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CAD/CAM rendszerek oktatása a 21. században

Juraj Czifra - Peter Szabó: CAD/CAM Systems Education in the 21st Century

Az eszközöket használni tudó és a számítógépes tervezés elméletét és gyakorlatát kitűnően ismerő mérnökök képzése kulcsfontosságú az egyetemeken, főiskolák számára. Olyan tanulmányi szakokkal, amelyek támogatják az ilyen irányú szakemberek képzését, olyan szakmát adnak a végzős hallgatók kezébe, amely maximálisan versenyképes a munkaerőpiacon. A tervezést, a technológiát és a gyártást összefogó tanulmányi szakokon folyó képzés csak a legmodernebb eszközökkel és a legmodernebb gondolkodással rendelkező emberek bevonásával folyhat.

Kulcsszavak: CAD, CAM, egyetemi oktatás, módszertan

ABSTRACT

Education of engineers' excellent knowing tools, theory and practice of computer-aided design is very important for the universities and colleges. They give for graduate students' specialization for CAD/CAM which profession is one of the most competitive in the job market. Academic training courses combining the design, production and technology is only possible in this direction by using the most modern equipment and with the modern thinking people involved in this field of science.

Keywords: CAD, CAM, university, education, methodology

INTRODUCTION

One of the basic characteristics of university education is to provide professional preparation for graduate students, which is really competitive in the labor market. Of course, we have to consider the fact that graduates have just some basic knowledge, the real professional knowledge they can reach only after the adaptation to a specific workplace. The major criteria of university education are creative thinking and open education – at least it should be. If professionalism and encouraging of creative thinking, active approach of problem

solving is realized, the engineers required by companies should start out successfully on the technical field and be really well-prepared.

THE ESSENCE OF THE METHOD

The quality of education is affected not only by the teachers participating in it, but also by the right technical environment have to be created. There is a need of course, of the most modern computer systems, appropriate programs and competent professors. But there is often a problem, when the school system as a whole is struggling with lack of resources. In higher education, experiencing constraints incredibly restrain the development as well as investments. How to handle this situation?

The answer is not simple, but plausible. We have to search for and apply a set of tools that will ensure the preparation, preparedness, and possibly does not cost very much – it's best to get them for free. There are such solutions, namely the so-called Open Source Systems. These solutions are practically free at our disposal, if we accept the conditions – they are usually linked to registration. Of course, it is needed to find, contact and use products of developers, which are reliable, have relevant professional experience and constantly improving their products.



On the other side of the coin is about the professional skills and preparation of professors'. For these, who have their tried and tested methods built on software often does not used, for them it will be difficult to switch to some kind of new methods, and learn and teach otherwise.

The first steps in each case of CAD/CAM system selection must be based on the task have to be solved. In our case, the goal is not a computer support for a design process, but the main criteria is to learn basics of computer-aided design, understanding and useful practical application of modern and logic design processes.

Based on the above, we chose a design system that corresponds with following criteria:

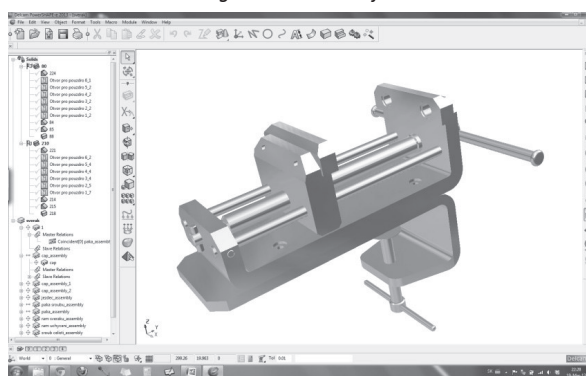
- Easy, intuitive handling
- Has adequate professional support
- At least one new version will be launched in a year
- Free to use and distribute
- Opportunities are not limited or have minimal restrictions
- Does not require special computer background
- Allows 3D modeling and 2D drawings generation

Of those listed in is clearly noticeable – we tried to find and compare more opportunities – that PowerShape from the DELCAM company offer is the most usable and suitable, so we started the education with this program in computer system design field. The following figure shows a model created within the framework of practical classes. There was described for our listeners development of elementary components, switching them to larger units, model set operation implementation, after that they had to create a 3D model of each

component part of an independent working group, than to create the final assembly of all components of complex (see Figure 1.).

Unfortunately, in this article we cannot describe in detail the possibilities of the program due to space reasons. However, we

Figure 1: Practical job

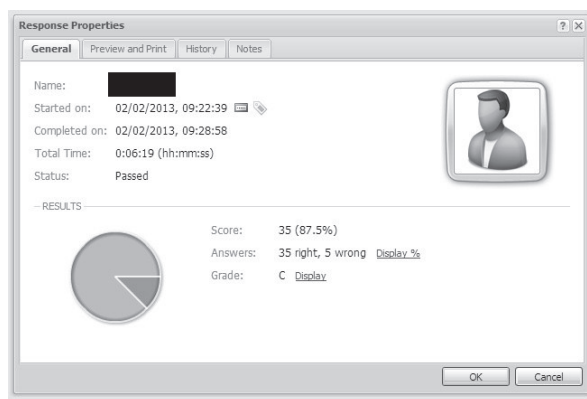


should mention an important fact: the program is suitable for to export data to another program (free software too) basis of which should be modeled components also computer-controlled manufactured. This program is FeatureCAM. By connecting these two suites a computer can be modeled not only the design, but also the preparation process and the production process too. The solution presented above is probably known for many people, but the manner in which is built into the process of education the electronic interactive board probably has something really new.

The next program which was used during the education is no longer bound to the computer-aided design – however, to teaching methodologies more. The program is also used for free; it is the Open-Sankoré. In fact, this is a fully interactive electronic board, which installed on any computer we obtained an extremely powerful tool. What makes the force? In addition to use it does not need any other device, only a normal LCD projector. At the time of presentation we can use pre-

prepared notes; we can write or draw into the presentation, directly to the given document, which will be automatically saved. By using may be completely omitted any board, because is suitable on any flat white surface. Lengthy setup or calibration is not necessary.

Figure 2: Open-Sankoré



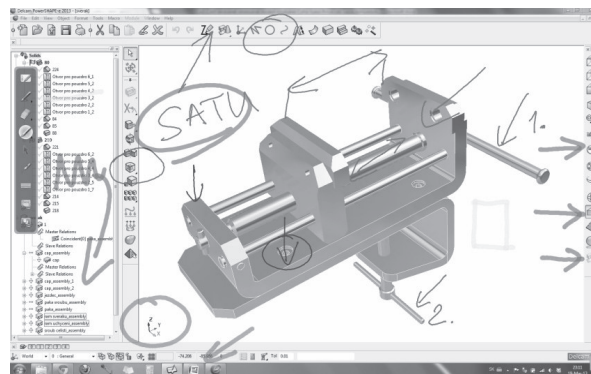
Using the Open-Sankoré allows us usage of any program; we should do snapshots from any moment, and put it into presentation prepared for the class. It allows film screenings and browser usage also, thus fully supports the use of latest information in the education process. The software controlling and handling is intuitive, easy to learn. The real efficiency of process should be reached by use of a wireless communication tablet, because the projected study material and the required software can be handle from anywhere of the auditorium. Students can be active participants of the lesson by using the tablet, because at any moment they may join into

work, they may comment or modify the projected learning material, or sketch the correct solution.

The study material can be saved in PDF format equipped with teachers comments and send to students by e-mail, and if they install the Open-Sankoré program on their own machines also, they will be able to take notes and extend the material during learning and repeating the materials for themselves, or designate the important parts.

On the second figure is shown a, "scribbled" presentation worksheet, but it is impossible to present all of options in one snapshot. The questions and possible answers are randomly compiled by the system from a created database, so it cannot happen that the same sort of questions and answers are given to students working next to each other. The evaluated effectiveness of tests is demonstrated in Figure 3. In the case of on-line tests the test subjects immediately see the right results of his/her test.

Figure 3: QuestBase



PRACTICAL EXPERIENCES, CONCLUSION

Past experiences has shown that the effectiveness of the methods and tools shown here is significantly higher than the effectiveness of traditional methods. Students prefer to use the possibilities of the interactive whiteboard at home, in the preparation and require an interactive study material developed within classes. During the preparation for the test results were quite surprising: in 5 days, more than 1,100 sample tests were solved, which is considered unprecedented.

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