBON AND LOW ALLOY STEELS | 26 |
| <i>Thomas H. C. Childs</i> | |
| A MECHANISTIC MODEL TO PREDICT CUTTING FORCE ON ORTHOGONAL MACHINING OF ALUMINUM 7475-T7351 CONSIDERING THE EDGE RADIUS | 32 |
| <i>A. Sela, G. Ortiz-De-Zarate, I. Arrieta, D. Soriano, P. J. Arrazola</i> | |
| MODELLING ORTHOGONAL AND OBLIQUE CUTTING VIA DISCONTINUITY LAYOUT OPTIMIZATION | 37 |
| <i>Thomas Pritchard, Colin Smith, Hassan Ghadbeigi, Marco Galindo-Fernandez, Sabino Ayvar-Soberinas</i> | |
| A COMPARATIVE STUDY OF THE INFLUENCE OF THE STRAIN-HARDENING IN CHIP FORMATION SIMULATIONS USING DIFFERENT SOFTWARE PACKAGES | 43 |
| <i>N. Wielki, S. Kuschel, J. Sölter</i> | |
| FINITE ELEMENT SIMULATIONS OF CUTTING FORCE, TORQUE, AND TEMPERATURE IN DRILLING OF INCONEL 718 | 47 |
| <i>Necati Uçak, Adem Çiçek, Ekrem Oezkaya, Kubilay Aslantas</i> | |
| A NEW CONSTITUTIVE MODEL FOR CUTTING SIMULATION OF 316L AUSTENITIC STAINLESS STEEL | 53 |
| <i>Amir Malakizadi, Jannick Nils Oberbeck, Martin Magnevall, Peter Krajnik</i> | |
| FE MODELLING OF CFRP MACHINING- PREDICTION OF THE EFFECTS OF CUTTING EDGE ROUNDING | 59 |
| <i>Nicolas Duboust, Christophe Pinna, Hassan Ghadbeigi, Andrew Collis, R Scaife</i> | |
| EVALUATION OF DIFFERENT FLOW STRESS LAWS COUPLED WITH A PHYSICAL BASED DUCTILE FAILURE CRITERION FOR THE MODELLING OF THE CHIP FORMATION PROCESS OF TI-6AL-4V UNDER BROACHING CONDITIONS | 65 |
| <i>G. Ortiz-De-Zarate, A. Sela, F. Ducobu, M. Saez-De-Buruaga, P. J. Arrazola</i> | |

HIGH-PERFORMANCE AND HARD MACHINING

| | |
|--|----|
| ANALYSIS OF MECHANISMS FOR CHIP FORMATION SIMULATION OF HARDENED STEEL | 71 |
| <i>M. Tiffe, J. Saelzer, A. Zabel</i> | |
| FEM MODELING OF HARD TURNING 42CRMOS4 STEEL | 77 |
| <i>M. Saez-De-Buruaga, L. Gainza, P. Aristimuno, D. Soler, P. J. Arrazola</i> | |
| NUMERICAL MODELING OF CUTTING FORCES AND TEMPERATURE DISTRIBUTION IN HIGH SPEED CRYOGENIC AND FLOOD-COOLED MILLING OF TI-6AL-4V | 83 |
| <i>J. Caudill, J. Schoop, I. S. Jawahir</i> | |

| | |
|--|----|
| INFLUENCE OF SUPERCRITICAL CO₂ COOLING ON TOOL WEAR AND CUTTING FORCES IN THE MILLING OF TI-6AL-4V | 89 |
| <i>K. K. Wika, O. Gurdal, P. Litwa, C. Hitchens</i> | |

MATERIAL BEHAVIOUR AND TRIBOLOGICAL ASPECTS IN CUTTING

| | |
|---|-----|
| USING DIGITAL IMAGE CORRELATION MEASUREMENTS FOR THE INVERSE IDENTIFICATION OF CONSTITUTIVE MATERIAL PARAMETERS APPLIED IN METAL CUTTING SIMULATIONS | 95 |
| <i>B. Thimm, J. Steden, M. Reuber, H.-J. Christ</i> | |
| DETERMINATION OF FRICTION COEFFICIENT IN CUTTING PROCESSES: COMPARISON BETWEEN OPEN AND CLOSED TRIBOMETERS | 101 |
| <i>Luka Sterle, Franci Pušavec, Mitjan Kalin</i> | |
| MICROSTRUCTURE-BASED APPROACH TO PREDICT THE MACHINABILITY OF THE FERRITIC-PEARLITIC STEEL C60 BY CUTTING OPERATIONS | 107 |
| <i>Mustapha Abouridouane, Gottfried Laschet, Viktor Kripak, Jens Dierdorf, Thomas Bergs</i> | |
| INFLUENCE OF ANISOTROPY OF ADDITIVELY MANUFACTURED ALSi10MG PARTS ON CHIP FORMATION DURING ORTHOGONAL CUTTING | 113 |
| <i>Eric Segebade, Michael Gerstenmeyer, Stefan Dietrich, Frederik Zanger, Volker Schulze</i> | |
| IDENTIFICATION OF FRICTION COEFFICIENTS WHEN DRILLING TITANIUM TIAL6V4 | 119 |
| <i>Raphael Lorain, Louis Olivier, Antoine Poggi, Frédéric Valiorgue, Joel Rech</i> | |
| VALIDATION OF THE SLIP-LINE MODEL FOR SERRATED CHIP FORMATION IN ORTHOGONAL TURNING UNDER DRY AND MQL CONDITIONS | 124 |
| <i>Alper Uysal, I. S. Jawahir</i> | |
| A PREDICTIVE MODEL TO ESTIMATE TOOL-CHIP FRICTION IN ORTHOGONAL MACHINING | 130 |
| <i>Akash Saini, Anshu Dhar Jayal</i> | |
| TRIBOLOGY OF METAL CUTTING: NEWLY FORMED UNDERSIDE OF CHIP | 136 |
| <i>A. Gregorio, T. Santos, R. Rossi, A. M. P. Jesus, P. A. R. Rosa</i> | |
| COUPLED EULERIAN-LAGRANGIAN (CEL) SIMULATION FOR MODELLING OF CHIP FORMATION IN AA2024-T3 | 142 |
| <i>F. Ducobu, E. Rivière-Lorphèvre, M. Galindo-Fernandez, S. Ayvar-Soberanis, H. Ghadbeigi</i> | |
| EFFECT OF CUTTING EDGE RADIUS AND COOLING STRATEGIES ON SURFACE INTEGRITY IN ORTHOGONAL MACHINING OF TI-6AL-4V ALLOY | 148 |
| <i>Guang Chen, Shi Chen, J. Caudill, I. S. Jawahir</i> | |
| FEM-BASED COMPARISON OF MODELS TO PREDICT DYNAMIC RECRYSTALLIZATION DURING ORTHOGONAL CUTTING OF AISI 4140 | 154 |
| <i>Germán González, Eric Segebade, Frederik Zanger, Volker Schulze</i> | |

PRECISION, ULTRA-PRECISION AND MICRO-MACHINING

| | |
|---|-----|
| SIMULATION-BASED DESIGN OF AN ULTRASONIC-ASSISTED AIR BEARING SPINDLE FOR MICRO MACHINING | 160 |
| <i>Sebastian Greco, Andreas Lange, Benjamin Kirsch, Jan C. Aurich</i> | |
| INVESTIGATING MICROSTRUCTURE EFFECTS OF HEAT-TREATED COMMERCIAL PURE TITANIUM (CP-TI) BASED ON MECHANISTIC MODELING OF MICRO MILLING | 166 |
| <i>A. Aksin, Y. Karpat</i> | |
| FEM SIMULATION OF MICROMILLING OF CUZn37 BRASS CONSIDERING TOOL RUN-OUT | 172 |
| <i>Andrea Abeni, Ceretti Elisabetta, Özel Tugrul, Attanasio Aldo</i> | |
| ORTHOGONAL CUTTING OF ALLOY STEEL 4340 WITH MICRO-GROOVED CUTTING TOOLS | 178 |
| <i>Kaushalendra V. Patel, Suril R. Shah, Tugrul Özel</i> | |

GRINDING AND NON-CONVENTIONAL PROCESSES

| | |
|---|-----|
| HYBRID MACHINING OF METAL-MATRIX COMPOSITE | 184 |
| <i>Jin Kim, Wei Bai, Anish Roy, Lewis C. R. Jones, Vadim V. Silberschmidt</i> | |

| | |
|--|-----|
| ANALYSIS OF THE INTERACTION OF THE HONING TOOL IN RELATION TO THE GIMBAL BY A SIMULATION IN PRECISION HONING | 190 |
| <i>Sven Klein, Manuel Greulich, Dirk Bähre</i> | |
| 3D MULTIPHYSICS SIMULATION OF JET ELECTROCHEMICAL MACHINING OF INTERSECTING LINE REMOVALS | 196 |
| <i>Raphael Paul, Matthias Hackert-Oschätzchen, Igor Danilov, Matin Yahyavi Zanjani, Andreas Schubert</i> | |
| SMOOTHED PARTICLE HYDRODYNAMICS (SPH) SIMULATION AND EXPERIMENTAL INVESTIGATION ON THE DIAMOND FLY-CUTTING MILLING OF ZIRCONIA CERAMICS | 202 |
| <i>Ben Deng, Minghui Yang, Lin Zhou, Haowei Wang, Fangyu Peng</i> | |
| SIMULATION OF LASER ABLATION MECHANISM OF SILICON NITRIDE BY ULTRASHORT PULSE LASER | 208 |
| <i>B. Soltani, F. Hojati, A. Daneshi, B. Azarhoushang</i> | |
| AN ANALYTICAL STUDY OF WHEEL REGENERATION IN SURFACE GRINDING | 214 |
| <i>Máté Tóth, Neil D Sims, David Curtis</i> | |
| CONCEPTS FOR ADVANCING THE USE OF PROCESS DATA IN ELECTRICAL DISCHARGE MACHINING | 220 |
| <i>Maximilian Holsten, Andreas Klink, Thomas Bergs</i> | |

MULTIPHYSICS AND MULTISCALE MODELLING

| | |
|--|-----|
| IMPROVING TECHNOLOGICAL MACHINING SIMULATION BY TAILORED WORKPIECE MODELS AND KINEMATICS | 224 |
| <i>V. Böß, B. Denkena, B. Breidenstein, M.-A. Dittrich, H. N. Nguyen</i> | |
| EVALUATION OF MACHINE TOOL DIGITAL TWIN FOR MACHINING OPERATIONS IN INDUSTRIAL ENVIRONMENT | 231 |
| <i>Mikel Armendia, Frédéric Cugnon, Luke Berglind, Erdem Ozturk, Jaouher Selmi</i> | |
| IMPLEMENTATION OF THE MACHINE TOOL-SPECIFIC CURRENT AND VOLTAGE CONTROL CHARACTERISTICS IN MULTIPHYSICS SIMULATION OF ELECTROCHEMICAL PRECISION MACHINING | 237 |
| <i>Ingo Schaarschmidt, Matthias Hackert-Oschätzchen, Gunnar Meichsner, Mike Zinecker, Andreas Schubert</i> | |
| MULTIPHYSICS SIMULATION OF OXIDE LAYER GROWTH IN LOCALIZED ANODIZATION OF ALUMINUM APPLYING A FREE-SURFACE ELECTROLYTE JET | 243 |
| <i>Matthias Hackert-Oschätzchen, Raphael Paul, Andreas Schubert</i> | |

DYNAMICS AND STABILITY OF MACHINING

| | |
|--|-----|
| CHARACTERIZATION OF MACHINE TOOL VISE USING OPERATIONAL MODAL ANALYSIS | 249 |
| <i>Kasper Ringgaard, Nikolaj Knudsen, Jens Jensen, Martin Ørum Ørhem Juul, Ole Balling</i> | |
| A NEW TYPE OF IMPACT DAMPER WITH LONG OVERHANGS IN THE INTERNAL TURNING OF HARDENED MATERIALS. | 255 |
| <i>Wallyson Thomas, Anselmo E. Diniz, Robson Pederiva, Daniel I. Suyama, Marcos V. De Albuquerque</i> | |
| POCKET MILLING STRATEGIES USING COMBINED-MODE AND FEED-DIRECTION-DEPENDENT STABILITY CRITERIA | 261 |
| <i>M. Gaur, M. Law</i> | |
| NUMERICAL INVESTIGATION OF ORTHOGONAL CUTTING PROCESSES WITH TOOL VIBRATION OF Ti6Al4V ALLOY | 267 |
| <i>Fei Shuang, Wei Ma</i> | |
| IDENTIFICATION OF SPINDLE DYNAMICS BY RECEPTANCE COUPLING FOR NON-CONTACT EXCITATION SYSTEM | 273 |
| <i>Orkun Özşahin, Mathieu Ritou, Erhan Budak, Clément Rabréau, Sébastien Le Loch</i> | |
| CONVERGENCE ANALYSIS OF THE MULTI-FREQUENCY APPROACH AROUND A VARIABLE-HELIX INSTABILITY ISLAND | 279 |
| <i>L. Ureña, E. Ozturk, N. Sims</i> | |
| MODELLING THE DYNAMICS OF A LARGE DAMPED BORING BAR IN A LATHE | 285 |
| <i>Dan Östling, Martin Magnevall</i> | |
| PREDICTION OF FORM ERROR DURING FACE TURNING ON FLEXIBLE INCONEL 718 WORKPIECE | 290 |
| <i>Bastien Toubhans, Fabien Viprey, Guillaume Fromentin, Habib Karaoui</i> | |

MONITORING AND DIAGNOSTICS

| | |
|--|-----|
| ENSEMBLE KALMAN FILTERING FOR FORCE MODEL IDENTIFICATION IN MILLING | 296 |
| <i>Max Schwenzer, Sebastian Stemmler, Muzaffer Ay, Thomas Bergs, Dirk Abel</i> | |
| A HYBRID APPROACH USING MACHINE LEARNING TO PREDICT THE CUTTING FORCES UNDER CONSIDERATION OF THE TOOL WEAR | 302 |
| <i>Bingxiao Peng, Thomas Bergs, Daniel Schraknepper, Fritz Klocke, Benjamin Döbbeler</i> | |
| AN ADAPTIVE CHATTER SIGNAL ENHANCEMENT APPROACH FOR EARLY FAULT DIAGNOSIS IN MACHINING PROCESS | 308 |
| <i>Le Cao, Xiaoming Zhang, Tao Huang, Xiaojian Zhang, Han Ding</i> | |
| QUANTITATIVE ANALYSIS OF CHIP SEGMENTATION IN MACHINING USING AN AUTOMATED IMAGE PROCESSING METHOD | 314 |
| <i>Andrew Hrechuk, Volodymyr Bushlya, Rachid M'Saoubi, Jan-Eric Ståhl</i> | |

SURFACE INTEGRITY OF MACHINED COMPONENTS

| | |
|---|-----|
| FINITE ELEMENT SIMULATIONS OF CHIP SERRATION IN TITANIUM ALLOY CUTTING BY CONSIDERING MATERIAL FAILURE | 320 |
| <i>Suril R. Shah, Guoliang Liu, Tugrul Özel</i> | |
| ON THE SURFACE INTEGRITY OF ELECTRON BEAM MELTED Ti6Al4V AFTER MACHINING | 326 |
| <i>R. Bertolini, L. Lizzul, S. Bruschi, A. Ghiotti</i> | |
| MACHINING INDUCED DAMAGE IN ORTHOGONAL CUTTING OF UD COMPOSITES: FEA BASED ASSESSMENT OF HASHIN AND PUCK CRITERIA | 332 |
| <i>F. Cepero-Mejias, V. A. Phadnis, J. L. Curiel-Sosa</i> | |
| FVPM SIMULATION OF SCRATCHING INDUCED BY A SPHERICAL INDENTER | 338 |
| <i>Charly Euzenat, Sylvain Lavernhe, Christophe Tournier</i> | |
| MATERIAL BEHAVIOUR AT LOW TEMPERATURES FOR CALIBRATING CRYOGENIC MACHINING NUMERICAL SIMULATIONS | 344 |
| <i>R. Bertolini, S. Bruschi, A. Ghiotti, G. Haugou, L. Dubar</i> | |
| PHYSICS BASED MODELING OF MACHINING INCONEL 718 TO PREDICT SURFACE INTEGRITY MODIFICATION | 350 |
| <i>Sergio Rinaldi, Stano Imbrogno, Giovanna Rotella, Domenico Umbrello, Luigino Filice</i> | |
| COMPUTATIONALLY EFFICIENT, MULTI-DOMAIN HYBRID MODELING OF SURFACE INTEGRITY IN MACHINING AND RELATED THERMOMECHANICAL FINISHING PROCESSES | 356 |
| <i>Julius Schoop, David Adeniji, Ian Brown</i> | |

OPTIMISATION OF MACHINING PROCESSES

| | |
|--|-----|
| OPTIMIZATION OF CORNER MICRO END MILLING BY FINITE ELEMENT MODELLING FOR MACHINING THIN FEATURES | 362 |
| <i>Ali Davoudinejad, Dongya Li, Yang Zhang, Guido Tosello</i> | |
| A 5-AXIS POCKET ROUGHING STRATEGY REDUCING THE REMAINING MATERIAL VOLUME | 368 |
| <i>Baptiste Jousselin, Yann Quinsat, Christophe Tournier</i> | |
| OPTIMIZATION-BASED PROCEDURE FOR THE DETERMINATION OF THE CONSTITUTIVE MODEL COEFFICIENTS USED IN MACHINING SIMULATIONS | 374 |
| <i>Wenyu Cheng, José Outeiro, Jean-Philippe Costes, Rachid M'Saoubi, Pedro Rosa</i> | |
| OPTIMIZATION OF COMPLEX CUTTING TOOLS USING A MULTI-DEXEL BASED MATERIAL REMOVAL SIMULATION | 379 |
| <i>B. Denkena, T. Grove, O. Pape</i> | |

THERMAL EFFECTS AND PART DISTORTION

| | |
|--|-----|
| THERMAL CHARACTERIZATION METHODOLOGY FOR DRY FINISHING TURNING OF SAF 2507 STAINLESS STEEL BASED ON FINITE ELEMENT SIMULATIONS AND SURROGATE MODELS | 383 |
| <i>Rodolfo Franchi, Michele Giannuzzi, Gabriele Papadia</i> | |

| | |
|--|-----|
| THERMAL ERRORS IN MILLING: COMPARISON OF DISPLACEMENTS OF THE MACHINE TOOL, TOOL AND WORKPIECE..... | 389 |
| <i>M. Putz, J. Regel, A. Wenzel, M. Bräunig</i> | |
| MACHINING DISTORTION IN ASYMMETRICAL RESIDUAL STRESS PROFILES..... | 395 |
| <i>Ravi Bilkhu, Sabino Ayvar-Soberanis, Christophe Pinna, Tom McLeay</i> | |
| DEVELOPMENT OF A 3D HYBRID MODELING OF RESIDUAL STRESSES INDUCED BY GROOVING | 400 |
| <i>G. Methon, F. Valiorgue, M. Dumas, A. Van-Robaey, J. Rech</i> | |
| ON-MACHINE CHARACTERIZATION OF BULK RESIDUAL STRESSES ON MACHINING BLANKS..... | 406 |
| <i>I. Llanos, M. Aurrekoetxea, A. Agirre, L. N. López De Lacalle, O. Zelaieta</i> | |
| COMPARISON OF BONE TEMPERATURE ELEVATION IN DRILLING OF HUMAN, BOVINE AND PORCINE BONE..... | 411 |
| <i>Mohd Faizal Ali Akhbar, Ahmad Razlan Yusoff</i> | |
| THE INFLUENCE OF STRUCTURED FLANK FACES ON COOLING PERFORMANCE WHEN DRILLING | 415 |
| <i>Daniel Müller, Benjamin Kirsch, Jan C. Aurich</i> | |
| DETERMINISTIC MODELLING AND SIMULATIONS OF THE INTERNAL COOLING OF END MILLS..... | 421 |
| <i>Jasmine Rance, Joseph Flynn, Vimal Dhokia, Alborz Shokrani</i> | |
| EFFECTS OF TOOLPATH AND CLAMPING STRATEGIES IN MACHINING DISTORTION OF STAINLESS-STEEL PARTS | 427 |
| <i>Iheb Cherif, José Outeiro, Dominique Cotton, Gérard Poulachon, Alexandre Brosse</i> | |
| SIMULATION OF THERMAL INDUCED MICROSTRUCTURE EVOLUTION WITHIN THE HEAT AFFECTED ZONE | 432 |
| <i>T. Bergs, M. Mohammadnejad, R. Hess, S. Harst, A. Klink</i> | |
| THERMOMECHANICALLY COUPLED NUMERICAL SIMULATION OF CRYOGENIC ORTHOGONAL CUTTING | 438 |
| <i>Benedict Stampfer, Philipp Golda, Frederik Zanger, Robert Schießl, Volker Schulze</i> | |

MACHINING OF COMPLEX SURFACES

| | |
|---|-----|
| AN INTELLIGENT METROLOGY INFORMATICS SYSTEM BASED ON NEURAL NETWORKS FOR MULTISTAGE MANUFACTURING PROCESSES..... | 444 |
| <i>Moschos Papanianis, Thomas E McLeay, Mahdi Mahfouf, Visakan Kadirkamanathan</i> | |
| MODELLING OF SURFACE FORMATION MECHANISM DURING BURNISHING OF ALUMINIUM..... | 450 |
| <i>Rico Stöckmann, Matthias Putz</i> | |
| NUMERICAL MODELLING OF CUTTING FORCES IN GEAR SKIVING | 455 |
| <i>Bruno Vargas, Matthias Zapf, Jan Klose, Frederik Zanger, Volker Schulze</i> | |
| A GEOMETRICAL AND MECHANISTIC GENERALIZED MODEL FOR COMPLEX SHAPE BROACHING OF SUPER ALLOY..... | 461 |
| <i>Côme Legrand, Guillaume Fromentin, Gérard Poulachon, Richard Chatain, Mickaël Rancic</i> | |
| USING MODEL BASED ANALYTIC CUTTING FORCE PREDICTION IN CAM TOOLPATH GENERATION..... | 467 |
| <i>Steffen Braun, Michael Storchak, Hans-Christian Möhring</i> | |
| ANALYSIS AND MODELLING OF TROCHOIDAL MILLING IN INCONEL 718..... | 473 |
| <i>Edouard Ducroux, David Prat, Fabien Viprey, Guillaume Fromentin, Alain D'Acunto</i> | |
| EFFECTIVE USAGE OF MODEL BASED DATA IN TURBINE ENGINE COMPONENT MACHINING | 479 |
| <i>Gregor Kappmeyer, Mattis Lieder</i> | |

ROBOTIC MACHINING

| | |
|---|-----|
| IMPROVED STABLE CONDITIONS IN ROBOTIC MILLING BY KINEMATIC REDUNDANCY..... | 485 |
| <i>Bora Gonul, Omer Faruk Sapmaz, Lutfi Taner Tunc</i> | |
| FORM ERROR PREDICTION IN ROBOTIC ASSISTED MILLING | 491 |
| <i>Chao Sun, Patrick L. F. Kengne, Asier Barrios, Sara Mata, Erdem Ozturk</i> | |
| MODEL-BASED PLANNING OF MACHINING OPERATIONS FOR INDUSTRIAL ROBOTS..... | 497 |
| <i>F. Schnoes, M. F. Zaeh</i> | |

| | |
|--|------------|
| EFFECT OF AXIAL VIBRATIONS ON REGENERATIVE CHATTER IN ROBOTIC MILLING..... | 503 |
| <i>Yaser Mohammadi, Keivan Ahmadi</i> | |
| CUTTING FORCE PREDICTION IN ROBOTIC MACHINING | 509 |
| <i>Edouard Rivière-Lorphèvre, Hoai Nam Huynh, Francois Ducobu, Olivier Verlinden</i> | |
| DIGITAL CHAIN DEVELOPMENT FOR SANDING APPLICATION WITH A KINEMATICALLY REDUNDANT ROBOTIC SYSTEM | 515 |
| <i>Kevin Subrin, Sebastien Garnier, Thomas Bressac, Benoit Furet</i> | |
| CHATTER SUPPRESSION IN ROBOTIC MILLING BY CONTROL OF CONFIGURATION DEPENDENT DYNAMICS | 521 |
| <i>Huseyin Celikag, Neil D. Sims, Erdem Ozturk</i> | |
| OFFLINE TOOL TRAJECTORY COMPENSATION FOR CUTTING FORCES INDUCED ERRORS IN A PORTABLE MACHINE TOOL..... | 527 |
| <i>Alessandro Checchi, Giuseppe Dalla Costa, Christian Haastrup Merrild, Giuliano Bissacco, Hans Nørgaard Hansen</i> | |
| Author Index | |