

# Teaching Research of “Pneumatic Control System Installation and Commissioning” Course Based on Job Competence Requirements

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**Abstract:**Most of the professional courses of engineering technology will follow the requirements of post ability, which is helpful to improve the personal professional ability of vocational students and quickly adapt to the job requirements. In order to achieve this goal, teaching methods should be reformed and post ability requirements should be integrated into the whole teaching process. Thus, the students’ learning objectives are integrated with the teaching objectives, enhancing their interest in learning and improving the learning effect.

**Keywords:** Post working ability;Pneumatic transmission; Teaching research.

With the continuous development of higher vocational education, most of the teaching of engineering technology courses in higher vocational education will follow the requirements of job competency, which helps to improve the personal vocational ability of vocational students in a targeted way and make it easier for them to find matching jobs according to their majors after graduation and to adapt to the job requirements in work quickly.<sup>[1]</sup> “Pneumatic control system installation and commissioning” is a required professional course for mechanical and electrical majors, and its content is practical. If the traditional teaching mode is adopted, it tends to be boring and the knowledge conversion rate is low. In order to improve the conversion rate of knowledge, we can adopt a teaching mode oriented to the requirements of job competency, and teach students according to their characteristics. In the process of teaching to cultivate the students’ comprehensive qualities, can take case as the main line, teacher as dominant, students as the main body of the training mode, optimizing the examination methods, to cultivate students’ innovative thinking and the ability to adapt, fully mobilize students’ learning initiative and enthusiasm, so as to realize the teaching goal of this course.

## 1. Clear training objectives based on job competence requirements

Intelligent manufacturing professional group in intelligent production equipment maintenance and repair positions require students to have the ability to apply electrical and pneumatic control, programming, installation and commissioning and operation and maintenance of conventional production equipment and production lines and intelligent production unit control.<sup>[2]</sup> The training objectives are refined according to the above-mentioned job competency requirements. The training is designed to provide the required vocational skills, knowledge, and abilities necessary for the performance of professional activities through a standardized educational process in response to the changing work environment. We focus on the development of professional behavioral skills and problem-solving skills, and emphasize the development of key competencies while focusing on the development of comprehensive professional skills.

### 1.1 Professional Competence

①Ability to regulate equipment and filter pressure reducing valve operating pressure; ②Ability to select and use manual valves to meet functional requirements; ③Ability to use throttle valves to regulate compressed air flow; ④Ability to master the function and use of shuttle valves;⑤Able to complete the construction and inspection of the gas circuit according to the gas circuit diagram; ⑥Able to choose the appropriate range of pressure gauge; ⑦Ability to use pressure reducing valves for secondary pressure reduction; ⑧Able to use gas-controlled time delay valve to adjust the delay action of the gas circuit; ⑨Ability to select appropriate stroke valves and pneumatic valves according to functional requirements; ⑩Ability to adjust the set pressure value of the pressure switching valve.

### 1.2 Core Competencies

①Ability to increase awareness of safe operations and to ensure safety and protection; ②Ability to collaborate, communicate and analyze problems;③Ability to read relevant forms, count materials and create bills of materials; ④Be able to self-evaluate and propose improvement measures after the project is completed.

### 1.3 Knowledge Objectives

①Pressure reducing valve use; ②Pneumatically controlled time delay valve use; ③Pressure switching valve use; ④Stroke valve use; ⑤Adjusting the working pressure of the air circuit; ⑥Manual valve, solenoid valve use; ⑦Pressure gauge range selection; ⑧Compressed air flow regulation

## 2. Implementation of “action-oriented” teaching methods

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The “action-oriented” approach enables students to independently develop a work plan for their future career, and to independently implement and evaluate that plan. The guiding idea is “learning for action, learning through action, and learning through action”. The action-oriented method breaks the traditional discipline system, defines the learning area, sets up the learning situation and carries out teaching activities according to the vocational work process. The teaching content is centered on vocational activities and focuses on the horizontal connection between disciplines. Following the principle of “practice in the front, knowledge in the back”, students learn by doing first, then learn by doing, and know what they know first, then know what they know. Through solving cases or projects close to the actual work process, students are centered and teachers are coached, and group learning is conducted in a way that emphasizes cooperation and communication in the learning process and guides students to conduct inquiry-based and discovery-based learning. The comprehensive ability of solving practical problems is exercised and improved, and the students’ personality development is comprehensive and characteristic. On the one hand, we use theory to guide practice, emphasizing that theory must be verified in practice, and deepen the understanding of theory through practice; on the other hand, we highlight the principle of “necessary enough” and the practicality of “learning to apply” regardless of the course content, and urge students to practice repeatedly and strengthen their proficiency to reach the required level.

### **2.1 Collecting Information**

Students will understand the requirements related to the learning tasks and collect, organize and analyze this information independently, taking into account their professional knowledge. Planning enables students to independently plan their work in accordance with the requirements of the teaching objectives. The plan includes: working steps, working hours, personnel allocation, inspection measures and so on.

### **2.2 Making Decisions**

In small groups, students will discuss their work plans and determine a work plan that is feasible.

### **2.3 Implementation Plan**

Under the supervision of the teacher, students complete their respective tasks according to the division of labor according to the execution plan determined by prior group discussions.

### **2.4 Inspection**

Students are guided by the instructor to conduct a thorough examination of the process of performing the task.

### **2.5 Evaluation**

At the end of the program, the teacher organizes a summary of the learning tasks and, based on this, receives feedback to improve the teaching and learning process.

## **3. Reforming evaluation methods**

The evaluation is divided into process evaluation and outcome evaluation.

### **3.1 Process Evaluation**

The teacher gives the corresponding evaluation score according to the operation process of the students, mainly for the operation standard and safety requirements.

### **3.2 Evaluation of results**

There is a division between self-evaluation and teacher evaluation, which requires professional correctness and attention to quality and practical production of the request. The purpose of the evaluation is to enable students to better undertake their work and to stimulate their willingness to learn vocational knowledge and skills.

## **4. Conclusions**

Higher vocational education is to cultivate senior technical talents facing the first line of production and service. Integrating the cultivation of job competence into the course teaching process can not only enhance the relevance and purpose of teaching, but also make students familiar with the future work position and work content in advance, so that students’ learning objectives and teaching goals can be integrated to enhance learning interest and improve learning effect. <sup>[3]</sup>

## **References:**

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