



Volume 4/3 • 2011

CIRP Journal of Manufacturing Science and Technology

Special Issue:
Production Networks Sustainability

Guest Editors:
Wilfried Sihn
Peter Kuhlmann



CIRP Journal of Manufacturing Science and Technology

Editor-in-Chief: Laszlo Monostori

Computer and Automation Research Institute (SZTAKI), Hungarian Academy of Sciences; and Department of Manufacturing Science and Technology, Budapest University of Technology and Economics (BME)

Associate Editors:

Y. Altintas, Canada
A. Balsamo, Italy
P. Bariani, Italy
K. Bouzakis, Greece
B. Denkena, Germany
N. Duffie, USA
P. Gu, Canada
H. Hansen, Denmark
M. Hauschild, Denmark
F. Hashimoto, Japan
J. Hu, USA

J. Jeswiet, Canada
B. Karpuschewski, Germany
W. Knapp, Switzerland
M. Kunieda, Japan
B. Lauwers, Belgium
A. Nee, Singapore
J. Oliveira, Brazil
S. Smith, USA
K. Ueda, Japan
A. Weckenmann, Germany

Editorial Board:

D.K. Aspinwall, UK
J. Aurich, Germany
A. Azushima, Japan
N. Bay, Denmark
A. Bernard, France
H. Bleý, Germany
A.N. Bramley, UK
D. Brissaud, France
D. Cegiarek, USA
L. Cser, Hungary
M. Davies, USA
D. Dornfeld, USA
D. Dumur, France
H. ElMaraghy, Canada
W. ElMaraghy, Canada
W.T. Estler, USA
L. Galantucci, Italy
U. Heisel, Germany
I.S. Jawahir, USA
J. Jedrzejewski, Poland
K. Jemielniak, Poland
S. Kara, Australia
Z. Katz, South Africa
S-G. Kim, USA
F. Kimura, Japan
T. Kjellberg, Sweden
V. Kovalenko, Ukraine
B. Kruszynski, Poland
S. Kumara, USA
M.C. Leu, USA
G. Levy, Switzerland
L. Li, UK
S. Lu, USA
D. Lucca, USA

P.G. Maropoulos, UK
L. Mathieu, France
J. McGeough, UK
J. Meijer, Netherlands
F. Micari, Italy
B. Milcic, Croatia
M. Mitsubishi, Japan
R. Neugebauer, Germany
M. Rahman, Singapore
K.P. Rajurkar, USA
E. Rivin, UK
W.B. Rowe, UK
R. Roy, UK
M. Santochi, Italy
G. Schuh, Germany
R. Shivpuri, USA
M. Shpitalni, Israel
D. Spath, Germany
N.P. Suh, USA
S. Takata, Japan
E. Telkaya, Germany
R. Tetti, Italy
S. Tichkiewitch, France
T. Tolio, Italy
T. Tomiyama, Netherlands
M. Tseng, Hong Kong
T. Ueda, Japan
E. Uhlmann, Germany
J. Váncza, Hungary
F. Van Houten, Netherlands
V.C. Venkatesh, Mali
A. Weckenmann, Germany
K. Weinert, Germany
D. Williams, UK

Honorary Editorial Board:

L. Alting, Denmark
J.G. Bollinger, USA
G. Chryssoulouris, Greece
M. DeVries, USA
R.J. Hocken, USA
I. Inasaki, Japan
F. Jovane, Italy
J. Kaczmarek, Poland
H.J.J. Kals, Netherlands
F. Klocke, Germany
F. Le Maître, France

R. Levi, Italy
P. McKeown, UK
J. Peters, Belgium
F.O. Rasch, Norway
G. Sohlenius, Sweden
H.K. Toenshoff, Germany
H. Van Brussel, Belgium
M. Véron, France
R. Wertheim, Germany
H. Yoshikawa, Japan

Aims and Scope

The *CIRP Journal of Manufacturing Science and Technology* (CIRP-JMST) publishes fundamental papers on manufacturing processes, production equipment and automation, product design, manufacturing systems and production organisations up to the level of the production networks, including all the related technical, human and economic factors. Preference is given to contributions describing research results whose feasibility has been demonstrated either in a laboratory or in the industrial praxis. Case studies and review papers on specific issues in manufacturing science and technology are equally encouraged.

The Journal has been established by *CIRP*, the International Academy of Production Engineering to meet the needs above. In addition the *CIRP* has appointed an Editorial Board of Fellows of the Academy which forms a team of highly recognised international experts in the field.

The intention is to establish a forum for publishing the best, most innovative research in the field and to this end the journal will publish both in-depth versions of the best papers from *CIRP* conferences, whilst at the same time, welcoming original contributions from authors worldwide. The main goal is to contribute to the further development of the Science and Technology of Manufacturing which is of fundamental importance for the future.

Funding body agreements and policies

Elsevier has established agreements and developed policies to allow authors who publish in Elsevier journals to comply with potential manuscript archiving requirements as specified as conditions of their grant awards. To learn more about existing agreements and policies please visit <http://www.elsevier.com/fundingbodies>.

CIRP Journal of Manufacturing Science and Technology



Editor-in-Chief

L. MONOSTORI

<http://ees.elsevier.com/cirpj>

Available online at www.sciencedirect.com

SciVerse ScienceDirect

VOLUME 4/3 (2011)



ELSEVIER

Amsterdam • Boston • London • New York • Oxford • Paris
Philadelphia • San Diego • St. Louis

Publishing information

Publishing Office: Elsevier Ltd, The Boulevard, Langford Lane, Kidlington, Oxford, OX5 1GB, UK

Advertising information: Advertising orders and enquiries can be sent to: James Kenney, Elsevier Ltd., 32 Jamestown Road, London NW1 7BY, UK; phone: (+44) 207 424 4216; fax: (+44) 1865 853 136; e-mail: j.kenney@elsevier.com. Customers in the US and Canada can also contact: Mr Tino DeCarlo, Advertising Department, Elsevier Inc., 360 Park Avenue South, New York, NY 10010-1710, USA; phone: (+1) (212) 633 3815; fax: (+1) (212) 633 3820; e-mail: t.decarlo@elsevier.com

Author enquiries: For enquiries relating to the submission of articles (including electronic submission where available) please visit this journal's homepage at <http://www.elsevier.com/locate/cirpj>. You can track accepted articles at <http://www.elsevier.com/trackarticle> and set up e-mail alerts to inform you of when an article's status has changed. Also accessible from here is information on copyright, frequently asked questions and more. Contact details for questions arising after acceptance of an article, especially those relating to proofs, will be provided by the publisher.

Publication information: CIRP Journal of Manufacturing Science and Technology (ISSN 1755-5817). For 2010, volume 3 (4 issues) is scheduled for publication. Subscription prices are available upon request from the Publisher or from the Regional Sales Office nearest you or from this journal's website (<http://www.elsevier.com/locate/cirpj>). Further information is available on this journal and other Elsevier products through Elsevier's website (<http://www.elsevier.com>). Subscriptions are accepted on a prepaid basis only and are entered on a calendar year basis. Issues are sent by standard mail (surface within Europe, air delivery outside Europe). Priority rates are available upon request. Claims for missing issues should be made within six months of the date of dispatch.

Frequency: Published quarterly.

Orders, claims, and journal enquiries: please contact the Regional Sales Office nearest you:

St. Louis: Elsevier, Customer Service Department, 11830 Westline Industrial Drive, St. Louis, MO 63146, USA; phone: (877) 8397126 [toll free within the USA]; (+1) (314) 4537076 [outside the USA]; fax: (+1) (314) 5235153; e-mail: JournalCustomerService-usa@elsevier.com

Amsterdam: Elsevier, Customer Service Department, PO Box 211, 1000 AE Amsterdam, The Netherlands; phone: (+31) (20) 4853757; fax: (+31) (20) 4853432; e-mail: JournalsCustomerServiceEMEA@elsevier.com

Tokyo: Elsevier, Customer Service Department, 4F Higashi-Azabu, 1-Chome Bldg, 1-9-15 Higashi-Azabu, Minato-ku, Tokyo 106-0044, Japan; phone: (+81) (3) 5561 5037; fax: (+81) (3) 5561 5047; e-mail: JournalsCustomerServiceJapan@elsevier.com

Singapore: Elsevier, Customer Service Department, 3 Killiney Road, #08-01 Winsland House I, Singapore 239519; phone: (+65) 63490222; fax: (+65) 67331510; e-mail: JournalsCustomerServiceAPAC@elsevier.com

Funding body agreements and policies

Elsevier has established agreements and developed policies to allow authors whose articles appear in journals published by Elsevier, to comply with potential manuscript archiving requirements as specified as conditions of their grant awards. To learn more about existing agreements and policies please visit <http://www.elsevier.com/fundingbodies>

Copyright information

Copyright © 2010, CIRP. Published by Elsevier Ltd. All rights reserved.

This journal and the individual contributions contained in it are protected under copyright by Elsevier Ltd, and the following terms and conditions apply to their use:

Photocopying

Single photocopies of single articles may be made for personal use as allowed by national copyright laws. Permission of the Publisher and payment of a fee is required for all other photocopying, including multiple or systematic copying, copying for advertising or promotional purposes, resale, and all forms of document delivery. Special rates are available for educational institutions that wish to make photocopies for non-profit educational classroom use.

For information on how to seek permission visit www.elsevier.com/permissions or call: (+44) 1865 843830 (UK) / (+1) 215 239 3804 (USA).

Derivative Works

Subscribers may reproduce tables of contents or prepare lists of articles including abstracts for internal circulation within their institutions. Permission of the Publisher is required for resale or distribution outside the institution. Permission of the Publisher is required for all other derivative works, including compilations and translations (please consult www.elsevier.com/permissions).

Electronic Storage or Usage

Permission of the Publisher is required to store or use electronically any material contained in this journal, including any article or part of an article (please consult www.elsevier.com/permissions).

Except as outlined above, no part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior written permission of the Publisher.

Notice

No responsibility is assumed by the Publisher for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions or ideas contained in the material herein. Because of rapid advances in the medical sciences, in particular, independent verification of diagnoses and drug dosages should be made.

Although all advertising material is expected to conform to ethical (medical) standards, inclusion in this publication does not constitute a guarantee or endorsement of the quality or value of such product or of the claims made of it by its manufacturer.

© The paper used in this publication meets the requirements of ANSI/NISO Z39.48-1992 (Permanence of Paper)

Special Issue: Production Networks Sustainability

Production Networks Wilfried Sihm and Peter Kuhlang	225
Collaborative planning with benefit balancing in Dynamic Supply Loops P. Egri, A. Döring, T. Timm and J. Váncza	226
A new approach for cost modelling and performance evaluation within operations planning João Malta and Pedro F. Cunha	234
Closed-loop production systems—A sustainable supply chain approach H. Winkler	243
Leveling of low volume and high mix production based on a Group Technology approach Fabian Bohnen, Thomas Maschek and Jochen Deuse	247
Concept of transport-oriented scheduling for reduction of inbound logistics traffic in the automotive industries M. Florian, J. Kemper, W. Sihm and B. Hellingrath	252
A framework for modelling energy consumption within manufacturing systems Y. Seow and S. Rahimifard	258
Supply chain design for the global expansion of manufacturing capacity in emerging markets Stefan Weiler, Dayán Páez, Jung-Hoon Chun, Steven C. Graves and Gisela Lanza	265
Joint design of quality and production control in manufacturing systems M. Colledani and T. Tolio	281
A web-services oriented workflow management system for integrated digital production engineering K. Alexopoulos, S. Makris, V. Xanthakis and G. Chrysosouris	290
Internet based collaboration in the manufacturing supply chain D. Mourtzis	296
A modular framework for the LCA-based simulation of production systems C. Brondi and E. Carpanzano	305
Ramp-up of hybrid manufacturing technologies B. Nau, A. Roderburg and F. Klocke	313
Embodied energy of manufacturing supply chains S. Kara and S. Ibbotson	317
Networked manufacturing control: An industrial case Bart Saint Germain, Paul Valckenaers, Hendrik Van Brussel and Jan Van Belle	324
Tool wear modelling through regression analysis and intelligent methods for nickel base alloy machining C. Leone, D. D'Addona and R. Teti	327
Structural concepts for horizontal cooperation to increase efficiency in logistics R. Leitner, F. Meizer, M. Prochazka and W. Sihm	332