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MODERN COMPUTER-AIDED DESIGN SYSTEMS OF NAVIGATION AND TRAFFIC CONTROL

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Abstract. *The basic design problem. A review of CAD. Possible universal computer-aided design of KOMPAS-3D.*

Keywords: design problem; computer-aided design**.**

Introduction

The widespread introduction of complicated electronic devices in navigation and traffic control, as well as the acceleration of the development of science and technology have led to:

a) continuous growth of the tactical and technical requirements to develop products, and complexity of their design, which increases the design period;

b) reduce the period of obsolescence of navigation and traffic control and necessity to change them on more perfect;

c) increase the cost of development;

d) the compressed timeframe for the development of new products.

In the industry there is a stiff competition. To survive in these difficult conditions, businesses struggle as soon as possible release new products, reduce their costs and improve quality.

These features of the design and development of new models of navigation and traffic control have made this process difficult and time consuming. Classical methods and means of "hand design" can`t, in some cases provide quality and quick creation of new products. Creating of navigation and traffic control must be addressed to large complex challenges, starting with the calculation of the individual elements to determine their geometry, relative position and ending with the preparation of a mathematical model of the functioning of the scheme as a whole to optimize its design, that in a "design manual" requires a lot of years.

The use of computer-aided design (CAD) software development effort can:

a) analyze hundreds of options for different design solutions in a short period of time, that can not make any designer conventional methods;

b) reduce the time and reduce development cost of equipment;

c) create the design that best take into account requirements to them technical requirements;

d) to improve the quality control of design documentation produced equipment;

e) a more precise methods of analysis and design techniques that minimize Trimmer – setting operation in the production of electrical products aircraft;

f) to expand the class to fundamentally feasible complexity.

Tasks that must be addressed in the design of navigation and traffic control

Design problem can be represented in the block diagram (fig. 1).

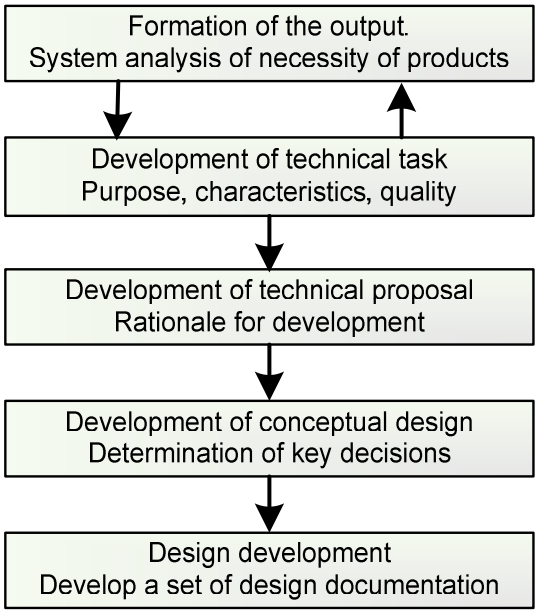

Fig. 1. The problem that is solved in the design of navigation and traffic control

Development of outstanding claims is the first stage of the product lifecycle. It identifies the basic properties of the product quality, the need for this product.

In developing the technical specifications defined by the appointment, composition, performance, reliability, ergonomics, safety, requirements for operation.

At the stage of conceptual design there is a development of fundamental decisions on the scheme and design of the product prototype is manufacture.

Detailed design provides complete documentation for the product that allows preparation for the construction of production.

Thus, by considering the basic design stages of navigation and traffic control, as well as possibilities of their automation we have the following conclusion. In the first three stages of the design most of tasks have some creative characteristics. In this case a small number of highly qualified specialists do this work. Impact of the solutions on the basic parameters of the manufactured products is large. Computers at these stages is mainly used for the analysis and monitoring of the work of man. The next stage of design (technical), by contrast, is characterized by greater complexity and, consequently, a large number of developers. Solved the problem at this stage are mostly "routine" in nature and are well formalized, which favors the use of machine methods to solve them. So naturally, the most widely developing get systems that are used to solve problems of designing systems of navigation and traffic control, where the area of efficiency of implementation of CAD is maximal.

Overview of CAD

The most common CAD`s are following:

T-FLEX CAD system of parametric design and drafting T-FLEX CAD is developed by Russian company "Top Systems". The system has the following main features:

– parametric design and simulation;

– assembly design and execution of assembly drawings;

– a complete set of tools for creating and editing drawings;

– spatial modeling, based on the technology of ACIS;

– parametric three-dimensional modeling;

– drawing management;

– preparation of data for systems with NC

– motion simulation design.

System T-FLEX CAD fell in the review for 1997 best CAD. Developer – Top Systems, Moscow.

KOMPAS. One of the leading Russian product. CAD-system use for a wide range of design work, easy to learn, easy to work with and has a price acceptable to the complex equipment of enterprises, including small and medium. Allows two-dimensional and three-dimensional design and construction, fast preparation and production of various drawings and design documentation, creation of technical text and graphics. Developer – Ascon, Russia.

CADdy. CADdy system in functionality is intermediate between the systems of high and low levels. Designed for complex integrated technology solutions from design to production.

Developer – the company ZIEGLER-Informatics GmbH, Germany.

SolidWorks. Powerfull machine-building CAD package for solid-state modeling of complicated details and assembly. Designed system of middle class is based on the parametrical and geometrical nucleus Parasolid. Developer – SolidWorks Corporation, USA.

Unigraphics. System Unigraphics is CAD/CAM/CAE – high-level system. Unigraphics allows full virtual product design, machining of complex parts, a fully associative database master model, Unigraphics Solutions is one of the fastest growing companies that produce computer-aided design, manufacturing and project management. It develops, markets and supports software to automate the design, production, engineering analysis and management.

Products of Unigraphics Solutions, Inc.: **Unigraphics Solutions, Parasolid, Solid Edge, Unigraphics, IMAN, ProductVision, GRIP**. Developer – Unigraphics Solutions, Inc., USA.

Selection of an optimal design for CAD navigation and traffic control

Taken into account when choosing a CAD system to decide whether the problems faced by the developer of navigation and traffic control.

The system must have the following capabilities:

– the ability to work with 3D-models;

– control of the intersection of details (when developer is working on product, he needs some distinct visualization of the project, as well as methods of optimizing the placement of items in a restricted space of product);

– the relationship of nodes of products (for example, changing the shape of one half, the other half of the body is automatically adjusted accordingly);

– product development – from the top to bottom and from the bottom to top;

– concurrent engineering, which significantly speeds up the development process;

– intuitive design process;

– compliance (issue of design documentation, standards-compliant, is required for the successful implementation of developments in production);

– intelligent design tools (the ability for each user to create his own design elements, from which he can build libraries for the company).

For these purposes a package suitable for general purposes KOMPAS-3D company ASCON (Russia), which provides for developers extensive design capabilities of different objects, technical systems and devices. The package is an automated system that designes drawings, so drawings, diagrams and schemes are created in interactive mode of controling system of hierarchical menus. In any drawing can be inserted the explanatory text. The set features include pan, zoom, scaling, rotation, sectioning, shading, and other operations to convert images. The system provides prompts in any state and for any command.

A key feature of KOMPAS-3D is the use of it`s own mathematical core and parametric technologies. The main problem that is solved by the system is modeling products to significantly reduce the period of their design and the early start of production.

Import/export of models (KOMPAS-3D supports formats IGES, SAT, XT, STEP, VRML) provide functioning of the complexes containing various CAD/CAM/CAE-systems.

Conclusions

The needs of modern industry dictate the need for information and computer technology at all stages of the product life cycle, from research design to recycling. The basis of the information technology in the design and production of navigation and traffic management today are full-featured by industrial-scale CAD, (CAD/CAM/CAE-system) such as KOMPAS-3D.

Active use of CAD on personal computers for the preparation of drawing documentation and convergence capabilities of personal computers and the “workstation” in design automation has prepared two trends in the development and use of CAD, that are observed recently:

– application of full CAD for designing and production of navigation and traffic control;

– CAD Integration with other information technologies.

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В. М. Синєглазов, О. В. Осадчій. Сучасні системи автоматизованого проектування систем навігації
Розглянуто основні проблеми проектування. Розглянуто системи автоматизованого проектування та можливості універсальної системи автоматизованого проектування КОМПАС-3D.
Ключові слова: проблеми проектування; автоматизоване проектування.

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В. М. Синеглазов, А. В. Осадчий. Современные системы автоматизированного проектирования систем навигации

Рассмотрены основные проблемы проектирования. Рассмотрены системы автоматизированного проектирования и возможности универсальной системы автоматизированного проектирования КОМПАС-3D.

Ключевые слова: проблемы проектирования; автоматизированное проектирование.

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