



COMPUTER MODELING OF PROCESSES IN PRINTING HOUSE

Chekanov I.O., Projects manager and Software developer, WPS Hong Kong

Grigoriev A.V., Ph.D., docent, MST Department KhNURE

Zhang Zhouchang, Purchasing Manager and Channel Development, WPS Hong Kong

Modeling of processes in production has huge importance in planning the activity of production enterprise. Building a model allows researchers to test how an enterprise will function under certain conditions. This fact allows not only predicting the result of the enterprise's activity in different conditions, but also it allows finding the most optimal solutions for difficult situations. All this became possible thanks for analyzing numerous factors with the help of the created model of enterprise.

The printing enterprise belongs to the production company. Therefore, the modeling of the processes, which occurred at the facility, is an actual task. The larger company, the more equipment and personnel engaged in the manufacturing of the product, and more material used in production works. This fact calls for more quantity of investigations and process modeling underlying functioning of facility. Building the model allows making long-term plans for the development of enterprises, determine the necessity for one or another expensive innovation and their appropriateness. Like any new development, modeling is associated with additional costs, but this extra expenses pay off for a certain period of time when a good model was created.

The increase in the quantity of factors considered by the model together with competent audit of the target enterprise, increase accuracy and effectiveness of the model in scope of forecasting, process modeling, and resource allocation. In the modern world, development of computer and information technology allows creating computer models of enterprises. These models allow quickly processing huge amounts of data, which were obtained during the audit and monitoring of the enterprise.

In this paper, the printing house of company WPS is considered as the target enterprise for building the model. This printing house located in China, stands out by hide speed and good quality. WPS uses its own experimental software to track the progress of work. Therefore, the simulation of the enterprise will provide data that can be used in this system. In turn, the data that accumulate in the system can be used for monitoring of the activities in enterprise. This accumulated data will help to make model more accurate. Given the possibility of such interaction, it was decided to create a computer model of the enterprise, which can be integrated into already existing system for monitoring the progress of work. This integration will allow two-way data exchanging. In view of the above, it was decided to develop software for modeling the activities of the enterprise with logics and control panel, which are compatible with the interface of the current program to track progress.

The program solution includes tools for designing a computer model of the enterprise and activities, with the most complete coverage of all parameters of equipment, personnel, materials and environment. In addition, the computer model takes into consideration the internal logistics of the enterprise. This feature further brings the model closer to actual production.



The user interface of the application for enterprise simulation consists of: the menu bar; the toolbar, which contains tools for model creating; the working space for the location of all modelled objects; the attribute table, which shows the attributes of the object which is selected in current moment of time; the timeline, which shows the current time and status of all objects that are being monitored.

Equipment, parts of buildings, personnel and materials are objects. Since this model takes into consideration the internal logistics of the enterprise, the creation of virtual premises of the plots is an obligatory stage in the of the model making. Size and shape are required attributes for all objects on the field. This feature will allow tracking a movement of all objects in the virtual enterprise. The model should be limited in a two-dimensional space with a plan view. This decision was made for the simplifying the model.

All objects have a number of parameters assigned by the user. There are a number of standard parameters: the entry point, the exit point, the interaction zone, the observation zone, the speed of movement, etc. For example, the printing equipment has several entry points for loading materials - paper, polygraphic paint, moisturizing solution and several exit points - for prints and waste. However, because of the printing equipment is stationary, it doesn't have speed and observation zone. Unlike a worker in printing house, who has observation zone and speed of movement. Zone of worker's interaction is within a meter from the point of location. It's a zone where the worker can reach for an object with his hands. An employee can interact with objects, which fall into the zone of his actions, for example, he can take and transfer the box with products from one point to another. It should be mentioned that model has some objects, which has interaction zone and speed, but these objects cannot move by themselves. They can move only when they hit a certain employee's action area. Examples of that objects are pallet truck or a forklift.

All of objects have parameters that user can create by himself. These parameters have a numerical value, a Boolean value, or an option from the enumeration list, which created and specified by the user.

After placing all objects in the virtual enterprise, user should specify the model of the object behavior, the optimal routes of travel, the zone of maximum deviation and the traffic area. All these manipulations must be performed for all types of objects. After launching the enterprise model, user can track the status of each object by the timeline. In addition, user can evaluate execution time of the particular subtask and identify bottlenecks in the virtual production model.

Integration of the simulation program with the status tracking software used in the enterprise allows process modeling of creating products. Model of these processes based on product's characteristics specified in the specification - color, volume, circulation, type of material. Described in this work model can integrate to the information system of enterprise. It allows to planning work of the enterprise and forecast various situations related to both its internal features, and with external factors caused by changes in the market of printing services.