

# Contents

---

## 1 Bio- and Nanotechnology

---

1-1	Robust Control Strategy of Fluid Dispensing Process for Solid Freeform Fabrication of Tissue Engineered Hydrogel Scaffold M. Vlasea and E. Toyserkani .....	3
1-2	An innovative approach for the fabrication of highly conductive nanocomposites with different carbon H. K. F. Cheng, N. G. Sahoo, L. Li, S. H. Chan and J. Zhao .....	9
1-3	Analysis of local field enhancement including tip interaction for the application to nano-manipulation using FDTD calculations B. H. Liu, L. J. Yang, Y. Wang and J. L. Yuan .....	15

---

## 2 Forming

---

2-1	Numerical Simulation of the Four Roll Bending Process A. G. Leacock, D. McCracken, D. Brown and R. McMurry .....	21
2-2	Investigation on the Process Parameters and Process Window of Three-Roll-Push-Bending R. Plettke, P. H. Vatter, D. Vipavc, M. Cojutti and H. Hagenah .....	25
2-3	Casting of Aluminium Alloy Strip by Improved Single-Roll Caster K. Akitsu, T. Haga, S. Kumai and H. Watari .....	29
2-4	Casting of Al-Si-SiCp composite alloy strip by a vertical type twin roll caster H. Harada and T. Haga .....	33
2-5	Casting of aluminium alloy clad strip using a vertical type tandem twin roll caster R. Nakamura, T. Haga, S. Kumai and H. Watari .....	37
2-6	Micro-forming of aluminum alloy by cold rolling T. Haga, K. Inoue, H. Harada and R. Nakamura .....	41
2-7	Rapid shape measurement of micro deep drawing parts by means of digital holographic contouring N. Wang, C. v. Kopylow and C. Falldorf .....	45
2-8	Fracture Limits of Metal Foils in Micro Forming F. Vollertsen, Z. Hu, H. Wielage and L. Blaurock .....	49
2-9	A theoretical model for the velocity field of the extrusion of shaped sections taking into account the variation of the axial component P. Farahmand and K. Abrinia .....	53

2-10	A theoretical model for the material flow for the forward extrusion of complicated and non-symmetric sections M. Ghorbani and K. Abrinia .....	59
2-11	An Optimization Algorithm for Improving Combined Multi-Stage Deep-Drawing and Ironing Processes of Axisymmetric Components. Analysis and Experimentation F. J. Ramírez, R. Domingo and M. A. Sebastián .....	63
2-12	Nanofinishing Process for 3D Freeform Surfaces Using Ball End MR Finishing Tool A. K. Singh, S. Jha and P. M. Pandey .....	67
2-13	Pressure Distribution in Cold Rolling of Turbo-engine Thin Compressor Blades M. Sedighi and M. Mahmoodi .....	71
2-14	Determination of the duty cycle in thermoset pultrusion W. A. Khan and J. Methven .....	75
2-15	Development of New Press-Forming Process for a Screw-Threaded Fuel Filler Pipe N. Kamei, Y. Kawamura, T. Nagamachi and H. Watari .....	79
2-16	Roller Hemming: A New Simulation Model for the Automotive Industry A. Arroyo, I. Pérez, M. Gutierrez, J. Bahillo and H. Toja .....	83
2-17	Control of the uniformity of direct electrical heating for Rotational Moulding W. A. Khan and J. Methven .....	87

---

### 3 Grinding

---

3-1	High Efficiency Deep Grinding, an Application with conventional wheels A. D. L. Batako .....	93
3-2	Detection of High and Low Temperature in the Grinding Zone using Laser Irradiation Technique A. Mohammed, J. Folkes and X. Chen .....	97
3-3	Investigation of Influences of Wheel Speed on Root Geometrical Dimension of Gas Turbine Blade A. R. Fazeli Nahrekhalaji, M. Sohrabi and S. M. Izadi .....	101
3-4	Ultra-fine Finishing of Metallic surfaces with Ice Bonded Abrasive Polishing Process R. Mohan and N. Ramesh Babu .....	105
3-5	Plane surface grinding with application of Minimum Quantity Lubrication (MQL) L. M. Barczak and A. D. L. Batako .....	109
3-6	Study of the Behavior of Air Flow around a Grinding Wheel under the Application of Pneumatic Barrier B. Mandal, R. Singh, S. Das and S. Banerjee .....	113

---

### 4 Manufacturing Systems and Management

---

4-1	A cutting plane algorithm for solving single machine scheduling problems with uncertain sequence-dependent setup times S.H. Zegordi, E. Nikbakhsh and M. Modarres .....	119
4-2	A Knowledge-Based Engineering System for Assembly Sequence Planning Y. Y. Hsu, W. C. Chen, P. H. Tai and Y. T. Tsai .....	123

4-3	Product Family Modeling and Optimization Driven by Customer Requirements	
Y. Su	.....	127
4-4	Transparency in Production by Monitoring the Condition of Molds, Dies and Machines	
R. Schmitt, M. Harding, A. Pavim and Y. Cai	.....	131
4-5	Simulation Modelling of Product-Service Systems: the Missing Link	
S. Phumbua and B. Tjahjono	.....	135
4-6	RFID Deployment at an Airport: A Simulation Study	
C. Saygin and B. Natarajan	.....	139

---

## 5 Design and Structures

---

5-1	Failure knowledge based decision-making in product quality	
W. Dai, P.G. Maropoulos and X.Q. Tang	.....	145
5-2	Predicting the End-Of-Life of Defence Electronic Systems at the Conceptual Design Stage	
W. M. Cheung, P. W. Griffin, L. B. Newnes, A. R. Mileham, R. Marsh and J. D. Lanham	.....	149
5-3	Design of Multi-Span Microfixturing Cell for Parallel Assembly of Microparts Using Electrothermally Actuated Microclamps	
M. Vismeh, M. Hamed and P. Salimi	.....	153
5-4	An Evaluation Method Based on Multiple Quality Characteristics for CNC Machining Center using Fuzzy Matter Element	
G. B. Zhang, J. H. Pang, G. H. Chen, X. L. Ren and Y. Ran	.....	157
5-5	Design of a Meso-scale 3-axis Milling with Nanometer Accuracy	
K. C. Fan, F. J. Shiou, K. M. Pan, Z. Y. Ke, Y. J. Lin and K. J. Wu	.....	161
5-6	A Novel Concept to Design Machine Tool Structures using Multifunctional Materials	
F. Aggogeri, A. Merlo and N. Pellegrini	.....	165
5-7	Design Synthesis of a three legged SPS Parallel Manipulator	
A. Khalid and S. Mekid	.....	169
5-8	Piezo-Metal-Composites as Smart Structures	
R. Neugebauer, L. Lachmann, W.-G. Drossel, S. Hensel, B. Kranz and M. Nestler	.....	175
5-9	A Methodology for Engineering Design Change Management Using Modelling and Problem Solving Techniques	
G. Fei, J. Gao, O. O. Owodunni and X. Q. Tang	.....	179
5-10	Modeling and Analysis of the strength of Adhesively Bond CFRP-Aluminium T-joints	
H. Cheng, K. F. Zhang and Y. Li	.....	183

---

## 6 Metal Cutting

---

6-1	Modelling of Machine Tapping with Straight Flute Taps	
N. M. Chen and A. J. R. Smith	.....	189
6-2	High Speed MQL Drilling of Titanium Alloy using Synthetic Ester and Palm Oil	
E. A. Rahim and H. Sasahara	.....	193

6-3	Estimation of minimum chip thickness for multi-phase steel using acoustic emission signals A. J. Mian, N. Driver and P. T. Mativenga .....	197
6-4	Extension of a Simple Predictive Model for Orthogonal Cutting to Include Flow below the Cutting Edge G. P. Zou, I. Yellowley and R. J. Seethaler .....	201
6-5	Drilling Carbon Fiber Reinforced Plastics with Diamond Coated Carbide Cutting Tools Y. Karpas, N. Camuşcu, A. Kılıç, F. Sonat, B. Değer and O. Bahtiyar.....	205
6-6	Research on 3D Groove for Cutting Heat Distribution of Coated Carbide Milling Inserts Y. He, C. J. Li and J. H. Zhou.....	209
6-7	In-Process Monitoring and Prediction of Surface Roughness on CNC Turning by using Response Surface Analysis T. Somkiat, A. Somchart and T. Sirichan .....	213
6-8	Influence of Edge Beveling on Burr Formation in Face Milling of an Aluminium Alloy P. P. Saha and S. Das .....	217
6-9	Experimental Investigations on Drilling of Woven CFRP Epoxy Laminates: The Effect of Pilot-hole or Drill Chisel Edge on Delamination A. Faraz and D. Biermann .....	223
6-10	Modelling of hard turning: effect of tool geometry on cutting force Z.Y. Shi, Z.Q. Liu and C.M. Cao.....	227
6-11	Selection of optimal process parameters for gear hobbing under cold air minimum quantity lubrication cutting environment G. Zhang and H. Wei.....	231
6-12	The Formation of Adiabatic Shear Bands as a result of Cryogenic CNC Machining of Elastomers V. G. Dhokia S. T. Newman, P. Crabtree and M. P. Ansell .....	235
6-13	Analysis of process parameters in the micromachining of Ti-6Al-4V alloy S. I. Jaffery, N. Driver and P. T. Mativenga .....	239
6-14	Tool Orientation Effects on the Geometry of 5-axis Ball-end Milling E. Ozturk and E. Budak .....	243
6-15	On deposition and characterisation of MoS <sub>x</sub> -Ti multilayer coating and performance evaluation in dry turning of aluminium alloy and steel S. Gangopadhyay, R. Acharya, A. K. Chattopadhyay and S. Paul.....	247
6-16	Novel Developments in Cutting and Grinding of Preheated Billets O. Mgaloblishvili, K. Inasharidze and M. Shvangiradze .....	251
6-17	Investigation of the Cutting Forces and Tool Wear in Laser Assisted Milling of Ti6Al4V Alloy S. Sun, M. Brandt, J. E. Barnes and M. S. Dargusch .....	255
6-18	Numerical Techniques for CAM Strategies for Machining of Mould and Die R. Ur-Rehman, C. Richterich, K. Arntz and F. Klocke.....	259

---

## 7 Welding

---

7-1	Net Shape Laser Butt Welding of Mild Steel Sheets R. M. Eghlio, A. J. Pinkerton and L. Li .....	267
-----	--	-----

7-2	Humping Modelling in Deep Penetration Laser Welding E. H. Amara .....	271
7-3	Keyholing or Conduction – Prediction of Laser Penetration Depth D. B. Hann, J. Iammi and J. Folkes.....	275
7-4	Dual Focus Nd:YAG Laser Welding of Titanium Alloys J. E. Blackburn, C. M. Allen, P. A. Hilton and L. Li .....	279
7-5	Product design for welding Antti Salminen, Jouko Kara, Marko Vattulainen, Aki Piironen.....	283
7-6	Studies on the Effect of Process Parameters on the Shear Performance of Joints of Aluminium Alloy Produced by Adhesive Joining, Spot Welding and Weld-Bonding M. D. Faseeulla Khan, D. K. Dwived and P. K. Ghosh .....	287
7-7	Influence of Electron Beam Local Annealing on the Residual Stresses for the joints with Electron Beam Welding of near $\alpha$ titanium alloy P. F. Fu, G. Fu, S. L. Gong, Y. J. Wang .....	293
7-8	Similar and Dissimilar Welding of Ductile Cast Iron M. El-Shennawy and A. A. Omar .....	297

---

## 8 Metrology

---

8-1	Recognition of Contact States in Robotized Assembly Using Qualitative Wavelet Based Features and Support Vector Machines Z. Jakovljevic and P. B. Petrovic .....	305
8-2	Linear Axes Performance Check on a Five-Axis Machine Tool by Probing an Uncalibrated Artefact T. Erkan and J. R.R. Mayer.....	309
8-3	A Holistic Approach to Quantifying and Controlling the Accuracy, Performance and Availability of Machine Tools P. Willoughby, M. Verma, A. P. Longstaff and S. Fletcher.....	313
8-4	Development of a Small 3-axis Angular Sensor for Real-time Abbé Error Compensation on Numerically Controlled Machine Tools K. C. Fan, S. M. Chen and S. Y. Lin.....	317
8-5	Micro-scale co-ordinate metrology at the National Physical Laboratory J. D. Claverley and R. K. Leach.....	323
8-6	Coating Thickness Measurement P. May and E. Zhou .....	327
8-7	Digital Alignment of a reconstructed Hologram for Measurement of Deterioration of Tools S. Huferath-von Luepke, T. Baumbach, E. Kolenovic, C. Falldorf and C. von Kopylow .....	331
8-8	Implementation of decision rules for CMM sampling in a KBE system B. J. Álvarez, E. Cuesta, S. Martínez, J. Barreiro and P. Fernández.....	335
8-9	Machine Vision System for Inline Inspection in Carbide Insert Production R. Schmitt, I. Scholl, Y. Cai, J. Xia, P. Dziwoki, M. Harding and A. Pavim .....	339

8-10	Assembly Tolerance Analysis including Flatness: Using Virtual Mating Plane T. Shuailong, Y. Jianfeng, L. Yuan and Y. Haicheng.....	343
8-11	Inspection of defects in CFRP-Foam Layered structure composite plates of aerospace materials using lock-in thermography L. Junyan, W. Song, W. Yang and W. Zhilan.....	347
8-12	Image Processing Methods for Online Measurement in Radial-Axial Ring Rolling H. Meier, J. Briselat, R. Hammelmann and H. Flick .....	355
8-13	Cognitive Production Metrology: A new concept for flexibly attending the inspection requirements of small series production T. Pfeifer, R. Schmitt, A. Pavim, M. Stemmer, M. Roloff and C. Schneider and M. Doro .....	359
8-14	The Metrology Enhanced Tooling for Aerospace (META) Framework O. C. Martin, J. E. Muelaner, D. Tomlinson, A. Kayani and P. G. Maropoulos.....	363

---

## 9 Rapid Prototyping

---

9-1	Application of 3D Printing for the Rapid Tooling of Thermoforming Moulds S. Junk, J. Sämann-Sun and M. Niederhofer .....	369
9-2	Printing Characteristics and Performance of Polymer Thick Film Inks for Direct Write Applications L. Hao, S. Raja, M. Sloan, R. Robinson, J. McDonald, J. Sidhu, C. Tuck and R. Hague.....	373
9-3	Effect of workpiece volume on statistically controlled rapid casting solution of aluminum alloys using three dimensional printing R. Singh and R. Singh.....	377
9-4	Using Additive Manufacturing Effectively: A CAD Tool to Support Decision Making P. C. Smith and A. E. W. Rennie .....	381
9-5	Dynamic strength and fracture toughness analysis of beam melted parts J. T. Sehrt and G. Witt .....	385
9-6	An additive method for photopatterning of metals on flexible substrates J. H. G. Ng, D. E. G. Watson, J. Sigwarth, A. McCarthy, H. Suyal, D. P. Hand, T. Y. Hin and M. P. Y. Desmulliez..	389

---

## 10 Green Engineering

---

10-1	An investigation of the EREE-based low carbon manufacturing on CNC machine S. Tridech and K. Cheng.....	395
10-2	Reduced Energy Consumption by Adapted Process Chains E. Brinksmeier, D. Meyer, M. Garbrecht, J.-W. Huntemann and R. Larek .....	401
10-3	Model-Based Predictive Consumption of Compressed Air for Electro-Pneumatic Systems P. Harris, G. E. O'Donnell and T. Whelan.....	405
10-4	Schottky Solar Cells Based on Graphene and Silicon X. M. Li, H. W. Zhu, K. L. Wang, J. Q. Wei, C. Y. Li and D. H. Wu.....	409
10-5	Variation of Engineer Performance and Emissions Using Ethanol Blends A. A. Abuhabaya and J. D. Feldhouse .....	413

---

## 11 ECM and EDM

---

11-1	EDM performance is affected by the white layer	
	J. D. Marafona .....	419
11-2	Development of a hybrid method for electrically dressing metal-bonded diamond grinding wheels	
	A. Sudiarmo and J. Atkinson.....	425
11-3	Robust Parameter Design and Multi-Objective Optimization of Electro-Discharge Diamond Face Grinding of HSS	
	G. K. Singh, V. Yadava and R. Kumar .....	429
11-4	Analysis of Non-limiting Current Resistance and Isopulse Power Supply for WEDM	
	C. J. Li, Y. F. Guo, J. C. Bai and Z. S. Lu .....	435
11-5	Some Aspects of Surface Integrity Study of Electro Discharge Machined Inconel 718	
	S. Rajesha, A. K. Sharma, Pradeep Kumar .....	439

---

## 12 Laser Technology – Cladding and Deposition

---

12-1	Advances in Direct Metal Deposition	
	J. Mazumder and L. Song .....	447
12-2	Effect of processing parameters in manufacturing of 3D parts through laser direct metal deposition	
	M. J. Tobar J. M. Amado, J. Lamas and A. Yáñez .....	451
12-3	A numerical investigation of powder heating in coaxial laser metal deposition	
	J. Ibarra-Medina and A. J. Pinkerton .....	455
12-4	Laser cladding of NiCr-WC metal matrix composites: dependence on the matrix composition	
	J. M. Amado, M. J. Tobar and A. Yáñez .....	459

---

## 13 Laser Technology – Bio and Micro System Processes

---

13-1	Wettability analysis of CO <sub>2</sub> laser surface patterned nylon 6,6 samples soaked in simulated body fluid (SBF)	
	D.G. Waugh and J. Lawrence .....	465
13-2	Fast parallel diffractive multi-beam laser surface micro-structuring	
	Z. Kuang, D. Liu, W. Perrie, J. Cheng, S. P. Edwardson, G. Dearden and K. G. Watkins .....	469
13-3	Effect of different processing parameters of Ti:Sapphire femtosecond laser on human dental dentine	
	L. Ji, L. Li, H. Devlin, Z. Liu, D. Whitehead, Z. Wang, W. Wang and J. Jiao .....	473
13-4	Forming microchannels on a glass substrate by CO <sub>2</sub> laser	
	Z. K. Wang, H. Y. Zheng, V. C. Tan and C. Y. Lam.....	477
13-5	Influence of pressure on aluminium plasma expansion produced by a nanosecond laser pulse: a numerical study	
	S. Aggoune, F. Vidal and E. H. Amara.....	481

---

## 14 Laser Technology – Powder Bed Processes

---

14-1	Consolidation behaviour and microstructure characteristics of pure aluminium and alloy powders following Selective Laser Melting processing P. G. E. Jerrard, L. Hao, S. Dadbakhsh and K. E. Evans .....	487
14-2	Influence of distortion on part accuracy of Indirect Metal Selective Laser Sintering K. Zakaria and K. W. Dalgarno .....	491
14-3	Surface Roughness Studies in Selective Laser Sintering of Glass filled Polyamide V. Srivastava, S. K. Parida and P. M. Pandey.....	495

---

## 15 Laser Technology – Forming

---

15-1	Finite Element Modelling of the Laser Forming of AISI 1010 Steel J. Griffiths, S. P. Edwardson, G. Dearden and K. G. Watkins .....	503
15-2	The effect of laser beam geometries on laser forming of sheet metal S. Jamil, M.A. Sheikh and L. Li .....	509
15-3	Towards Controlled 3D Laser Forming S.P. Edwardson, J. Griffiths, G. Dearden and K. G. Watkins .....	513

---

## 16 Laser Technology – Surface Modification

---

16-1	Fracture Toughness Modifications By Means of CO <sub>2</sub> Laser Beam Surface Processing of a Silicon Nitride Engineering Ceramic P. P. Shukla and J. Lawrence .....	519
16-2	Surface oxygen diffusion hardening of TA2 pure titanium by pulsed Nd: YAG laser under different gas atmosphere C. Chen, M. Zhang, S. Zahng, Q. Chang and H. Ma .....	523
16-3	Investigation on the Key Techniques of Confined Medium and Coating Layer for Laser Shock Processing on Aeroengine Blade Z. Che, S. Gong, S. Zou, Z. Cao and Q. Fei.....	527
16-4	Improvement of Corrosion Performance of HVOF MMC Coatings by Laser Surface Treatment M. Rakhes, E. Koroleva and Z. Liu .....	531
16-5	Numerical and Experimental Studies on the Laser Melting of Steel Plate Surfaces I. A. Roberts, C. J. Wang, K. A. Kibble, M. Stanford and D. J. Mynors .....	535
16-6	Analysis of temperature distribution during fibre laser surface treatment of a zirconia engineering ceramic P. P. Shukla and J. Lawrence .....	539

---

## 17 Laser Technology – Micro and Nano Processes

---

17-1	WC Nano powder cold planting via laser shock peening onto aluminium/magnesium alloy surfaces M. Zhong, L. Lv, C. Dong, R. Zhu, H. Zhang and W. Liu .....	545
------	---	-----

17-2	Femtosecond laser induced two-photon polymerization of dielectric-loaded surface plasmon-polariton nanowaveguides Y. Li, Z. Liu, H. Cui, H. Yang and Q. Gong .....	549
17-3	Real-time control of polarization in ultra-short pulse laser micro-processing O. J. Allegre, W. Perrie, K. Bauchert, D. Liu, S. P. Edwardson, G. Dearden and K. G. Watkins .....	553

---

## 18 Laser Technology – Industrial Applications

---

18-1	Laser Inertial Fusion-based Energy (LIFE) - Developing Manufacturing Technology for low cost and high volume fusion fuel is critical to our future energy needs K. Carlisle and R. R. Miles .....	559
18-2	Initial Strategies for 3D RAP Processing of Optical Surfaces Based on a Temperature Adaptation Approach M. Castelli, R. Jourdain, G. McMeeking, P. Morantz, P. Shore, D. Proscia and P. Subrahmanyam .....	569
18-3	Wireless & Powerless Laser Welding Monitoring System G D'Angelo .....	573
18-4	System Design for Laser Assisted Milling of Complex Parts X. F. Wu, Y. Wang and H.Z. Zhang .....	577
18-5	Direct Laser Writing System of Mask for Integrated Photonics Devices S. Messaoud, A. Allam, F. Siserir, Y. Bouceta, T. Kerdja, D. Ouadjaout and T. Touam .....	581

---

## 19 Laser Technology – Welding

---

19-1	Direct Laser Welding for Al- Li Alloy Plate without the Cleaning of Surface Film C. Kai, Y. Wuxiong and X. Rongshi .....	587
19-2	Characteristics of keyhole and molten pool during laser welding of TC4 Ti-alloy D. Aiqin and C. Li .....	591
19-3	Typical Joint Defects in Laser Welding of Aluminium-Lithium Alloy J. Yang, S. Gang, X. Li, L. Chen and F. Xu .....	595



<http://www.springer.com/978-1-84996-431-9>

Proceedings of the 36th International MATADOR  
Conference

Hinduja, S.; Li, L. (Eds.)

2010, XIX, 598 p. 848 illus., 48 illus. in color. With  
CD-ROM., Hardcover

ISBN: 978-1-84996-431-9