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International Journal of Simulation Modelling

Volume 14: Number 3: September 2015

pp 375-566

CONTENTS

-
- 378 Scope & Topics
- 379 Fixture Layout Design Based on a Single-Surface Clamping with Local Deformation
Tadic, B.; Todorovic, P.; Novkinic, B.; Buchmeister, B.; Radenkovic, M.; Budak, I. & Vukelic, D.
- 392 Simulation and Visual Control of Chip Size for Constant Surface Roughness
Zuperl, U. & Cus, F.
- 404 Optimal Products' Hand-Handle Interface Parameter Identification
Harih, G.; Borovinsek, M.; Ren, Z. & Dolsak, B.
- 416 Performance of Uncoated and Coated Carbide Tools in Turning FCD700 Using FEM Simulation
Yanda, H.; Ghani, J. A.; Rizal, M. & Che Haron, C. H.
- 426 Numerical Simulation of Modified Low-Density Jet Penetrating Shell Charge
Chang, B. H.; Yin, J. P.; Cui, Z. Q. & Liu, T. X.
- 438 A Novel Fault Diagnosis Method for Rotating Machinery Based on EEMD and MCKD
Lv, Z.-L.; Tang, B.-P.; Zhou, Y. & Zhou, C.-D.
- 450 A New Production Scheduling Module Using Priority-Rule Based Genetic Algorithm
Aydemir, E. & Koruca, H. I.
- 463 Competition or Cooperation: a Simulation of the Price Strategy of Ports
Zhou, X.
- 475 On-Time Delivery Achievement of High Priority Orders in Order-Driven Fabrications
Seo, J. C.; Chung, Y. H. & Park, S. C.
- 485 New Markets Forecast and Dynamic Production Redesign Through Stochastic Simulation
Bendato, I.; Cassettari, L.; Mosca, M.; Mosca, R. & Rolando, F.
- 499 A Promoted Hybrid Heuristic Algorithm for Two-Dimensional Multi-Depots Vehicle Routing Problem
Zhu, X. N.; Yan, R. & Zhang, Q.
- 511 An Intuitionistic Fuzzy-TODIM Method to Solve Distributor Evaluation and Selection Problem
Li, M.; Wu, C.; Zhang, L. & You, L.-N.

- 525 A Variables Clustering Based Differential Evolution Algorithm to Solve Production Planning Problem
Yang, K. W.; Zhang, P. L.; Ge, B. F. & Dou, Y. J.
- 539 Inter-Organizational Cooperative Innovation of Project-Based Supply Chains under Consideration of Monitoring Signals
Wu, G.-D. & Tang, D.-Z.
- 551 Modelling Risk Coordination of Supply Chains with Put Option Contracts and Selective Return Policies
Yi, H. Y. & Guo, P.
- 563 Calendar of Events
- 564 Notes for Contributors

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SCOPE & TOPICS

The *International Journal of Simulation Modelling* (IJSIMM) provides a global forum for the publication of all forms of simulation modelling research work in academic institutions, in industry or in consultancy. The journal publishes two types of issues: regular issues and special issues. Regular issues are collections of papers submitted without special invitation directly to the Editor-in-Chief. Special issues are collections of papers on a specific topic or event coordinated by a Guest Editor.

The editors of the IJSIMM are searching primarily for original, high-quality, truly insightful, theoretical and application-oriented research papers (based on practical experience, case study situation or experimental results) dealing with simulation modelling, mainly within discrete-event simulation field and mechanical, production or industrial engineering. In selected chapters of the paper (in the Introduction or in the Literature review or in the Conclusion) the authors should include simple descriptions with clear answers to some of the following questions:

- Where is the problem?
- What is the original contribution of the paper?
- Why should this contribution be considered important?
- What are the most closely related publications by others?
- How can other researchers make use of the results and findings of the paper?
- Does the paper have the potential to make an impact to practice?
- What experience has been obtained in applying the proposed approach? Etc.

General approaches, formalisms, algorithms, or techniques should be illustrated with significant applications that demonstrate their applicability to real-world problems and advance the knowledge and practice of simulation.

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FIXTURE LAYOUT DESIGN BASED ON A SINGLE-SURFACE CLAMPING WITH LOCAL DEFORMATION

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Abstract

Proposed in this paper is a novel approach to fixture layout design. The contact interface between workpiece and fixture is reduced to a single workpiece surface. This allows reliable machining of the remaining five workpiece surfaces in a single setup. Workpiece clamping is performed by inserting special elements into prepared auxiliary openings on the workpiece. Clamping is thus reduced to indenting of sharp clamping element tips into the workpiece surface. Shallow indenting is performed on surfaces which have no practical function. Special device was designed to allow experimental investigation. Experimental results point towards the efficiency of the proposed approach. Workpiece displacements were small during machining and allowed the required machining accuracy. Furthermore, the results obtained during machining indicate high surface quality.

(Received in August 2014, accepted in January 2015. This paper was with the authors 1 month for 1 revision.)

Key Words: Fixture, Machining, Locating, Clamping

1. INTRODUCTION

Companies are always trying to stay competitive on the world market and to improve their work and products by making them better, cheaper, safer and adding value. One of the most important manufacturing problems is how to create quality products within short timeframes. Short release time of new products is one way to stay ahead of competitors and to ensure bigger profit. Next to this, costumers are used to variety so that's one more problem for manufacturers since they need to create new manufacturing practices to ensure faster turnaround in product development. Flexible manufacturing can not be achieved without using flexible fixtures, so one fixturing element can be used on several manufacturing operations [1]. Costs regarding fixturing are not very small and they influence from 10 % to 20 % of total costs of manufacturing system [2]. Around 40 % of all rejected parts are due to dimensioning errors that has appeared because of poor fixturing design [3].

Fixture layout plays an important role at the machining process planning stage. Optimization of fixture layout is a critical aspect of machining fixture design, defining the types, number, and material of fixture elements, and their position relative to workpiece [4]. Most frequently, goal function was minimization elastic workpiece deformation, minimization deformation at workpiece-fixture contact points, minimization clamping forces, minimization workpiece location errors (improve the location accuracy), minimization vibration during machining, etc. Numerous approaches have been used to determine optimal fixture layout.

Siebenaler and Melkote [5] presented a fixture-workpiece model using finite element method (FEM) to investigate the influence of various parameters on workpiece deformation,

