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## RESEARCH OF METHODS AND ALGORITHMS FOR SOLVING PRODUCTION PLANNING PROBLEMS

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*Improving efficiency of production systems is the main task of each manufacturing enterprise, and ensuring the coordinated work of all production links is the main goal of operational and production planning. This article discusses the need and relevance of the development and research of methods for optimizing the production process.*

Today, the important task of every manufacturing enterprise is to improve efficiency of production systems management.

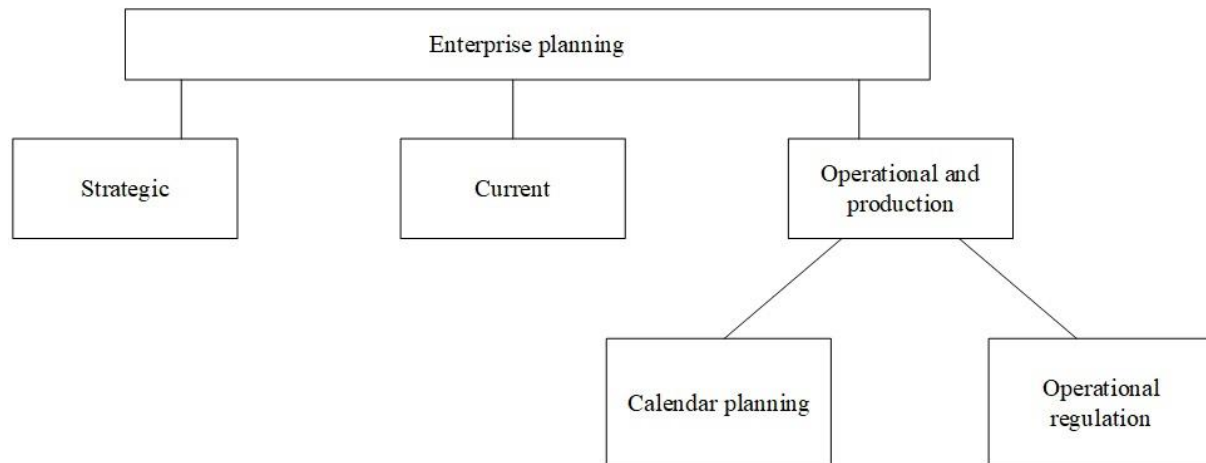
Generally speaking, an enterprise is a collection of diverse and interrelated processes distributed in space and time. Since the available production and time resources are limited, it is advisable to use production planning in enterprise management. There are many methods of operational planning process (OPP). However, it should be understood that it is necessary not only to predict the volume of products produced in order to meet the demand, but also to identify possible problems or difficulties that may arise. Determine ways to avoid and solve them. It is important to choose a management plan for the production system that will maximize profit with the least cost of resources.

At the same time, planning is often carried out under conditions of partial or complete uncertainty of the input parameters, which depend on various factors.

Thus, the task of analyzing and improving production planning methods under conditions of uncertainty is urgent.

Mechanical engineering, like any manufacturing enterprise, is a complex structure consisting of certain objects, processes and the relationships between them.

According to the timing of planning, long-term (strategic), medium-term (current) and short-term (operational and production) planning are distinguished (fig. 1).



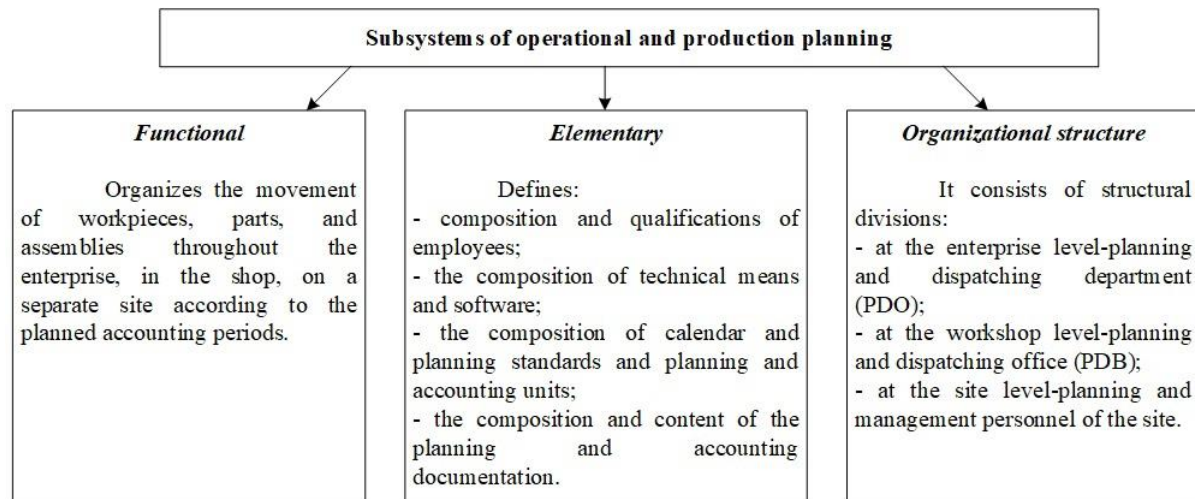
**Fig. 1. – Types of planning in the enterprise**

Let us take a closer look at operational production planning. Its main goal is to ensure the coordinated work of all production links to manufacture products in accordance with a given quantity, nomenclature and on time.

To achieve the main goal of the PPO it is necessary [1]:

- to develop calendar-planning standards;
- create a production plan for the enterprise for each month of the year;
- draw up operational and calendar plans for the production of products by workshops, sections by quarters, months, weeks, days, shifts;
- calculate the load of equipment;
- make shift planning.

Operational management is carried out using functional, elementary and organizational subsystems. Operational planning subsystems are shown in figure 2.



**Fig. 2. – Subsystems of operational and production planning**

The production dispatch department (PDO) develops operational and calendar standards, determines and establishes plans for the release of parts in workshops, and monitors the implementation of the schedule.

The production dispatch bureau (PRB) determines the places and dates of the beginning and end of processing of each detail of the operation, draws up a calendar schedule for the work of the shop sections for a quarter, month, week, day, shift, and also ensures the well-organized work of the shops to fulfill the given program.

Operational-production planning must necessarily take into account the industry specifics, serial production, design and technological features of the products, the features of the technologies used at the enterprise and other various factors.

The system of operational and production planning consists of the following interrelated and interdependent elements:

- planning and accounting periods - time intervals for which the plan is drawn up;
- planning and accounting units - a detailed planning object (order, assembly, part, etc.);
- scheduling standards - quantitative and time values of indicators (for example, batch size, duration of the production cycle, etc.);
- systems of operational production planning - a set of methods for calculating the planned parameters for the production output.

When choosing an OPP system, it is important to take into account such factors as the dynamics of demand for manufactured products, the cost of borrowed material resources, the indicator of material consumption of products, the cost of labor, the number of technological redistributions, the coefficient of coverage of general production costs, the coefficient of production specialization.

The type of production (single, batch or mass) affects both the various elements of the OPP and the features of the control and management of the production process [2].

Based on the foregoing, the expediency of developing and researching methods for optimizing the production process, taking into account the uncertainty of the initial data, as well as the formalization of a fuzzy model of the production system, is confirmed.

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