# THE RESOURCE MANAGEMENT SYSTEM OF THE ENTERPRISE

Due to the growing popularity of computer systems, the idea arose to use their capabilities to plan the activities of the enterprise, including production processes. The need for planning is due to the fact that the bulk of the delays in the production process is associated with the delay in the receipt of individual components, as a result of which, as a rule, in parallel with the decrease in production efficiency in warehouses, there is an excess of materials received on time or earlier. In addition, due to the imbalance in the supply of components, there are additional complications with taking into account and tracking their condition in the production process, it was virtually impossible to determine, for example, which party belongs to this component element in the already assembled finished product.

In order to prevent such problems, a methodology was developed for planning the need for materials **MRP** (Material Requirements Planning). The implementation of the system, working on this methodology, is a computer program that allows you to optimally regulate the supply of components in the production process, controlling the stock in the warehouse and the production technology itself.

The purpose of the MRP is to ensure that the required quantity of required materials is available at any time during the planning period, along with the possible reduction of permanent stocks. To achieve this goal, the system solves the problem of forming, controlling and, if necessary, changing the order moments so that all the materials required for production are received simultaneously. To do this, it processes data files (main production plan, list of items, inventory status data, product composition specification) and generates results files based on them (schedule of purchase orders/production of materials and components or adjustment of previously planned purchase orders/production).

The material status is a key pointer to the current state of the material: has this material in stock, reserved for other purposes, are there any current orders or order for it is only planned. Thus, the status of the material uniquely describes the degree of readiness of each material to be put into the production process.

An insurance stock of material is necessary to maintain the production process in the event of unforeseen and unavoidable delays in its delivery.

The material requirement in the MRP program is a specific quantitative unit that reflects the need to order this material at some point in time during the planning period. There are concepts of total demand for material, which displays the amount that is required to be released into production, and net demand, the calculation of which takes into account the presence of all insurance and reserved reserves of this material. An order in the system is automatically created when a non zero net need arises.

The planning process includes the functions of automatically creating projects for purchase orders and / or internal production of necessary materials or components. Thus, the MRP system optimizes the delivery time of components, thereby reducing production costs and increasing its efficiency.

The main advantages of using such a system in production are:

 guarantee the availability of the required components and reduce time delays in their delivery, and therefore increase the production of finished products without increasing the number of jobs and the load on the production equipment;  reduction of production defects in the process of Assembly of finished products arising from the use of non-conforming technology components;

 ordering production due to the control of the status of materials, which allows you to uniquely track the entire conveyor path, from the creation of an order for this material to its position in the already assembled finished product. Full reliability and efficiency of production accounting is achieved.

However, in practice, the MRP system has encountered the following problems and disadvantages:

 a significant amount of computation and pre-processing.;

 increasing logistics costs for order processing and transportation in the company's desire to further reduce the inventory of MP or go to work with small orders with a high frequency of their execution;

 insensitivity to short-term changes in demand;

 a large number of failures due to the large size of the system and its complexity.

Production planning systems are constantly evolving. Initially, MRP systems actually simply formed an order plan for a certain period based on the approved production program, which did not fully meet the growing needs. In order to increase the efficiency of planning in the late 70s, Oliver white and George Plosl proposed the idea of reproducing a closed loop in MRP systems. The idea was to consider a wider range of factors in planning by introducing additional functions. The core capacity planning and material requirements it was proposed to add a number of additional control of the quantity of goods manufactured quantity used in the Assembly process of components, preparation of regular reports on delays of orders; the volume and dynamics of the sales of products, about suppliers, etc.

The term "closed loop" reflects the main feature of the modified system, which consists in the fact that the reports created in the course of its work are analyzed and taken into account at further stages of planning, changing the production program, and, consequently, the order plan, if necessary. In other

words, additional functions provide feedback in the system that provides planning flexibility in relation to external factors, such as the level of demand, the state of Affairs of suppliers, and so on.

Further improvements to the system led to the transformation of the closed- loop MRP system into an extended modification, which was later called **MRP-II** (Factory Resource Planning) due to the identity of the abbreviations. This system was created for effective planning of all resources of the production enterprise, including financial and personnel.

**MRP-II** is a set of principles, models and procedures for management and control that serve to improve the economic performance of the enterprise.

The **MRP-II** standard describes sixteen groups of system functions:

1. sales and production planning;
2. demand management;
3. drawing up a production plan;
4. planning material needs;
5. product specifications;
6. warehouse management;
7. planned deliveries;
8. management at the production floor level;
9. the capacity planning;
10. input / output control;
11. logistics;
12. resource allocation planning;
13. planning and control of production operations;
14. financial management;
15. modeling;
16. the performance evaluation

With the accumulation of experience in modeling production and non- production operations, these concepts are constantly being refined, gradually covering more and more functions.

The task of MRP-II class information systems is the optimal formation of the flow of materials (raw materials), semi-finished products (including those in productions) and finished products. The MRP-II class system is designed to integrate all the main processes implemented by the enterprise, such as supply, inventory, production, sales, planning, control over the implementation of the plan, costs, Finance, fixed assets. The MRP-II standard divides the scope of individual functions into two levels: necessary and optional. In order for the software to be classified as MRP-II, it must perform a certain amount of necessary (basic) functions (procedures). Some SOFTWARE vendors have adopted a different range of implementations of the optional part of this standard's procedures.

Results of using integrated systems of the MRP-II standard:

 getting up-to-date information about the current results of the company as a whole, and with full detail on individual orders, types of resources, implementation of plans;

 long-term, operational and detailed planning of the company's activities with the possibility of adjusting the planned data based on operational information;  solving problems of optimization of production and material flows;  real reduction of material resources in warehouses;

 planning and controlling the entire production cycle with the ability to influence it in order to achieve optimal efficiency in the use of production capacity, all types of resources and meet the needs of customers;

 automation of work of the contract Department with full control over payments, shipment of products and terms of performance of contractual obligations;

 financial reflection of the company's activities as a whole;  significant reduction of non-production costs;

 protection of investments made in information technology;

 possibility of phased implementation of the system taking into account the investment policy of a particular enterprise.

In the further process of development of AIS, MRP-II planning systems in integration with the financial planning module **FRP** (Finance requirements planning) have received the name of business planning systems **ERP** (Enterprise requirements planning), which allow you to most effectively plan all commercial activities of a modern enterprise, including financial costs for equipment upgrade projects and investments in the production of a new line of products. As a rule, ERP Systems are built on a modular principle and to some extent cover all the key processes of the company.

ERP-system is an information system used for control and planning of all resources that are used in the enterprise; implementation of sales and production of products; procurement and accounting of raw materials, as well as all means involved in the process of execution of third-party orders and production of main products. The most important purpose of ERP systems is to find relationships between all departments, as well as to create a single information data warehouse containing all the necessary information about the company, about the services provided, about the products produced, about the work of all the services of the company, etc.

ERP systems are based on the principle of creating a single data warehouse that contains all corporate business information and provides simultaneous access to it for any necessary number of employees of the enterprise, who have the appropriate authority. Data changes are made through the system's functions (functionality). Main functions of ERP systems:

 maintenance of design and technological specifications that determine the composition of manufactured products, as well as material resources and operations necessary for their manufacture;

 formation of sales and production plans;

 planning of requirements for materials and components, terms and volumes of deliveries for performance of the production plan;

 inventory management and procurement: maintenance contracts, implementation of centralized purchasing, to ensure accounting and optimization of warehouse and shop supplies;

 capacity planning from integrated planning to the use of individual machines and equipment;

 operational financial management, including preparation of the financial plan and control of its execution, financial and management accounting; project management, including planning stages and resources

It so happened that the concept of ERP management, which is based on resource planning, has received universal recognition and this has led to intensive software development in this area and to tougher competition in this segment of the it market. An application called an ERP system is no longer just a resource planning tool, since this product usually has a multi-module structure. At the same time, the functionality of the modules covers various areas of corporate activity: from repair management to financial analysis. Since many divisions of a company usually have their own Autonomous systems for data processing, the task of an ERP system is to consolidate incoming information in a single database, to enable departments to exchange data, to reduce the time spent on routine operations, to maximize the transparency of work, and, of course, to facilitate control and management at the highest level of the corporate hierarchy.

To some extent, modern ERP systems include the following modules:  EAM (Enterprise Asset Management) - management of fixed assets of the enterprise;

 MES (Manufacturing Execution System) - operational production management;

 WMS (Warehouse Management System) - warehouse management;  CRM (Customer relationship management) – customer relationship management;

 SCM (Supply Chain Management) is a supply chain management;

 CMMS (Computerized Maintenance Management System) - computerized maintenance management systems;

 HRM (Human Resource Management) personnel management (HR);

Note some features of the implementation of ERP-systems.In contrast to the so-called "boxed" software, ERP systems are classified as "heavy" software products that require quite a long time to configure in order to start using them. System selection, acquisition, and implementation usually require careful planning in a long-term project involving a partner supplier or consultant. Since ERP Systems are built on a modular basis, the customer often (at least at an early stage of such projects) does not purchase a full range of modules, but a limited set of them. During implementation, the project team usually takes several months to configure the delivered modules. Replacing an existing information system with a new one in one operation is called the «big bang ERP system».

Using an ERP system allows you to use one integrated program instead of several separate ones. A single system can manage processing, logistics, distribution, inventory, delivery, and accounting.

The information access control system implemented in ERP systems is designed (in combination with other enterprise information security measures) to counter both external threats (for example, industrial espionage) and internal threats (for example, theft). Implemented in conjunction with the CRM system and quality control system, ERP systems are aimed at maximum satisfaction of the needs of companies in business management tools.

The main difficulties at the stage of implementation of ERP systems arise for the following reasons:

 high cost of implementation;

 "weak link problem" – the effectiveness of the entire system can be disrupted by a single Department or Department;

 distrust of the company owners of high-tech solutions, as a result-weak support for the project on their part;

 insufficient investment in staff training;  compatibility issue with previous systems

As an example of systems of the named classes, mySAP ERP, Oracle E- Business Suite, Microsoft Business Solutions Axapta, Baan ERP, iScala are indicated. From domestic 1C: Enterprise, systems "Galaxy" and "Parus".