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The Practice and Thoughts about Accreditation of Minerals Processing Engineering Program

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Abstract: The professional status and characteristics of the minerals processing engineering program at the China University of Mining and Technology (CUMT) were introduced along with the achievements of innovative training of mineral processing engineers. The necessity of accreditation of the minerals processing engineering program was analyzed. According to general standard and professional supplement standard for the professional accreditation of the Chinese engineering education, the accreditation practice at CUMT was described. It is concluded that a specific the talent-training objective, rational curriculum, stable faculty, rich contents of professional courses, solid engineering practice experience, and internationalization strategy of personnel training are powerful elements for accreditation of the engineering program.

Keywords: mineral processing; engineering education accreditation; training objective; Curriculum; engineering practice; internationalization.

Background and Significance about Accreditation of Minerals Processing Engineering Program

Since 2006, geological and mining specialties have launched accreditation experimental work for mining and safety specialty in China. Now, this is the first time for mineral processing to carry out the accreditation, mineral processing of China university of mining and technology is one of the first and the only one who accept the accreditation of engineering education in mineral processing specialty.

Engineering talents' training mode in China is neither like United States, before graduates enter into industrial enterprise. First they should accept job training for engineers; nor like German engineering graduates who have experience in project. Our project education has the tendency to respect for science and underestimate technology, and faces with the challenge of combination with industry and project-oriented engineering.

In the last decade, engineering education in China developed rapidly. The enrollment and professional grow too fast. So, there are many problems, especially in quality of talents

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cultivation. Such as:

- ① Engineering education does not really target at industrial enterprises;
- ② Single type in project personnel training, lack of hierarchy;
- ③ Engineering practice is generally weak in the process of engineering talents training;
- ④ Lack of cultivation of innovation and creative ability in engineering education [1].

It is strategic important to engineering construction and personnel training for development of accreditation of engineering education under this background. The goal of accreditation of engineering education is to construct quality control system for engineering education in China, and promote the reform of engineering education and further improve the quality of engineering education. To establish accreditation system for engineering education which is linked up with the registered engineer, construct contact mechanism of engineering education and business, enhance adaptability that of personnel training of engineering education for industry development; To promote mutual recognition of engineering education in China, and enhance the international competitiveness. Mineral processing of CUMT is the first one who is accepted engineering education accreditation, it's very significant for the promotion of the quality of engineering education, its international competition and the development of the major through accreditation of engineering education as soon as possible.

The Development and Characteristics of Mineral Processing of China University of Mining and Technology

Mineral processing in CUMT begun 1952, and currently it was developed by early coal preparation, mineral processing, it was approved for master program in 1981 and doctor in 1984. It also established post-doctoral research center in 1985. And in 1988, it was assessed as national key disciplines. In 1998, it was the first disciplines with chair professor of 'Chang-jiang scholar award scheme' which was also the "project 211" and "985" key construction disciplines of advantage platform by ministry of education. In 2001, it was named as the national key disciplines again. And in 2007, it was taken as national specialty construction point; in 2008, "teaching team of main course of mineral processing" was assessed as the national teaching team.

The subject has a high level academic team who takes academician Chen Ching-ru as the academic leaders, now there are 30 teaching and research staff. Including 2 academicians of Chinese engineering academy, 3 chair professors with Chang-jiang scholars program of ministry of education, 2 winners of national outstanding youth Fund, 1 national model teachers, 3 famous teachers of Jiangsu Province, 12 doctoral supervisors and 15 professors. And there are also several young and middle-aged experts of outstanding contributions with

state level and 20 people who acquire China youth science and technology award, and get fund and title of honor of ten outstanding youth of Jiangsu Province or other provincial level or above rewards.

The major is characterized with the features of processing and utilization of coal and clean coal technology. Now it has formed a group of research achievements with international leading level, and it has been important base for personnel training and scientific research of mineral processing in China, and has a higher international outstanding academic and influence.

The major has achieved outstanding achievement in undergraduate teaching, experiments and practice teaching. It has two national content courses of ‘mineral processing subject’ and ‘concentration plant design’, six of them are top-quality courses of Jiangsu; Laboratory of mineral processing is the key laboratory of ministry of education. And in 2009, it was awarded as national experimental teaching demonstration centers with mining engineering and safety engineering, and it has formed a training system of mineral processing to adapt the new century.

Nearly 60 years, taking mineral processing of national key disciplines and solid teacher strength as base, types of research projects as platform for innovative, our major has trained a large number of excellent engineering and technical personnel for our country who have comprehensive development of virtue, solid foundation, strong engineering practice, creative and innovative ability.

Practice of the Education Accreditation of Mineral Processing of CUMT

Accreditation Standards of Engineering Education. It is very significant for the development of engineering education, reform of deepening engineering education and the quality of education ensure. The process of education accreditation of mineral processing is to certificate standards by comparison. And through successive terms check, so it is highly relevant and important to the scientific and comprehensive of accreditation standard which is basic quality assurance of undergraduate education. This accreditation standard is minimum requirement to the quality of professional education called basic requirement. At present, there are two accreditation standards of engineering education in China, the one is common criteria, and the other is special supplement standards^[2].

(1) Universal standard mainly is composed of seven indicators which is the basic requirements for the development of national engineering education and is a qualitative criteria guiding.

(2) Special supplement standards relates to the training goal and curriculum, especially the main curriculum, the numbers and course name. For example: Mineral processing creates three main courses: mineral processing subject, mineral processing plant design, laboratory experimental investigation method in mineral processing. The main courses can ensure students obtain the professional basic knowledge and skills in mineral processing. And according to their own school conditions and characteristics, under the premise of ensuring key curriculum meet the certification standard, the other related institutions can build their own curriculum system, organize course content, make full use of play to their strengths and then form their own professional disciplines characteristics.

Goal of Personal Cultivation. Engineering teaching is of the prerequisite personal cultivation and is very important in ensuring the quality of education, if there is no clear training objectives and its positioning is not accurate or do not meet the development trend of China's current economic, it will be not only difficult to build teaching system, but also can't cultivate qualified engineering and technical personnel.

Mineral processing takes national key disciplines as the basis, strength of the teachers as the protection, research projects as the innovation platform. And though solid foundation, strengthening capacity of engineering practice, it highlights the sense of innovation and creativity to develop the complex engineering and technical personnel in the field of mineral processing and make senior scientific research personnel as the goal.

Though spot examination of the expert group, the goal of professional training in mineral processing of CUMT is clear, its characteristic is distinguishing too. And it can be able to carry out teaching activity around the goal of personnel training. In basic education, specialized basic education, professional teaching, practice teaching and curriculum construction activities, it pay attention to the basic theory, basic skills of training and innovation and engineering practice ability. And it has foregrounding results in the part of converting teaching reform, curriculum development and scientific research into excellent teaching resources.

Comprehensive Curriculum. Training of the undergraduate talents is the process of comprehensive training whose key point is curriculum. In 2004, around the training objectives of 'thick foundation, wide professional, strong ability and high quality', we have re-planned and designed the undergraduate training program, course content and curriculum. In 2008, based on the school development orientation of innovative personnel training of mineral processing, our disciplines re-enacted the new undergraduate program of

2008. And by increasing the general education curriculum, reinforce the foundation, broadening the professional range, expanding percentage of the non-coal programs, highlighting the aspects of engineering training and innovation ability, we improve the curriculum system of mineral processing. Through the active construction undergraduate innovative training system which is compatible with the research university, we launched the construction of undergraduate education quality engineering to further improve the quality of undergraduate teaching.

Through developing the construction of high quality course materials and teaching materials of mineral processing subject and concentration plant design, it can improve teaching quality of the main courses. By professional categories training and setting of different professional direction, the new training program highlights the different levels of curriculum modules. Such as setting the two specialty directions of separation technology and equipment and coal quality management and marketing in mineral processing. At the same time, we should take effects to strengthen the cohesion of undergraduate and graduate curriculums, take part of the graduate curriculums as senior undergraduate elective courses to meet their own needs of development and success. Such as clean coal technology, processing and utilization of mineral resources etc.

In practice teaching, and through practice inside and outside the classroom, we comprehensively build a complete education practice system and improve the quality of personnel training. Over the years, our mineral processing adhere to penetrate practice education concepts into the whole training process and combine practice education with course content, productive labor, scientific research, extra-curricular activities for science and technology innovation and social practice. At the same time, based on the combination of production and study, we have established nearly 20 practice bases and social practice base to effectively safeguard the development of practice education.

Stable Teaching Staff. To train qualified professional talents, there must be a dynamic and stable teaching staff. As a national key discipline, the development of mineral processing of China University of mining and technology has created an innovative teaching staff whose academic structure and learning-origin structure are rational. There is more than 55% full-time teachers with doctor degree and it has extensive teaching resources. The teaching team of the main courses is national team of outstanding teaching, at the same time, which is innovative research group of national natural science foundation. It contains two academicians of Chinese academy of engineering, one national model teacher and three prominent teachers in Jiangsu province. Professor and doctor tutor are the backbone to

cultivate creative professionals who insist on undergraduate first-line teaching and being the class teacher of undergraduate students. Our discipline focus on training young teachers and carry teachers guidance system into practice. And we use the way of pass on experience to help young teachers grow as soon as possible, and keep professional teachers remain owning innovative vigor.

Abundant Specialty Connotation. Over the years, mineral processing has been trying to hold on transforming high-level scientific research to the resource advantages of undergraduate teaching, and enable students to timely contact to professional frontier. The subject is characterize by processing and utilization of coal resource and clean coal technology, and by generation and generation effects, it forms its own research direction of obvious feature and five advantages which contain dry coal separation and screening technology, clean coal-based fuels, deep desulfurization and ash reduction techniques of coal, simulation and control of mineral processing, comprehensive utilization of resources and environmental protection. And we have gained a number of research achievements of international advanced level. By converting lectures, classroom teaching, research and other forms to undergraduate teaching resources, we provide a strong support for the innovative talents of mineral processing.

Solid Engineering Practice. Mineral Processing in China University of mining and engineering always pays attention to engineering practice and creative ability. From course system to platform construction, they all take engineering practice and innovative ability into an important position. We train engineering practical ability of students, innovative consciousness and ability by characteristic curriculum establishment, experimental courses, metalworking practice, cognition practice, productive practice, graduation practice, curriculum design, graduation design, students' training program, teachers' research and 'challenge Cup' competition participation or other aspects.

International Talent Training Strategy. International education is one of the important strategies to the development of the subject by leaps and bounds. The developing tendency of engineering education is to focus on training students in international perspective and make them become internationally competitive and innovative talents. In recent years, our major send young core teachers to abroad high level university to train each year and recruit foreign university professors to our school to open specialized courses. The major has cooperated with many institutions such as University of Kentucky of U.S, University of Queensland of Australia, Duisburg University of Germany and the University of Dortmund. We cultivate

undergraduates with "2+2" talent fostering mode and develop students' international perspective and absorb foreign academic frontier knowledge, and make them become creative talents in mineral processing owning international competition.

Conclusion

The quality of engineering education in China lags behind developed countries in Europe and America, it has a late start, and the system standard is not perfect too. So Through accreditation, the directions for improvement is more clear, we should make the achievement of accreditation as a new starting point, and link the accreditation and the follow-up reform deepening of engineering education together. At the same time, we can take accreditation as an opportunity and make effect to build engineering education system to train modern high-quality engineering and technical personnel talents which has more characteristics and meets to our national conditions and international environment, and further strengthen the introduction and training of international high-level talents of mineral processing and expand the international perspective of them. We should continue to reinforce efforts to train personnel of non-coal mineral processing, wider professional scope of knowledge, and make effect to take the mineral processing as the major influence international training base.

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