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On the optimization of the probation teaching for the undergraduate major of mechanical design application

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Abstract: It is an important aspect of higher education reform to promote the transformation of some undergraduate colleges and universities from theoretical teaching mode to applied teaching mode. This also means changes in teaching concepts and teaching methods. On the one hand, the teaching concept should be transformed from the original training of theoretical talents to the training of applied talents; on the other hand, the teaching methods should also meet the training needs of applied talents. Especially in the probationary teaching, we must start to improve, so that the probationary teaching and the professional theory teaching can be organically combined to realize the optimization of the probationary teaching. This article is devoted to discussing the optimization plan for the undergraduate probation teaching of mechanical design application.

Keywords: Higher education reform; Mechanical design; Applied undergraduate; Probation teaching; optimization.

1. Introduction

With the continuous advancement of higher education reform, undergraduate teaching has shifted from cultivating theoretical talents in the past to cultivating applied talents. Therefore, in terms of teaching content, it is necessary to shift from the previous theory-based indoctrination to both theoretical learning and practical learning. At the same time, facing the training needs of application-oriented talents, the teaching focuses on practical learning, so that students have proficient practical skills and necessary innovation capabilities. To this end, we need to consider more practical teaching plans. This article takes the practical teaching reform plan of mechanical engineering materials for applied undergraduates as an example to carry out relevant discussions, which has certain pertinence [1].

2. An Analysis of the Status Quo of Intern Teaching for Applied Undergraduates

Engineering case application practice is a basic technical course in mechanical design undergraduate major.It is recognized as one of the essential basic skills in mechanical design, which lays the foundation for the later professional system learning.The main training goal is to create the necessary professional innovation skills and good engineering practice skills for students.Compared with other courses, because this course is very practical and has many connections with specific production practices and daily life, it cannot be separated from specific production links.Therefore, when teaching, you should not be separated from the specific engineering practice cases, otherwise the students will not be easy to understand and accept. Below we analyze the status quo of its probationary teaching.

Now, as application-oriented undergraduate is still a new thing in China, many teaching concepts and models have not been adjusted in time, and there are some defects, which we need to focus on improving in the future teaching. For example, there is too much theory and too little practice, too much analysis of the case surface and too few opportunities for students to experience it. These defects are specifically reflected in：

(1)The proportion of case teaching is too low

Compared with similar foreign colleges and universities, the proportion of engineering case teaching in domestic application-oriented mechanical design majors is still insufficient in the whole teaching system, and there is still a long way to go compared with the goal of training senior application-oriented talents.For example, in some applied undergraduate colleges in the United States, engineering case teaching in mechanical design majors accounts for about 80% (about 30 class hours), and theoretical explanations only take up two to six class hours.However, most of the applied undergraduate mechanical design majors in our country often fall into the misunderstanding that there are too many theoretical explanations and the insufficient proportion of engineering case teaching.In this way, even if students have mastered more theoretical knowledge, they can often only "talk on paper", and their practical ability has not been improved in the true sense.

(2)Teaching content is too old and backward

Mechanical design itself is a discipline that needs to keep pace with the times.If the teaching content is still stuck to those already outdated engineering concepts, even if students master the teaching content, after entering the actual work, it is still easy for the theory to be out of touch with practice.However, the collection and analysis of engineering cases in many colleges and universities is obviously out of step with the current era, and the teaching content is too old and backward to meet the

development needs of students in the future.For example, take the teaching content of "pulley drive" as an example. The teaching in many colleges still starts from the manual sewing machine.However, as a product that has been "dead", manual sewing machines have long been difficult to see in the market. In this way, students will have difficulties in sensory cognition, and it will not help them to fully understand the teaching content.

In contrast, if we take some popular products such as "sweeping robots" as an example, since the product itself has received a high degree of attention on the market, it will be easier for students to perform sensory cognition. Help them fully understand the teaching content.

3. The Current Situation of Mechanical Design Industry Inspires Teaching

Next, through the analysis of the current situation of the mechanical design industry, from the curriculum setting and teaching objectives, teaching content, teaching design, teaching methods and methods[2],they can all get some inspiration to improve our teaching.

(1)Design changes

Now, finite element simulation analysis and overall performance optimization technology is very popular.The former is used to discretize gridded product design model, carry out loading and boundary constraints, submit to computer for numerical calculation, and obtain the structural performance of the product, such as the expected deformation, bearing capacity and stress state of the design.If the design requirements are not met, you can return to adjust the design parameters, and then perform iterative virtual verification to make the design more accurate and reasonable, and the virtual evaluation and verification of performance and usage methods more reliable.In recent years, the optimization design developed on the basis of the parameters of the main dimensions of the design, through experimental design and other numerical algorithms to achieve the optimal treatment of product design, not only to meet the design requirements, but also to achieve the minimum material, the lightest weight and other lightweight and cost requirements.

(2)Realize informatization

This is achieved through network technologies such as collaborative design, remote design, and shared design.Among them, collaborative design is mainly to realize that all members of the team jointly design a mechanical product on the grid, so that designers from different regions can carry out the same design task.In collaborative design, remote design can apply high-speed network, remote operation design workstation to realize remote operation.In shared design, common design components, including standard parts, are shared to each member of the design team

through high-speed grid, thus reducing design workload and repetitive design.In this way, it is conducive to remote control and sharing in the design and development process, improves design efficiency, avoids manual design errors, reduces design costs, and improves design innovation.

(3)Realize intelligence

First, the mechanical product is decomposed to form several modules. Each module can define a key feature and main function to form an intelligent module library (Figure 1 is a flowchart of intelligent mechanical design).

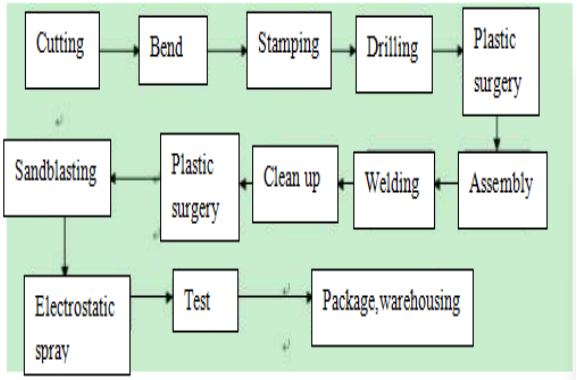

Figure 1 is a flowchart of intelligent mechanical design

Then, in the development of new mechanical products, it is firstly decomposed into several functional modules from the architecture. Each module can define functional requirements, and the design system can be searched and matched with the intelligent module library defined in the early stage, so as to quickly search for various module designs that can be matched.Then make manual comparison from the design scheme recommended by the intelligent system to determine the final design scheme.The promotion and application of the intelligent design and development system solves the modeling and assembly of many design schemes from the development efficiency, saves a lot of working time, and also provides many design scheme choices for junior and intermediate design engineers.

Nowadays, more and more attention is paid to the concept of environmental protection, which requires us to achieve "green design" in design. This requires optimization of the design process to avoid waste and pollution of materials.While some mechanical products module in technology, principle and function of products without any change, but in the resource saving policy and under the guidance of the concept of green environmental protection, able to review materials in the application materials recycled and reused, so as to avoid material waste and pollution, reach the role of resource conservation and environmental protection.

4. Sone Suggestions for Optimizing the Teaching Plan

Before carrying out engineering practice case teaching, first guide students to consult

some related documents to understand how this case is proposed and in which fields it is currently being applied.When carrying out teaching, it is necessary to scientifically optimize and reform the teaching content, teaching methods and assessments. Pay attention to scientifically setting up questions in the classroom, and then select typical cases to summarize, and let students feel the interest of the teaching process And innovation.Teachers should also pay more attention to understand the development status of the mechanical design industry, and select those representative, forward-looking and practical cases according to the current development status, so as to make the teaching more contemporary.

5. Conclusion

Applied undergraduate teaching is an important direction of undergraduate teaching reform, and mechanical design is one of the focuses of applied undergraduate teaching. In order to effectively meet the needs of applied undergraduate teaching, we need to fully analyze the weaknesses in the past teaching models, and continuously improve the teaching models, so as to increase the benefits of teaching.

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