Understanding and Practice of Constructing the School Light Industry Equipment Production Practice Base

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Keywords: Light Industrial Machinery, Characteristic Specialty, Practice Base, Practice and Reform.

Abstract. Students' production practice is an important part of talents cultivation in the process of cultivating the professional talents of light industry machinery. Aiming at the situation of difficult production practice arrangement and poor practice effect, constructing light industrial equipment production practice base on the basis of researching the existing training process and knowledge system. The equipment of school light industry production practice base should cover all the knowledge points of light industry machinery professional class, which can integrate the students' curriculum experiment, production practice, professional design, graduation design and graduation practice as a whole. It is a useful exploration to cultivate professional talents to adapt the development of modern society.

Current Situation and Background

The characteristics of light industry machinery is significantly different from the general machinery and engineering machinery, precise motion, novel mechanism, and complex control are its main features, the requirement of integrated application of machine, light, electricity, gas and other disciplines is becoming more and more high for light industry machinery. College of mechanical and electrical engineering, Zhengzhou University of Light Industry always take the teaching, research and talents cultivation for light industrial machinery as its target, which have cultivated a large number of talents on light industrial machinery researching, manufacturing, management and application for the industry. Although on the aspect of training talent, college of mechanical and electrical engineering, Zhengzhou University of Light Industry carries on a great deal of exploration and gains remarkable achievements, talent training still cannot meet the needs of social and economic development.

In the teaching process, teachers' production practice and engineering practice ability is weak, the curriculum system focus on theory teaching, students are lack of mechanical engineering quality, students' practical, hands-on ability and innovation ability is not strong etc. One of the root causes is that teachers and students lack of practice base. It is difficult to arrange production practice and the practice effect is weak[1][2]. The construction of the school light industry equipment practice base can integrate the students' curriculum experiment, production practice, professional design, graduation design and graduation practice as a whole.
Professional Development Needs Analysis

Practice is the key teaching contents to cultivate engineering students, in order to maintain the professional characteristic advantage and talent cultivation quality, it is needed to own the advanced equipment and practice teaching idea to meet the requirements of the quality of teaching practice.

In recent years, the major of machine design manufacture and automation, measurement technology and instrument for Zhengzhou University of Light Industry is developed rapid on professional and disciplinary construction aspect. It is shown as: the rapid increase in the number of undergraduate in the school, the scale of graduate students continue to expand, graduate students is in short supply in the professional field. Social employing unit demand is higher and higher for talent innovation ability and practical operation ability. In this case, the relative lag of laboratory construction has become an important factor to restrict professional and disciplinary development. In particular, lack of a comprehensive experimental platform which can not only manifest characteristics of running a school for Institute of mechanical and electrical engineering of Zhengzhou University of Light Industry, but also provide one platform for design, manufacturing, mechanical and electrical control, measurement and control methods integrated. In order to highlight the professional characteristics, maintain the healthy development of professional direction, realize the goal of ensuring undergraduate teaching, it is needed to build light industrial equipment engineering experimental platform as soon as possible, which can ensure to provide creative, high quality engineering and technical personnel owing the knowledge of modern light industrial machinery.

Knowledge Point Analysis for Experimental Platform of Light Industry Equipment

The development of manufacturing, light industry and food industry in Henan is rapid, which needs a large number of engineering and technical personnel of light industrial equipment design, manufacturing and new technology, and a large number of senior technical personnel mastering the modern measurement and monitoring technology is also needed. In order to meet the needs, it is needed to let the students master the method of design, manufacturing technology, control technology, testing theory and method of high technology and which application in light industry equipment, and the comprehensive experimental platform is needed to build, which is convenient for students to understand the teaching content in the actual operation of light industrial equipment system instrument. The application and innovation of modern technology in light industry equipment can be conducted in the experiment for students.

Light industry equipment experimental platform is mainly focus on the first class of mechanical engineering, highlighting the characteristics of light industry. The platform is focus on the key core processes of light industrial production line, including filling, labeling, packaging, stacking, etc. solving key problems of the design, manufacture, inspection and maintenance of light industrial equipment and production line. This platform can undertake the practice teaching task of principle and design for automatic machine, packaging technology and equipment, mechanical fault diagnosis, mechanical, electrical integration, testing technology, robot design, robot dynamics, production practice and the experimental work of graduation thesis. Through the practice teaching of industrial field, the comprehensive training of basic skills for students to become mechanical design engineers is completed. Let the students mastering the new and practical mechanical design and analysis technology, in order to adapt the rapid development of light industry machinery equipment and high-end industrial technology.

Building the Equipment Platform

The laboratory around the construction direction of light industrial equipment production practice bases, through purchasing a number of advanced equipments of production, testing, analysis, constructing the teaching experiment platform which can outstanding light industrial characteristic and whose aim is to cultivate innovative engineering talents. The platform is shown in Figure 1.

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Construction of the experimental platform is mainly to deepen students' understanding and mastering of light industrial equipment design and process. After the laboratory has been built, it can not only meet the students' understanding and mastering of equipment process for packaging production line, but also meet the student's learning of the packaging equipment structure. It is suitable for students to understand the experiment, and suitable for curriculum design, graduate design experiments. The students can also carry out extracurricular innovation experiments.

Light industry equipment practice platform mainly consists of 4 systems, including:

1. Typical filling system: with pure water filling as the representative, the main equipment includes: send bottles, wash bottles, filling, capping, conveying system, etc.

2. Online quality inspection system: the main equipment includes: lamp inspection, liquid level inspection, extrusion inspection, conveying system, etc.

3. Typical label sticking system: the main equipment includes: paste labeling machine, labeling machine, shrink packaging machine, laser inkjet printer, conveying system, etc.

4. Typical material flow system: the main equipment includes: Z type lifting machine, quantitative packing machine, unpacking machine, robot sorting system, sealing machine, strapping machine, palletizing robot, AGV robot, wrapping machine, conveying system, etc.

Each system can support the teaching experiment:

1. Typical filling system
   The students of mechanical manufacturing professional direction can do filling machinery and equipment structure design experiments, the students of machine design professional direction can do system design of filling production line, the students of measurement control professional direction can do collaborative design experiment method research of sending bottle, washing bottle, filling and sealing, the students of mechanical electrical professional direction can do electromechanical system cooperative control experiment.

2. Online quality inspection system
   Developing related experiment of light industrial products detection technology for students. And deepen the understanding of the importance of product quality, improving product quality control and safety awareness, and then improving the interest of learning quality detection technology. The students of mechanical electrical professional direction can do the loop performance test experiment for light industrial machinery. the students of measurement control professional direction can do automatic monitoring experiment of product quality.

3. Typical label sticking system
   The students of mechanical manufacturing professional direction can do structure design experiment of labeling machine. The students of machine design professional direction can do labeling and trapping label machine course design. Deepen students' understanding of the structural characteristics and implementation principles of the labeling and trapping label machine. The
students of mechanical electrical professional direction can do control experiment of marking machine and labeling machine, in order to improve the efficiency and accuracy of labeling.

(4) Typical material flow system

The platform provides effective methods and verification testing place for developing automation equipment, precision high speed production line, the motion control of light equipment and dynamics analysis. The students of mechanical manufacturing professional direction can do packaging machinery design experiment of mechanism and typical process. The students of machine design professional direction can do mechanism motion and dynamics analysis experiment. The students of mechanical electrical professional direction can do robot target tracking, path planning experiment, etc.

Conclusion

Through constructing more advanced laboratory, providing a strong support for further improving the quality of undergraduate teaching and innovative talents training, it can get more excellent results in the outstanding graduation thesis and major competition in related fields.

Through constructing experimental platform of light industrial equipment, providing support to solve the key technical problems of light equipment development, production, operation and maintenance on the background of light industry, and constructing innovative heights for light industrial products, equipment design and development.

School light industry equipment production practice base cover the main knowledge of Light Industry Machinery professional class, it can integrate the students' curriculum experiment, production practice, and professional design, graduation design and graduation practice as a whole.

Through the reform, Light Industry Machinery professional characteristics are more obvious, the students' practical ability were significantly improved. This has laid a good foundation to further improve the training level of the professional talents.

Acknowledgement

This work was supported by higher education teaching reform project in Henan Province and the tenth key education teaching reform project of Zhengzhou University of Light Industry.

References


