

# Teaching Strategy Reform of Mechatronics in the New Era

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## Abstract

**With the development of modern industrial production, mechatronics technology has become an important part of today's Industrial Science and technology. Starting from the requirements of high skilled personnel training in higher vocational education, combined with the post skill requirements, and according to the actual situation of teaching, from the guiding ideology and teaching strategies.**

## Keywords

**mechatronics; teaching reform; exploration of mechatronics teaching reform in strategy.**

## 1. Introduction

For a long time, the mechanical and electrical specialty has basically organized teaching according to the traditional theoretical system with the discipline as the core, taking the teaching of systematic theoretical knowledge as the starting point of organizing teaching, as the main line of teaching process and the main standard of quality assessment, In view of the fact that the teaching of Mechatronics can not meet the needs of rapid economic development, this paper puts forward the practice oriented teaching reform of mechatronics.

## 2. Guiding Ideology

The guiding ideology of personnel training of mechatronics technology specialty is: according to the needs of the society, based on the survey results, aiming at improving the students' professional ability and professional quality, establish the education and training concept of applying what they have learned, and establish a teaching mechanism integrating diversity, flexibility and selectivity, and through specific vocational and technical practice activities, Help students to accumulate a lot of practical work experience, so that they can become excellent mechanical and electrical integration field technical personnel.

## 3. Teaching Strategy

### 3.1. Integration of Course Content

With the rapid development of modern science and technology, the integration and integration of scientific knowledge have been significantly strengthened, which makes the social profession show a trend of comprehensive development, and some traditional and single majors are gradually shrinking or even disappearing. At the same time, many new cross specialties have emerged. Today, with the increasingly fierce market competition, product upgrading and production structure adjustment becoming more and more frequent, The communication between people and people, people and environment in professional activities is more complex and extensive, and the conversion of professional posts is also increasing, which puts forward more, newer and higher requirements on workers' communication ability, adaptability,

psychological endurance and many other aspects. Students often change their learning content, training methods and thinking mode. In addition, the comprehensive and integrated course content can organically and reasonably arrange the teaching content, avoid repeated teaching, broaden the scope of knowledge of the subject or specialty, strengthen the connection between the contents of various parts, so as to make students form skilled professional skills more quickly and effectively improve the teaching efficiency

### **3.2. Pay Attention to Choose the Appropriate Teaching Place**

In the teaching process, the teaching place is very important, which determines the teaching effect, and the construction of integration should be strengthened. The establishment of a professional classroom of "integration" of theory and practice is to integrate classroom, practical training and examination into one, which requires the purchase and self-made of a large number of teaching equipment, and multimedia teaching can be carried out in all professional classrooms. The professional classroom has many functions, such as multimedia teaching, physical display, practice training, strengthening training and examination for work, creating a good professional atmosphere and environment. It can also carry out practical training. The teaching method is intuitive and flexible, and the teaching form is vivid and lively. It stimulates students' learning enthusiasm, mobilizes students' participation and initiative, helps to expand students' ability and develop their potential, thus cultivating a large number of comprehensive talents and greatly improving teaching quality. At the same time, it also saves teaching time and improves teaching effect.

### **3.3. Strengthen the Construction of Practice Base**

Practice facilities and equipment are the material basis and prerequisite of practice teaching. In order to improve the professional skill level of graduates majoring in mechatronics, it is necessary to build a good practice base inside and outside the school.

(1) build the school practice base. According to the requirements of the modernization of occupation and electromechanical integration, occupation schools should build advanced and relatively complete campus practice bases suitable for training objectives and teaching plans.

It is necessary to have certain advanced nature and adequate quantity. The electromechanical integration specialty has the practice base in the school, and it can adjust the practice plan timely according to the practice outline and the requirements of the enterprise personnel, and rationally design the practice subjects according to the students' learning reality. The quality of the teaching practice has been guaranteed. According to the actual situation of the school, we should carry out step by step and perfect step by step.

(2) In order to meet the needs of students' internship before graduation, students can get access to advanced production equipment, learn advanced production technology and processing methods, broaden their horizons, and apply what they have learned. At the same time, in the process of communication with enterprises, the school can also understand the requirements of modern enterprises for the comprehensive quality of employees and solicit suggestions from enterprises for running schools, so as to reform and adjust all aspects of education and teaching.

The integrated teaching mode is especially suitable for the practical course teaching. In the course teaching process, it plays an unprecedented role in giving full play to the students' subjective initiative, improving the teaching quality, and cultivating knowledge-based and application-oriented technical talents. In the future, with the further deepening of higher vocational education, vocational schools should constantly summarize teaching methods suitable for their own development needs, Strive to improve the level and quality of vocational education, for the country to cultivate high - quality applied talents.

#### 4. Curriculum Design of Automatic Production Line

The training ability of Mechatronics professionals includes: drawing ability, mechanical and electrical installation and maintenance ability, electric control system debugging and maintenance ability, automatic line debugging and maintenance ability, mechanical and electrical equipment management ability and mechanical and electrical product marketing ability, etc. the preliminary courses of installation and debugging of automatic production line include PLC technology, sensor technology, motor and control, The following courses include machine tool maintenance, etc. among the teaching objectives we want to achieve, the knowledge objectives include: working principle of manipulator, control principle of manipulator, pneumatic principle of manipulator, and familiarity with safety operation regulations; ability objectives include: measuring the mechanical parts of the installed mechanical mobile phone; basic debugging of the air circuit of the manipulator; judging the fault position according to the fault phenomenon; and checking the safety operation rules Check and analyze, find the fault point and solve the fault; abide by the safety operation rules; have strict professional attitude, standardized operation habits, innovative spirit, unity and cooperation spirit, independent learning spirit and communication ability.

This core course is based on project driven teaching to improve students' professional ability. Taking specific automatic production line as carrier, integrating cognition, installation, debugging and testing, the core course realizes integrated teaching of teaching, learning, doing and evaluation, and highlights the professionalism, practicality and openness of the course, Involving circuit diagram analysis, electrical diagram design, program design, equipment assembly, equipment operation and debugging, equipment detection, equipment maintenance and other action fields, six learning situations are set: parts disassembly, sensor detection, gas path detection, asynchronous motor detection, stepper motor detection, and overall detection and debugging, which is divided into 20 tasks.

Project 1: installation of feeding station, including three tasks: mechanical disassembly, gas path disassembly and electrical equipment disassembly; project 2: installation of processing station, with three tasks of processing station assembly, photoelectric sensor detection and limit sensor detection; project 3: installation of assembly station, The design tasks include assembly station assembly, solenoid valve detection and cylinder detection; project 4: installation of sorting station; design tasks include sorting station assembly, conveyor belt detection, asynchronous motor detection and frequency converter detection; project 5: installation of conveying station, The design task includes four tasks: transportation station assembly, optical fiber sensor detection, manipulator detection, stepper motor detection and slide board detection; project 6: overall operation and debugging, including three tasks: PLC control network construction, programming and comprehensive debugging.

#### 5. Teaching Method and Evaluation Design of Automatic Production Line

Teaching methods:

(1) Teaching method: explain the project task, impart the knowledge points related to the project task, and explain the knowledge points in the process of students' implementation.

(2) Field teaching method: practice the operation skills and maintenance application ability in the working environment meeting the production requirements, improve the professional atmosphere, and enhance the students' professional ethics, professional quality and post adaptability in the working process.

(3) Task driven method: the teaching process is integrated into the project task, so that students can discuss, analyze and implement independently, and obtain knowledge in the working process.

(4) Group discussion method: every six to eight students in a group, group discussion and analysis, discussion and solution, division of labor and cooperation to complete the project task.

Six step teaching implementation: clear task, discussion and analysis, formulation of scheme, fault detection, test effect, summary and analysis. Teachers explain the goal, pay attention to observe and record the analysis of the phenomenon by the group, answer the questions raised by students, guide the group that deviates too far from the theme analysis, and let the students explore by themselves, In the later stage, the abnormal operation that may cause accidents or damage equipment and tools should be corrected. Finally, the teacher should organize the team to report the troubleshooting work, evaluate each group, and guide the students to summarize by themselves.

Evaluation design:

The course adopts a variety of assessment methods, including the combination of process assessment and final assessment, the combination of enterprise assessment and school project assessment, and the combination of teacher assessment and student assessment, which is conducive to integrating theory with practice, facilitating students' learning innovation and thinking, and urging them to find and improve in practice and find suitable projects and topics.

The course assessment includes three categories: school projects, enterprises and comprehensive training. The assessment of the current class includes: teacher assessment, group mutual evaluation and group self-evaluation; the teacher assessment content includes five items: task analysis, implementation plan formulation, task completion quality, division and cooperation spirit, fault detection means, safety operation specification and group summary.

Like many professional courses, a variety of teaching methods and comprehensive evaluation programs effectively ensure the teaching effect.

## 6. Teaching Related Courses

Teaching of motor and electrical control:

This course takes the generator as the theme, takes the work task as the guidance, takes the scene teaching of the design, installation, debugging and maintenance of the practical electrical control system as the main line throughout the whole course, and carries out the intuitive teaching with objects, so as to make the students have strong perceptual knowledge and enough rational knowledge.

Typical teaching tasks include three-phase asynchronous motor full voltage starting, three-phase asynchronous motor long-term control, three-phase asynchronous motor forward and reverse control, three-phase asynchronous motor delay start-up control (or three-phase asynchronous motor Y -  $\Delta$  step-down start-up), manipulator control, etc.

The characteristics of the course are that students make full use of the knowledge, network resources and spare time as the three-month "relay control curriculum design". The task book requires that students can select the type and model of each component according to the functional requirements, understand the working principle and use method of each component, and connect the components to realize the requirements of the course design. Design content and requirements: two sets The motor has the possibility of heavy load starting. When any conveyor belt stops working, other conveyor belts must stop working. The control circuit has necessary protection links, There is a fault alarm device. The course design book should have

topic introduction, topic, abstract, overall scheme design, design purpose, control requirements, design requirements, hardware selection, design of main circuit schematic diagram, control circuit schematic design, heavy load protection circuit design, undervoltage protection circuit design and summary. 3.2 PLC Teaching.

With the development of computer technology and communication technology, the control core of the control device is microprocessor, and its function has been greatly expanded. In addition to the most extensive switch logic control which replaces the traditional relay contactor control, there are also process control, data processing, communication networking and display printing, and the PLC interface adopts photoelectric isolation, The internal circuit of PLC is isolated from the external circuit, and the electromagnetic interference is reduced.

The added learning situations often include the following tasks: flushing control of toilets, statistics of items entering the warehouse, design of competition responder device.

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