Thinking on the Training Mode and New Mechanism of Vehicle Engineering Master

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Abstract. The aims on training master's excellent engineers are to create a group of senior engineers who have independent innovation ability and solve complex engineering problems. Combining with the vehicle engineering professional master's outstanding engineers training plan, this article explores professional postgraduate training objectives, training requirements and training standards. Meanwhile, this article also put forward some advice on strengthening engineering ability and innovation ability as the key point of professional degree master's training mode, and personnel training mechanism in close cooperation with industry enterprise. These can improve and perfect high level auto engineering talent training project.

Introduction

With the development of economy and society, China's economy is facing transformation and pressure. Traditional postgraduate education in academic engineering has been unable to meet the demand of increasing high-level application talents. According to the spirit of "national medium and long-term education reform and development plan outline (2010-2020) "[1], the structure of postgraduate education type and training system has been set out to improve in 2009. Outstanding engineers plan is included in the postgraduate education major reforms on the construction of new industrialization with Chinese characteristics and an innovative country.

Auto industry is one of the pillar industries of national economy development in our country. In order to meet the demand of strategic transformation and innovation better, it is needed to cultivate a large number of high-level research and development talents who are skilled by means of scientific and innovative methods. The major of vehicle engineering in Wuhan University of science and technology is one of the engineering series major which is established earlier in our university. "Master's engineer class" program was approved as a pilot program in 2014. The mode of full-time master of engineering need to reflect the engineering master's training characteristics in the field of vehicle engineering education.

Because training plan of most professional master graduate student is derived from traditional academic master's degree graduate, this made an obvious gap between the contents of engineering master's regular curriculum teaching in current domestic vehicle engineering field and the demands of the auto industry of high level talents knowledge structure and practical skills. Therefore, training objectives, requirements, standards, mode and training plan with enterprise of vehicle engineering master's talent all need to further reform and explore. This article mainly discusses the training mode and training mechanism of the training program of master’s excellence engineer in vehicle engineering of Wuhan University of science and technology.
The Training Objectives, Training Requirements and Training Standards of Master’S Talent Training Programs

The reforms must be closely around the goals of national policy adjustment and cultivating the high-level professional talents who is needed for economic construction. Master’s talent training programs need to improve and perfect high level auto engineering talent training project.

The Training Objectives

The engineering master degree of outstanding engineers is a kind of degrees oriented by practice. The rule of training plan must be based on the needs of engineering talents in the current engineering field.[2] The vehicle engineering professional master's outstanding engineers training objectives in our university are: the training specialized knowledge in mechanical engineering, vehicle engineering, information science and technology and so on. In the future, they can become high-quality innovative senior engineering and technical personnel engaged in product development, manufacturing, test, technology and management work in the automotive, new energy, mechanical engineering and other fields.

The Training Requirements

Considering the needs of talents in the field of engineering specifications, the demands of master's outstanding engineers are put forward. The talents need to have solid foundation of mathematics, English, computer and application ability, and good political, business and cultural quality. They need to reach the training requirements including to engage in all kinds of machinery and automobile product design and manufacture, test and detection, computer application, production organization and management of the vehicles professional skills, scientific research ability, strong ability of communication, organization and management.

The Training Standards

In view of the requirements of engineering practice and the specific considerations of engineer's ability, the standards of the postgraduate training are established. A master's degree may be obtained when the training programmer is met. After engineering practice of 1 ~ 2 years, the technical qualification of senior engineer can be applied [3]. Vehicle engineering outstanding engineers professional master's graduators can both engage in vehicle engineering basic theory research, engineering, construction technology of vehicle, and undertake the design of new products and new technology, research and development of new technology, etc.

New Training Mode of Vehicle Professional Degree Master Talent

In order to train the talents of master engineers to meet the needs of the industry, a professional degree master talent training mode with emphasis on engineering ability and innovation ability should be set.

Pay Both Attention to Theory and Practice in the Process of Teaching

The study process of master degree students is divided into two stages: school study and enterprise learning. During the study at school, postgraduates should strengthen the ability of fusing theoretical basis and practice course. Innovation drive and application oriented should be outstanding. In the course of learning phase in the enterprise, the task is mainly focus on engaging in engineering practice activities, participating in enterprise technology innovation and engineering development. Master's thesis should be completed combining with actual production [4].

In the course of professional degree teaching, at least one course should be taught by the professional and technical personnel outside the campus or teacher in campus who has a rich practical experience. They can be set up or separately by teachers to form a complete curriculum system, or can also be opened in the form of a seminar. The study based on the problem, the project, the case study, etc. are promoted to strengthen the training of students' creative ability.
The Curriculum System Is Designed to Cultivate the Ability of Engineers

Curriculum setting is the main link of the graduate students to master the solid theoretical foundation and broad professional knowledge [5]. In combination with the development orientation of vehicle engineering discipline in our school and our country industry technical requirements, professional training directions are established in terms of knowledge structure, such as the direction of "new energy automotive technology", "automobile energy saving and emission reduction technology", "vehicle CAD/CAE/CAM" and "the auto safety, reliability and fault diagnosis" and others. One core course and three optional courses are contained in each development direction.

In order to push the auto subject with mechanical, chemical, electronic, computer, management, and other related discipline intersection, related disciplines experts are invited to open required course of teaching entrepreneurship, intellectual property and literature retrieval in engineering fields. Foundation courses such as new energy vehicles electrochemical, motor control are added to increase professional engineering master's long-term growth potential. At the same time, the university also invited senior engineers in the domestic auto industry to give medium and short-term courses. By these ways, the fields of engineering master's academic and engineering practices are broadened.

Master’s Thesis Focuses on Applicability and Exploration of Innovation

Writing professional degree master thesis aims to enhance the abilities of graduators’ research of practical problems and the solution actual problem. Therefore professional dissertation should be based on practice. Students should do research work on the basis of investigation and research in view of the problems needed to be solved in the practical work, focusing on practice to explore innovative.

The program of vehicle engineering master major degree in our school has cooperated with recent 10 companies in Hubei province. Students can choose one according to their mastery of the technical characteristics and interests. Graduation projects begin at the beginning of school and continue until graduation. The results and reports of the project are the main assessment of the students' graduation reply.

New training Mechanism of Vehicle Professional Degree Master Talent

To achieve professional degree master's training objectives, new training mechanisms combined with universities and enterprise must be founded including implement training plan multi-sectorial coordination mechanism, industry guidance, university-enterprise joint training plan implementation mechanism and the mechanism of university-enterprise cooperation joint training.

Double Tutorial System to Train Students' Ability Comprehensively

Professional master degree aims at cultivating high order and innovative talents. In the process of talent training in vehicle engineering professional engineering postgraduate, the campus academic advisor and outside the enterprise mentors and double tutorial system should be established by using the project as the medium. Combined with specific engineering practical problems, the study of the real problem begins in the form of actual engineering projects. This gives student’s different learning phase under guidance of academic advisor and tutor.

Enterprise curriculums are set according to the training goal. Such as the course of “modern automotive engineering technology”, it is taught by the master of the enterprise. In addition to keynote lectures and knowledge eyeball in the classroom, students are asked to go deep in business line, such as production line, design department and testing room of Dongfeng Passenger Vehicle Company, to understand the detail process of production organization, product design and testing. These measures develop the students' field of vision; improve the students' practical ability.

Strengthen the Practice Link with the Combination of Production And Research

Production, learning, study and use are the combination of higher education reform. This is an important aspect of training students' innovative and practice ability. They can not only enhance
students' theoretical knowledge of perceptual knowledge, expand the aspect of knowledge, but also let students participate in the actual production and technology innovation of enterprises. At the same time, with the rapid development of automobile technology today, through participating in the technological transformation of the enterprise, students enable to understand the trend of the development of automobile technology in a more three-dimensional way, and clarify the direction of their efforts. In addition, by this way, students can go into the management departments of enterprises at different levels, understand the management mode, characteristics and methods of modern automobile enterprises, and strengthen the cultivation of students' management ability.

Professional degree postgraduate practices are generally completed on external practice base, related enterprises and institutions. A joint venture production alliance was established through Wuhan University of science and technology and Wuhan Yangtze automobile co., LTD. The projects identify some problems that urgently needed to be addressed in the process of industry or enterprise production or development. Thus, the practical content of graduate students is connected with the actual demand of industry enterprises. The postgraduates should submit the practical plan, write the summary report of the practice, and sign the assessment opinion by the person in charge of the internship unit. The college organizes the students to report publicly and evaluates the credit of the qualified students. Under the guidance of inside and outside the school teacher, graduate students can participate in the research and development process of the project, directly understand the needs of the enterprise, and solve some practical problems independently. These measurements greatly promote the graduate students’ ability to solve practical problems.

Summary

In general, through the study of the objective, the automotive industry excellence engineer talent training mechanism is formed. The implementation of training mode optimizes the vehicle engineering graduate training scheme. The comprehensive reforms of engineering postgraduates constantly improve the level of research and engineering practice ability, not only from the theory course and practice course system, but also from teaching content and teaching methods.

This project achieves the cooperation enterprises of the two "full participation", namely the enterprise fully participate in the development of training plan, full participation in frontier theory teaching professional guidance and a comprehensive range of engineering practice guidance and thesis guidance. Through the establishment of the double tutorial system, the reforms of link in cooperative enterprises practice and paper phase on outstanding engineers are mainly explored. It realizes comprehensive promotion of students’ research ability and engineering practice ability.

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