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A RULE BASED APPROACH FOR DEADLOCK AVOIDANCE IN CELLULAR MANUFACTURING

Jain, P. K. & Fukuda, Y.
Department of Mechanical and Industrial Engineering, Indian Institute of Technology Roorkee, Roorkee, India
E-mail: pjainfme@iitr.ernet.in

Abstract
The proposed methodology has been implemented in modular system architecture to avoid deadlock situations in real time using a rule base approach. A system configuration consisting of work centers, buffers, robots, and loading/unloading stations is taken with limited capacities as the example case study. A part mix with a variety of processing sequences such as, re-entrant only, jig-jag, re-entrant and jig-jag, and flow type is processed in the taken system configuration to demonstrate the capabilities of the proposed deadlock avoidance approach. A deterministic setup for simulation study is taken to get valuable insight into the system behavior in terms of deadlock occurrences, batch completion times etc. 13 refs.

Key Words: *Rule Based Approach, Deadlock Occurrence, Deterministic Model*

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MATERIAL FLOW MANAGEMENT IN VALIDATING CONCENTRATE AND DIFFUSED FMS ARCHITECTURES

Cotet, C. E. & Dragoi, G.
University Politehnica of Bucharest, PREMINV, Bucharest, Romania
E-mail: costel@mix.mmi.pub.ro

Abstract
In this paper we present a set of practical material flow management techniques used to validate flexible manufacturing system (FMS) architectures. We propose here an algorithm available both for concentrate and diffused FMS illustrated by two case studies. As a first case study we perform an optimization for a diffused FMS, a fixing device assemble and disassemble flexible cell, using Witness software. Based on the same algorithm we describe a concentrate process simulation analysis of a production system using a case study for the CPFH 500 model. In this second case study the simulation project was undertaken with the goals of demonstrating and confirming production rates of a manufacturing process based on a proposed design layout and operational data, and of identifying ways of improving the design of the flexible cell in order to increase those production rates. The productivity improvement in both cases is significantly validating our algorithm. 8 refs.

Key Words: *Discrete Material Flows, Flexible Cell, Simulation Techniques, Strangled Flow, Production Rates*

Pages 121-129

A UNIVERSAL MODEL FOR EVALUATING MEASURING UNCERTAINTY IN CALIBRATION

Acko, B.
University of Maribor, Faculty of Mechanical Engineering, Maribor, Slovenia
E-mail: bojan.acko@uni-mb.si

Abstract
Uncertainty of measurement means doubt about the validity of the result of a measurement. It reflects the lack of exact knowledge of the value of the measurand. A measurement result shall contain information about the measuring uncertainty, which indicates its quality. These facts are very well known in metrological laboratories and related institutions. The industry is, however, still not aware enough of the importance of uncertainty evaluation. Standard procedures for evaluating uncertainty are quite complex and hard to understand. Therefore, these procedures are not very convenient for the use in industry. Our industrial research has shown that industrial metrology staff is interested in controlling uncertainty, but they would need simple procedures for evaluating it. This was the reason for developing a universal uncertainty evaluation model for length measurements, based on our expert knowledge. The first development stage, which is presented in this article, deals with a model for calibration of length measurement instruments and is applicable for all industrial calibrations in this field. 8 refs.

Key Words: *Measuring Uncertainty, Calibration, Length, Model*