

Material Molding and Control Engineering Program Vocational Undergraduate Initial Exploration

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Abstract

The practical significance of the high-vocational mold program under the condition of industrial upgrading and new technology-driven conditions to become the undergraduate program of materials molding and control engineering was discussed. through the college-industry co-construction of the industrial college, it has broaden the teachers and training facilities of vocational education, promote the in-depth integration of college and industries, realize the inherent attributes of vocational education for the industrial chain. Promote the high-quality development of the manufacturing industry and provide them with key positions of materials for molding.

Keywords

Undergraduate; Materials Forming; Curriculum System; Industrial College.

1. Introduction

The material molding industry, especially the molding industry, is an important pillar of modern manufacturing. It plays an important supporting role in the development of machinery, electronics, automotive, aerospace, medical care, transportation, energy and other industries [1-3]. In 2020, the sales revenue of enterprises above designated size in my country's mold industry was about 281.6 billion RMB, which supported about 3 billion RMB in related product manufacturing. "As a" mother of industry ", molds have played a huge role in the transformation of" Made in China "to" Chinese 'quality' "and providing strong strategic support for the realization of the great rejuvenation of the Chinese nation. The foundation of the industry is the foundation of various manufacturing industries. At the 2021 China mold industry innovation development and brand construction conference, the China Mold Industry Association proposed to create a national high-end mold-level mold cluster to accelerate the mold industry chain, innovation chain, and innovation chain, and The value chain and ecological chain are deeply integrated, and the development of the mold industry is high-end, intelligent, and branded[4-6].

In response to the shortcomings of the mold industry chain, the China Mold Industry Association coordinates domestic professional research institutions and mold -related enterprises, colleges and universities to carry out multi-level, multi-form technology, services, markets, capital and other cooperation. Promote the construction of the mold industry innovation alliance, mold manufacturing innovation center, break through the key technologies and technologies of "card neck" such as mold materials, smart molds, molding production digitalization, and informatization, and promote the industrialization of scientific and technological innovation achievements. Large -scale applications to enhance the level of China's mold industry chain; improve the service capabilities of digital solutions in the mold industry, and gradually establish an intelligent manufacturing model for the full range of production, management comprehensive, and product life cycle[7-9].

With the development of the material molding industry, transformation and upgrading have become the only way for the material molding industry to change from great to strong. Its main

means is to improve the ability of independent innovation, focus on high-end products, cultivate brands, improve quality, do a good job of quality. The integration of the two into the two, do specialty, refine, and strengthen. As the main industries of metal products and plastic products, as the main industries of the production of electromechanical products, the lean R & D and innovation service platform project has been launched. The level of digital informationization in the industry has continued to improve. The automated production line and large-scale customization production have started. The construction, scale, and level of district construction, scale, and level are gradually developing to high-end development; innovation, composite and high -skilled talents have also achieved results.

As the pace of industrial upgrading accelerates, companies' requirements for technical and skills talents are getting higher and higher. Even in front-line technology positions, not only practitioners have technical and operational operations, but also require certain engineering analysis capabilities, new technical application capabilities and innovative consciousness, and high-quality innovative, composite high-level technical skills talents.

Material molding related positions: Equipment operators, mold assembly and maintenance personnel manufactured by the main training of mold-related parts and components; the main training of traditional mold designers or mold producers of higher vocational colleges; Materials discipline knowledge system, applied engineering technicians engaged in material molding research; professional undergraduate training, high-level technical skills of the modification and strengthening of materials and reinforcement of materials. The relationship between industrial products manufacturing and material molding was shown in Fig 1.

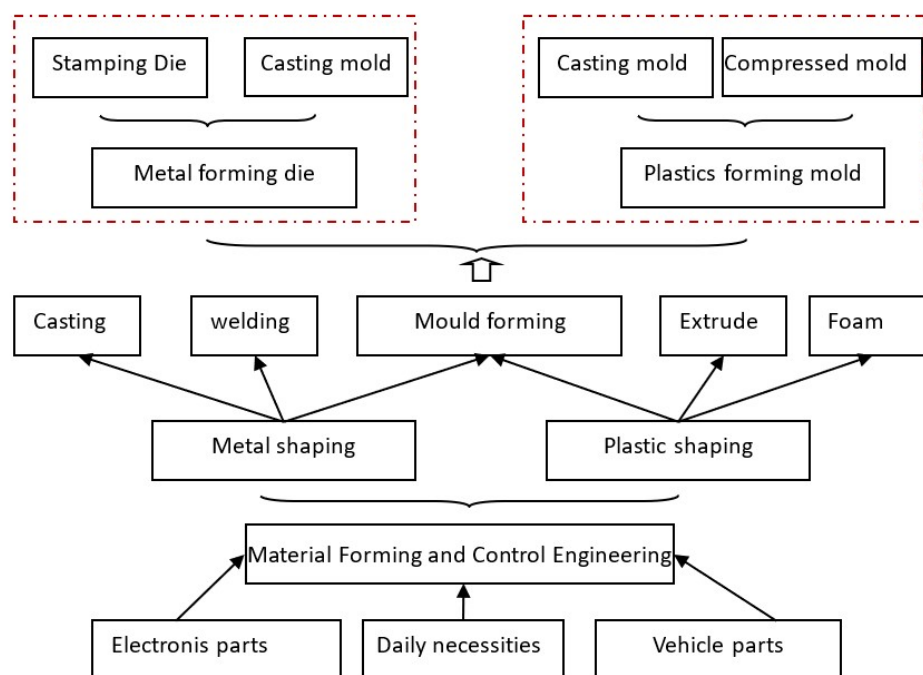


Fig. 1 relationship between industrial products manufacturing and material molding

2. Talent Training Mode Path

Focusing on the material molding equipment, smart mold design and manufacturing of the material molding equipment, new technologies needed for the transformation and upgrading of the automotive manufacturing industry, the transformation and upgrading of the automobile manufacturing industry, and the new product development, and the various molds in electrical equipment and new energy vehicles are required. The molding parts are the molding objects,

and the Joint Triangle Mold Industry and Education Alliance, the Zhejiang Mold Industry Federation, the Zhejiang Mold Association, and the Wenzhou Mold Association and other industries have carried out collaboration and complementary advantages. Cooperate with regional leading enterprises or enterprises through joint construction of productive training bases, production and education integration demonstration workshops, training research and creation multifunctional training bases, to achieve professional core courses, professional expansion courses and centralized practice courses in the industry and enterprises. The combination of engineering, taking into account the requirements of professional capabilities with the production needs of the enterprise, and focusing on ensuring that the development of new product development and new technology application requires the need for course teaching work. Professional training practices for industry-oriented application relying on the actual production needs of enterprises, closely combined with enterprise technology research and development and high-quality production of skills transformation.

Professional training practice classes hire enterprise product design, material molding process, mold design engineer, technician, especially engineering masters, chief technicians and other engineering types at or above the municipal level, and craftsman -based enterprise high -level technical personnel. Teachers and training instructors, realize the implementation of training and practical teaching, so as to produce zero distance from enterprises. Taking the central Zhejiang Coastal Advanced Equipment Industry Club, Economic and Technological Development Zone and other enterprise concentrated areas as the main target, build a "1+N" hybrid order class for mold design and new materials development of upstream and downstream mechanical and electrical products. It is the physical class of the undergraduate teaching of this major. Complete advantages, build a positive atmosphere of collaborative education, and achieve a win -win situation for school talent training and corporate technology upgrades.

Relying on the provincial "Intelligent Manufacturing Training Research and Creation" productive training base of the School of Intelligent Manufacturing, integrate student curriculum training and product research and development and mold structure innovation, and realize the development of new product development, new material forming, new process formulation in school training. Preliminary ideas and verification during the practice period, gradually verify after centralized comprehensive training and comprehensive graduation training, to achieve small -scale customization of enterprises' non -emergency research and development products, and provide materials molding and mold design for enterprise technology transformation and high -quality development practical experience.

3. Curriculum System Construction Direction

Program curriculum construction must highlight professionalism, form a practical and professional vocational education curriculum system with professional capabilities, penetrate updates, integrate optimization and reorganization courses, and pay attention to the application of the curriculum; highlight the practical teaching curriculum, use "post-ability" Centers, build a knowledge capacity matrix, based on projects, with solving implementation problems, and conducting curriculum teaching with "problem-task-ability" as the main line.

The curriculum consists of professional basic courses, professional core courses, professional expansion courses, and centralized training courses for professional courses. Construct a professional ability of "full coverage of molding materials", "high -end mold design", and "intelligent molding process", and the professional ability of the professional ability to cultivate the core ability of students. The positioning of materials for mold molding and control engineering is "Materials Modeling Craftsman" and "Mold Design Engineers".

The core capabilities of material molding craftsman positions are material modification and strengthening ability, material plastic formation process formulation capabilities and material molding quality process control capabilities. These three capabilities include mainstream metal materials and plastic materials in industrial products in the process of molding. Divided by the formation process, covering solid metal molding, liquid metal molding and plastic molding. From the perspective of the actual production of the enterprise, it covers the material molding control technology, material molding testing technology and engineering technology training, from the selection of materials to the process, from the process to the formation of production, which is completely consistent with the real production process of the industry enterprise. Position needs, high-level applications of high-level knowledge and skills, and cultivating students in this major can engage in the transformation of scientific and technological achievements, the transformation of test results, and engage in the formulation of complex industrial product processes and solve the more complex material molding process and quality problems.

Mold design engineers are wide-caliber because mold molding products in different industries are large. For industrial products such as electrical equipment, automotive parts and other industrial products, characteristic superior products, and new materials for strategic emerging products in Wenzhou area, metal products and plastic products are formed by the strategic emerging products. Manufacturing capabilities, professional core courses and core positions are highly consistent, combining professional literacy, craftsmanship and digital design and intelligent manufacturing to cultivate high-level molding mold design technical skills.

In the course of course construction, knowledge and skills are integrated. The learning of each course clearly understands the knowledge and skills that should be mastered. The main line of skills should be mastered and improved to determine the knowledge and training subjects necessary for the curriculum. According to the needs of employment positions for occupational capabilities, according to the curriculum system and system development ideas, that is, the corresponding technical application concentrated practice links (curriculum design), curriculum skills training concentrated practice week according to the curriculum system and system development. The system is parallel.

Taking job ability and skills as the basis for curriculum development, vocational literacy education, innovation and entrepreneurial education have become a system integration in the teaching process. Focus on the development of electrical and electrical products for the molding of electrical equipment, automobile manufacturing and other industries, and on the basis of the specific technical and skills requirements that should be grasped with the staff of the enterprise engineering and technical personnel and part-time teachers. Ability and operational skills are further refined and implemented in the teaching of professional core courses and industry applications and training links. And combine related knowledge points, abilities and operating skills into several curriculum modules for teaching, each module includes theoretical and practical teaching links. In the construction of each course module, knowledge and skills are integrated into one. Each module clearly explicitly master the skills, use the skills to master and improve the main trunk line, determine the knowledge and training subjects necessary for the module, and end assessment methods.

4. Co-constructing Shared Industrial College

Promote the integration of production and education, school-enterprise cooperation, and cultivate more high-quality technical and skillful talents, ingenious craftsmen, and artisans for the new development stage. Establish a multi-level, multi-field school-enterprise alliance, in-depth promotion of industry-university-research cooperation, cooperative education,

cooperation and employment, cooperation, cooperation, and cooperation, and sharing results, and achieve win-win cooperation.

4.1. Deepen the Cooperation of School-enterprise

Focusing on the characteristic and advantageous industrial clusters of electrical equipment, automobile parts manufacturing, etc., adjust the specific time and content of professional courses, accurately connect the technical characteristics and talent needs of the industrial mold molding, build practical content for the specific business of the enterprise, and improve the practicality of the curriculum; Based on the internship and employment positions provided by the enterprise, it provides recommendation services, organizes students' social practice and internship, and keeps closely following the needs of the industry, and continuously corrects the practicality of professional courses; combined with the development of industries and enterprises Teaching reform, cultivating high-level technical and skilled talents. Take the initiative to invite cooperative industries and enterprises to participate in the development of courses, and provide teaching skills training; according to the needs of industrial and enterprise development, strengthen communication in the aspects of professional courses, centralized practice of professional courses, and comprehensive graduation practice. The development project is the content of curriculum teaching to promote the landing of production and education.

4.2. Promote the Sharing of School-enterprise Resources.

Professional open talents to industries, enterprises, platforms, laboratories, etc.; Rely on their own rich social resources to organize various activities to increase the popularity of industries and enterprises; introduce the talents of industries, enterprises, intelligence, technology, capital, management, etc. Resources, achieve complementary advantages, support high-quality development of education, and enhance the core competitiveness of professionalism. Participating industries and enterprises provide application-oriented talents, open platforms, laboratories, and provide funds; cooperate with majors to conduct student skills training, innovate and entrepreneurship practical places and opportunities, jointly develop high-quality scientific and technological achievements, and obtain regional resources cooperation and development.

4.3. Explore the New Model of School-enterprise Cooperation.

Professionally adhere to the integration of production and education, use program groups to connect the industrial chain, use the industrial college to connect the regional high-tech industrial park, the economic and technological development zone, and the southern Zhejiang science and technology city of mechanical and electrical products. Explore the effective connection mechanism of the industrial chain, innovation chain, and education chain, establish new types of information, talents, technology and material resources sharing mechanisms, improve the mechanism for integration of production and education integration, innovative enterprise part-time teachers' evaluation mechanism, build higher education and industrial cluster linkage Development mechanism, creating demonstration materials for the formation of talent training, scientific research, technological innovation, corporate services, student entrepreneurship and other functions, and the training entity of undergraduate talents in the mold design program, realize the win-win situation of talent employment, industrial upgrading, and enterprise development. The Joint Industry College logics illustrated in Fig.2.

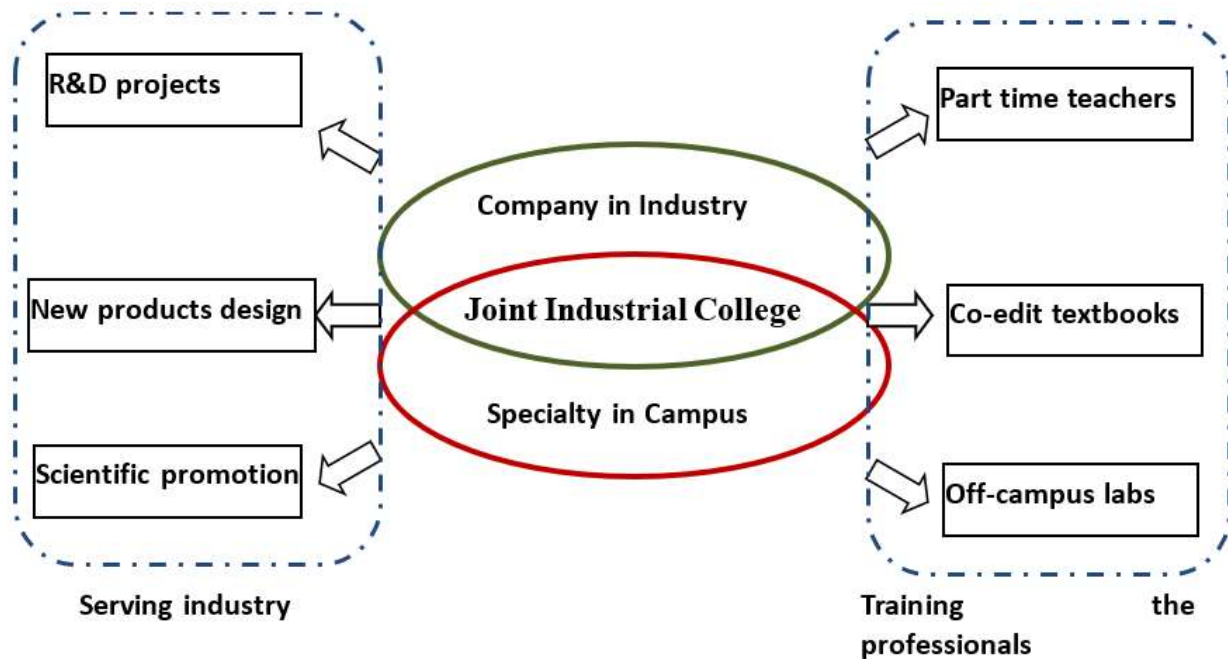


Fig. 2 Joint industry college for material shaping

4.4. Actively Deepen College-enterprise Cooperation.

According to the technical research and development and talent needs of Wenzhou Mold Industry Association and the leading enterprises of Wenzhou Municipal Mechanical and Electrical Products in molding equipment, it has promoted the diversified joint education models such as apprenticeships, engineering alternation, customized joint training, and studio. Based on the team of professional undergraduate teachers, the Wenzhou Mold Association as the bridge, give full play to the role of the Wenzhou Mold Industry Association and the key laboratory of the mold of Wenzhou, integrate the college-enterprise teachers team With the teaching resources and environment, aiming at the needs of mold talents such as electrical equipment, automotive parts manufacturing, etc., the political schools are jointly established, and the implementation of deep integration of production and education is implemented. Make efforts for 3 to 5 years to to form a college-enterprise collaborative management, specializing in teaching, sharing of reality resources, and continuous improvement of talent quality. The school's professional implementation of part-time teachers, student school training internships, and joint development of textbooks, foreign companies realize the use of high-quality intellectual resources in colleges and universities for project technical research, product research and development trial production, and transformation of scientific and technological achievements.

5. Conclusion

In the context of the transformation and upgrading of the national manufacturing industry and the transformation of traditional manufacturing to intelligent manufacturing, the high-vocational mold design and manufacturing program faces multiple tasks of teaching knowledge updates, skills iteration upgrades, and enhance students' comprehensive quality and vocational skills. molding is one of the main ways of molding of mechanical and electrical products. With the continuous use of new materials, especially the continuous development of additive manufacturing, some new products are no longer forming through traditional molds, but through mold equipmentization. , The three -year academic system of higher vocational mold program limits the depth and breadth of teaching content, so it is very important to be upgraded to become the undergraduate program of materials forming and control engineering vocational

undergraduate program. The professional curriculum system is composed, and through the college-industry co-construction of the industrial college, it broaden the teachers and training facilities of vocational education, and promote the in-depth integration of college and industries.

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