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The Study and Practice of the Thermal Energy and Power Engineering Characteristic Specialty in China

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***Abstract*—**According to the demand of the power and refrigeration industry, the theoretical and practical teachings of the Thermal Energy and Power Engineering characteristic specialty in china are studied. The teaching reform and practice of the Thermal Energy and Power Engineering specialty have been carried out, including construction and reform measures, teaching reform and practice, features, and achievements. Proved by practices, the theoretical and practical teaching effects are obvious. The study results can provides certain reference experience for theoretical and practical teachings of the related specialties in china.

***Keywords*—**Theoretical teaching, practical teaching, Thermal Energy and Power Engineering, characteristic specialty, teaching reform.

I. Introduction

IN recent years, the enrolling scale of colleges and universities has enlarged continuously. However, the relevant teaching methods and resource are lagged behind, especially the teaching models, methods and plans of the Thermal Energy and Power Engineering specialty; they mostly follow the same pattern which makes the top-notch innovative talents lacking to some extent.

In order to solve the above-mentioned problem, it is necessary to emphasis the theoretical and practical teaching of the Thermal Energy and Power Engineering characteristic specialty. In recent years, we have made lots of researches and practices on how to effectively emphasis the characteristics of our major and train the urgent need talents. In order to keep to the scientific concept of development and the open-school concept, for national and local socio-economic development needs, based on social status and demand trends of talents, according to the school location, we adjusted direction of the college and amended the training schedules. On the basis of maintaining the basic objective and the training talents standard, we further optimized the content of the curriculum and teaching, and strengthened the practical teaching. In order to improve the quality and effectiveness of talents training, and the competitiveness of talents; to raise the overall level of major construction, we should pay attention not only to basic theoretical teaching, but also to practical ability teaching; not only made students to grasp the basic theory, basic knowledge and basic skills, but also made them have the ability of innovation, creativity and entrepreneurship [1].

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Serving the needs of social development and national economy, the major objective is to developing the "solid foundation, high value on practice, strong capacity" Thermal Energy and Power Engineering specialty and technical personnel and management personnel, reforming of personnel training programs, strengthening the curriculum system, teaching materials and the practical teaching, optimizing the teaching staff. Therefore, the major has a distinct "Thermal Energy and Power Engineering" specialty characteristics and the "the power industry" features, and obtained a series of remarkable results [2].

The teaching reform of the Thermal Energy and Power Engineering specialty becomes necessary for the talent demand of the power plant and refrigeration industry, and the current situation of higher education, and it is also the basis and power of the teaching reform of the Thermal Energy and Power Engineering specialty.

II. Construction and Reform Measures

A. Established and Formed the Personnel Training Research Mechanism

According to the national demand for talents to develop and adapt the different major direction of modular and hierarchical training programs, through the School Board on a regular basis to carry out energy power, power generation (thermal power, gas power, wind power and nuclear powered.)And environmental protection and other related professionals in demand in the research and graduate employment status of discussions and analysis, established and formed a personnel training research mechanism [2].

B. Basic Theory Research and Practicality Applications

The second classroom is an indispensable organic part in the educational system in universities. Now it had be taken as an independent classroom, complementary to the first classroom and built into a wide and firm platform for quality education. In order to strengthen the students' practical ability, we establish the opening and optimized management systems of laboratory. The open laboratory will stimulate our students to active for making some products themselves, to improve their innovative and confidence ability. The students are awarded in relevant contests which is true recognition of our teaching reform [3].

C. Strengthened the Construction of Teachers

Strengthened the construction of teachers, and reformed teacher training and using mechanism, including sending young teachers to the high-level research institutions and universities at home and abroad as short-term collaborative

research or visiting scholars, or to participate in the short-term high-level technical training company according to plan, and to engage a certain number of production and management experience with a staff of part-time teaching, which can form a regular personnel exchange mechanism between school, research institutes and businesses [2].

D. Constructing Various Experimental Open Mode

According to the different modules, Thermal Energy and Power Engineering Experimental Teaching Center is open to all the students and teachers for different characteristics in the range. The major basis and major experimental modules suppose professional experiment items which are matched with the major courses, and implement booking open according to the teachers and students' application. Plant Practice Teaching and Learning Center implement centralized and booking open for all the students of school. The center founded two elective open experiment items for all students, one is “Power Plant Simulation Experiment”, and the other is “Power Equipment Disassembly”. The center sets up special fund for carry out innovative experiments and experimental teaching reform project of Thermal Energy and Power Engineering, and encourages students to free combination and independent design innovative experiment project. The selective project requires innovative ideas, definite requirement, innovative, and exploratory. The students can be complete the innovative experiment research projects self-organization and implementation under the guidance of teachers and funding [4].

E. Subject Courses of Basic Courses

Subject based curriculum covers Engineering Graphics, Engineering Mechanics, Electric Engineering Theory, Material Molding Tech, and Mechanical Design Basis. To implement broad range education, the establishment of a thermal energy platforms curriculum Group, will be a common basis of the specialty direction included in the Platform. Including: Engineering Thermodynamics, Thermal Transfer Theory, Engineering Fluid Mechanics, Power Mechanical Engineering Basis, Energy Saving and Environmental Conservation, Thermal Engineering and Power Testing, and Manufacturing Technology of Power Machines etc.

F. Improving the Power Plant Practice Teaching Modules and Enhancing Foreign Exchanges

The power plant practice teaching module of the center has distinctive characteristics of professional and electric power industry, and has become an influencing practical base of power generation and energy in china, which is now the important platform and window for foreign exchange. The simulation lab of the center has been the only designated national electric power industries guiding teacher training base and the simulation of electric power industry personnel post qualification authentication and training base. We will continue to refine and improve the power plant practice teaching modules, and better to play the role of public services and radiation exemplar henceforth.

The power plant practice teaching center consists of four parts: power plant simulation laboratory, power equipment model room, electricity production multimedia room, power equipment disassembly room. These kinds of combination have been achieved in the practice teaching process, i.e., the combination of physical simulation and numerical simulation; the combination of models, videos and real objects; and the combination of demonstration and operation. The practice teaching center focuses on students' ability cultivation, and adopts a scientific teaching system of different-level and multi-module. All the students, from different majors and different grades, can choose different training contents. It provides the students with a practical place to simulate on-site environment and operation of power plant, which has achieved satisfactory results.

III. Teaching Reform and Practice

The twenty-one century is a rapid development age. The science and technology is a key factor of sustained and rapid development for the developing countries like china which the knowledge of laborers is relatively scarce. The technology application is an important process of transforming science and technology into productive forces, and the application effect depends largely on the first-line technical personnel quality. At present, the professional quality of the first-line skilled personnel in China is generally low. It is a barrier for the application and development of science and technology. In China, the requirement for technical personnel has been raised for joining in WTO and economic globalization trend.

Due to the gap between training goal, training mode and students’ skills of the Thermal Energy and Power Engineering characteristic specialty, and the social demand of the national electricity, refrigeration and air-conditioning industry, the following shortcomings of the knowledge and ability structure of the first-line technical staff and the graduate in recent years have been existing.

The skill is not prominent. The graduate students who recently graduated from schools seem to know something, or could do something, but it is not sure for the graduate whether it is correct. Especially it is difficult for them to complete some comprehensive operation independently.

The skill is not enough. The graduate may be competent of some work, but it is difficult to meet the demand of the employing unit for the multi-skill and compound talent. For example, engineering builder could be better to complete construction management, but the project budget or the engineering design has been completed by others.

The self-study skill is scarce. It needs a long process to obtain new knowledge and technology, and the depth is not enough. The self-development ability of the graduate is often inadequate.

The teaching reform of the Thermal Energy and Power Engineering characteristic specialty becomes necessary for the talent demand of the refrigeration and air conditioning industry and the current situation of higher education, and it is also the basis and power of the teaching reform of the Thermal Energy and Power Engineering characteristic specialty.

A. Professional Training Goal

Combining the idea of the professional teacher, the engineer and the graduate, the training goal of the Thermal Energy and Power Engineering characteristic specialty have been determined as follows.

The Thermal Energy and Power Engineering specialty commit oneself to train the senior application type talent who could be adapt to the social and economic development requirement at the present stage in China, with the whole development of moral, intellect, physique and virtue, the coordinated development of knowledge, ability, and quality, solid foundation, broad knowledge, high quality, strong ability, and innovation consciousness. The graduate can be engaged in the design, installation and operation management of boiler, turbine, power plant, refrigeration and air conditioning system, small refrigeration equipment, cold storage system, and obtain preliminary application research and development ability [5].

B. The Curriculum System

The necessary basic quality of the graduate includes political theory quality, moral education, occupation moral, legal consciousness, innovation consciousness, cultural quality and professional academic quality. The basic cultural course, the second classroom and the engineering practice is the important way to develop these basic qualities. Around the requirement of ability target and quality, the graduate must master the necessary basic knowledge and the professional knowledge. The relative curriculum system matching with these quality exercises is consistent with the national engineering college.

The curriculum system has been set from cultivating students' practice ability, innovation ability and comprehensive quality, and considering the characteristics of the Thermal Energy and Power Engineering specialty. The detailed content of the curriculum system is as follows.

The professional basic course include engineering thermodynamics, heat transfer, pump and fan, engineering fluid mechanics, engineering mechanics, mechanical design, energy engineering and management, the principle of automatic control, and electrical engineering.

The main professional course include principles of boiler, principle of steam turbine, thermal power plant, circulating fluidized bed boiler, principles and equipment of refrigeration, refrigeration equipment and application, refrigeration compressors, heat exchanger principle, refrigeration equipment electrical and automatic control, HVAC, and structure design and small refrigeration device.

The main practice link include military training, descriptive geometry and engineering graphics curriculum design, database hands-on practice, CAD hands-on practice, welding practice, cognition practice, production practice, course design of HVAC, course design of refrigeration unit and application, graduation practice and graduation design (or thesis).

The comprehensive training scheme of the Thermal Energy and Power Engineering specialty has been also revised. The overall arrangement of the curriculum time has been adjusted. The adjusting principle is that the curriculum time of the professional basic course and the professional necessary course have been put forward for one semester, and the curriculum time of the specialized elective course are mainly concentrated in sixth and the seventh semester. It paves a way for improving the graduation design quality and the employment rate of students.

C. Emending Teaching Program

The teaching program of theoretical courses has followed the following principle [5]:

- Clarifying the curriculum goal and duty to meet with the requirement of students' knowledge, ability and quality structure;
- Embodying the characteristics of higher vocational education, i.e. moderate basic theoretical knowledge to meet the requirement of professional courses, specialized courses with strong practicality and pertinence, and the attention to combine with theoretical courses. The content of professional courses should be promptly added with the application of new technology, and the content of theoretical courses should also pay attention to the sustainable development of students [6];
- Clarifying the mastering degree for curriculum contents. The mastering degree may be classified into skilled master, master, understand, know and selected requirements according to different curriculum contents;
- Moderate teaching contents. The relations between new lessons and exercises in class should be arranged in reason. It should be sure both to master the emphasis content, also to broaden students' knowledge properly to meet with the requirement of teaching hours for compact theoretical courses;
- Introducing the teaching method reform. According to course contents and purposes, the heuristic teaching method and the discussion teaching method could be actively tried to encourage students to think independently, analyze problems and solve problems, and to train students' scientific spirit and innovative consciousness [7];
- Reforming the examination mode of courses. The usual class performance and exercises of students should be included in students' achievement assessment; the teaching program should have clear outline and precise content, and the content of the context should be paid attention to. And the teaching program should obtain clear format and excellent readability.

The teaching program of practice teaching has followed the following principle [5]:

- Clarifying the aim and task of practical curriculum to meet with the requirement of students' ability of technical application;
- Clarifying the mastering degree of the content of practical courses. The mastering degree of the content of practical courses may be classified into skilled master, master and understand [8];
- Emphasizing the combination of engineering application and theoretical teaching. During the mastering process of practical skills, the learning and understanding to theoretical content has been deepened;

- Introducing practice teaching mode reform; According to course content and purpose, the heuristic teaching method and the inducting teaching method could be actively tried to induct students to think during operation, analyze problems and solve problems, and to train students' innovative consciousness;
- Reforming the examination mode of practical courses. The usual operation performance should be included in students' achievement assessment, especially the consciousness and ability of students to solve problems independently;
- The teaching program should have clear outline and precise content, and the content of the context should be paid attention to. The teaching program should obtain clear format and excellent readability [9].

D. The Goal and Planning of Teacher Training

According to the teacher training plan, the talent at high level, especially the talent of the thermal energy and power engineering specialty in low grade energy, cold storage technology, refrigeration system simulation optimization and energy saving refrigeration system, should be introduced. At the same time, the training of young teachers has been strengthened. The working goal of young teachers have been set, and the young teacher have been required to improve education, English skills and computer skills in limited time to develop their teaching and research ability. The aim is to make them become the backbone of scientific research and teaching. The condition and environment of scientific research has been actively created, and the academic exchange activity has been also enhanced. The leading role of part-time professor in scientific research has been fully displayed [5].

The following way may be adopted to further improve the quality of teachers:

- Many young teachers each year have been selected to enterprise or engineering first line to improve practical teaching ability;
- The training of young teachers has been strengthened. Young teachers in-service have been encouraged to study for Ph.D. to meet with the requirement which 80 % young teachers have Ph.D.;
- The high level talent who have professional expertise and rich practical experiences have been introduced to enrich the full-time teacher team.

E. The Construction of Practice-based Professional Learning

Practice-based professional learning (pbpl) is best understood in contrast to 'classroom-' or 'theory-based' learning. It is kindred to terms such as 'work-based', 'workplace' or 'work-centred' learning. Distinctive, though, are a concern for professional learning, and the preference for 'practice' rather than 'work'. While it does not disdain propositional knowledge and what is sometimes called 'theory', its prime interest is in the formation of self-renewing and effective professional practices-a distinct theoretical position in its own right.

The construction of practice teaching base of thermal energy and power engineering specialty has been actively carried out. The practice teaching base includes the practice base in campus and the off-campus practice base [5]. At present, the practice base in campus includes the coal-fired boiler house and the refrigeration station in campus. The long-term off-campus practice base include Jiaozuo Huarun Thermal Power limited company, Xinxiang Aviation Industry limited company, China Huaneng Group, China Guodian Corporation, Huaneng Power International, Inc., China Power Investment Corporation, State Grid Corporation of China, Federal Grid Company of Unified Energy System, Shenhua Group Corporation Limited, China Electric Power Research Institute, Frestech Electrical Appliance limited company, Gree Electric Appliances Inc., Midea America and Canada Corp., and Kelong limited company.

The practice teaching base is the important place to complete practice teaching tasks. Based on full use of existing teaching bases, the following method has been adopted to further strengthen the construction of practice training base: expanding the number of practice teaching base. The practice teaching base in field of some new emerging techniques have been complemented and improved to make the teaching base amount enough, complete functions, advanced technology to meet the different requirement of practice at different post; further exploring the mode of school-enterprise co-constructing practice base; combined with practice teaching base, improving teaching method. The theoretical teaching in classroom, the experimental teaching in labs and the base practice teaching have been tightly combined to improve the quality of theoretical teaching and practice teaching.

F. The Reform of Teaching Method and Means

The teaching method has been reformed, and modern means of teaching have been fully used to improve the teaching quality and effect: the classroom teaching has been transformed from "filling" teaching mode to "guiding" teaching mode to improve students' learning interest, participation consciousness, the ability to analyze problems, the comprehensive ability and the innovation ability; adopting modern multimedia teaching means such as electronic teaching plan and courseware; making full use of experiment and practice training facilities to carry out on-the-spot enhanced skill teaching to cultivate students' innovation spirit and innovation ability [5].

Aimed at training students' innovation ability and comprehensive ability of thermal energy and power engineering specialty, the reform and practice from professional training objectives, graduate specification, curriculum system setting, teaching faculty construction, practice teaching base construction and the reformation of teaching method and means have been carried out. The specialty cultivation objective has been adjusted. Combined with the actual situation of students training, curriculum system has been made a major adjustment. The construction of practice base has been strengthened. The practice base in campus, and the off-campus practice base have been constructed. The

teaching means of adopting multimedia and projector have been promoted. The heuristic teaching has been adopted, and the teaching methods have also been enriched.

IV. Features of the Specialty

With the direction of the national energy development need, Thermal Energy and Power Engineering specialty derived a number of new professional and academic orientations, and will continue to strengthen the content, expanding extension, to meet national electricity and refrigeration industry for energy needs.

A. Specialty and Industry Characteristics

Thermal Energy and Power Engineering specialty has a distinct "Thermal Energy and Power Engineering" specialty characteristics and the "the power and refrigeration industry" features. The graduates' once employment rate is more than 98%; graduates for "style of solid, hands-on ability, stronger enterprising spirit" access to the energy power industry and other employer's praise [10].

B. Supporting Large Power System

In 1985, the Thermal Energy and Power Engineering specialty did research around the direction of "thermal power plant pollution control processing", and derived environmental engineering profession.

In order to meet the demand of national and international strategies in the energy sector, Thermal Energy and Power Engineering specialty support and derived building environment and equipment engineering, water conservancy and hydropower project, wind energy and power engineering, nuclear technology and other professional direction, and make the school's discipline system from a thermal power as the core, extended to the set of thermal power, hydropower, nuclear and wind power. Therefore, supporting and forming Large Power System, which further enhance the school services in national energy capacity and level [11].

C. Theory and Practice Teaching System

The Thermal Energy and Power Engineering characteristic specialty established a sub-level, multi-module interrelated theoretical and experimental teaching system, which in the main line of capacity-building. The courses setting achieved a serialization, arrangement and modularization. Thermal Energy and Power Engineering Experimental Teaching Center built a practical teaching module contains the power plant module, power engineering basic experimental module, thermal power engineering test module and innovative test module [12]. The center have the functions of knowledge learning, kills development, engineering, training and innovation ability building, and reflects the "solid foundation, high value on practice, strong capacity" personnel training characteristics.

D. Exploring New Model for Cultivating Innovative Talents

The reforms of Thermal Energy and Power Engineering specialty were carried out, including courses system, personnel training models, teaching methods and teaching content, and through establishing "Innovation Training Experimental Classes" and adopting the "Innovation Type" training mode between colleges and enterprises. Therefore, which has promoted the innovation, talent training, and demonstration effect [13].

V. Undergraduate Training Scheme

A. Program Objective

Thermal energy and power engineering specialized student should master elementary knowledge about energy and power science and engineering, such as thermal power machinery and equipment, refrigeration and air conditioning equipment and so on. The graduates for this major should have the abilities of scientific research, technical development, equipment design, and management in different areas as power, refrigeration, chemical, medicines, light industry, environmental protection and machinery.

B. Program Requirement

The students should learn the thermal energy and power engineering elementary knowledge, master the basic theory and technology of energy conversion and utilization, power engineering and engineering, dynamic mechanical and thermal equipment design. The graduates should obtain some knowledge and abilities as follows:

- Master the basic theory and basic skill of thermal energy and power engineering;
- Have the design ability of thermal energy and power engineering, fluid engineering, chemical engineering equipment and control technology;
- With the preliminary ability of research and development, innovative design, project cost evaluation and investment decision-making of heat and power plant;
- Have the basic knowledge and skill of heat and power plant design, research and development, environmental protection and fire safety and other aspects of the guidelines, policies and regulations;
- Master the method of literature searching and information query, have the abilities of scientific research, scientific paper writing and practical work;
- Master one foreign language, and have the abilities of listening, speaking, reading and writing;
- Have the ability of innovation and new knowledge obtaining.

C. Main Subject

Power Engineering and Thermal Physics, Mechanical Engineering.

D. Main Courses

General Physics, Theoretical Mechanics, Material Mechanics, Mechanical Principle, Machine Design, Electrical Engineering, Engineering Thermodynamics, Fluid Mechanics, Heat Transfer, Principles of Chemical Engineering, Theory of Control Engineering, Principles of Boiler, Survey Technology and Specialty Experimentation, Refrigeration Principle & Equipment, Air Conditioning, Control for Thermal Process etc.

E. Main Practice

Metalworking practice, specialty experiment, curriculum design,graduation practice, graduation project (paper) etc.

F. Duration of Study

4 years.

G. Qualification Awarded

Bachelor's Degree.

H. Employment Market

The main employers of our graduates in the power engineering direction are design and research institutes of electric power industry, power plants and power equipment manufacturing, power machinery, combustion equipment enterprises and their relevant departments. The main employers of our graduates in the environmental control engineering are those enterprises dealing with energy utilization, operation management of air conditioner, compressor, freezer, central air conditioning, heat transfer equipment, and management of energy use, energy-saving. After graduation, our students may engage in the work of designing, testing, manufacturing, installation, operation, maintenance, management, marketing and sales in the relevant fields. This major belongs to the category of energy and power, which is one of the key development areas of China. The development prospect of this major is rather bright, and the employment market is very promising. Some enterprises such as Jiaozuo Huarun Thermal Power limited company, Xinxiang Aviation Industry limited company, China Huaneng Group, China Guodian Corporation, Huaneng Power International, Inc., China Power Investment Corporation, State Grid Corporation of China, Federal Grid Company of Unified Energy System, Shenhua Group Corporation Limited, China Electric Power Research Institute, Frestech Electrical Appliance limited company, Gree Electric Appliances Inc., Midea America and Canada Corp., and Kelong limited company have “booked” our students.

I. Student Space

The students in the department all strive to develop themselves in all areas. They are diligent in their studies and active in various research projects, service projects and sports activities, which creates a lively and encouraging atmosphere. Many student organizations provide opportunities where the students can make their dreams come true [14].

The Association of Science and Technology provides students who love research and inventing with many opportunities. The students can take part in both research activities and various science and technology competitions, for which they get technical guidance and financial support. Every year, our students perform well in the Mechanical Design Competition and the Challenge Cup, which showcase their scientific and technical talents. The Doctoral Forum provides graduate students with opportunities for academic interactions [15].

Student meetings are also organized by the departmental Youth League committee and the graduate student League branch to discuss various educational topics, quality extension projects, service projects and discussions of various occupations. The quality extension projects encourage students to exert their creativity, to find approaches for studying outside of the classrooms, and to assume social responsibility. The Youth League committee offers funds and guidance for students who apply for the quality extension programs [16].

The Student Union and the Graduate Student Union are student run organizations so they are from the students, representing the students, and for the students. Therefore, these organizations provide excellent opportunities for the students to development their scientific and leadership abilities. The students also greatly enjoy the traditional 12.9 choral competition, the Student Festival, the welcome party for freshmen, the Boy’s day and the Girl’s day. The students also participate in many informal games every afternoon and have founded swimming, badminton, ping-pong clubs [17].

In addition, the TMS Association provides students opportunities to study and discuss political theories, to further understand and love our way of life and to learn more about caring for the whole society. The departmental newspaper, Voice of DTE, also provides students many opportunities to practice their writing skills [18].

VI. Master training scheme

A. Masters of Engineering

- Goals

The department aims to train professionals with a strong foundation of fundamental theory, professional knowledge, and the ability to independently implement scientific research, teaching and engineering project management.

- Program Length

The Master’s program requires 2-3 years.

- Subject Areas

The primary master’s programs are in Thermal Engineering and Engineering Thermo-physics, the first category, Engineering, Coding as 080700.

The branches including thermo-physics, thermal engineering, power mechanics and engineering, and fluid power machinery.

- Training

All master’s candidates have major professors that mentor the students as they take courses and complete an independent research project that culminates in the writing of their master’s thesis.

The master’ s degree candidate must complete no less than 23 credits of courses (with at least 19 credits in courses that require examinations) including 5 credits of general compulsory courses and no less than 16 credits of major courses and 2 credits of literature.

B. Master of Professional

- Goals

The department aims to train professionals with a solid foundation of fundamental theory, and professional knowledge in power engineering, and with strong abilities to solve engineering problems, to independently in charge of professional technology or management.

- Program Length

The Master's program requires 2 years.

- Subject Areas

The professional master's programs are in Power Engineering, Coding as 080562.

- Training

The professional master's degree candidate must complete no less than 25 credits of courses (with at least 17 credits in courses that require examinations) including 4 credits of general compulsory courses and no less than 17 credits of major courses and 4 credits of professional practices.

The all-day training is adopted for masters of professional students. All courses study, opening speech and defending thesis shall be completed in campus. During the training, the students shall take a professional practice no less than half year (no less than one year for students without working experiences). The professional practice shall be finished at the cooperating company or plants. After practice, a report with the signature given by the cooperating company shall be provided. The practice shall be evaluated with the thesis interim report by experts committee [19].

The research work shall have a strong background of engineering. Co supervisors coming from collaborating companies are encouraged to help guide student's research work. Students can applied for opening speech after they get more than half of credits required. The research work shall be no less than one year [20].

C. Professional Master's of Engineering

- Goals

The professional master's of engineering is designed for engineers who are already working in an engineering field, with emphasis on engineering applications, to train leaders in engineering technology and management for industry.

The students master a solid theoretical foundation, advanced technical methods for solving engineering problems, innovative technologies and the ability to independently manage technical projects.

- Program Length

The professional Master's program must be completed within 5 years, with the course results valid towards the graduation requirements for 5 years after the student begins the program.

- Applicable fields

Power Mechanics and Engineering, coding as 041107.

- Training

The professional master's degree candidate must complete no less than 30 course credits (with at least 22 credits in courses requiring an examination) including at least 23 credits of compulsory courses and 6 credits of optional courses.

The Professional Master's program combines coursework and research with the students doing their research as part of their work after finishing their courses at the university. The students are mentored by a professor at the university and a supervisor at their place of work. The thesis subject is related to their work so that it is directly applicable to technical or research projects at their company.

VII. Achievements

- We have cultivated a team of modern teachers with high quality, reasonable age structure, education certification structure and title structure;
- We have established a talents training system, which improved the cultivating quality dramatically. The graduate employment rate is over 98% and the community's satisfaction rate to students is over 90%;
- The practicing conditions in and out of college improved a lot. All kinds of experiments were offered to students. What is more, we offered a series of innovating experiments and comprehensive experiments;
- We formed our specialty characteristics based on dual-tutors and practicing on real post system to cultivate comprehensive talents who are both component for teachers and engineers.

VIII. Conclusion

In this paper, aimed at training students' innovation ability and comprehensive ability of the Thermal Energy and Power Engineering characteristic specialty, the reform and practice from professional training objectives, curriculum system setting, graduate specification, practice teaching base construction, teaching faculty construction, and the reformation of teaching method and means have been carried out. The specialty cultivation objective has been adjusted. Combined with the actual situation of students training, curriculum system has been made a major adjustment. The construction of practice base has been strengthened. The practice base in campus and the off-campus practice base have been constructed. The teaching means of adopting multimedia and projector have been promoted. The heuristic teaching has been adopted, and the teaching methods have also been enriched.

Through our unremitting efforts, we firmly believe that Thermal Energy and Power Engineering characteristic specialty will have the international influence in the thermal dynamic field, and training more energy and power field talents for the country.

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