

Reform and Practice of Numerical Control Technology Applied Talents Training in Local Universities under the Background of New Era

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Abstract: Various disadvantages existing in the training of numerical control (NC) technology applied talents in local colleges and universities were listed in this paper. Based on the present demand for numerical control technology talents in relevant industries, NC technology talents training was improved by the curriculum teaching system oriented from the corresponding industries, NC virtual simulation software to simulate the actual machining process, double drive teachers construction, scientific research teaching mechanism, and established practice teaching unions in the new era of numerical control technology. This paper enhances the practice ability, innovation ability and international competitiveness of NC technology talents, and further boosted our country manufacturing industry to manufacture power shift.

Keywords: Applied Talents; Numerical Control Technology; Talents Training

1. Introduction

Driven by new technologies such as "Internet +", "Artificial Intelligence +" and "Industry 4.0", the information society, new economy, new industries and new forms of business are constantly changing. This revolution has puts forward new requirements for higher engineering education to adapt to the future technological and social changes. To adapt the talent demands changes resulted from the technological revolution and industrial revolution, applied universities should train the higher engineering technique talented person which adapt the future development of technology development. Simultaneously, aim to speed up the construction and development of new engineering education, most of applied universities out of the circle of "elite education", focus on training applied undergraduate personnel in place, the service industry oriented ^[1].The training of applied talents has become the focus and starting point of the development of local applied type universities in the new era.

Manufacturing industry is the main body of the national economy. China has been built into a manufacturing country and which is transforming into a manufacturing power. Under the background of the new era, a strong manufacturing talented team is urgently needed in the process of transforming China from a manufacturer of quantity to one of quality. However, numerical control (NC) technology talents account for a relatively large gap in the above manufacturing talent ^[2].

The Manufacturing Talent Development Planning Guide jointly issued by the Ministry of Education, the Ministry of Human Resources and Social Security, and the Ministry of Industry and Information Technology in 2016. And the Manufacturing Talent Development Planning Guide predicts that the talent gap in high-end CNC machine tools and robotics will reach 4.5 million up to 2025 [3]. However, a multitude of disadvantages exists in the process of NC technologies talents training for local application-oriented undergraduate universities, such as NC practice teaching idea and method is obsolete, and the local application-oriented undergraduate universities failure to effectively deal with large-scale online education as well as the impact of the Internet technology and challenges. Therefore, the above problems further lead to the practice ability of the training talents is not strong, and the training talents simultaneously lack of innovation awareness. The training of high quality NC technology application-oriented talents was restricted, and further cannot meet the need of social and industrial development

2. Problems exist in the NC technologies talents training

Insufficient updating of teaching content. Different to research-oriented talent training and academic talent training, application-oriented talents are those persons with strong engineering practice ability and innovation capacity. Applied talents training should put emphasis on the industry-oriented practical and innovation capacity. However, the teaching content of local universities still adopts the traditional academic talent training mode. This phenomenon results in the applied talents training has not been able to keep up with the technological level the present CNC industry.

With the continuous progress of contemporary science and technology, CNC machine tools are updated quickly. In addition, the price of CNC machine tools is high. Therefore, the local application-oriented universities basically do not have the relevant financial budget support to update the relevant CNC equipment every year. Furthermore, the CNC technical personnel trained by the current level of CNC machine tools cannot satisfy the demands of nowadays technology and social change.

The resources consumption, such as electricity, liquid, gas and others, is very high in the operation of CNC machine tools. In addition, the equipment maintenance cost of CNC machine tools is very high. More importantly, the operation risk of the NC machine tool is high.

Due to lack of funds and limited venues, the number of CNC machine tool sets equipped by local application type colleges and universities is limited. This phenomenon leading to a low degree of students' participation, or they can only watch some demonstration experiments, which cannot satisfy the requirements of students' practical ability training. In addition, it is difficult to carry out an open, independent design and innovative experiments.

Due to the processing noise of the NC machine tool and its auxiliary air source noise is very big, the field practice teaching effect of CNC activities is inferior. Some local application type colleges and universities seldom allow students to participate in the actual NC machining for the sake of student safety.

Due to the pressure of production and safety, enterprises give students less and less time and space to practice at the front line of NC machining. In addition, it is difficult to obtain the desired results of production practice.

The shortage of qualified teachers, and the teachers lack of professional ability. A majority of faculties in local application type universities are young doctors with no practical experience in enterprises. Many new teachers cannot even operate the CNC machine tools, it is difficult to implement application-oriented talent training.

3. NC technology application-oriented personnel training path of local and universities

3.1 Establish a curriculum teaching system oriented to the demands of the industry

Traditional research-oriented colleges are intend to train research-oriented academic talents and ignore the cultivation of practical ability of talents in the setting of curriculum education content system. The education of application-oriented talents should lay emphasis on training the practical ability and innovation capacity. And the corresponding curriculum teaching content system must go out of the textbook content. In addition, the corresponding curriculum teaching content system should orient to the relevant needs of the industry, and establish a sound and perfect training system of NC technology application-oriented talents.

3.2 Teaching mode of NC virtual simulation replaces the actual machining

Construct a reasonable knowledge, ability and quality structure for students is an important parameter in assessing the application-oriented undergraduate personnel training pattern. The realization of this structure is closely related to a reasonable practical teaching mode. At present, CNC machine tools develop rapidly, CNC machine tools update quickly, and its cost is high. Due to the lack of financial budget, the local colleges and universities are difficult to update the real-time CNC machine tools new products. To make up this disadvantage, local colleges and universities should adopt numerical

control simulation software for relevant numerical control teaching. This practice avoids the risk of the students in practical operation process and reduces resource consumption.

3.3 The construction of "double-type" teachers

The professional skill level of teachers largely determines the quality of numerical control technology applied talents training. To date, the proportion of "double-type" teachers in local applied type colleges and universities is still low. Establishing a sound training mechanism of double-qualified teachers, and training a group of double teachers with high theoretical level, strong expertise and good overall quality is a key factor which directly affects the NC technology applied personnel training.

3.4 Scientific research drives the establishment of teaching mechanism

For training a novel engineering talent which can accommodate to the progress of contemporary science and technology, the talent training scheme and mode must be relate to the current progress of science and technology. Local universities should establish an effective scientific research driven teaching mechanism, so as to integrate scientific research results of teachers into the course education. This practice enable students' practice links closely with the frontier of science and technology closely combined. Additionally, this practice can further attract the learn interest of student and enhance the quality of numerical control technology applied talents training.

3.5 Practice teaching alliance system construction

There are some differences between simulation machining and actual NC machining. The practical teaching of real NC machining is essential in improving the comprehensive ability of students. According to the same situation of talent training and differences in educational resources among local universities, the practical teaching alliance among local universities is established to share practical teaching resources. However, the practical teaching resources of local universities are limited, and the progress of modern science and technology makes enterprises have to update a large number of CNC machine tools. To effectively promote the seamless docking of talent training in local colleges and enterprises, and further facilitate the effective use of resources, the university-enterprise practical teaching alliance was established.

4. Conclusion

Many problems can restrict the practical ability training of student in local applied type colleges and universities. In this present paper, the NC technologies talent cultivation is oriented to the current industrial CNC machining requirements. In the meantime, the double drive teachers construction, scientific research teaching mechanism, set up practice teaching unions improve NC machine tools and programming practice teaching system were introduced into this research. The above practices result to enable students to fully master NC technologies, improve students' professional interest and ability to link theory with practice. In addition, the above practices consolidate students' professional theoretical knowledge, improve their practical ability, innovation capacity and international competition power. At the same time, it saves a lot of financial expenditure for local applied type universities, reduces the consumption of relevant resources, and further avoids the operational risk of actual NC machining.

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