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Use of computer technology in the design process

Introduction

Computers for several years, support the work of people around the world. They can perform many tasks for us – from simple mathematical calculations to complex visualizations that take into account the environment, the forces acting on an object, and many other factors [Piecuch 2006].

Programs CAD (Computer Aided Design) or computer support in the design, is the kind of software that is used for many years engineers building, architecture, and interior designers. CAD involves the use of computer technology in the design and preparation of documentation. CAD software can be used to design curves in two dimensions (2D) and the surface and three-dimensional objects (3D) [http://www.ask.com/pictures?qsrc=167&o=101699&l=dis&q=turning%20torso&locale=en_US].

Software of this type of support to engineers every industry, from engineering through construction, electricity, and energy. CAD software is used in many industrial fields such as automotive, shipbuilding, aerospace, architecture, construction, prosthetics, industrial hydraulic, mechanical and electrical.

Due to the enormous economic importance of CAD is the main driving force of research in computer geometry, computer graphics (both hardware and software) and in differential geometry.

1. CAD design software

The first CAD programs appeared in 1980. With the CAD programs (particularly in small and medium-sized companies) decreased need for traditional drawing boards. Affordable price and the ability to run on personal computers has enabled engineers to eliminate entire departments.

By now many CAD software engineers can work together on a project, even if they are far away from each other, for example, in a completely other countries. It is also easier to copy and archive drawings by CAD software because there is no need to store them in a certain place and instead the pictures are stored on your computer. It is much easier to print a figure than copy it [Pham, EEldukhri, Soroka 2007].

At the beginning of CAD programs work in practice only in Windows. Today work on all possible platforms include Windows, Linux, UNIX, and Mac

OS X. As far as hardware requirements are a computer should have a fairly modern graphics card (min 128mb), 256 mb of RAM and a Pentium or an analogue of a minimum of 900 mhz. Today, hardly any engineer knows CAD software. Many universities and technical schools educate their students using CAD applications. For the development of the CAD programs were of great importance [Otto F., Otto E. 1994].

The first phase of the development of 2D CAD systems designed to ensure that replace the drawing board. They offer basic tools for working

Documentation flat, sketching, dimensioning drawings. At the outset, one of the biggest advantages of thought – the ability to „eraser mouse” or reverse operations performed incorrectly. Compared with the ordinary rubber, a razor blade and a pin to „Stain” errors in the drawing, it was a revelation and comfort.

Now the whole world engineering abound in almost the advantages arising from the possibility inherent in 3D CAD systems. Solid modeling, surface modeling, techniques for modeling synchronous with the history or no history tree surgery... The possibility of a real preview the resulting model, its analysis using FEM etc., And finally the integration of the latest generation of PLM systems, allowing also for imaging data related to the life cycle and product development in 3D all this makes you a great adventure begins in the world of CAD for 2D applications may look indulgent or even with disgust. Layman moving into the world of engineering easier to assimilate the skills of working with some of the at least three CAD systems and will be able to create projects, than if he had done the corresponding flat drawings not only in 2D CAD system, but even on paper. The assistance will be extended to serve him helpy, video tuto Rials, many on-line tutorials. This advantage is evident even on the example application based on 3D CAD systems, and imaging data used to design, file sharing, performance visualization for marketing departments, traders etc. [Pham, EEldukhri, Soroka 2007].

2. AutoCAD – the leading platform for designing

There are many CAD programs. The most popular is undoubtedly AutoCAD. But apart from him, there are many other programs such as: ZWCAD, GstarCAD, Bricscad, progeCAD, IntelliCAD. CAD library symbols are also present in many programs [<http://articles.marketwatch.com/keyword/autocad>].

Until recently, AutoCAD was practically a monopoly when it comes to the commercial market. The first version of this program was founded in 1982. The program has been released in multiple versions of a multi-ons and plug-ins that are tailored to the requirements of particular industries. The program is available on multiple platforms, both Windows and MacOS [Wiebe, LoPresti, Yount 2007].

AutoCAD software lets you design, visualize, and document your ideas clearly and efficiently. AutoCAD is a software that allows engineers to quickly

and easily make the design documentation of the level of controls to ensure that the drawings have a professional appearance. The program helps users solve the everyday problems in a manner consistent with the current way of working, it requires only a short or no additional training. From conceptual design to create sketches and drawings, AutoCAD is all that is needed to design, visualize, document, and sharing their creative ideas. Combines the familiar AutoCAD commands and interface as AutoCAD with an updated design environment, which like no other helps shape and develop ideas.

3. What's new in AutoCAD 2013?

AutoCAD 2013 features a new and powerful tools for 3D design enables architects, engineers and other design professionals to more efficient use of design ideas, efficient preparation of documentation and hassle-free execution of project tasks. AutoCAD 2013 provides users with greater flexibility by adapting the software to the needs of industry and the improvement of the design process – from conception to the final stage [Waldner 1992].

The latest version of the software includes a powerful new tool design data aggregation, cloud connectivity and efficient design and documentation. It is also a direct connection with other services based Autodesk about cloud computing and collaboration on projects virtually from anywhere.

AutoCAD 2013 Users can download and install hundreds of applications from Autodesk Exchange Apps, and thus make it easier to adapt AutoCAD to suit your needs [http://www.ask.com/pictures?qsrc=167&o=101699&l=dis&q=turning%20torso&locale=en_US].

Hassle-free connection to the whole process of working through aggregation models with different file formats for AutoCAD. Users can now access their files and save them in the cloud from your own software. Ability to import and aggregation of 3D models, connecting to social media and monitoring of projects from mobile devices will contribute to the improvement of cooperation between members of the project team. Accelerating the creation of documentation and speed projects from conception to completion of the project, using tools such as cross-sectional views and details, modern user templates. Minimizing the number of repetitive tasks and accelerate workflows, users can import 3D models directly into AutoCAD and instantly create intelligent floor plan (plans) 2D [http://www.ask.com/pictures?qsrc=167&o=101699&l=dis&q=turning%20torso&locale=en_US].

The possibility of using ideas 2D and 3D design with new powerful features such as a free 3D design, context-sensitive function to press and drag to draw a curve surface and integration with Autodesk Inventor Fusion. These intuitive tools allow you to visualize and implement the ideas.

Easy customization of AutoCAD with AutoCAD Apps service on Autodesk Exchange, personalization and file synchronization service, simplified migration tools [Pottmann, Asperl, Hofer, Kilian 2007].

4. A new approach to the design process

Twenty years in the history of computing in a big way. Over time, created an entirely new ideas and technologies that better meet the needs of the current industry. Again, the answer to the arising Autodesk demand is as revolutionary as the creation of AutoCAD. For designers of mechanical, Autodesk has developed Autodesk Inventor. Inventor is a completely new approach to the design process. Autodesk, having so many years of experience in CAD software development has created a program that works as a designer thinks, and so allows the designer to fully focus on the project, not on the software. Inventor is a parametric solid design. It has an extremely easy-to-use graphical interface, which allows a person with little experience in the design on the computer to create advanced projects after just one day of training. Inventor is also completely new ideas and techniques, of which the foreground is adaptability, the ability to match the new geometry to the existing geometry. You could say that I like 20 years ago so now AutoCAD Inventor is the future of CAD. Solutions used in Inventor are so revolutionary as once a solution that created the Windows operating system. More and more companies, which until now was enough flat documents created in AutoCAD or other 2D drafting program to willingly choose to enter into a three-dimensional design environment in Inventor [Otto F., Otto E. 1994].

The reasons for this interest are two: three-dimensional design has a very significant advantage, and Inventor is a unique opportunity to use existing documentation flat. The project created a three-dimensional computer memory is without a huge amount of errors that can occur during a two-dimensional design, even on a computer. With the memory of a computer model of a device that does not yet exist, we can discuss its features, design and performance in a group of people interested in the project. When designing a three-dimensional system, which is Autodesk Inventor, the designer puts the focus on the actual design or to build accurate 3D model. If the virtual model designed meets the expectations of the constructor it comes time to create design documentation. Inventor strongly supports constructor generating drawing views, creating sections, details, interrupts, and other elements of a flat drawing documentation that is associated with the 3D model. With this solution, the constructor does not need to waste time on tedious drafting drawings, and all changes made to the three-dimensional model immediately appear in the documentation associated with it flat. Designed a three-dimensional device in the system will be better and more thoughtful. In fact, every designer appreciates the huge advantages of three-

dimensional design, but when you have a huge library of 2D drawings is wondering what to do with existing drawings [Wiebe, LoPresti, Yount 2007].

Traditional two-dimensional assembly drawings used for years do not ensure prompt capture of errors and discontinuities in the construction of particular parts. To control correctness of assembly and kinematic assumptions it usually was necessary to construct design of object model or even a prototype in working. Two-dimensional drawings often require very thorough, time-consuming revision which is hampered by the fact that each assembly parts had been designed by many people. 2-D technical documentation is very time-consuming to update. Every modification in the draft should be put onto several projections or even onto some supplementary sections and views. It is easy then to make a mistake or miss amend on the particular documentation part, which makes finished projections and sections unsuited one to another. Parts and sets designed with the use of classical 2D method usually prevent from making even the simplest kinematic or endurance analyses. More and more common use of 3D modeling systems facilitates process of production planning and generating necessary treatment data, making it easier and faster [Pottmann, Asperl, Hofer, Kilian 2007].

Three-dimensional modeling exclude the need for drawing another object projections and views, since the entire documentation is formed automatically. A designer is only to indicate particular views and sections, which are automatically generated on the basis of solid model and spaced over the flat drawing. Moreover, as far as solid models are concerned, making a change in model geometry does not entails the need to modify the other projections of a working drawing. The program updates them after any transformation made in basic geometry [http://www.ask.com/pictures?qsrc=167&o=101699&l=dis&q=turning%20torso&locale=en_US].

Literature

http://www.ask.com/pictures?qsrc=167&o=101699&l=dis&q=turning%20torso&locale=en_US

<http://articles.marketwatch.com/keyword/autocad>

Otto F., Otto E. (1994), *Podręcznik geometrii wykreślnej*, Warszawa.

Pham D.T., EEldukhri E.A., Soroka J. (2007), *Intelligent Production Machines and System*, Elsevier.

Piecuch A. (2006), *Z teorii i praktyki uczenia się i nauczania informatyki [w:] Dydaktyka informatyki. Problemy uczenia się i nauczania informatyki i technologii informacyjnych*, red. A. Piecuch, Rzeszów.

Pottmann H., Asperl A., Hofer M., Kilian A. (2007), *Architectural Geometry*, Bentley Institute Press. ISBN 978-1-934493-04-5.

Waldner J.B. (1992), *CIM: Principles of Computer-integrated Manufacturing*, John Wiley&Sons.

Wiebe E., LoPresti J., Yount C. (2007), *Introduction To Pro/ENGINEER*, London.

Abstract

Programs CAD (Computer Aided Design) or computer support in the design, is the kind of software that is used for many years engineers building, architecture, and interior designers. CAD involves the use of computer technology in the design and preparation of documentation. CAD software can be used to design curves in two dimensions (2D) and the surface and three-dimensional objects (3D). Due to the enormous economic importance of CAD is the main driving force of research in computer geometry, computer graphics (both hardware and software) and in differential geometry.

Key words: computer-aided design, spatial design, rendering.

Wykorzystanie technologii komputerowych w procesie projektowania

Streszczenie

Programy CAD (Computer Aided Design), czyli komputerowe wsparcie w projektowaniu, jest tym rodzajem oprogramowania, które od wielu lat służy inżynierom budownictwa, architektury, a także projektantom wnętrz. CAD polega na wykorzystaniu technologii komputerowych w procesie projektowania i przygotowywania dokumentacji. Oprogramowanie CAD może być używane do projektowania krzywych w dwóch wymiarach (2D) oraz powierzchni i obiektów trójwymiarowych (3D). Ze względu na ogromne znaczenie gospodarcze CAD jest główną siłą napędową badań w komputerowej geometrii, grafiki komputerowej (sprzętu i oprogramowania) oraz w geometrii różniczkowej.

Słowa kluczowe: projektowanie wspomagane komputerowo, wizualizacja, rendering.