The Application of PROE Software in the Teaching of Mechanical Courses

Jian SUN* and Ru-Sheng WANG

Mechanical and Electronic Department, Xuzhou Institute of Technology, Xuzhou 221111, China

*sunbin275@163.com

Keywords: PROE software, Teaching, Mechanical Courses.

Abstract. To meet the need of training complex mechanical application type talents, in this paper, starting from the teaching problems existing in the current mechanical principles, to make the three-dimensional software used in machinery courses teaching, which are not only deepen students' understanding of abstract theory to mobilize the students' enthusiasm for learning, but also exercise the ability of solve problems. The results have achieved good teaching effect.

Introduction

Applied Vocational Talents Education is a product of human social development and technological progress, is also the result of social differentiation development of professional positions, its purpose is to develop higher technology applied talents. Mechanical courses have very practical, and the content is relatively boring, but traditional teaching methods are often very simple, so its effect is very small [1]. Especially in explaining the various types of mechanical components, structural features and working principle, in order to make students to read assembly drawings and schematics in the textbooks, teachers often need to spend a lot of time and effort to explain. The students often lack engineering background, so it is difficult to speak clearly three-dimensional structure of a mechanical only relying on to explain, in a result, students feel boring course, and can not train a professional interest and to achieve their teaching. In order to meet the needs of the development of advanced manufacturing technology and mechanical personnel training, the three-dimensional CAD software Pro / E is applied to teaching practice in mechanical engineering courses, for the old mechanical teaching curriculum reform, to improve the mechanical application of professional talents modern engineering quality and develop their ability of innovate has a positive meaning.

Pro / ENGINEER software is a three-dimensional computer design software, which is used the computer to finish parts modeling, assembly components, product assembly and institutions overall simulation of machinery products [2]. In most universities, the software has become a professional software for the mold, CNC, mechanism and other professional students to be must master. It is not only widely used in manufacturing and in the machinery industry three-dimensional solid modeling design, but also play a significant role in the field of machinery specialized course teaching. By attempting to use Pro / E of powerful features to assist teaching in the teaching process, has a great help for students to understand and master the mechanical course content.

The Applications of Pro / E Software in Teaching of Mechanical Drawing

Mechanical Drawing is a very important professional technical courses. For engineering and technical staff, the premise requirement with professional skills is to be able to master variety of tools of the view of engineering drawing, drawing techniques, anatomical view, etc. This course requires a high demand abstract and logical thinking ability for students. Then the newly enrolled students are precisely the lack of this ability. If not take effective ways to improve student learning and interest in learning, which will make students to have a sense of the disgust and fear for the course to lead to ineffective teaching. In the teaching, Pro / E software can be used to demonstrate the process of the formation of the mechanical mechanism, such as the basic body of the machine,
the truncated body, the intersection, the combination and other three-dimensional entities, and to achieve flip, modify, regeneration process of model, and also to be dynamic simulation for the part and assembly relationships [3]. Through the physical model and dynamic simulation, students can enter the real three-dimensional space more intuitively, and understand the structure and relative position of the 3D entity. At the same time, it also set up a bridge between the projection view and the entity to enhance the students' understanding and mastery of the knowledge. The following examples illustrate.

![Figure 1. The plan diagram and three-dimensional model of the part.](image)

When talking about this content in the classroom, the teacher is always facing the drawings to explain its structure, then some students lack the ability to identify the images and three-dimensional imaginative faculty, and their thinking will lag behind, so, it is difficult to understand the real structure of the parts, or only by the projection law to complete the part of the axis mapping to draw the correct part of the three views, the relevant lines and intersecting lines are difficult to be correctly drawn. By using Pro/E software and multimedia technology, the three-dimensional modeling of parts can be displayed directly, and it can be displayed from different visual angles. Teachers can also establish the 3D mode in the field to help students understand the more intuitive parts forming process and develop the understanding and graphics capabilities of students for complex shapes.

**The Applications of Pro/E Software in Teaching of Mechanical Principle**

Mechanical principle is an important basic course of mechanical specialty in Colleges and universities, and it is a course of research on machine and mechanism. Kinematics and dynamics of institutional analysis is run through the main line of this course, which has the characteristics of knowledge points and more difficult, and it often involves more theoretical analysis and calculation of the design and implementation of mechanical motion plan in the classroom teaching process. Due to the theoretical teaching takes up a lot of time, which often make students interest in classroom teaching less and less, leading to poor teaching effect. The three-dimensional modeling simulation software advantages can be fully played in kinematic analysis teaching to make the teaching link become vivid and easy to understand [4].
The structure of shaper shown in Fig.2 is more complex, so we can not be determined for each member inside and can not imagine the movement of each member. Faced with this situation, the teacher can explain it again in accordance with the transmission method for students to stay out of space to think. Subsequently, they can used the three-dimensional modeling software to display the designed parts in advance, shown in Fig.2, the use of virtual assembly and motion simulation to achieve the movement of the body. The problem which students can not figure out will be solved immediately. Using this method to develop students' interest in learning and thinking skills, as time passes, the students' ability of understanding and imagination has been improved.

The Applications of Pro / E Software in Teaching of Mechanical Design

Mechanical design is a main course of mechanical discipline, which involves a lot of knowledge of the course. The course design is the most important content of mechanical design course, and the content of the theory teaching involves a lot of parts of the design are reflected in the curriculum design. There are many institutions are combination in mechanical design course, so it has not practical to simply explain the parts, and it is difficult for students to understand the master. Pro / E has a very powerful 3D removable module that can give students to demonstrate a model of the process, and a simple mechanical disassembly, which can greatly stimulate students' curiosity and thirst for knowledge [5]. For example, when explaining shafting parts, we can operate the assembly process of the production of good ladder shaft, flat key, gear and other parts, to make students grasp the key connection, the structure of the shaft, shaft parts positioning and other knowledge. When guiding the students in curriculum design, in addition to the application of Pro / E requirements for solid modeling, for the ample force students, we can guide them to design the reducer dynamic assembly process simulation. So that students can make the content of the previously to form a complete concept and achieve good teaching effect.
The Applications of Pro/E Software in Design Graduation

The graduation project is the most comprehensive practical activity in University, which can make the students' comprehensive ability of applying knowledge more comprehensively and deeply. To guide students to apply Pro/E software in graduation design, it can improve students' ability of flexible application and mechanical design of CAD/CAM software, and can lay a good foundation for future work. As shown in Fig.4, the three dimensional model of the vibratory wheel of the road roller designed by the students in the graduation project, which expresses the structural characteristics and quality attributes of the vibrating wheel. Combining the model and dynamics analysis software, we can be easily to analyze the vibration of the vibration roller, obtain the vibration characteristic curve of each part of the vibration wheel, which can give designers into the true feelings of the whole process.

Conclusion

To meet the need for complex mechanical applications cultivate talents, Pro / E software is used in machinery courses teaching, which can improve students' understanding and master for many other courses content, and exercise the ability of the students to solve practical problems. Therefore, it can greatly mobilize the enthusiasm and creativity to learn courses, and play a positive role in promoting the development of the students' innovation ability.

References


