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SIMULATION OF PLASMA ASSISTED MILLING OF HEAT RESISTANT ALLOYS

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Abstract
In this paper results are obtained for a Thermal Enhanced Milling process using plasma generated heating system. This technique, named Plasma Assisted Machining (PAM), is applied to heat resistant alloys, such as nickel-base alloys (Inconel 718) and cobalt-base alloys (Haynes 25). Numerical results from a finite element simulation, as well as experimental results are presented. By comparing the cutting forces obtained by PAM with those from the conventional milling process, a reduction of about 30 % is derived from both the numerical and experimental analyses. Therefore, the cutting speed could be increased in the process, thus improving the machining efficiency. A metallurgical study of effects of heating in material structure is also included showing that plasma is adequate for the stability of cobalt alloys structure. 9 refs.

Key Words: *Thermal Enhanced Machining, Plasma Assisted Machining, Machining Simulation, Heat Resistant Alloys*

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OPTIMISATION OF FLEXIBLE ASSEMBLY SYSTEM USING SIMULATION

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Abstract
In order to fulfil new market requirements, flexible manufacturing environments must be able to react quickly and effectively. Small-batch, high-variety and continuously increasing of products complexity call for extensive computation.
In this paper the simulation model of complex flexible system for electrical motor assembly is represented. Presented model is developed and examined in discrete simulation software Arena 5.0. Following factors are examined: station failure, influence of palette number and different motor types on efficiency and functionality of a flexible manufacturing system. 5 refs.

Key Words: *Flexible Assembly, Simulation Model, Computing Strategies, Analysis, Stations*

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SIMULATION STUDY OF EFFECTS OF RESOURCES' DOWNTIMES ON SHOP PERFORMANCE

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Abstract
Simulation has become a standard tool in manufacturing. Complex automated manufacturing systems require the evaluation of dynamic relationships during operation. The paper deals with the influence of unforeseen changes in production capacities on a model of a flexible manufacturing system. Four kinds of products are manufactured on 14 machine tools of five different types in a balanced flexible manufacturing system. By simulating downtimes of individual machine tools or components of the transport system in different moments or intervals of time the influence on the following values was established: the productivity of the manufacturing system (the number of finished products), flow times of products, the utilisation of capacities and of the transport, the percentage of blockades at workplaces, the utilisation of buffers and waiting times in buffers. Simulation package SIMFACTORY II.5 has been used for the experimental part. 9 refs.

Key Words: *Simulation, Downtime, Frequency, Duration, Performance*

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FINITE ELEMENT STUDY AND SIMULATION OF PLATE BENDING PROCESS

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Abstract
In order to determine the inevitable mechanical spring back of a bended plates, designed for assembling the spherical tanks, made of steel StE 500, according to DIN 17102/83, an elastic-plastic incremental finite element calculation has been carried out to analyse axis-symmetric strain sheet metal bending process. Sufficiently accurate stress distributions and deformed geometry of plates as parts of spherical tanks have been obtained through the whole bending process. The load-deflection curve has been carried out based on reaction forces and compared with experimentally obtained results. Friction effects and material characteristics such as work hardening are also covered. The accuracy of the simulation results, mechanical spring back and the residual stress distribution after unloading are discussed through the comparison with the experimental results. 7 refs.

Key Words: *Bending, Spring Back, Finite Element Method, Simulation*