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ANALYSIS AND REQUIREMENTS FOR FLEXIBLE MANUFACTURING ENTERPRISE

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Abstract: Currently, in terms of development of application software products and are quite clearly specified the key trends that need to be respected when computer support project activities. In particular, user interface with a high degree of comfort interactive graphics, two-dimensional and three-dimensional computer graphics significantly contribute to more effective project methodology and procedures. This stems mainly from the fact that in modern manufacturing systems design engineering high number of solving the problem is clearly graphic in nature. Automate tasks graphic character is therefore an important direction of development of the area concerned.
Keywords: CIM-OSA, JIT, CIB, CIM, HIM

INTRODUCTION

Engineering production directed to meeting the social requirements for consumer products, production companies and requires the development and application of appropriate methods of design implementation, i.e., production systems. Piercingly increase productivity, improve quality, save raw materials, energy, environmentally sound manner and under. It is only possible in well-designed, it well-structured and optimized production systems. Required changes are mainly based on the use of new approaches in project activities. A systematic approach, good orientation in developing directions of science, considerable creative potential, as well as the right strategic decisions given the rapidly changing technical, technological, economic and social conditions are necessary in a practical project activity.

In actual practice, the identified shortcomings of the design process. These are generally analyzed in terms of cost, time of preparation, quality and other criteria designed production systems. A significant impact on the design of science in solving specific problems is relatively little pronounced. In this regard, the recently quite successful and they create the applied advanced design methods. These in some areas reached the level of world-class innovation trends [1, 2]. Onset type of production systems JIT (Just-In-Time), CAD (Computer Aided Design) / CAM (Computer Aided Manufacturing), CIM (Computer integrated Manufacturing), HIM (Human integrated Manufacturing) and so on. He has created a new impetus for the integration of philosophical, technical, economic and social concepts design theories, methodologies and tools for market development stage company. New production technology based on currently CNC production machines, industrial robots, flexible transportation and storage equipment, computer control technology and other means bring problems integrating character. Their solution requires a new industrial structure. For its preparation is an important knowledge base and design theory, based on scientific knowledge, methods and tools to adequately develop analytical and synthetic culture engineering activities [3].

Notable innovation trends in this area is computer aided design. According to scientific forecasts, the use of computer support will be essential methods used in engineering activities of different nature. Trends computer support in full will affect the area of technical preparation machinery production and actual production. Concrete expression systems are applied to product development, manufacturing technologies and processes, manufacturing systems planning, organization and management of the production and operation. It is generally considered that computer support in the design of complex production systems becomes essential both in terms of general as well as specific characters of automation engineering and technical operations.

Computer aided design activities has also its specific problems that need to be addressed. The development process is not only experienced hardware and software, but significant progress has been identified in the implementation of computer and information technology.

ANALYSIS OF TRENDS IN THE DEVELOPMENT OF MECHANICAL ENGINEERING

For the current development strategy of mechanical engineering is critical orientation to customer requirements. These requirements relate to the new functional products, environment, education, humanizing the life, culture and the production. Satisfying them puts pressure on shortening innovation cycles in the development and manufacture of products. Mass-produced goods cease to be attractive relative to individualized and rapidly changing customer demands.

Competitiveness is associated with the use of new types of products and their functions, new materials, new technologies, including information and knowledge. According to [4,5,6] Mainstreaming engineering and manufacturing changes are:

- customer orientation in production but also in business,
- segmentation as well as opening new markets,
- increasing uncertainty and risks.

An important factor in the current as well as future changes in engineering production is therefore its customer orientation. This philosophy is based on [7]:

- selection of customer values,
- the creation of values,
- delivery of customer value.

The strategy to achieve competitiveness calls for a more flexible production. Required:

- rapid adaptation of new products,
- quick customer satisfaction.
- high quality,
- reasonable price.

REQUIREMENTS FOR FLEXIBLE MANUFACTURING ENTERPRISE IN ENGINEERING PRODUCTION

From the perspective of orienting the manufacturers to flexible production, to meet customer requirements, the following factors are important [8]:

- Customer - Respecting client needs is a must have when developing a new product.
- Automation - Product instability is now the main factor which should guide the automation of production. The production process is broken down into small units that can be built as the islands of automation, and then integrated.
- Integration - It is seen as linking between the existing organizational units, respectively subsystems, which, depending on the degree of integration coalesce into a qualitatively new unit. It builds primarily by means of information and material flows. The number of exchanged information continues to grow, their rate of exchange requirement increases, the time for decision-making is reduced.
- Agility - Agile enterprise must reach to produce the right product at the right place at the right time for the right customer at the correct price.
- Variability products - Building of variation based on the use of standardization of elements, resulting in the interchangeability and routing modules. When designing modular concept allows for added modules to create different variants. Approach allows for short time from standardized components to design a large number of final products.
- Additional value - To ensure the competitiveness of the company it is necessary that this focus on those activities that will allow it to offer products with a sufficient proportion of added value.
- Time - It allows to overtake a competitor in customer satisfaction. The new structure of the company must be flexible so that time losses were minimal.
- Innovation - Large manufacturing strategies are built on a unique idea, abilities and not only on investments. In a rapidly changing environment, innovation is a must. Competition in innovation is reflected in shortening the development time of new products and their marketing.
- Flexibility - It does not require achievement of a maximum of productivity, ie, to means of production than were used, but it requires the ability to be available to manufacture the product in the required time.
- Manufacturing cells - Cell structure provides interconnection between machines, saving time and space. Operation of the means of production is synchronized material flow fast.
- JIT - The essence of the elimination of those times that do not contribute to the formation of the new value of the product. The method was developed in response to the speed and flexibility in responding to market.
- Group technology - Similar product groups are formed on the basis of material flow through the same means of production. On a group of technology is thus also possible for a small number of products in batches to achieve high production flexibility, ensuring the quality and aspect of the production process and show the economic effects of scale.
- Quality - It is a necessity, it cannot now be separated from requirements to customer satisfaction, but not enough to gain the customer.

» Decentralized management - With flexible production management is decentralized. Most decisions are implemented on the ground in the production system. Management is easier and faster.
» Multi-professional activity of the workers - To meet customer requirements creates interdisciplinary problem-oriented and time-bound groups in which employees assume different roles, often pass from one to another working system and used very flexibly their working time.

The main changes in recent years, affecting the reorganization are [9]:

» Increased use of modern means of computer equipment and software, computer networks and the like. Their innovation takes place at ever shorter intervals.
» The explosion of new knowledge, disciplines and sources of information (eg. Internet). People are inundated with information, and it is still difficult to find accurate information required by decision.
» Globalization and internationalization development, production, trade and business.
» The amount of training programs, retraining people is taking place in ever shorter cycles.
» Rapid changes in the product mix, diversification, changes in the portfolios of companies, mergers and bankruptcies.
» New discoveries, inventions, technologies, business opportunities in new market segments.

THE FUNDS NECESSARY FOR THE DEVELOPMENT OF MANUFACTURING PLANT

It is especially needed to develop the means of production (machinery), human resources, engineering, planning and management methods for supporting decision-making. Overview of development needs is shown in Figure 1.

THE ANALYSIS OF GENERAL TRENDS IN THE DESIGN OF PRODUCTION SYSTEMS

Analysis and evaluation of new methods and approaches to designing of production systems (clusters) deal with a series of works [9, 10, 11]. A comprehensive look at the issue is presented especially the work of Jones' Desing methods "[1]. Classic design methods are classified in two main groups ie as an evolution of existing solutions and design based on drawings. New strategies are classified into six groups. As fundamental aspects for project evaluation strategies are used:

» presentation of the breakdown of projects on subtasks,
» strategy of partial sequence solutions and interrelationships,
» techniques for generating project ideas, review solutions, process information processing and so on.

Figure 1. Overview of the envisaged areas of modern production

Strategy Selection of project solutions for the concrete realization of the conditions is complex and often ambiguous. Surveys show that in the design of complex production systems (complex) is most commonly used cyclic and branched-chain strategy. In addition to general project methodology is currently being developed special approaches to innovation-oriented systems such as CIM, flexible manufacturing, robotic manufacturing, customer-oriented production and so on. In terms of computer

support in these modern methodological aspects of the production it is recorded major progress. Reformation for access to scientific design methods of production clusters can be considered in the program ESPRIT procedure known as CIM-OSA. Its conceptual diagram is illustrated in Figure 2. The methodology of great importance modeling procedures integrated into one unit.

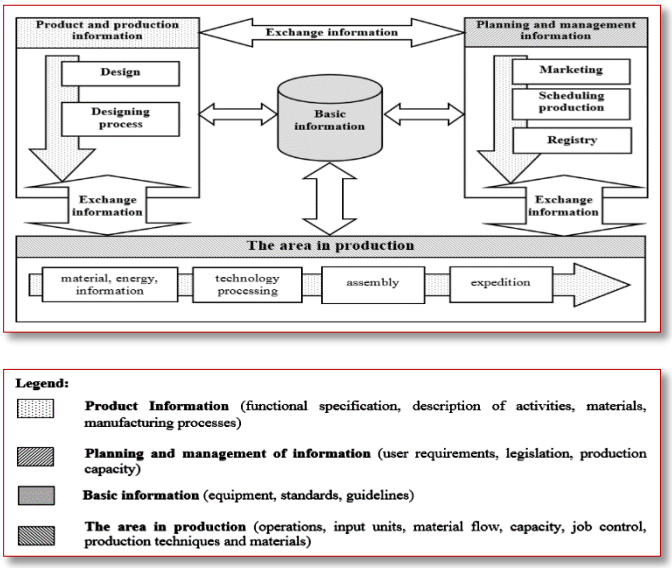

Figure 2. Developing Production grouping procedure CIM – OSA

The Esprit project includes also the methodology to design structural systems CIM distinctive analytical phase (what should be addressed) and implementation phase (as is to be addressed). In the analytical phase is generated model around the system (includes a context diagram) and model behavior of the system (data charts). The implementation phase will specify the structure of decision-making.

In terms of basic directions of development of engineering design is identified by the penetration of knowledge engineering in this field [12]. Particularly in the USA, these new technologies are beginning to use in commercial practice (Intel Corporation, Technowlidge, Inference Corp., etc.). Knowledge Engineering is represented by expert systems and differs from traditional software systems more characters. The design is applied in two different ways:

- partial systems to the design defined technical units or industrial complexes (eg. A part robot, NC operation, etc.). Systems of this type are less difficult to prepare and are easy to acquire.
- complex systems designed for large engineering units (DARS projects, etc.). Applications of this kind for Slovak conditions anticipated.

CONCLUSION

The design technology and product innovation, a higher degree of satisfaction of social requirements (customer requirements) is essential in the implementation of new project activity. It is particularly important to work towards the development of robotic manufacturing systems. Preferred are those engineering approach enables the use of the knowledge potential of multiple disciplines, allow the right strategic and tactical decisions in particular in relation to the rapidly changing technological, economic and social conditions.

Study and analysis of current approaches to modern designing of that, it has several shortcomings, especially in terms of examining the impact of science to solve specific problems. It can be concluded that the impact of science on designing solutions to existing problems has its specific provisions. As a result of such contexts they are therefore developed and applied advanced design methods. They are influenced most significantly to progress in information and computer technologies.

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