

**SIZING MANUFACTURING CELL MACHINES BASED ON THE SIMULATION  
AND AN EXPERT SYSTEM**

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**Abstract**

This article developed a new method of the manufacturing cell sizing according to an approach based on the simulation and expert system. This method takes into consideration the stochastic aspect which governs the production system, the production scales of the product family to be treated, the products arrival law, the adopted scheduling and the used optimization criteria.

This study starts with the modeling of a manufacturing cell and the simulation of its functioning using the software "ARENA", which provides performance ratings. In a second stage, the expert system exploits these performance measures by a confrontation of the obtained results to the pre-defined objectives. This step permits to lead to a possible decision in order to size each of the machines to obtain a better manufacturing cell functioning. This process is repeated iteratively until the obtention of a cell having the performances which conform to the objectives already defined. The method represents a very useful and economical approach to predict the system size.

Finally, applications of the developed method for the sizing of manufacturing cell machines permitted to get satisfactory results. 11 refs.

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**Key Words:** *Sizing, Manufacturing Cell, Simulation, Expert System, Performance Measures*

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**SIMULATION ANALYSIS FOR REDUCING QUEUES IN MIXED-PATIENTS' OUTPATIENT  
DEPARTMENT**

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**Abstract**

Customers desire short waiting times whereas service providers want to maximize resources utilization. Long waiting time is not uncommon in many service organizations and it is familiar especially in outpatient departments. To make the study more realistic, some assumptions were removed and use an animated simulation model for a mixed-patient type environment in an outpatient department. A special purpose data generator is designed to explore bottlenecks in consultation rooms. Four appointment scheduling rules and their possible combinations are evaluated in two steps. First, experimentation concentrates on appointed and non-appointed patients. Second, it considers new patients in addition to those two categories. It is revealed that the rule which records the lowest waiting time is not feasible due to the high portion of server idle time. The rule that shows the lowest server idle time is not viable due to increased waiting time. It is possible to find the best rule which lies between these two times in a mixed-patient type environment. 17 refs.

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**Key Words:** *Appointment Scheduling, Outpatient Department, Discrete Event Simulation*

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**MODELLING OF MANUFACTURING ACTIVITIES BY PROCESS PLANNING  
KNOWLEDGE REPRESENTATION**

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**Abstract**

Process planning is one of the key activities for product design and manufacturing. Impact of process plans on all phases of product design and manufacture requires high level of interaction of different activities and tight integration of them into coherent system. In this paper we describe a model for manufacturing activities that allows integration. The framework for integration is briefly described and the manufacturing process model that considers three dimensions of planning is explained. Then an object-oriented knowledge representation approach is presented with module for parts modeling and module for generation of process plan. Description of machining process entities and their relationships with features, machines and tools are provided. The benefits of the proposed representation, which include connection with geometric model, reduced search space and alternative plan generation, are discussed. These new contributions provide for a new generation of CAPP systems that can be adapted for various manufacturing systems and can be integrated with other CIM modules. 13 refs.

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**Key Words:** *Process Planning, Knowledge, Object-Oriented Programming, Features*