Study on Training Mode of Digital Design Innovative Talents

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Abstract. Digital design technology is the core technology of modern enterprise product design and processing manufacturing industry. Enterprises urgently need a large number of innovative talents with digital ability. It is necessary to study and reform the training mode of design innovative talents in the colleges and universities. According to the analysis of the research significance of digital talent training mode, this paper studies the connotation of product digital design, constructs the training mode of digital design innovative talents. In addition, this paper put forward to some measures of the digital design innovative talents in accordance with the current situation of the digital innovative talent.

Keywords: Digital Design, Training Mode, Innovative Talents.

1. Introduction

With the rapid development of global economic integration technology and modern science and technology, the environment of modern manufacturing industry has been significantly changed, and the product design has become the leading enterprise. The product digital design technology is an advanced design technology, which integrates CAD, CAE, CAM, and CAPP with other technologies [1-2]. With the help of computer, it can realize virtual design, assembly, simulation, analysis and optimization and virtual machining, and bring a new product design method and design concept to mechanical design and manufacturing industry. Product digital design technology has gradually replaced the traditional two-dimensional design and manufacturing methods, and become the core technology of product design and processing manufacturing industry, which has the characteristics of short research and development cycle, high production efficiency and low product cost. The development of digital product design has changed the traditional manufacturing industry's production and management mode, which is mainly based on two-dimensional drawings and manual design and brings revolutionary changes to Chinese manufacturing industry [3-4]. At the same time, it also poses a challenge to the reform of the training mode and training system for mechanical majors in colleges and universities. With the rapid development of China's mechanical industry, the innovative talents of the digital design cannot meet the existing mechanical demand. It is urgent for colleges and universities to accelerate the training of the digital design technology innovative talents, which is of great significance to study the training mode of digital design talents for mechanical specialty. The digital design talents should adapt to the development trends of advanced design and manufacturing technology, and reformed the talents training methods in accordance with innovating the talents training modes. In addition, the colleges and universities should construct a scientific and reasonable personnel training system and expand the connotation of discipline construction, so as to cultivate high-quality and high-skilled innovative product digital design technical talents.

2. The Connotation of Product Digital Design

Product digital design is mainly composed of CAD module, CAD module, CAM module, CAPP module and PDM module [5]. Firstly, the demand and analysis of market should be researched. Secondly, product schema design should be implemented. Finally, according to the advantages and disadvantages of the existing products in the market, the innovative design should be also improved. According to the design schema, 3D system is used to construct 3D parts of the product, and 3D CAD system assembly module is used to conduct virtual assembly of the product. Through the finite element analysis of virtual prototype and other optimization design methods, the structure and

performance of the assembled products are optimized, and the optimized product parts are obtained. Then, by the using the 3D CAD system, the engineering drawings of all parts of the product are exported.

Compared with the traditional enterprises design and manufacture method, 3D digital design is a kind of information and digitization of design patterns [6]. The whole design and manufacturing process have been fully digitized from 3d digital product modeling to product structure and optimization analysis (such as kinematics analysis, dynamics analysis, stress and strain analysis, structural optimization analysis, reliability analysis, etc.).

3. The Overall Framework of Digital Design Talents Training Mode

The overall structure of digital design talent training mode is mainly composed of three parts: the construction of digital design system, the cultivation of digital design professional ability and the application practice of digital design talent training.

The construction of the teaching system of digital design closely revolves around the modern digital design technology, digital simulation technology, digital manufacturing technology and the construction of a new type mechanical theory courses teaching system. The new curriculum system pays attention to students' digital design and analysis of the cultivation of comprehensive ability. Students' engineering practice ability of integrating theory with practice is cultivated by practice of single subject application and comprehensive application. In addition, by combining the reform of practical teaching system and the comprehensive works of innovative design, so as to strengthen engineering practice of students' digital design. The training of the digital design ability mainly includes the engineering drawing ability, two-dimensional CAD graphic design, the 3D digital modeling ability of products, the technical ability of virtual prototyping of products and the training of computer-aided manufacturing ability. In order to develop innovative digital design talents, the traditional teaching modes need be changed, and the students' initiative cognitive and learning ability also need fully be mobilized. In addition, teachers should combine manufacturing idea, design with the manufacturing products by the form of school-enterprises cooperation and constructed the digital design teams, so as to improve students' comprehensive digital design ability.

4. The Training Measures of Digital Design Talents.

4.1 Constructing the Course Teaching System Suitable for Training Digital Talents

The digital design technology integrates modern design and manufacturing advanced technology, which includes digital product modeling technology, product virtual assembly analysis, product structure optimization design, product data management, etc. According to the goal and requirement of training digital design innovative application-oriented talents, curriculum system should be reasonably set up. At the same time, the course reform should be deepened, so as to establish a series of course of the combination of theory and practice in accordance with the goal of the digital design technology. In the course of teaching, real cases of enterprises should be introduced into the classroom, so that students can have a complete understanding of product design, processing planning, CNC machining structure, performance analysis and processing management. In addition, students should also truly understand and master the processing of the product design through the CAK/ CAE/ CAPP/ CAM. By changing the traditional teacher-centered teaching modes, students can cultivate their ability to find problems, analyze problem and solve problems in the real teaching cases. Teachers should pay attention to training of students' digital design ability in accordance with the reform of traditional 2D mechanical course system, and focus on some technologies, such as the modern digitalization design technology, digitalization simulation analysis technology, digitalization manufacturing technology and digitalization management technology, and so on.

4.2 Improving the Engineering Consciousness and Innovation Ability of Digital Design Talents.

Innovation is the soul of a nation's progress and the inexhaustible driving force for national prosperity. The international competition in the 21st century will mainly be the competition of the comprehensive national strength of each country, the national technology technologically innovative ability too. How to train students' creative design ability is the core of current higher education reform. In the digital design talent cultivation system, the cultivation of engineering consciousness and innovation ability should take the digital design, digital analysis, digital manufacturing, product structure analysis and virtual prototyping technology as carrier, and take Mechanical principle course design, mechanical design course design, graduation design and extracurricular innovation activities as a way.

4.3 Improving the Engineering Consciousness and Innovation Ability of Digital Design Talents.

The education mode of Production-Learning-Research cooperation is an important way to cultivate design ability, innovation ability and practical ability, and also an important platform to develop the function of scientific research and social service. It is beneficial to cultivate more high-quality digital design talent by education modes of Production-Learning-Research cooperation, and cultivate students the rigorous work style and innovative ability of engineering practice. In addition, it can let students stand in the real environment of enterprise to grasp the method of design, quickly improve their design level and design ability. The colleges should actively explore the training mode of industry-university-research cooperation education, make use of local resource, give play to its own regional advantages, and strengthen the connection between the school and enterprise through colleges-enterprise cooperation and other forms. In recent years, we have built and trained the high level of product digital design team. In addition, by cooperating with local enterprises, we have organized students to directly participate in project design and development, the innovative ability and digital design ability of students have been greatly improved on the original basis and the good results have been achieved.

4.4 Taking the Opportunity of the National College Students Mechanical Innovation Competition to Cultivate the Comprehensive Design Ability of Students' Digital Design.

The nation college students' mechanical innovation competition is approved by the ministry of higher education, which is a mass scientific and technological activity for college students. At the same time, it is an important practical platform for high-level digital design talents, and also one of the important ways to cultivate high-level digital design talents. In recent years, the members of our college to participate in the national mechanical innovation design competition are mainly selected from the digital design team. The team has a solid digital design analysis and manufacturing capabilities in the early training process. In recent years, our team has participated in this competition for many times and achieves ideal results.

4.5 Giving Full Play to Industry Advantages and Sharing Resources between Colleges and Enterprises.

The training base is an important platform for personnel training. We can rapidly improve the college's own condition through resource sharing, a long-term operation mechanism of college-enterprise cooperative management. Students can practice what they have learned through the training base. For the courses with strong practically, such as mold manufacturing, mold design and numerical control machining, we can employ technicians with rich practical experience from some enterprises as part-time teachers, so that the professional knowledge and engineering practical ability of students can be constantly improved. Compared with the traditional design and manufacturing methods, 3D digital design improves the design efficiency, shortens the development cycle and enhances the competitiveness of enterprises.

5. Summary

With the rapid development of technology, the traditional two-dimensional design and manufacturing has been gradually replaced by the product digital design, which has become the core of product design and manufacturing. Having higher digital design ability of products will greatly improve the comprehensive design level and engineering application ability of undergraduates, which is of great significance to research on the training mode of digital talents in mechanical engineering. This paper analyzes the connotation and structure of digital design, and on the basis, constructs the overall structure of digital design training mode.

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