Digital Modelling in Education
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J. Rado*
* University of Pécs Polleck Mihály Faculty of Engineering/Department of Information Technology, Pécs, Hungary

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I. ABSTRACT

By the aid of the IBM Catia software students have the opportunity of modelling various objects in the three dimensional space. The Catia package provides several possibilities for the establishment of the model of a real physical object. A given object can be modelled by means of surface modelling with the wireframe and surface design module or by the aid of the part designer module of Catia. The modelled parts can be assembled into larger components and on the resulting more complex model many further investigations can be carried out. Among many other properties the orientation, the position and the size of the modelled object can be examined just to mention a few. The complex models can also be investigated as cinematic systems, and from these virtual experiments many useful information can be obtained. In my presentation I would like to show the application possibilities of this very versatile software package, which is very popular among students of various engineering fields.

II. THE CATIA

The IBM Corporation and the Dassault Systems a software developer started the co-operation in 1981. This co-operation had the most successful result the Catia (Computer Aided Three-Dimensional Interactive Application). The user gives a complex CAX system which supports the next process

- CAD Computer Aided Design,
- CAPP Computer Aided Process Planning,
- CAM Computer Aided Manufacturing,
- CAE Computer Aided Engineering,
- CIM Computer Integrated Manufacturing

The software favours the PLM (Product lifecycle management) technology. The automotive industry, shipbuilding, aerospace, industrial equipment are the users of the program package. The authorities of any industries used this product (TOYOTA, WV, BMW, Ford, Boeing, Adidas, Gucci, Guess, Black & Decker, Husqvarna, Nordica, Citizen Watch, etc). In 2001 were more then 210.000 Catia workplaces in the world. The Catia is supported many operation systems and this is the other reason that it is widely used.

- Windows NT/2000/XP/Vista
- IBM AIX
- Hewlett Packard HP-UX
- SGI IRIX
- Sun Solaris

The Catia has 144 modules. We educate only four from these. These are in the Mechanical Design which consists of the following modules. The marked modules are educated in this university.

- Part Design
- Assembly Design
- Sketcher
- Product Functional Tolerancing & Annotation
- Weld Design
- Mold Tooling Design
- Structure Design
The IBM 200 free licences gives to the hungarian education, and these are in the next faculty or university:
- Budapest University of Technology and Economics (BME)
- University of Miskolc
- University of Pécs Pollack Mihály Faculty of Engineering
- Budapest Tech
- Széchenyi István University

III. THE EDUCATION

The subject makes come to know an up-to-date design program. The students are learning the use of a software which is widely used in the research and technological development. This subject lasts two semesters. They study about body modelling, wireframe and surface modelling and assembly modelling. First of all they learn about the sketch designing in the 2D. This is the based of the further work. The methods of education of this subject consist of five parts.
- make a lecture
- make some given practise
- make some self-sufficing practice
- make consultation
- make exam

In the first part the students get much knowledge from the facility of the program. In this phase I introduce the commands of the given module. I use the original pdf file, which belongs to the Catia. It contains the total commands to the given module. During this presentation I use the program, and I show the function of the commands.

In the second part the students make some practise. They get the right solution as well. It is a detail step. They practise the different commands, but every parameter and the order of the commands are given. They don’t have to think hard, the practice is stressed.

In the third part the students make some self-supporting practice. They give a 2D plan from the object or some given views, and they build the models. They discover which commands and which parameters are good for that task.

In the fourth part of the education I give some chance to the students for questions. They may have problems from the previous parts or any other modelling problem from theirs practise.

In the last part of the exam the students have a task – similar like in the phase three – and they try to solve it. The duration of the exam is 45 minutes.

In every semester the education has two modules, and from this we have an exam. The students get a note from these two notes.
IV. THE RESULTS OF THE EDUCATION

In the followings I’ll show some work of the students made with Catia. We can see that the students used various objects similar to the industry. It is a favourite thesis theme.

Fig. 1. A electric driller [1]

Fig. 2. The Skylark it is a hungarian designed light aircraft [2]

Fig. 3. VAZ2101 differential [3]
Fig. 4. Soda maker [4]

Fig. 5. Stapler [5]
Fig. 6. Sanden climate-compressor [6]

Fig. 7. Trabant 601 engine [7]
Fig. 8.  A floppy drive [8]

Fig. 9.  Zsiguli engine [9]

REFERENCES