IJSIMM
ISSN 1726-4529

International Journal of Simulation Modelling

Volume 14, Number 3
September 2015

INTERNATIONAL JOURNAL OF SIMULATION MODELLING

Identification Statement

ISSN 1726-4529 Abbreviated key title: **Int j simul model** Start Year: 2002

Published quarterly by **DAAAM International Vienna, TU Wien, Karlsplatz 13/311, A – 1040 Vienna, Austria**
Phone: +43 1 58801 31121
DAAAM homepage: http://daaam.info/
IJSIMM homepage: http://www.ijsimm.com

Place of publication: Vienna, Austria (AUT) Language of text: English

IJSIMM Editorial

Editorial Board Members

Subscription rate: 200 EUR (4 issues), worldwide postage included
Single copies: 50 EUR (plus 10 EUR for postage)
Details about payment – contact: info@ijsimm.com

Postmaster: Send address changes to: DAAAM International Vienna or to: info@ijsimm.com

DAAAM International is a member of CrossRef.

IJSIMM is indexed / abstracted in: **Web of Science**, **Science Citation Index Expanded**, **Current Contents** – Engineering, Computing & Technology, **INSPEC**, **ProQuest - CSA** (Cambridge Scientific Abstracts: Advanced Technologies Database with Aerospace, Ceramic Abstracts, Computer and Information Systems Abstracts, Electronics and Communications Abstracts, Engineering Research Database, Materials Research Database, Mechanical & Transportation Engineering Abstracts, METADEX), **PASCAL**, **RAM**, **SCOPUS**, **TEMA, GALE** (Academic OneFile, InfoTrac Custom, Computer Database). Included in: **SCImago Journal Rank (SJR)** indicator, **Cabell's** Directories, **EBSCO** (Academic Search Complete, Current Abstracts, Mainfile, TOC Premier), **Microsoft** Academic Search. Listed in **Ulrich's** Periodicals Directory.

TECHNISCHE UNIVERSITÄT WIEN
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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.

Impact Factor 2014 for the IJSIMM, released by *Thomson Reuters* Journal Citation Report / Science Citation Impact (SCI) in June 2015: **2.083** (top 6 out of 43 Industrial Engineering journals).

Int j simul model 14 (2015) 3, 379-391
ISSN 1726-4529 Original scientific paper

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.[****]

[*] University of Kragujevac, Faculty of Engineering, Sestre Janjic 6, Kragujevac, Serbia
[**] Ministry of Defence, Kraljice Marije bb, Banja Luka, Bosnia and Herzegovina
[***] University of Maribor, Faculty of Mechanical Engineering, Smetanova 17, Maribor, Slovenia
[****] University of Novi Sad, Faculty of Techical Sciences, Trg Dositeja Obradovica 6, Novi Sad, Serbia
E-Mail: btadic@kg.ac.rs, petar@kg.ac.rs, bekir_novkinic@hotmail.com, borut.buchmeister@um.si, radenkovic@kg.ac.rs, budaki@uns.ac.rs, vukelic@uns.ac.rs

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,