

Research on Teaching Reform of Power Electronic Technology based on Engineering Certification

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Abstract. In this paper, according to the requirements of engineering certification index, combined with the characteristics of power electronic technology course, through the significance of reform, reform of teaching content, methods and indicators are analyzed, reform of teaching, hoping to improve the students' comprehensive ability and engineering practice ability, achieve satisfactory results.

Keywords: Engineering Certification; Power Electronic Technology; The Teaching Reform.

1. Introduction

The course of power electronic technology is the main course of automation major, which is helpful for students to master the knowledge of power transformation and control. At the same time, learning this course well is of great significance to broaden the technical vision of automation students.

2. Significance of Power Electronic Technology Reform based on the Concept of Engineering Certification

"Power Electronic Technology" is an important and main course of electrical engineering and automation (power system direction) and automation major in our school. It means that through the study of this course, students have the knowledge of power electronic devices and AC power control, have the ability of power supply interconversion, and realize the drag of various power supplies and corresponding motors.

At present, almost all of the engineering school are all in automation, electrical engineering and its automation or is applying for the professional, and in all types of automation and electrical engineering and its automation, opened the power electronic technology, so if the certification under the concept of power electronic technology based on engineering practice content reform "to reform successfully, this topic the research content of this course not only, It also has significant reference and promotion value for other similar courses in this major, so there is a wide space for promotion.

3. Reform of Teaching Methods and Contents

1) Power electronics course 44 hours, each lesson a small topic. Each topic is theoretical teaching + practical teaching. The course of integrating theory and practice hopes to embody students' dominant position and cultivate students' consciousness of independent learning by using theory and practice in the classroom, combining teaching interaction, student discussion, hands-on operation and other forms. It is worth mentioning that for practical operation teaching, practical operation explanation part adopts video teaching, which is convenient for students to watch videos while doing practical operation and prevent misoperation.

In order to avoid the single and boring theory teaching, the theoretical teaching part retains some traditional teaching, and the other part adopts diversified learning methods, which are not only student-centered, but also integrated with engineering education concepts .

(1) Discussion courses: The teacher divides the content of a topic into several questions, guides the students to discuss in groups, and guides the students to speak, turning passive learning into active learning. Since the knowledge points are divided, teachers need to thread the needle and systematize the theme in organizing the whole teaching.

(2) Video lesson. Teachers in advance in the study on APP upload next time learning the subject knowledge video, the stipulated time period in class, students' autonomous learning video, the teacher may through the notes of the students, or by using learning APP regularly send test way, test results of students' self-study, and at the appropriate time to do the generalizations.

(3) Engineering case course. The actual case is introduced into the course, and the teacher introduces the premise and background of the case, the required topic knowledge, the solution approach, and the calculation of specific parameters. At present, some cases have been introduced, such as the transformation of voltage regulator for electric furnace in synthetic tower of small nitrogen fertilizer plant, small switching power supply, vehicle-mounted inverter, etc. In the practical operation teaching part, part of the traditional experimental table verification experiment operation is also retained. In addition, welding operation and Multisim simulation operation are arranged around the theme of each class, which greatly increases the opportunities for students to use their hands and brains. Students can deepen their understanding and consolidation of theoretical knowledge through Multisim simulation, which is an important link in the digestion and supplement of theoretical knowledge. Through welding some small objects such as small switching power charger, small inverter, cultivate students' ability of active thinking, error correction, deepen understanding and improve learning motivation. In the practice of power electronics technology, students are arranged to learn the production line of switching power supply, understand the field operation and technological process, and cultivate students' standard consciousness, which is the continuation and summary of school teaching, and also the necessary way to train skilled talents, laying a foundation for students' future study and employment.

2) Engineering case examples

The introduction of engineering cases in class can be cases with long teaching cycle and many knowledge points, such as switching power supply involving EMI circuit, rectifier circuit, isolated DC-DC converter, PWM control principle, closed-loop control principle, etc. Teachers need to analyze and introduce students in the later stage of teaching. Teachers can also introduce some engineering cases for a certain point. For example, when students finish learning single-phase controllable rectifier circuit, they need to learn three-phase controllable rectifier next. At this time, they can introduce the transformation of voltage regulator used in electric furnace of synthesis tower in small nitrogen fertilizer plant. The example is as follows: Voltage regulator used in electric furnace of synthesis tower in a small nitrogen fertilizer plant. Single-phase 220V SCR voltage regulator is used. The regulator is simple in structure and easy to debug. But it can only power a 15-meter furnace wire at most. With the improvement of the productivity of the plant, it is necessary to increase the power of the electric furnace, not only for the electric furnace wire between 15 and 18 meters in length, how do they transform the voltage regulator?

With the introduction of this engineering case, teachers can perfectly transition the explanation of single-phase rectifier circuit to three-phase rectifier circuit.

4. Revision of Teaching Objectives based on Engineering Education Certification

According to the characteristics of students in our school, combined with the graduation requirements of engineering education certification, on the basis of concise and complete expression, the author split and reformed the original teaching objectives, and formulated the teaching objectives in line with power electronic technology:

Objective 1: To master the working principle, characteristics, characteristics, electrical parameters and applications of several common power semiconductor switching devices. Master the working principle, waveform analysis, design calculation and control methods of several basic power electronic converter circuits. Able to develop the ability to model and solve specific problems.

Objective 2: To master several control techniques and typical power electronic application circuits.

Ability to analyze typical circuits. Understand the development of power electronics industry in new energy vehicles, switching power supply, uninterruptible power supply and other fields, understand the importance of power safety, have a rigorous and meticulous work style and the concept of life first.

Objective 3: Master the most basic experimental skills and test methods in this field, have a certain degree of proficiency in software simulation and physical operation, and be able to effectively analyze the results and draw effective conclusions. At the same time, in the practice process, I can complete the practical task as a group. In the course of teaching, the students' research thinking ability of analyzing and solving problems is cultivated, and their engineering practice ability is emphasized.

5. Key Issues to be Solved

In order to organize teaching with the idea of engineering education certification, we should pay attention to the training of engineering idea while attaching importance to the training of basic theory and basic skills. Students are the main body of learning, teaching needs to help students establish a correct view of students; Get rid of the trouble of "learning difficulties", cultivate students' learning ability and self-learning consciousness. In this paper, from the optimization of teaching objectives, to the reform of teaching methods, teaching content, teaching platform and the construction of assessment and evaluation system to improve the course of power electronic technology, improve the quality of teaching, in order to improve the employer's satisfaction with graduates, to complete the goal of high-quality education.

6. Implementation Plan

(1) Construction of teaching echelon: It is planned to build a teaching team for curriculum implementation with rigorous scholarship, strong sense of responsibility, good spirit of unity and cooperation, reasonable knowledge structure, title structure and age structure, and broad professional coverage.

(2) Teaching methods and means in the curriculum system: pay attention to the use of advanced teaching methods and means, and actively and reasonably use modern educational technologies, methods and means such as projects, networks and multimedia. Increase the amount of information in classroom teaching, improve the teaching efficiency, make classroom teaching visualization, concretization, easier for students to accept. Explore the use of "multimedia courseware + case teaching method" teaching method, "learning while doing projects" teaching method, "group discussion" teaching method, "case analysis" teaching method, self-learning teaching method, etc.

(3) In the course system: the improvement of students' practical ability must be done through practice, and it is difficult to achieve the expected effect by talking on paper. A set of hardware practice platform suitable for students should be established to maximize the practical ability of students.

(4) Establish a teaching assessment and evaluation system suitable for the course of the major.

7. Conclusion

In the traditional training mode of "Power Electronic Technology", colleges and universities often pay attention to the cultivation of students' comprehensive ability, so that students can have certain working ability in related fields while completing the corresponding courses. Under the framework of traditional automation professional curriculum system, the teaching of theoretical knowledge is generally dominated, supplemented by appropriate experiment or practice teaching. The traditional thinking of talent training focuses on the imparting of knowledge rather than the cultivation of engineering practice ability, which leads to the shortcomings of students in solving practical engineering problems and innovative thinking ability, and the lack of continuous improvement and promotion of their own quality, knowledge and ability. The traditional thinking of automation

professional talents training deviates from the discipline attribute of automation itself, and there is a certain gap with the concept of engineering education certification, which needs to be changed in time. The core concept of engineering education certification is "student-centered, guided by students' learning output and ability training as curriculum setting and resource allocation, emphasizing that the major should continuously promote the continuous improvement and improvement of education quality".

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