

# Research on Improving Teaching Quality of Practical Training Course of Numerical Control Specialty

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**Abstract:** With the continuous advancement of “Industry 4.0”, the rapid development of intelligent manufacturing industry requires a large number of CNC professionals. According to research, China needs 20 million jobs in the next ten years to match the CNC profession. However, with China’s machinery manufacturing industry has made rapid progress, but at the same time, it has also increased the requirements for machinery professionals. Especially in recent years, the innovation of automatic processing and manufacturing technology has provided a new technical support for the field of CNC machining. Training teachers need to implement the ideology of intelligent manufacturing to improve the comprehensive quality of CNC machining teaching. The author has been engaged in vocational education for more than ten years, and has been serving as the practical training teaching of CNC machine tool processing, which has been affirmed by the relevant full-time teachers and practical training instructors and praised by students.

**Keywords:** CNC machining centers; Practical teaching; Technical expertise; Improve teaching level

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## 1. The significance of numerical control machining training teaching in higher vocational colleges

During CNC machining, students should be actively integrated into the practical training teaching process, so that students can quickly grasp the use of CNC machine tools and requirements, so that students can adapt to the position faster. Therefore, it is necessary to set up a perfect numerical control practical training teaching mode to guide students to learn, perceive, create and understand in the practical training exploration, so that students can more comprehensively realize the results of numerical control machining and the connotation of technological technology. Teachers should guide students to absorb the knowledge points of practical training design independently, share and learn the results of practical training in the process of experiential learning and practical operation, which is more conducive to developing and cultivating students’ practical level, innovative spirit and creative ability.

## 2. Problems existing in the practical training of CNC machining in higher vocational colleges

At this stage, there is a phenomenon of “heavy theory, light practical training” in the teaching process of CNC technology and professional in higher vocational colleges. Even if some practical training teaching activities are carried out, there are certain problems, which brings a lot of unfavorable factors to the training of CNC machining and manufacturing talents.

### 2.1 The content of practical training and teaching lags behind the actual production of enterprises

At present, many higher vocational colleges are still using the past pattern content when carrying out numerical control machining practical training teaching, and there is a serious disconnect problem with the actual production situation of processing and manufacturing enterprises, and students rarely or not at all to practice training in production enterprises.

## **2.2 The practical training teaching method is too simple**

Although the level of vocational education in our country has been greatly improved compared with the past, the progress of teaching methods is not obvious, and it is still very simple and outdated, especially the practical teaching link, the method is simple and rough, it can not effectively improve the efficiency of practical teaching and teaching level.

## **2.3 The practical training teaching evaluation system is not perfect**

The imperfect evaluation of teaching has always been a long-term problem in the field of education in China, and the practical teaching of machining in higher vocational colleges is no exception. Because of the lack of a sound evaluation mechanism, it can not provide real and effective reference for the improvement of practical training teaching in practical work.

## **3. Problems Reform measures of numerical control machining training in higher vocational colleges**

In view of the above mentioned problems, the author puts forward the following solutions based on his years of practical experience, hoping to promote the improvement of students' practical ability level and the improvement of practical teaching quality.

### **3.1 Introduce OBE mechanism to improve students' interest and enthusiasm for practical training processing**

Interest is the best teacher for students, which can make students actively explore knowledge and actively participate in practical teaching activities. Only with interest can students enjoy the fun of learning and feel happy in learning. Training instructors must do everything possible to find ways to improve students' enthusiasm for numerical control training processing, and now they are all post-00 college students who love fresh challenges, so that students realize that every training is a competition. Before the practical training, the author will carefully prepare several parts drawings with different degrees of difficulty but suitable for the practical training content, and they will take the initiative to operate the CNC lathe and process higher quality products.

### **3.2 Improve the content of practical training**

Change the old defects of the previous practical training content, and adjust the teaching content according to the actual production items of the enterprise. For example, some simple parts process examples being processed by the enterprise can be taken as the practical training content, and the processing enterprises can cooperate closely to ensure that the designed practical training content is consistent with the actual production situation of the enterprise. Strive for students to be able to basically meet the actual job needs of enterprises before graduation. At present, the large machinery CNC processing enterprises (Huazhong CNC) in the surrounding area of our school have carried out "school-enterprise integration", "production-education combination" and "strong combination". After completing the practical training tasks, teachers and students can use their spare time to learn processing technology and corporate culture from the technicians of the enterprise, and actually process products. It also provides students with more opportunities for practical training, and the processing students can also have a certain income, so the processing enthusiasm of teachers and students is relatively high.

### **3.3 Optimize practical training teaching teachers**

The construction of training teachers is the key to improve the quality of CNC machining teaching in higher vocational colleges. In addition to arranging to send training instructors to advanced processing enterprises to learn lessons, engineers with high practical operation ability in enterprises should be absorbed as a supplement to the training teachers. It can also invite professional and technical personnel of machinery processing enterprises, senior engineers and other part-time teachers of machinery majors in higher vocational colleges to participate in practical training teaching.

### **3.4 Enrich the teaching methods of numerical control practical training processing**

In order to stimulate students' interest in learning, we should change the single teaching method in the past and enrich the teaching method on the basis of introducing modern and new teaching ideas. In the process of practical training teaching, the instructor should use appropriate teaching methods to teach, only in this way, can make students gain something in the process of practical training, so that students' actual processing ability can be improved. In the process of practical training, the author mainly adopts the project teaching method to carry out the practical training of CNC lathe machining.

#### **3.4.1 Brief introduction of project-based teaching**

From the actual situation of the development of education, project-based teaching is adopted in the teaching of many subjects in the field of education. According to the actual learning situation of students, the skills and knowledge in the textbook are divided into many technical knowledge points or skill units, and then each knowledge point or unit is taught as a project, which means that the knowledge is broken into pieces and then integrated together for effective teaching, and the theoretical knowledge and practical skill

training are combined. Enable students to acquire knowledge and skills faster.

### **3.4.2 The steps of project-type teaching in numerical control lathe training**

There are a number of CNC lathes in our college, and we have mechatronics majors, mechanism majors, industrial robots majors, etc. There are about 200 students in each grade, with an average of about 35 students in each class, and an average of 2 weeks of practical training for each class. In the practical training class, I always let the students to cooperate in learning, and the monitor or the study committee will assign the students to form the learning practical training group, with 4-5 people in each group (the members in the group have complementary advantages, that is, the balance between good theoretical performance and good practical ability), and choose one person as the leader.

The first step is to set up practical training projects for different majors and students. The operation technology of CNC lathes is divided into the operation of lathes, the use of lathes control instructions and the learning method of the process. Then the numerical control lathe training objectives are determined, and certain requirements are carried out, requiring students to learn the basic structure and format of each system programming program in the textbook, and will use the editing method of the system program, and carry out practical application.

The second step, let the students understand the machining skills of CNC lathe shaft parts, first let the students learn the simple machining methods of shaft parts, and learn and use the CNC lathe instructions such as G00 and G01. Then let the students to CNC lathe arc parts processing method to learn, and master its characteristics, learn to use the CNC lathe instruction G02,G03; Learn and master the processing methods of slot parts, master the processing skills and characteristics; Then the basic processing method and process characteristics of the platform shaft are studied, the basic preparation is made, and the technical application of CNC lathe G71 rough turning cycle and G70 fine turning cycle is mastered. Then the knowledge of cutting thread principle and characteristics of basic learning, master the CNC lathe G82 thread cutting instructions and its application characteristics.

The third step is the comprehensive processing training of complex parts and matching parts.

From the above three aspects, it can be seen that although project-based teaching is separate learning of knowledge points, each knowledge point is interrelated rather than a single existence. After students have mastered the basic knowledge of textbooks and simple craft learning, they can carry out item-based teaching and practical training, which can better integrate vocational theory with vocational technology. Effectively improve students' comprehensive ability and professional technical level.

### **3.5 Improve the practical training teaching evaluation system**

A good system is a powerful means to ensure quality. At present, the evaluation method of practical training in higher vocational colleges is very simple and simple, which can not objectively evaluate students' practical training results and teachers' teaching effects to a large extent.

## **4. Conclusion**

At present, there are still some problems in the practical training teaching of CNC machining in higher vocational colleges. Therefore, the practical training instructors in higher vocational colleges must change the teaching mode and teaching concept, have the courage to innovate and constantly reform, fully mobilize the students' interest in practical training and adopt appropriate teaching methods, so that students can take the initiative and consciously participate in the teaching and training activities of CNC lathe. Modern society has a great demand for practical and technical talents, and provides students with more opportunities for practical training through various ways, so that students can accumulate practical experience and level in the practical training process and truly learn technology. Practice has proved that as long as in the process of numerical control machining training, do a good job in these aspects of the reform, can greatly for the enterprise and society to cultivate more comprehensive high-quality talents, so as to achieve higher vocational colleges to improve the quality of CNC machining training teaching goals.

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