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EMPIRICAL MANUFACTURING LINE DESIGNS IN JAPANESE AUTOMOBILE PLANTS

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Abstract
Manufacturing line (ML) designers have understood that simulation studies can help to form a more reliable ML than conventional methods that for the most based upon engineering experiences. However, the use of simulation has not been applied much in designing the ML, and a confident method of designing a new ML or modifying the capacity of a current manufacturing line (CML) has remained a task in Japanese automobile manufacturing plants. The main purpose of this research is to propose a new perspective of a simulation study in Japanese automobile industry from an empirical point of view to implement the framework for designing a ML. The second purpose is to introduce the method and analytical procedures of modifying a CML utilized by a linear programming (LP) model for selecting alternatives for simulation study. The proposed method was applied in an actual design project to confirm the feasibility of the framework. 15 refs.
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Key Words: *Manufacturing Line Design, Discrete Event Simulation, LP Model*

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MULTI-OBJECTIVE OPTIMIZATION OF ALUMINIUM FOAM MANUFACTURING PARAMETERS

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Abstract
Aluminium foams are a new class of materials with low densities, large specific surface and novel physical and mechanical properties. Their applications are extremely varied: for light weight structural components, for filters and electrodes and for shock or sound absorbing products. Recently, interesting foaming technology developments have proposed metallic foams as a valid commercial chance; foam manufacturing techniques include solid, liquid or vapour state methods. The foams presented in this study are produced by Melt Gas Injection (MGI) process starting from melt aluminium. The objective of this paper is to develop a method for the analysis of the effects of process parameters on the quality of foam parts and to determine their optimal combination. The effects of the foaming parameters are studied by the Taguchi method, applied to design an orthogonal experimental array. A multi-objective optimization approach is then proposed by simultaneously minimizing the relative density and maximizing the absorbed energy efficiency. 21 refs.
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Key Words: *Aluminium Foam, Melt Gas Injection Process, Taguchi Method, Multi-Objective Optimization*

Pages 90-101

PART-MACHINE GROUP FORMATION WITH ORDINAL-RATIO LEVEL DATA & PRODUCTION VOLUME

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Abstract
This work presents an algorithm for design of cellular manufacturing system. It considers ordinal level data and ratio level data. We consider sequence of operation for every component as ordinal level data. The ratio level data includes operation time per unit, production volume & machine capacity. Adapted design activity model & image representation in computer vision is used to model ordinal-ratio level data. Orthographic view part grouping is used for part family formation. Machines are allocated on basis of their net utilization for a part family. Performance of algorithm is comparable & of good quality with existing methods in its class. To validate the result, a two way ANOVA technique is used, and on simulated example the F-ratio is enumerated. It is observed that production volume has significant influence on cell configuration and cell performance. It is concluded that the change in production volume mixes may need reconfiguration & capacity scaling according to recommendation of algorithm & ANOVA analysis. To facilitate industrial application, it can be implemented by using free software, Scilab and/or commercial softwares. 27 refs.
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Key Words: *Cellular Manufacturing, Part Families and Machine Cells, Algorithm, ANOVA*

Pages 102-113

WEB-BASED SIMULATION OF MANUFACTURING SYSTEMS

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Abstract
Powerful new features may be incorporated to simulation environments by exploiting existing Web technology. To demonstrate this, WebManSim, a prototype web-based manufacturing system simulator has been developed. The proposed system includes project management principles, supports communication and voting and provides workflow facilities and simulation program generation - execution capabilities. Such a system provides close monitor to the evolution of the simulation project, enhances the coordination and communication of the simulation participants, identifies and resolves conflicts that may arise in the simulation team and creates virtual simulation expert communities. The use of such a system may improve the simulation team coordination by automatically initiating project tasks as soon as possible, reduce the project duration by eliminating dead time between activities and decrease the overall simulation project cost by minimizing the face-to-face meetings especially when used by project teams located at geographically remote places. 11 refs.
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Key Words: *Web-Based Simulation, Simulation Project, Groupware, Manufacturing Simulators*

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LOADING AND DEFORMATION PROGRESSION DURING OPEN FORGING OF HOLLOW CYLINDRICAL BLANKS

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Abstract
A solution for a hollow cylindrical blank with a velocity field derived from the equations of equilibrium and compatibility conditions is obtained. The solution, accounts for both platen interfacial friction and the blank geometry. The platens were assumed as flat bodies moving normal to the blank surface. The problem is solved by the upper-bound approach, with the assumption of constant shear factor (average coefficient of friction) between platens and blank. The radius of the blank which does not experience deformation during the forging process is referred to as the neutral radius, and was determined by power minimization. The neutral radius as well as the friction coefficient at the blank interface were found to play an important role in determining the average forging pressure and the blank deformation from initial to final configurations. 11 refs.
(Extended paper from the ICAT 2008 Conference, Ptuj, Slovenia, 17-18 September 2008.)

Key Words: *Forging, Deformation, Interfacial Pressure, Upper Bound Approach*