

Research on The Construction of Mechanical and Electrical Specialty Group of Traffic Engineering based on Guizhou Traffic Characteristics

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Abstract. Based on the double-high goals of the school, through the analysis of the opportunities and challenges faced by the training of traffic mechanical and electrical talents, in order to cultivate traffic mechanical and electrical composite talents, the traffic engineering mechanical and electrical professional group is set up with three majors: construction machinery application technology, mechatronics integration technology and industrial robot technology. Target at traffic mechanical and electrical facilities construction, traffic mechanical and electrical equipment operation management, traffic construction machinery management and maintenance of three industrial job clusters. With the adjustment of professional orientation as the core, on the original basis, the talent training mode meeting the talent training requirements of transportation enterprises in Guizhou is formulated. Finally, the system construction idea of Guizhou traffic engineering mechanical and electrical professional group is summarized, which lays a foundation for the later training of traffic engineering mechanical and electrical professional talents, and provides a reference for the transformation of mechanical and electrical major, so as to find a professional development road with traffic characteristics.

Keywords: Traffic Machinery; Professional Group; Personnel Training; Vocational Education.

1. Introduction

In 2019, after the college became a "dual university" construction project unit, in the process of adjusting the school running direction of "based on transportation, service transportation". Combined with the background of industry development, especially in the engineering machinery technology, to the intelligent, automation direction and traffic electromechanical engineering in the "new infrastructure" industry background, to the intelligent highway, fine intelligent perception technology direction, the premise, after market research, the formation of traffic engineering electromechanical professional group, out of a professional development of their own features Road.

The development of transportation is related to the development of the national economy as a whole, and the smooth flow of transportation promotes the development of economy, culture and humanities. The development of transportation in Guizhou Province is centered on the overall goal of realizing "one growth, one completion, four breakthroughs, three enhancements", building an "important land transportation hub in Southwest China", and reaching the leading level in the west in terms of major development indicators. The construction of transportation broadly includes the construction of traffic engineering, engineering testing and engineering operations, etc., the application of construction equipment, such as engineering and construction equipment (pavement machinery, lifting machinery, concrete machinery, tunnel machinery, bridge machinery, road maintenance machinery, compaction machinery, stone machinery, earthmoving machinery, asphalt equipment, etc.), traffic electromechanical systems equipment (monitoring systems, communication systems, toll collection systems, low-voltage power supply and distribution system, Lighting system, tunnel electromechanical engineering system electromechanical testing equipment, etc.), characteristics of the scene construction testing equipment (mobile robots, drones, etc.), etc., the application of

transportation construction equipment required professional skilled personnel cum with engineering machinery technology, mechatronics technology, industrial robotics technology skilled personnel.

2. Facing Opportunities and Challenges

2.1. Faced with an Opportunity

(1) Quantitative demand. With the continuous growth of transportation construction in Guizhou Province, the demand for transportation electromechanical engineering personnel continues to increase, the regional demand for the industrial pattern of technical skills for the technical personnel to provide "quantity" of demand.

(2) Composite and cross-border skill talents training. The creation of intelligent transportation and smart transportation has ushered in new opportunities for industrial technology upgrading to meet the demand for composite and cross-border talents.

(3) The proposal of wisdom and intelligent transportation adds new connotation to the development of professional groups. Guizhou will be big data industry, digital road construction (intelligent highway) direction as the focus of development, intelligent transportation electromechanical will be the future direction of development.

(4) The proposal of new infrastructure. The proposal of new infrastructure ushers in new development opportunities for transportation intelligence and wisdom.

2.2. Face Challenges

"Green transportation" puts forward higher requirements and challenges to the construction and development of professional groups. Under the guidance of the concept of "green transportation", the construction concept of "energy saving and emission reduction, environmental protection construction" will become the wind vane of the industry in the future transportation construction projects, and the intelligentization and intensification of transportation engineering, "engine common rail technology", "exhaust emission post-treatment technology", "remanufacturing" and other new technologies. Intellectualization and intensification of transportation projects, "common rail engine technology", "exhaust gas emission after-treatment technology", "remanufacturing" and other new technologies will also give rise to a new market, is imperative. With the development of "Internet +" and big data, intelligent transportation is vigorously promoted, non-stop charging, digital high-definition monitoring and other types of information technology equipment in the traffic system, making the construction and operation of traffic mechanical and electrical engineering management is more intelligent, intelligent, to provide us with a safer, more convenient and more comfortable traffic environment. The upgrading of the transportation engineering electromechanical industry requires composite talents, and for the cultivation of composite talents, the creation of the faculty team and the formulation of talent training are new challenges.

3. Grouping Logic

Accurately docking to the national requirements of the intelligentization and wisdom of the traffic engineering industry, facing the construction of traffic electromechanical facilities, traffic equipment electromechanical operation and maintenance management, traffic electromechanical equipment maintenance and repair, traffic electromechanical engineering jobs in the context of the new industry of intelligent transportation to cultivate mastery of the installation of traffic electromechanical equipment, debugging, operation, maintenance and testing, application programming, sales, and intelligent control technology of traffic electromechanics and meet the requirements of the modern intelligent transportation industry chain of high-quality complex talents. Modern intelligent transportation industry chain needs high-quality complex talents.

Mechatronics technology is mainly applied in the construction module of transportation electromechanical facilities. Mainly includes monitoring, communication, toll and other systems, power supply and distribution, lighting, tunnel ventilation, tunnel fire and lightning protection and grounding facilities, including installation, construction technology. The inspection technology involved in the pre-commissioning of electromechanical equipment after installation is also included; the interlocking and linkage of electromechanical systems and other system control technologies are widely used in this module; the operation technology of mechanical equipment involved in the construction process provides the conditions for the installation of electromechanical facilities; and the intelligent control technology of engineering equipment provides an intelligent basis for the operation of the equipment in the construction process, such as the application of intelligent excavation, leveling and compaction systems, etc. .

Industrial robotics technology is mainly applied in the transportation electromechanical equipment operation and management module. Among them, the intelligent control technology provides tools such as design and simulation, operation test analysis and management, which provide important guarantee for the operation and scheduling of transportation electromechanical equipment network. The knowledge of electromechanical equipment communication protocols and industrial network security in equipment communication technology is directly related to the health of operation and management. Internet of Things technology provides a mature model for the grid operation of transportation electromechanical equipment. Sensor detection technology, electromechanical equipment detection technology, electromechanical system control technology and engineering equipment intelligent control technology serve as the basis of operation management and are part of operation management.

Engineering machinery application technology plays an indispensable role in the repair and maintenance of transportation electromechanical equipment. Road, bridge, tunnel and other electromechanical engineering equipment maintenance needs to be synergized with electromechanical system control technology and electromechanical equipment maintenance technology of mechatronics technology. Transportation engineering electromechanical engineering machinery, special machinery and equipment, such as excavation, ballast, bulldozing, cranes, forklifts, second liner trucks and other equipment is a large value, more complex structure of the assets, involving this part of the daily maintenance of the equipment, fault repair work needs to be provided by the engineering machinery maintenance technology, engineering machinery maintenance technology to provide technical support. Sensor detection technology, intelligent control technology of construction machinery as an indispensable technology within the module for intelligent maintenance services.

Through the construction, management, maintenance of the three major industry modules for technical decomposition, positioning, we find that the three professions to establish a complementary group of talents to meet the business needs of the transportation engineering electromechanical industry.

Taking mechatronics technology as the core, and relying on the support of engineering machinery application technology and industrial robotics technology, we build a professional group that serves the middle and downstream positions in the industry chain of transportation electromechanical construction, management and maintenance, and promotes the integration and sharing of resources, see Figure 1.

The professional group takes the construction, management and maintenance of electromechanical equipments and facilities in modern transportation engineering as the logical starting point of the whole professional group, takes the national backbone professional engineering machinery application technology as the core, and serves the modern intelligent transportation electromechanical engineering system through "cross-boundary fusion", together with electromechanical integration technology and industrial robot technology. Professional group is formed together with electromechanical integration technology and industrial robotics technology. Give full play to the role

of "interconnection, mutual integration and mutual promotion" of each specialty in the new mode of modern intelligent transportation electromechanical engineering system, form a professional talent training pattern of division of labor and complementary advantages, docking the Internet + electromechanical engineering industry, and promote the transformation and upgrading of the industry. The logic of professional cluster grouping is shown in Figure 2.

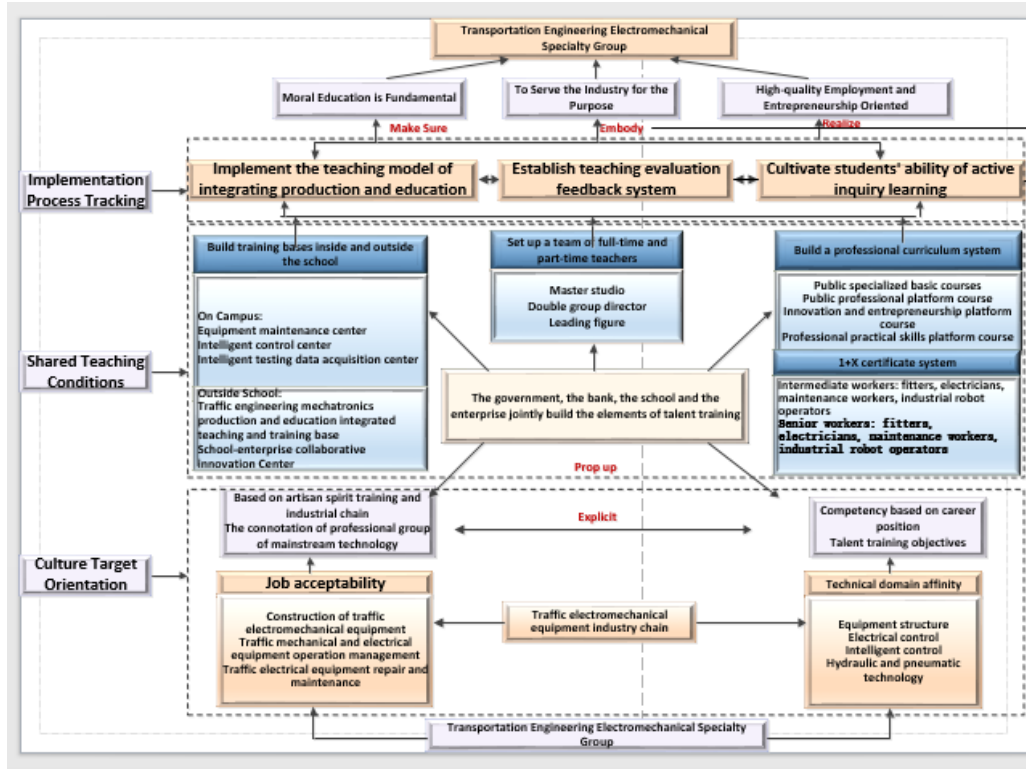
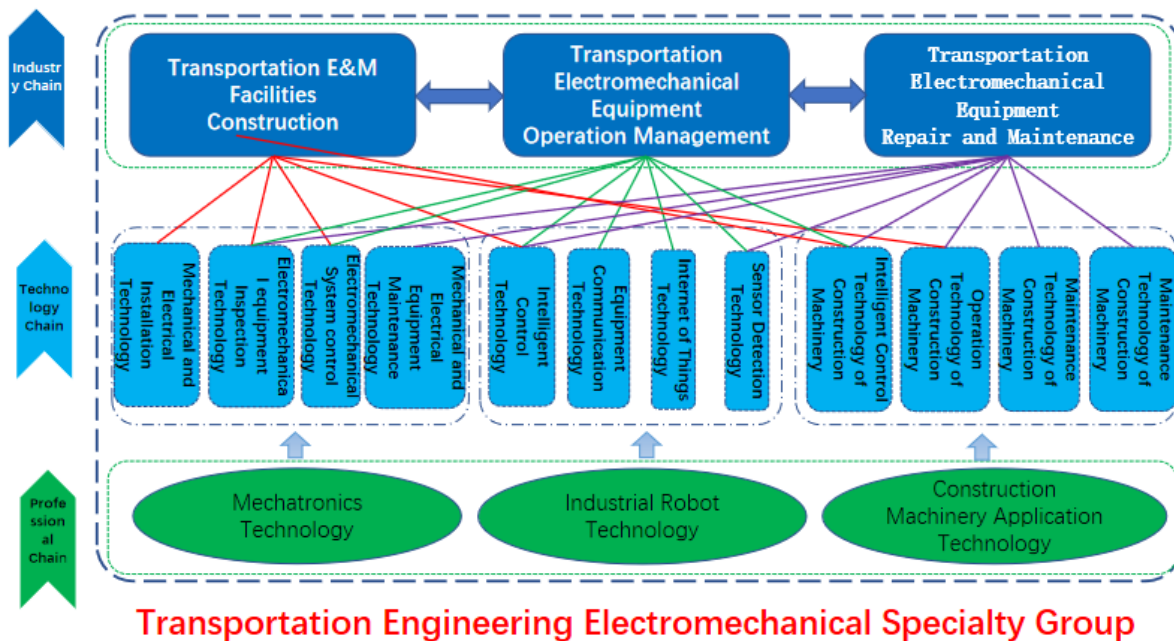


Figure 1. Logical Correspondence within the Transportation Engineering Electromechanical Specialty Cluster



Transportation Engineering Electromechanical Specialty Group

Figure 2. Logic Diagram of Professional Chain to Technology Chain and Industry Chain Clusters

4. School-Enterprise Cooperation Talent Cultivation Mode

Through in-depth cooperation between schools and enterprises, enterprises participate in the joint development of talent training programs, correct the direction of professional development in a timely manner based on the development of the industry, and change the traditional school assessment to joint assessment by schools and enterprises, with enterprise satisfaction as the core indicator of the quality of talent training. Through the reform of apprenticeship order cultivation and other cultivation modes, the school and enterprises will work together to improve the implementation of the curriculum, the construction of teacher teams, the construction of training rooms, social service training, etc., so as to meet the training of talents in the transportation electromechanical professional group.

Based on the demand of Guizhou economic and social development and industrial transformation and upgrading for high-quality technical and skilled talents, with the purpose of serving the transportation electromechanical industry, facing the modern transportation electromechanical technology jobs, with the core of improving the quality of talent cultivation, accurately grasping the positioning and development direction of transportation electromechanical professional group, taking the initiative to adapt to the demand of modern manufacturing jobs, adhering to the policy of "to The school running policy of "to establish virtue as the fundamental purpose, to improve quality as the basic task, to promote employment as the action-oriented, to serve the development as the main goal", to innovate the talent training mode as the main line, in accordance with the requirements of the "work-learning alternation, dual-certification and integration" talent training mode, through the school and enterprise In accordance with the requirements of "work-work alternation, dual-certificate integration" talent training mode, through the in-depth analysis of the resource requirements of both schools and enterprises, and with the objectives of school-enterprise cooperation in school running, cooperation in educating people, cooperation in employment, cooperation in development, and with the core of improving the vocational qualities of the students, we have built the talent training mode of the group of specialties in the application of electromechanical technology based on the cooperation between schools and enterprises. Formulate the school-enterprise cooperation system to normalize and institutionalize the operation of school-enterprise cooperation.

5. Professional Cluster Platform Curriculum System

The professional group platform courses are based on the principles of interoperability of basic courses, differentiation of core courses and diversity of extension courses, which satisfy the development of students' inter-professional multi-skills and benefit the cultivation of multi-skilled composite talents, and the framework of the professional group platform course system is shown in Fig.3.

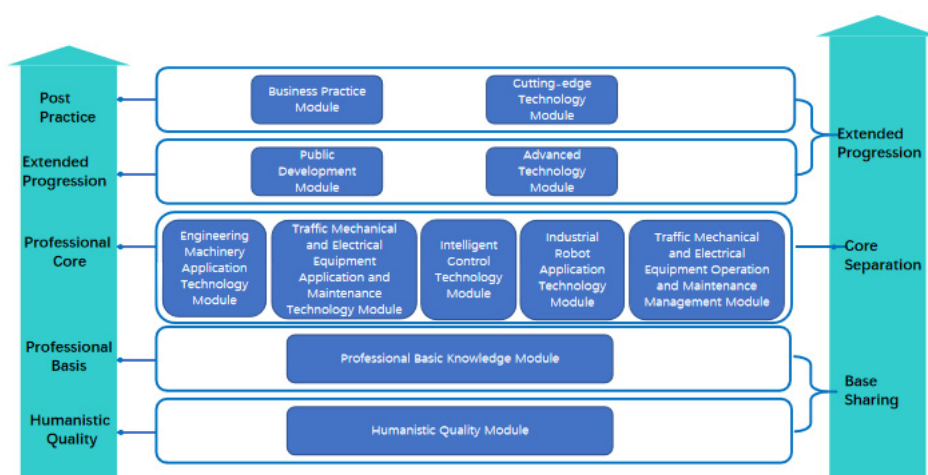


Figure 3. Professional Cluster Platform Curriculum System Framework

To establish a learning outcome-oriented curriculum system for professional groups jointly built by schools and enterprises. Taking the "national high-quality online open courses" as the standard, cultivating students' core job competence as the goal, and based on the general course module + humanistic quality course module + professional course module (professional group platform course, professional direction course, career development course) courses oriented on the acquisition of course learning results, the university-enterprise co-construction is based on the "1+X" certificate results-oriented course system. The university-enterprise joint construction of a results-oriented curriculum system based on the "1+X" certificate. Based on the result-oriented construction of graduation requirements, optimization of course content and course learning outcomes, the curriculum and training objectives closely follow the needs of students' personal development and the needs of industry and enterprises, and form a curriculum system and talent cultivation mode that satisfies students, parents, schools and employers.

According to the talent cultivation objectives of the professional group, strengthen the whole process of school-enterprise cooperation with enterprises, implement professional co-construction, curriculum co-construction and talent co-education, and organically combine the three aspects of vocational ethics, knowledge learning and skill cultivation; through the participation and support of cooperative enterprises in the whole process of talent cultivation, we can realize the "in-depth integration of schools and enterprises, and the close integration of engineering and learning" to achieve the goal of "students and apprentices, teachers and masters, classrooms and workshops, and teaching and production". "Students and apprentices are united, teachers and masters are united, classrooms and workshops are united, and teaching and production are united.

Strengthen the all-round cooperation and integration with enterprises: jointly develop the curriculum system according to the job requirements; jointly build and share the resource base; jointly cultivate enterprise technicians and dual-teachers by hiring enterprise technicians to be part-time teachers in schools and college teachers to work in enterprises; jointly carry out various forms of university-industry integration, such as product development, process development, equipment renovation, technological research, and staff training. Realize the win-win situation of school and enterprise.

With the goal of "professional group" docking "vocational job group", with the improvement of students' vocational ability as the base, and with the reform of professional practice teaching mode as the breakthrough, we innovate the practice teaching system of the professional group of traffic engineering electromechanics. Based on the general skills and specialized skills training of each specialty in the cluster, we systematically design the practical training system, integrate the practical teaching resources of core specialties and related specialties, and set up practical training bases. Through the forms of "modularization" and "project-oriented", we carry out the series construction of practical training teaching content, and build a system of "theory-practice", "theory-practice", "theory-practice", "theory-practice", "theory-practice", "theory-practice" and "theory-practice". The "theory-practice" and "theory-practice again" are the characteristics of the "double-cycle" practical teaching system. The "theory-practice", "theory-practice" and "double-cycle" practical teaching system has been constructed.

6. Construction of Practical Training Platform System

Focusing on the key areas and technologies of the development of intelligent transportation engineering electromechanics, coordinating and integrating social resources, and investing in the construction of practical training bases to meet the skills requirements of the professional group through the joint efforts of the university, government, enterprises and banks.

The practical teaching system construction of "traffic engineering electromechanical professional group" optimizes the "six platforms - progressive" practical teaching bases, focusing on the cross-border integration of the practical teaching resources of engineering machinery technology, electromechanical integration technology and industrial robotics technology, and forms a practical teaching base in line with the training of complex talents of the professional group. The practical

teaching base will be formed in line with the cultivation of composite talents in the professional group. During the construction period, the practice teaching bases serving the high-quality development of the professional group will be built, and the Management Measures for the Development of Practice Bases will be formed. According to the characteristics of each specialty of the professional group, the teaching standards and task manuals of three professional practical training programs are formulated to support the teaching and management of the practical training bases.

Facing the demand of talents in the intelligent transportation electromechanical industry, and with the main line of vocational ability cultivation, we have built a four-step progressive professional group practice teaching system of "basic ability cultivation, professional skill enhancement, innovation literacy cultivation, and comprehensive social practice". Intelligent Transportation Electromechanical Control Training Center: Combined with the construction of the College's "Karst Mountain Highway Engineering Safety Technology R&D and Science Popularization Education Base" project, the center is built to have the ability to realistically reproduce the typical "intelligent highway" in accordance with the requirements of "physical display + professional practical training". Intelligent Transportation Electromechanical Control Training Center: In accordance with the requirements of "physical display + professional practical training", the "Intelligent Transportation Electromechanical Control Training Center" is constructed with a system of support equipment that can realistically reproduce the typical intelligent highway, and is equipped with a full range of human-vehicle-road information collection sensors, vehicle-road cooperative control system, and intelligent traffic signal.

7. Technical Skills Platform Planning

Cooperate with Guizhou transportation engineering construction enterprises to establish "Transportation Engineering Electromechanical Technology Research Center" around the core technology fields of transportation engineering electromechanical intelligent control technology and engineering equipment intelligent control technology, focusing on the cultivation of high-quality and complex technical and skillful talents, the creation of a high-level scientific research and innovation team, and the service of our province's economic and industrial development needs. The center will serve the needs of economic and industrial development of the province, drive the innovation and entrepreneurship of outstanding talents, and make the above technical skills platform a comprehensive platform integrating teacher training and students' innovation and entrepreneurship education.

Introducing high-tech enterprises in transportation engineering to build a science and technology innovation platform for close cooperation among the government, industry, academia, research and application, creating a high-quality research and development team, serving the development of intelligent transportation in Guizhou Province, jointly researching intelligent control technologies such as intelligent control technology of transportation engineering, intelligent maintenance technology of transportation electromechanical engineering and other intelligent control technologies, planning the cultivation of high-quality composite technical and skillful talents through the regional talent demand, and building a high-level scientific research and innovation team, to Serve the needs of economic and industrial development in our province, and drive the innovation and entrepreneurship of outstanding talents in the technical skills platform.

8. Summary

Through the construction of a professional coordination and co-construction system of "interconnection, mutual integration and mutual promotion", the work is focused on the innovation of talent training mode, the construction of curriculum system, the construction of teacher teaching innovation team, and the improvement of practical training platform that meet the needs of the development orientation of professional groups. Comprehensively improve the talent training quality, dynamic adjustment ability and collaborative innovation ability of the professional group, play a leading and demonstration role in cultivating high-skill composite talents serving the traffic

engineering electromechanical industry, build the traffic electromechanical professional group into a professional group with Guizhou characteristics, support the development needs of the intelligent transportation engineering system industry, and provide strong support for the construction of a green transportation power. To provide talent "engine" for Guizhou Province's "great poverty alleviation" strategy and western rural revitalization.

Acknowledgments

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