METHODOLOGY OF DEVELOPMENT OF CONSTRUCTION DOCUMENTS IN THE AUTOMATED DESIGN SYSTEM

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Abstract

A perfect analysis includes three main activities: studying the principle of operation of the current system, determining the desire and demand of users, and proposing an alternative solution. A complete analysis is sometimes called a logic diagram because systems analysts develop any technical tools or hardware in addition to the proposed solution. That is, they try to determine the action that should be automated and done manually.

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The introduction of methods of automation of the design process into the engineering practice made it possible to move to computer modeling of machine details and entire machine structures using CAD/CAM/CAE systems.

Recently, the choice of CAD/CAM/CAE systems has become a very important task for enterprises.

The term CAD - Computer-Aided Drafting (Design) can be translated as "Drawing on a computer" or "Designing on a computer". CAE - Computer-Aided Engineering - is a set of software products that give the characteristics of how a product model created on a computer behaves in real life. In other words, CAE is an engineering analysis system. CAM - Computer-Aided Manufacturing - is an automated system or a module of an automated system designed to create programs for controlling numerical control machines.

DASSAULT SYSTEMES and IBM are joint manufacturers and distributors of the CATIA automatic design system. CATIA was created at Dassault Systemes. CATIA is an automated system of automated design, testing and preparation, which is used in many mechanical engineering enterprises around the world. Scope of application: automated design, preparation for production, reengineering. CATIA/CADAM Solutions is a fully integrated, high-level universal CAD/CAM/CAE system that enables parallel design and manufacturing cycles (http://www.ibm.com).

UNIGRAPHICS is a high-level CAD/CAM/CAE system that implements a full cycle of design-production processes in the aerospace, automotive, high-tech, machine-building and medical industries. It has a tool that allows you to choose the right tools for creating a product called "Hybrid Modeling". There is a complete associative database of master models of complex shaped parts, machining methods and more. The manufacturer is Unigraphics Solutions Inc., USA (http://www.ugsolutions.ru/).

The current state of the software products market for automated design can be characterized as follows. First, all existing automatic design systems are divided into two large groups: special and universal. Second, the desired automated design system consists of a complex of programs (in a correspondingly multi-variant configuration). Third, there are automated design systems that are common and less well-known. Automated design systems can be further divided into "light", "medium" and "heavy" types [2].

As for special programs, they can be used autonomously or as part of universal systems. In most cases, the most successful special programs are added by universal automated design systems and a separate module is developed for them in the program interface.

ANSYS is a multi-purpose finite element engineering analysis software package for strength, thermal physics, fluid dynamics, and many other fields. Today, ANSYS is a leading package that solves strength, thermal, and cross-sectional analysis tasks with optimization in a single design environment. In addition, the best price-quality ratio of the product, two-way communication with CAD packages, openness - the possibility of modification and adding user modules as desired, and the presence of a wide network of support and technical service are its advantages. can be entered.

The programs named above have become the standard in the production of serious constructions abroad. That is, the project "transferred" from one of these systems is considered to be reliably calculated and optimized. In addition, these manufacturers are trying to expand their systems to the level of a universal system.

Pro/ENGINEER is developed by Parametric Technology (PTC) (http://www.ptc.com) [3]. It is considered platform independent by the manufacturer. Euclid is produced by Euclid Matra Datavision (http://www.matradatavision.com). I-DEAS is developed by SDRC (http://www.sdrc.com). CADMATIC is produced by Macrovision. SolidEdge is manufactured by Intergraph [4].

Solid works. Parametric drawing-design editor designed for the development of design and technological documents. One of Solidworks' greatest strengths is its support for uniform design documentation standards. Solidworks also has a number of additional libraries, including: a specification design system, a mechanical engineering library, a rotating body design library, and more.

Solid works. A three-dimensional solid modeling system. Field of application of solid works: modeling of details for the purpose of calculation of geometric and mass-centering characteristics; modeling details to give calculation packages their geometry; modeling of details to give their geometry to CNC machine tools; creating isometric images of details.

CAD is an integrated package for two-dimensional drafting, three-dimensional modeling, and realistic visualization for engineers, architects, and designers. It is possible to import and export drawings and volumetric models in AutoCAD and 3D Studio formats.

CADDS 5 is designed to automate the design and technological preparation of production of products of mechanical engineering and other industries. It includes more than 85 separate programs that perform tasks such as sketching and working design, synthesis of geometric models, engineering analysis, design documentation and preparation for production. The products included in CADDS 5 have great flexibility in application based on the tasks of enterprises and in the design and production of products produced by them.

ADEM is a universal system. Unlike most heavy-duty systems, ADEM only requires volumetric modeling when it's absolutely necessary. ADEM uses 3D modeling and volumetric processing to design and manufacture complex shaped products. The results of planar and volumetric modeling are transferred directly to the machining modeling module. The system provides an opportunity to create complex products at each stage in a way that is suitable for it: solid modeling, surface modeling, flat modeling.

The oldest of the math packages is Derive. It is a DOS program that performs numerical methods and graphing. Nothing more serious can be created with this package. Of course, there are other programs, such as Eureka, but they are all numerical problem solvers. Numerical methods were replaced by symbolic methods of calculation. What are symbolic methods? These are the most accurate algorithms of calculations, because the solution of the task is carried out analytically.

MatLab - the system was originally intended for calculation by numerical methods. Over time, the capabilities of MatLab have grown significantly, libraries that are unique to mathematical packages have appeared. For example, the well-known library Simulink, using the principle of visual programming, allows you to build and analyze a control system from standard blocks (amplifier, adder, integrator, etc.) without writing a single line of code. MatLab is characterized by high calculation speed. The disadvantages are that the environment is not highly integrated, Help is not very good, and MatLab's code editor is unique.

MathCad is a unique SAE program. He is widely known as the best editor of mathematical texts. MathCad is a programming language itself. Calculations are carried out at the level of visual records of common mathematical expressions. The symbolic computing device is derived from Maple. MathCad is very handy for small calculations. It creates ample opportunities to formalize work in a normal way. Extensive options for data import/export, integration with the Internet, the ability to work with Excel tables inside the MathCad-document, etc. (Developer: MathSoft Inc.) [6].

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