Содержание:

Development of the information sphere of production

INTRODUCTION

Computers have been firmly integrated into production activities, and currently there is no need to prove the feasibility of using computer technology in process control systems, design, research, administrative management, in the educational process, banking, healthcare, service sector, etc.the Rapid development of information technologies over the past decades is due to the high demand of society for them, primarily the needs of production.

Many tasks that once required monotonous and long work, it became possible to solve using a computer in a matter of minutes, which greatly simplified life, helped to save working time and successfully helps to reduce costs of various kinds in production. The use of modern information technologies becomes possible even where it would seem that they will never be able to Supplement or even completely replace the work of a specialist.

The introduction of automation systems in production helps to significantly reduce the number of employees, giving preference to a few specialists in the field of information technology, who will be able to solve most of the production problems. In most cases, this approach allows you to achieve significant savings, despite the high level of salaries of such specialists. By all indicators, automated production wins, so it is important for a modern specialist not only to know about the existence of automation systems, but also to be able to work with them perfectly.

The purpose of this work is to familiarize with the process of development of the information sphere in production, and the task is to consider the main information systems of production automation.

1.PRODUCTION MANAGEMENT AUTOMATION SYSTEMS

In recent years, there have been significant changes in the field of creation and development of information systems: initially, information systems were used only in production with large volumes, for example, in machine-building or defense plants. The gradual popularization and availability of computers made it possible to use information systems on a smaller scale, while providing an incentive for the development of the logical part of the systems themselves, which will be shown below on the example of the evolution of the MRP information system Into the MRPII system. automation information management

Successful production always depends on equally successful management. It is on the shoulders of managers that they have a high responsibility for organizing production processes that will bring profit to the company as a whole. Today, there are about twenty main modern theories of production automation, which are based on modern information technologies. Each approach has its own pros and cons in certain conditions, so it is useful to consider each of them. It is also impossible not to notice that some automation systems appeared in the process of upgrading once-existing systems, but this did not lead to a complete rejection of the original development. For example, an ERP system (enterprise resource planning system) is a logical extension of material requirements planning systems (MRP systems) and production resource planning systems (MRPII systems).

The choice of a specific information system for production automation depends on many factors, including: volumes, type, purpose, and the need for automation.

For example, the above-mentioned ERP systems we can say that smallholder production is unlikely to be useful to spend time implementing such a large-scale information system, which, with a small degree of development of the enterprise, will just take time, leading to deterioration.

Choosing the right information system for production is not an easy and very important decision, especially at the time of the company's formation, when orientation to a certain automation model can determine the formation of the entire production. Complex systems that provide maximum control in numerous areas may not only be unclaimed, but also serve as a significant cost item, which is highly undesirable in most cases. One of

the initial systems that combines successful management methods and low cost of implementation is a system for planning the need for materials.

2.MRP SYSTEM

The MRP (MaterialRequirementsPlanning) system-planning the need for materials was developed in the United States in the 1950s, but only 25 years later, when there was a rapid leap in the development of computer technology, it became known and subsequently widespread.

In the middle of the XX century, many manufacturers faced quite serious problems of late delivery of resources, which led to a decrease in production indicators and the accumulation of a large number of materials in warehouses.

The main task of MRP is to ensure that every element of production, every component part is at the right time in the right quantity. This is ensured by the formation of a sequence of production operations that allows you to correlate the timely production of products with the planned release plan. This approach is also designed to ensure a minimum amount of inventory in the warehouse. In a simplified form, the source information for the MRP system is represented by production schedules, a list of materials, product composition, and inventory status. Based on the input data, the MRP system performs the following basic operations:

1) according to the production schedule, the number of final products for each planning period is determined;

2) spare parts that are not included in the production schedule are added to the composition of final products;

3) for the production schedule and spare parts, the total need for material resources is determined in accordance with the list of materials and the composition of the product with distribution by planning time periods;

4) the total material requirement is adjusted to reflect the inventory status for each planning time period;

5) orders for replenishment of stocks are formed taking into account the necessary advance time.

The result of the MRP system is a schedule for the supply of material resources for production (the need for each accounting unit of materials and components for each time period). To implement the supply schedule, the system creates an order schedule linked to time periods. It is used for placing orders to suppliers of materials and components, or for planning self-manufacturing with the possibility of making adjustments during the production process. MRP - class systems in terms of price/quality ratio are suitable for small businesses where management functions are limited to accounting (accounting, warehouse, operational), inventory management in warehouses and personnel management.

To date, the use of the material requirements planning system is not relevant due to the age of the system, but it is the basis for a large number of existing automation systems.

3.MRPII SYSTEM

MRPII system (ManufacturingResourcePlanning) - planning of production resources.

The MRP system was replaced by a production resource planning system called MRPII to emphasize the connection of systems. The new system paid attention to a much larger number of factors, which made it possible to significantly expand the scope of application and increase indicators. The transition from one system to another was caused not only by the visible shortcomings in the original MRP system, but also by the constantly increasing computer power. Over time, calculations of more complex and multi-level operations became possible on relatively cheap computers, which served as an increasing interest in the constant improvement of information systems.

In contrast to MRP, the MRP II system makes planning not only in material terms, but also in monetary terms, which allows you to cover a much larger number of various indicators. MRPII is still a method for effective planning of all the resources of a production company. Some manufacturers have not yet abandoned the use of the MRPII scheme, considering it an optimal information system. Ideally, operational planning is performed in natural units of measurement, financial planning in cost units of measurement, and contains modeling capabilities to answer the questions "what happens if...?".

The model consists of a set of processes, each of which is related to others: business planning, production planning (sales and operations planning), development of the main production schedule, planning of material requirements, planning of capacity requirements, and support systems for monitoring performance by capacity and

materials. The result of such systems is integrated with financial reports such as the business plan, purchase agreement report, shipment budget, and inventory forecast in value terms." As you can see, the difference between the two models is noticeable, since MRPII operates with a much larger number of indicators.

The MRP II system software standard includes 16 sequential functions: sales and production planning, demand management, production planning, raw material requirements planning, product specifications, warehouse subsystem, finished product shipment, production management at the shop level, production capacity planning, input/output control, logistics, inventory planning of the sales network, planning and management of tools, financial planning, modeling and evaluation of performance.

The advantages of the model include reduced inventory, improved customer service that leads to increased sales, increased worker productivity, uniform reduction of purchasing costs, reduced overtime, and reduced transportation costs at an increased rate.

4. THE APS SYSTEM

APS system (AdvancedPlanningandScheduling) - advanced planning.

The main feature of the APS system is the ability to quickly draw up plans based on available resources and production constraints (equipment changeover, availability of equipment, communication between machines, etc.) and quickly reschedule according to pre-made optimization scenarios. The APS system can be divided into two parts that are closely related to other automation information systems.

The first part of the APS method is similar to the MRP II algorithm. A significant difference is that in the APS system, the coordination of materials and capacities is not iterative, but synchronous, which dramatically reduces the time for rescheduling. APS-type systems allow you to solve such tasks as" pushing " an urgent order into production schedules, distributing tasks based on priorities and restrictions, and rescheduling using a full-fledged graphical interface. This is especially true for order-based production, as well as in cases of fierce competition in terms of order fulfillment and the need to accurately meet these deadlines.

The second part of the APS method is production dispatching, with the possibility of taking into account various restrictions, with elements of optimization. The APS functions inherent in production ERP systems are still relatively new. However, it is believed that

over time, APS algorithms will become common for many manufacturing enterprises.

The main components of the system are: sales and demand forecasting, main production plan and General capacity utilization planning, production planning and detailed capacity utilization planning. The first module is responsible for forecasting based on the system's history. The user can make their own adjustments in the form of market conditions. Unlike MRP II, at this stage it is possible to achieve a significant increase in planning speed, since planning is possible while taking into account capacity and resource constraints. In practice, the time gain is often significant. The production plan and load planning component is useful for "on-demand", "on-warehouse", and continuous production schemes. Comparison of data for the production schedule and data received in real time, allows to identify "bottlenecks" of production. The component also allows you to compare several production plans to determine the optimal load of production facilities. The third component allows you to take into account the dynamics and real state of Affairs in order to create calendar schedules in accordance with the availability of resources (equipment, labor, storage, energy sources, basic materials).

APS systems are a kind of add-on to existing ERP systems, replacing similar mechanisms in them. The need for high accuracy of input data can be considered in two ways, since, on the one hand, this is undoubtedly a positive side for production planning, on the other, a negative side, because errors in calculations can lead to losses. Using APS systems requires great accuracy and professionalism, which significantly complicates their implementation.

5. THE JIT SYSTEM

One of the most widely used information models in the world is the just-in-time (JIT) model.

Its main idea is as follows: if the production schedule is set, you can organize the movement of material flows in such a way that all materials, components and semi-finished products will arrive in the required quantity, at the right place (on the Assembly line) and exactly on time for the production or Assembly of finished products. This means that components from the previous operation (processing or delivery from the supplier) are put into production when and only when they are needed. Unlike MRP, which is designed for enterprises with large-scale production, JIT is more applicable to medium-scale production, where there is a constant and continuous production process of small batches, which requires constant supply of materials in small quantities. The advantage

of this approach is that there is no need for insurance reserves and immobilizing funds, but it is worth making a reservation that this is true for medium-and small-scale enterprises. This system is a successful alternative to MRP with certain conditions. The simplicity of supply planning procedures is not compatible with large production facilities where planning and control of production processes is at a higher level, as this will ultimately have a negative impact on performance.

The concept of "just in time" is closely related to the components of the logistics cycle. Ideally, material resources or finished products should be delivered to a specific point in the logistics chain (channel) at the exact moment when they are needed, which eliminates excess inventory, both in production and distribution. Many modern information systems based on this approach are focused on short components of logistics cycles, and this requires an adequate response of the information system links to changes in demand and, accordingly, the production program.

This model is characterized by the following main features:

1) minimum (zero) reserves of material resources, work in progress, finished products;

2) short production cycles;

3) small volumes of production of finished products and replenishment of stocks (deliveries);

4) relationships for the procurement of material resources with a small number of reliable suppliers and carriers;

5) effective information support;

6) high quality of finished products and service of supply of materials.

The "just in time" concept helps to strengthen control and maintain the level of product quality in the context of all components of the production structure. Implemented information systems based on this approach, associated with the synchronization of all processes and stages of the supply of material resources, production and Assembly, delivery of finished products to consumers, assume high accuracy of information and forecasting. This explains, in particular, the short components of production cycles. For effective implementation, JIT technologies must work with reliable telecommunications systems and information and computer support.

The development of small manufacturing companies and the relative simplicity of the JIT information system could not go unnoticed. The more companies implement the information system at home, the more amendments to it may appear.

Modern JIT technologies have become more integrated and are combined from various variants of production concepts and distribution systems, such as systems that minimize inventory in logistics channels, logistics systems for rapid switching, inventory leveling, group technologies, preventive flexible automated production, modern logistics systems for universal statistical control and product quality cycle management, etc.

The main goal of the JIT II information system is the maximum integration of all logistics functions of the company to minimize the level of inventory in the integrated information system, ensuring high reliability and quality of products and services to maximize customer satisfaction. Systems based on the ideology of JIT II use flexible production technologies for the production of small volumes of finished products in a group range based on early prediction of customer demand.

A striking example of the implementation of the JIT information system is the Kanban micro system, which became one of the first attempts to implement the "just in time"concept in practice.

This system combines the features of the "just in time" system, in particular, the small size of the stock, and individual production units. The systems are most applicable for products that are produced in large volumes on a regular basis. They are much less applicable to expensive or large products that have high storage or delivery costs; they are less applicable to infrequently and irregularly used products or to manufacturing enterprises that are not divided into small production units.

6. ERP SYSTEMS

The abbreviation ERP is used to refer to integrated enterprise management systems (Enterprise-Resource Planning). The key term for ERP is Enterprise-Enterprise, and only then - resource planning. The true purpose of ERP is to integrate all departments and functions of the company into a single computer system that can serve all the specific needs of individual departments.

ERP replaces the old disparate computer systems for Finance, personnel management, production control, logistics, and warehouse with a single unified system consisting of

software modules that repeat the functionality of the old systems. Programs that serve Finance, production, or warehouse are now linked together, and you can look at information from one Department to another. Most vendors ' ERP systems are flexible and easy to configure.you can install them in modules without purchasing the entire package at once. For example, many companies initially purchase only financial or human resources modules, leaving the automation of other functions for the future.

The ERP system automates the procedures that form business processes. For example, executing a customer's order: accepting an order, placing it, shipping from a warehouse, delivering it, invoicing it, and receiving payment. The ERP system "picks up" the customer's order and serves as a kind of road map, which automates various steps on the way to order execution. When a representative of the representative office enters a customer's order into the ERP system, they have access to all the information necessary to launch the order for execution. For example, it immediately gets access to the customer's credit rating and order history from the Finance module, learns about the availability of goods from the warehouse module, and the shipment schedule of goods from the logistics module.

Employees working in different departments see the same information and can update it in their own part. When one Department finishes working on an order, the order is automatically forwarded to another Department within the system itself. To find out where the order was at any given time, you only need to log in and track the order progress. Since the entire process is now transparent, customer orders are executed faster and with fewer errors than before. The same thing happens with other important processes, such as creating financial reports, calculating salaries, and so on.

The need for automation of management processes was first realized in the late 60s and early 70s, when it became clear that the management of a large Corporation is subject to the same laws as any bureaucratic structure. One of Parkinson's laws States “ " the staff of an organization has nothing to do with the amount of work it does.” In other words, as the number of management personnel increases, the efficiency of their work falls to zero.

In this regard, the idea was born: to organize the work of managers using an automated system in the same way as the conveyor organizes the work of workers. As a result, the concept of regular management was born, based not on talented individuals, but on formally described procedures that make the work of each Manager effective.

CONCLUSION

In the course of this work, we described the main information systems that were once popular, but had a significant impact, or successfully used in production in our time. The importance and usefulness of these techniques has been repeatedly proven by manufacturing firms around the world. Some principles of information systems for production automation were formed in the middle of the last century, but in our time they have not lost their relevance in certain conditions, being the basis for newer systems. Presentation of the principles of information systems is an important and integral part of the work for managers at various levels in any enterprise. A clear representation of the diagrams allows you not only to correctly and carefully make management decisions within a certain model, but also to correctly use the software designed for processing information and then providing reports

It should be noted that there are other variations of information systems for production, which in certain cases are used in practice, and at the same time very successfully. However, their popularity is not so high.

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