THE CATIA DESIGN PROCESS, DESIGN AND MANUFACTURE IN AVIATION

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Abstract

The draft technical documentation is difficult work. One of the most difficult problems is to create technical solutions and their subsequent optimization. The current market CAx systems are very different. Each of these systems operates with its own data format, and many of them are based on different modeling kernel. It brings a lot of problems if you need in your CAx system to work with data from another system. The quality of data generated contributes substantially modeling kernel itself.

Key words: CAx, CATIA, Digital manufacturing, Digital Mock-Up, Aerospace Industry.

INTRODUCTION

CATIA is currently the most commonly used version is the product of the French company Dassault Systems. This is software for 3D computer-designed in CAD, CAM, CAE and PDM. CATIA allows covering the entire process life cycle - from design through construction, simulation, analysis to their own maintenance and production. By integrating the entire process and its simulation reduces the consumption of physical prototypes, significantly shortens the development cycle, reducing costs and increasing quality of the final product.

The great advantage is also the possibility of optional parameterization. As a result, the designer can decide whether works parameterized and used the advantages of parametric modifications or changes will be implemented through modifications of individual elements. All modules and modeling techniques are integrated so that changes in individual elements of the model or take immediate effect and the related parts. It uses a digital prototype of a parallel construction.

CATIA is widely used in all engineering sectors, particularly in the automotive and aerospace sector. CATIA V4, V5 VÁTI, Pro / ENGINEER, NX (formerly Unigraphics), Solid Works and systems are dominant.

CATIA is the world leader in CAD / CAM / CAE technology. The system offers a wide range of integrated solutions in a single environment for all aspects of:
- Design and product development
- increasing the competitiveness of firms
- reducing costs,
- Optimization of technological processes.

THE USE OF THE CATIA IN PRACTICE

CATIA provides easy to use tools suitable for a wide range of businesses from the smallest, the concerns in all areas of industry, automotive, aerospace, and electronics and so on. Thousands of companies worldwide have chosen this solution for achieving competitiveness and market dominance. Applying the latest scientific knowledge and the technology itself in the CATIA CAD /CAM / CAE allows you to achieve different objectives for virtual modeling products, strength and other mathematical analysis and optimization, with the possibility to immediately apply the changes to the product according to the results obtained, and of course the creation of alternatives to solve and final design for successful entry to market. This integrated application process and design changes have a decisive impact on the introduction of optimized final product on the market.

CATIA is a comprehensive tool for the design in various industries such as mechanics, mechanical engineering, aerospace, automotive and consumer goods and so on. PLM (Product Lifecycle Management) is used to include all segments of the global aviation, aerospace and defense companies from civil and military aviation for satellites and launch satellites into space. In industries where there is no possibility to forward it as read, use and rely most companies implementing the aviation system to CATIA and other engineering solutions.

Fig. 1 3D panel model

Description CATIA basic applications:
Engineering Analysis: Applications are mainly intended for preliminary sizing accuracy of the proposed design engineers to quickly and provide available information on the stability of the structures directly in its creation.

Mechanical design:

A group of application modules for the development of CAD model of the aircraft structures based on hybrid modeling to create fully editable parametric model with a range of geometric and technological features and full associatively.

Interior equipment and systems:

Applications to the design, modification and analysis of electrical and fluid systems to deal with the general layout of spatial relationships in industrial product.

For industrial process plant:

Modeling the spatial layout of production units operating from separate files to the whole Community business operator ensures specialized application clusters, holds functions for the deployment of technological equipment, structures and networks to the disposition of production sites and buildings.

Synthesis Product:

Software applications designed for virtual analysis and functional assessment of complex industrial product throughout its lifecycle. This includes the final assembly, simulation of utility functions, features and service performances and the final dismantling after life.

Styling and Shaping:

Specialized applications for the highest standards of free and parametric design based on surface modeling. Includes specialized tools for the professional development requirements.

Infrastructure System:

Scientific and technical knowledge and "know-how," Emerging and defined during the development process in an organization can implement the system as a set of binding rules and standardized procedures, which are then shared with all participants in development.

With this knowledge the system can be tested structures created or inherited knowledge and used directly in the creation of new structures. Group applications based on knowledge engineering to enable the highest level of sharing and use of "know-how" within the company structure.

CATIA V5 - THE FLEXIBLE SOLUTION

CATIA V5 solution provides a unique solution for integrated product development process and optimizes teamwork. It is a great product in terms of competitiveness in the links of design, shapes modeling and digital modeling. Open architecture allows users to build solutions for digital 3D definition and simulation products.

Flexible solution provides users who are focused on the development of 2D models and assemblies, cutting edge solutions for the transition to complete technical processing in 3D. CATIA V5 fully covers the entire process from design and fine-tuning the product, through an integrated analysis to manufacturing. CATIA V5 is trying its modules cover all the technical preparation of production. One of them is the strength calculations whole separate reports.

The basis of this calculation is finished replacement parts mathematical model. This creates a finite element method (FEM or FEM Finite Element Method), a numerical method of finding approximate solutions of partial differential equations and integral equations of the mathematical model.

The creation of such networks use different types of elements and from them is then dependent on the equation used by FEM. For each element type is another type of equation, and the right choice has an impact on the final result of the calculation. The number of elements network you can imagine such a system of equations in matrix form. Operations of such matrices with ten thousand lines require high computing power.

Solution runs the standard mathematical methods such as Euler method or Runge-Kutta and the like.
CONCLUSION

CAX system is only a tool, which streamlines the mental ability of man. Uniform user interface CATIA was developed using the latest knowledge about the ergonomics of work. Context-oriented environment controls and menus with icons, multilanguage version of texts, graphical dialog boxes and multi-level documentation are characteristic of the CATIA user interface and can be described as cutting edge solutions. This interface is common to all applications. They meet with him all the specialists working on the projects implemented.

Of all the CAD / CAE / CAM / PDM CATIA provides the most comprehensive range of solutions to ensure a coherent and stable environment in product development.

Applying the latest scientific knowledge and the technology itself in the CATIA CAD / CAM / CAE allows you to achieve different objectives for virtual modeling products, strength and other mathematical analysis and optimization, with the possibility to immediately apply the changes to the product according to the results obtained, and of course the creation of alternatives to solve and final design for successful entry to market.

References