

Table of Contents

Preface

Chapter 1: Tools and Equipment

Time Domain Simulation of Surface Topography in Broaching Considering Tools with General Cutting Edge Geometries and Three DoF Parametric Dynamics	
Z. Iklodi, Z. Gabos, A. Bártfai and Z. Dombovari	3
Mathematical Optimization of Cold Wire Drawing Operations	
F.J. Doblas-Charneco, D. Morales-Palma, A. Estevez and C. Vallellano	13
Data Analytics Applied to Tool Condition Monitoring during Drilling of Hybrid Stacks in Industrial Aircraft Production Systems	
A. Hernández-Valle, C. Domínguez-Monferrer, A. Guerra-Sancho, M.H. Miguélez and J.L. Cantero	22
Catastrophic Tool Failure Detection in Aeronautical Industrial Drilling Systems Based on Spindle Power Consumption Analysis	
A. Guerra-Sancho, C. Domínguez-Monferrer, M.H. Miguélez and J.L. Cantero	31

Chapter 2: Industrial Measurements, Metrology and Product Quality Control

Development of Quality Assurance System in the Automotive Industry	
L.S. Gonçalves, R.D.S.G. Campilho and C. Prakash	43
Automatic Wear Detection on Normalized Gears Made by Additive Manufacturing from Dense 3D Point Clouds	
M. Rodríguez-Martín, P. Rodríguez-González, L. Aguado and S. Martínez-Pellitero	53
Analyzing the Influence of Dressing Parameters on the Real Depth of Cut during Rotary Dressing of Vitrified Bonded CBN Grinding Wheels	
E. Martín, L. Godino, J. Álvarez and J.A. Sánchez	61
A Modelica Library to Simulate Geometrical and Dimensional Deviations in Process Assemblies	
D.A. Antolí, P. Rosado-Castellano and S.B. Nácher	70
Design of a Test Part for Verification and Validation of a Three Linear Axes Machine Tool	
S.A. Jiménez, L. Lorente, J.A. Albajez, J. Velázquez and J.S. Mazo	79
Influence of a Single Machine-Tool Vibration on the Workpiece Waviness Profile in Turning	
M. Gil-Inchaurza, X. Beudaert, J. Munoa, D. Barrenetxea and J.A. Sánchez	89
Ductile Fracture Analysis in Nakazima vs. SPIF Tests	
M. Borrego Puche, D. Palomo, A.J. Martínez-Donaire, D. Morales-Palma and C. Vallellano	99

Chapter 3: Robotics, Mechatronics and Automation

Design and Validation of Gripper Solution Using Soft Robotics Principles	
P.J.P.D. Pereira, R.D.S.G. Campilho, J.P.G.T. Pereira, L.C.F. Moreira and C. Prakash	109
Weld Joint Reconstruction and Classification Algorithm for Trajectory Generation in Robotic Welding	
D. Curiel, F. Veiga, A. Suárez, P. Villanueva and E. Aldalur	120
SIMO: An Automatic Speech Recognition System for Paperless Manufactures	
R. Luque, A.R. Galisteo, P. Vega and E. Ferrera	129
Full Automation of a Manual Inspection Unit for Industrial Borescopy	
A. Gil-Cuadrado, A. Martínez-Gutiérrez, J. Díez-González, P. Verde, R. Ferrero-Guillén and H. Pérez	140

Using PETG/rPET Blends in Fused Particle Fabrication: Analysis of Feasibility and Mechanical Behaviour

P. Fernández, R. Marqués, N. Beltrán, B. Puerto and D. Blanco

147

Design of a Test Bench to Measure In-Plane Friction Forces Produced by a New Under-Actuated Modular Device

E. Bianchi, O.J. Jorg, G. Fantoni, F.J. Brosed Dueso and J.A. Yagüe-Fabra

155

Chapter 4: Industry X.0, Digital Manufacturing, and CAx-PLM Technologies

Implementation of a Test Plan Ontology for Incremental Sheet Metal Forming Made with Models for Manufacturing (MfM) Methodology

D. Morales-Palma, F. Mas, R. Arista, M. Oliva and C. Vallellano

167

Determination of Cost-Effective Machining Strategies for Rough Pocket Milling of Aluminum by Computer-Aided Manufacturing

E. García-Martínez, V. Miguel, Á. Mancebo and A. Martínez-Martínez

176

Digital Twin Development and Validation for a Tapered Roller Bearing Multi-Stage Production Line

J. Domínguez, A. Esteban, J.A. Romeo, F. Cebrián, S. Santo Domingo and J.J. Aguilar Martín

184

A Prototype of the Digital Twin of an Aerospace Industrial Production Line

G. Domínguez-Domínguez, M. Romero, D. Morales-Palma, M. Oliva and F. Mas

194

NC Toolpath Generation and Optimization from 3D Point Cloud in Reverse Engineering

A. García-Dominguez, J. Claver, J. Ayllón, M.M. Marín and E.M. Rubio

204

Technological Migration from I3.0 to I4.0 Applying Concurrent Engineering and Adapted Agile Management Methodologies

I. Iglesias, M. Araujo, E. Ares and G. Peláez

213

Comparison of Augmented Reality Technologies Applied to Assembly Processes in Aerospace Industry

F.J. Servan and M. Oliva

223

Augmented Reality in Industrial Manufacturing - Identification of Application Areas for AR-Based Quality Control/Assembly Based on Technology Suitability

P.T. Ho, J.A. Albajez, J.S. Mazo and J.A. Yagüe-Fabra

233

A Proposal for Using Models for Manufacturing (MfM) Methodology to Reconfigure Aerospace Manufacturing Systems

R. Arista, F. Mas, D. Morales-Palma and C. Vallellano

241

Redesign of Manufacturing Workstation with Value Sensitive Design and Axiomatic Design to Incorporate Values of Industry 5.0

A. Agote-Garrido, A.M. Martín-Gómez and J.R. Lama-Ruiz

250

Extended Reality in End of Arm Tooling Development and Assembly

P. Pesca and D.G. Afonso

260

Application of Models for Manufacturing (MfM) Methodology to Aerospace Sheet Metal Parts Manufacturing

M.H.B. Andrade, A.L. Szejka and F. Mas

270

An Approach to Zero-Failures Maintenance Using Industry 4.0 in Network Connected Multistage Industrial Machines

F.J. Álvarez García, Ó. López Pérez, A. González González and D. Rodríguez Salgado

279

Maintenance Data Management: The Potential Effect of Blockchain Technology

M.A. Turino, P. Manco, P. Maresca and R. Macchiaroli

289

Chapter 5: Product Design

Design for the Manufacture of a Video Game Controller Applying Emotional Design

Ó. López Pérez, A. González González, F.J. Álvarez García, D. Rodríguez Salgado and J.F. Vázquez Pons

299

End-to-End Bioinspired Lightweight Structure Manufacturing-Oriented Design, Validation, and Manufacturing with Advanced Methods

I.L. Blanc, M.G. de Cortazar and F.A. Girot Mata

310

Data Preparing for Reverse Engineering D. Kubátová, L. Čížek and V. Netrvál	320
Tailoring HALT/HASS Tests towards Product Reliability Growth and Cost Saving F. Mancusi, V. Romaniello, F. Fruggiero, S. Martino, A. Drago and A. Lambiase	330
Analysis of the Applicable Regulations and Definition of the Procedure for the Commissioning of Enclosures for High-Precision Electronic A. Sanchidrián, A. Brunete, F. Gómez, M. Hueso, A. Ochoa, F. Santos and C. Tank	341

Chapter 6: Engineering Management

Last Trends in the Application of the Hybrid Additive and Subtractive Manufacturing in the Aeronautic Industry M.A. Rabalo, A. García-Dominguez, E.M. Rubio, M.M. Marín and B. de Agustina	353
Prospective in Additive Manufacturing Based on R-Meta-Analysis and Bibliometric Study M. Rodríguez-Martín, R. Domingo and J. Ribeiro	363
Application of the Human-Oriented Planning Model in the Supply Chain: From the Global System to Specific Cases D. Gallego-García, S. Gallego-García and M. García-García	373
A Maintenance-Based Project Management Approach towards Organizational Sustainability Goals E. García-García, S. Gallego-García, D. Ren and M. García-García	384
Optimizing the Supply Chain of Intensive Care Unit Blood Culture Samples to Clinical Microbiology Laboratory Using Lean Six Sigma D. Sancho, R. Acero Cacho, M.J. Lavilla, M. Corral, A. Carrillo-López and A. Rezusta	394
The Use of Simulation and Artificial Intelligence as a Decision Support Tool for Sustainable Production Lines M.G. Cardoso, E. Ares, L.P. Ferreira and G. Peláez	405
Impact of Key Enabling Technologies on Safety Risks in Shipbuilding. Application to Painting Activities on Large Vessels M. Ramírez-Peña, M. Otero-Mateo, A. Pastor-Fernandez, M. Batista and A. Cerezo-Narvaez	413
Guide for the Implementation of Operational Control Procedures in Underwater Cutting and Welding Activities J.F. Solano, S. Martín-Béjar, J.M. Cañero-Nieto and L. Sevilla Hurtado	423
Performance Improvement in Service Manufacturing Lines Supported by Information Sharing and Task Assignment Flexibility A.G. Arteaga and R. Calvo	432
Development of Real-Time Indicators to Assess and Improve the Energy Efficiency of Machine Tools M.P. Lambán, P. Morella, J.C. Sanchez, A. Les, J. Royo and F. Quero	443

Chapter 7: Some Social Aspects of Industrial Development

Human Needs Evolution and Organizational Development: A Case Study Analysis towards the Fifth Industrial Revolution S. Gallego-García and M. García-García	453
Deontology in Industrial Engineering: A Comparison between some Spanish Autonomous Communities A.C. Larrañaga Pastor, C. González Gaya and C. de Lama Burgos	464

Chapter 8: History of Technology and Machines, Industrial Heritage

Virtual Modeling of the Brown and Sharpe's Universal Grinding Machine from 1877 F.J. Trujillo Vilches, M. Herrera Fernández, C. Bermudo Gamboa and L. Sevilla Hurtado	475
Historical and Technological Study and Scale Reconstruction of Trebuchet J.L. Ródenas-Vigil, R. López-García, G. Medina Sánchez and M.F. Guerrero-Villar	485

Multicriteria Decision Methodology Applied to the Textile Factory “La Juanona” in Antequera	
C. Bermudo Gamboa, S. Martín-Béjar, J. Claver and L. Sevilla Hurtado	494
Technological and Heritage Analysis of a Singular Screw Press from the early 19th Century of the Museum of the Royal Factories of Riópar (Spain)	
M.Á. Sebastián, J. Claver, L. Sevilla Hurtado, F.J. Trujillo Vilches, M. Vera and A. Galán	502
Identification of Criteria for the Protection and Enhancement of Railway Industrial Heritage Assets through the Analysis of Two Examples on the Border between Spain and Portugal	
J.I. de Grado, J. Claver and M.Á. Sebastián	511

Chapter 9: Supporting the Teaching and Learning Process in Engineering Education

Creation of a Model of a Cutting Tool Using Additive Manufacturing for Visualization of Machining Angles	
F.d.S. Martín Fernández, M.J. Martín Sánchez, M.J. Cano Iglesias and F. Carrión Rodríguez	523
Simulation-Assisted Analysis of Sand Casting Distribution Systems for Teaching Purposes	
A. Sambruno, P. Márquez, F. Bañón-García, F.J. Puerta-Morales and A. Gómez-Parra	531
Other Dimensions of Additive Manufacturing: Learning and Development of Technical Skills in Bachelor Subjects	
A.M. Camacho, A. Rodríguez-Prieto, J. Claver, J. Ayllón, A. García-Dominguez, B. de Agustina, E.M. Rubio, A. Holl and I. García	540
Diagnosis of Students' Mathematical Background to Address Manufacturing Courses	
J. Serrano, G.M. Bruscas-Bellido, S. Benavent-Nácher, P. Rosado-Castellano and J.V. Abellán-Nebot	549