MANUFACTURING SIMULATION: COMPUTER AIDED TOLERANCING FOR PROCESS PLANNING

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Abstract

The simulation of the process planning is a decisive stage in the manufacturing process of a set of parts. This simulation is generally carried out by the calculation of the working dimensions (WD) according to the blueprint dimensions (BPD), to the means of production and to the machining process. The calculation and the generating of the working dimensions can be done by using different methods such as the transfer method, the dispersion method and the tolerance chart method.

This article presents a system of automatic generating of the working dimensions (WD) through the tolerance chart method. From the blueprint dimensions and from the process planning proposed, the system allows the automatic generating of three graphs: the blueprint dimensions graph, the blueprint dimensions and the stock removal graph, as well as the working dimensions graph. After the drawing of the two last graphs, the dimensional chains appear in the matrix from: $Y = P \cdot X$.

At last, the calculation of the tolerance intervals for each dimension is done from the resolution of an equation system according to the minimum economic tolerances imposed by the manufacturing process and to the weight assigned to the tolerances. 12 refs.

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PERFORMANCE MODELLING OF RECONFIGURABLE ASSEMBLY LINE

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Abstract

This paper deals with the modelling and simulated performance analysis of a reconfigurable assembly line (RAL). The RAL model considered in this work has a set of in-line movable robots, which can move on a guided path to serve various workstations. Each robot in the RAL can access and serve more than one workstation by moving to their locations while satisfying the accessibility constraints. Capacity flexibility is addressed by varying the number of serving robots in the system. Error recovery flexibility is addressed by pulling out the failed robot from the assembly line for repair. The failed robot is reintroduced into assembly line after its repair. The system hardware has plug and play capabilities for ease of handling of system resources. Assumptions are made to simplify the problem as well as to highlight the specific features considered in the model. Simulation results have been presented to show the effectiveness of the proposed model. 14 refs.

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DESIGN AND EVALUATION OF THE CLASS-BASED MULTI-AISLE AS/RS

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Abstract

In this paper, the design and evaluation of the multi-aisle automated storage and retrieval systems (AS/RS) is presented. In comparison with the well known single-aisle systems, the multi-aisle systems, where the storage and retrieval machine serves more than one picking aisle, can substantially reduce the investment cost. The objective of this study is to exploit the benefits of the class-based multi-aisle system for reducing the average travel time for a transaction and consequently to increase the throughput capacity. For the storage operation, the random location assignment policy was applied, while for the retrieval operation the "first come first served" and "nearest neighbour" request selection rules were applied. The performance comparison of the single-class and class-based multi-aisle systems is contrasted with the alternative combination of the storage rack configuration and the number of picking aisles. The results show that class-based multi-aisle systems are effective in reducing the average travel time and also show large improvements in throughput capacities. 18 refs.

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