Organization of the production is expressed by matching in time and space the elements of the production process (work power, which means labor and the elements of labor). Its purpose is to attain the most effective results. The positive effects of the production organization are achieved through the maximum usage of the work fields, the rational arrangement of the machines and the equipment and the movement of the streams of the object (raw materials; work in process and output) by its processing on the line of the technologic process, improving of the technology, synchronization in the execution of the technology operations and the rational usage of the work time of the machines and the workers.

By the earliest form of industrial production—the individual one is the typical single type of production. It uses a wide range of articles, machines and equipment and workers with high professional qualification for execution of individual errands and projects of customers.

The investments in this form of the production organization are minimal, because there are predominantly used simpler woodworking machines. The output’s price includes more labor expenses and productiveness of this form is low. By this form of execution of the productive operations the self-control and responsibility of the worker is very important, so that each individual project can turn into the desired article.

By a streaming form of organization of the production mass production types is used for producing wooded plates; plywood etc. According to [1] the biggest influence on the production exerts technology and the technique, expressed by differing the production process and the technologic sequence by the executions of the operations in the streaming line with opportunities for automation and robotization. By this form all principles of the organization of the production can be preserved—sequence, proportion, parallel, rhythm. The productiveness is high the expenses for salaries in the common expenses on a unit of output are the lower.

Difficulties appear by the synchronization of the production processes, the monotonous work lack of motivation etc.

Prerequisites for the utilization of modern methods in the production process

What are the prerequisites for the utilization of new methods in the production organization? Until now, the main resources were material, financial and human. Nowadays other resources are being added to them: informational resources, training and knowledge needed to use the informational resources and entrepreneurship. Until recently, production was considered as a “closed” system. Nowadays because of the internationalization and globalization of the business a so-called “open” system has been introduced, which is characterized by a considerable flexibility in relation to the influence of the surrounding environment. Each system is linked to other systems through its communication channels. These channels determine the level of flexibility (the extent to which the boundaries of the system are open), which is an indicator of the link with the surrounding environment and of the potential or the constraints in the utilization of the resources and the realization of the results at the exit of the system.

In line with the external, the internal integration processes and the interaction between the system elements are also developed. That is why we call this kind of production integrated.

The individualization of the clients’ orders in the project implementation and the production of articles begins to clearly dominate the organization of the production process in the company. This kind of production is characterized by the requirements towards the equipment. It can’t be as in the simple
type of production (the individual form of production organization), but has to be with capabilities of high-speed processing, multiple settings and possibility of quick resetting.

Currently more and more companies go from the mass-production – considered until not long ago as an achievement to the order-made production in order to satisfy their client’s specific needs. In the process of creating of the products there are more and more participants. The suppliers of different components must be able to react fast to changes in the requirements of the end-product.

For many large manufacturers “virtual manufacture” is a reality. They take the production of components out of their own manufacturing process and sometimes the assembling of the end product and leave for themselves the basic operations as concept development and project-making.

When virtualizing manufacturing, in order not to have a drop down of the quality of the end product and to reach the expected economic result, companies need technical automation at all stages of the life cycle of the product, as well as their cooperation when organizing the entire process of information.

For the improvement of the quality and the productivity of the performed technological operations computer-based control systems can be used on the basis of including robots in the manufacturing process, mechanical and automatic supply and take-off of instruments from the working table, manageable transport means and equipment.

![Diagram](image.png)

**1. Computer integrated manufacture (CIM)** – combines the of manufacture with information technologies in order to obtain a competitive advantage.

As mentioned in [2], when CIM is properly organized, it offers much more of its components technologies. Fig. 1. describes CIM as an engineering design, flexible manufacture and product planning as control components. Flexible production and product planning are control components.

**Engineering design** - the computer system CAD assists the organization to perform high quality and specialized design of the manufactures goods in the company quickly and precisely. Through this programme the individual needs of the client are satisfied.

**Flexible manufacturing systems** – facilitate the effective manufacture of high-quality goods. Enable the organization to use special methods for fast and quality production with minimum manufacturing costs.

**2. Computer product planning and control systems** [2]

Enables the organization to manage the departments and to produce a wide range of different
products without losing its flexibility.  

**CAD** – computer applicable; it makes the designing of geometric models automatically and enable simulation of the mechanisms of separate parts.  

**FMS** – flexible manufacturing systems. The can react fast to the design and product's changes in the manufacturing process. It includes working stations, automatic belts, computer control system, a central computer system that manages the object of production in real time, manages the flow of materials for the production and the tuning of the robots and the automatic instruments when there are changes in the produced article.  

**Cell manufacturing** – the physical plan of the factory in product units and manufacturing departments. Each centre /cell/ includes a description and a characteristic of the machines needed for the manufacture of the article’s component.  

**Group technology /GT/** – Group technology is a process of classification of the groups at their composing parts according to their peculiarities, technologies, geometric characteristics and the materials needed for the production.  

**CAM** – computerized manufacturing. Computer application which is connected to the control centers for surveillance of the manufacturing process and control of the manufacturing operations.  

**CAPP** – computerized planning of the processes – a system for assistance to the decisions, generating instructions from the manufacture of the articles. It plans the productivity of the machines and the performed operations on them and determines the rules among them.  

**JIT (Just In Time)** – Just in time is a business strategy for designing manufacturing systems, responding exactly to the requirements of time for the supply of raw materials, the synchronization between the supplies between the operations and the realization of the final goods. The strategy is focused on the cutting of time for management and tuning of the machines and higher quality of the products.  

**MRPII** – planning of the resources in manufacture. A system for support of the planning and the control of the manufacturing operations. It helps to determine all necessary materials and resources for the manufacture. It includes data and software possibilities for manufacturing decisions related to marketing and finances.  

Research and analysis of the production organization in the Furniture making factory “Stella” in the city of Velingrad /Bulgaria  

“Stella” Furniture making factory is located in the industrial area of the city of Velingrad and makes furniture in small series and at the client’s order. It has a wooden plates department, a department for massive wood, a department for finishing/grinding and varnishing. The machines in the separate departments are not connected one to another and the object is moved from one place to another on hands. At the time of the visit there was an enlargement of the wooden plates department with the purpose of improving the flow of the materials in it. This department is the one that has contemporary computer-managed machines for wooden plates cutting, for milling/cutting and drawing.  

1. **Entry** – ready made tables with standard measures  
2. **Cutting machine** for wooded plates (technological module)  
3. **Multifunctional machine** for milling/cutting, drawing, hole making (technological module – processing center)  
4. **Foil placing machine** (technological module foiling)  
5. **Edging machine** (technological module for edging)  
6. **Assembling**  

1. At the entry tables with standard measure are placed: 1830x2440mm, 3660x1830mm 2800x2070mm with thickness 16 – 18mm.  
2. Cutting machine – computer managed: when entering data for the measures of the table and the measures of the needed tables and their quantity a cutting program is formed so that the left-overs are minimal. The machine can process tables thick up to 60 mm and this allows to cut on it several tables at
the same time. (cutting technological module)

3. Multifunctional machine – computer managed: when entering a program it can do cutting/milling, make holes and figures of all type and measures. (technological module or processing centre.)

4. Machine for foiling – after machine treatment details are foiled with necessary foil (technological module foiling).

5. Edging machine – after foiling details are edged with the necessary edge (technological module for edging).

6. Assembling department – where from the different details the entire product is assembled

In order to establish a completely functioning flexible technological system at STELLA Furniture making factory it is necessary to connect the technological modules through suitable automatic transport means and equipment, as well as to connect each module to the central computer from where the to direct, control and look after the synchronization of the different modules in the flexible technological system.

For this purpose an entirely computerized managing system was ordered for the German company supplier of the equipment in the department which is installed already and put in use.

Conclusions

Looking into the historic plan of manufacture, it goes from a single type production, to the production in series and finally to the mass-production. At first a multifunctional machine was used. Work was slow and in shifts. The factories are created, where series of a product were created. The mass-production is where everything is automated but then come the problems with the tuning of the machines and the monotonousness of labour.

Nowadays each company must be able to perform all requirements of the client in order to be competitive on the market, i.e. it must be very flexible, to be able to tune the machines managing them through computers. The synchronization between the machines must be good. This is how STELLA Furniture making factory work is synchronized, where almost 75% of the production is based on individual orders because only a company, able to satisfy the requirement of each client to the maximum is competitive enough in our days, i.e. again we return to what was typical of the single-type production of individual orders but investing in new, fast computerized machines, easy and fast to be tuned and the products of which are with low cost price an high quality, with no loss of time for the tuning of the machines and with high productivity.

Bibliography


MODERN METHODS OF THE PRODUCTION ORGANIZATION IN THE WOODWORKING AND FURNITURE INDUSTRY (AFTER THE MODEL OF THE “STELA-VELINGRAD” FURNITURE FIRM)

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ABSTRACT

Some modern methods of the production organisation in the woodworking and furniture industry are examined in this paper. The production based on individual orders optimisation problems to perform all requirements of the clients are discussed.

Special attention is brought to the use of computer aided management to synchronisation between the machines. The STELLA Furniture making factory, based in Velingrad production model is analysed.