

## Primary Study on the Reformation of Production Engineering Practice

### Course System of the Petroleum Engineering

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**Abstract:** There are many of problems in the practice part of teaching because of the shackle of the Chinese traditional teaching system. We raised the new idea of reformation of practice teaching system based on outstanding engineers training project by analyzing the problems existed in practice education. The idea is that with college-enterprise cooperation, taking advantage of different education environment and resources of college and enterprise, basing on engineering consciousness and engineering quality, mainly training engineering practice enterprise comprehensive practice platform, constructing the practice teaching system which can meet the requirements of outstanding engineers knowledge, ability and quality. There have been and still are many attempts on the production engineering practice course system in Northeast Petroleum University, for example, the reformation of teaching method and evaluation mode, the management of corporate practice teaching, et, which achieve primary success, while some new problems appear, to strengthen the practice teaching construction for reference.

**Keywords:** petroleum engineering; outstanding engineers; practice reformation; teaching system

#### 1. Introduction

In February, 2012, petroleum engineering of the Northeast Petroleum University was listed into the plan which is '*Outstanding Engineering Education Development Program*' (referred to as *the outstanding plan*) by Ministry of Education of the People's Republic of China. This plan is a significant exploration in our country to promote engineering education, aiming at developing high-quality engineering technician with owning more innovation and meeting social development, which is significant to promote international mutual recognition of the engineering education and engineer. In traditional education teaching, there are such many adverse factors in practice part that graduates are nearly able to obtain enterprise's full approval in the project practice. As to petroleum engineering that includes three domains (*Drilling Engineering, Production Engineering and Oilfield Development Engineering*), now it has gradually extensive domain knowledge, shortage of the course schedule for studying each domain and not full-scale engineering training. So I will illustrate Production Engineering practice course system as an example for researching the direction of the reformation [1-3].

#### 2. The problem existed in traditional teaching of production of engineering

##### 2.1 The problems in context and method for the practice teaching

As to the aspect of the practice teaching context set and arranged, there is not link enough with developing talents' goal and normal phenomenon with emphasizing theory and knowledge and

underestimating practice and ability, which lead to theory and practice out of touch to students. At the same time, the method of practice teaching is single and the strategy relatively lag behind. At present, in addition to the book—*Petroleum Engineering*—refers to the theory knowledge of the production engineering part, there is relative production practice only in the practice base of Daqing Petroleum Technology School, no teaching material, few chance to learn the pumping unit in the relative course design, and no experimental teaching. Students completely finish the operation at the range set by teachers, and lack of active and positive thinking themselves [4].

### *2.2 The problems in construction of the practice condition*

Laboratories and practice bases are imperative hardware support for practice teaching and play an important role in students' practice teaching. Now there is not special production engineering laboratory opened to undergraduates and graduates' creative laboratories have small scale, single function and low efficiency, all of which don't take advantage of abilities of experiment skill, complex ability and innovation ability developed. Being only a form and difficult to play a role, practice teaching bases are outside of our university and have low enthusiasm to arrange students' learning practices.

### *2.3 The problems in practice teaching level of the teams of teacher*

Almost zero to the teachers' troops with having practice technology, inadequate numbers of teacher for experimental courses, unbalanced teachers' structure and professional teachers lacked of practice of engineering are common issue at present for the teachers' troops. Focus on academic background while inadequately on application—oriented graduates or person with work experience, so these teachers are difficult to fill relevant guiding practice because of lacking of specialized training of the practice link of engineering and far from expert themselves. Moreover, there are limited factors for teachers to create opportunities of training, further education and practice in enterprises.

### *2.4 The problem in appraisal and management of the practice teaching*

Effective practice teaching evaluation system is an important pledge to display the practice effects. Evaluation system of current theory teaching is more mature, but lacking of institutional entire process control, the practice teaching evaluation system have not been established. In virtue of lacking of awareness for the importance of practice teaching and no press, the practice will be beyond imagination, if it lacks the management surveillance.

## **3. The reform measures of outstanding engineering practice teaching system**

Whether the design in the outstanding engineering practice teaching system can reach to the expected target, the key is to achieve the organization with various parts, implementation processes and results. So we should attach great importance and take effective measures to promote the reformation of the practice teaching of *the outstanding plan*. In practice of the production engineering, we made the following tries.

### *3.1 Strengthen laboratories and training bases construction*

According to the development goal of the outstanding plan, we need further strengthen laboratories and training bases.

(1) We should try to extend opening laboratories, increase input in professional laboratories and make the most of two platforms of the graduates' innovation and opening experiment and enhance comprehensive utilization of the laboratories. (2) We should introduce enterprises' resources and equipment, construct the laboratories by cooperating with enterprises and simulate engineering setting on site. (3) We should establish stable training bases outside and inside our university.

Creating good engineering practice setting for students, letting them study engineering in the engineering setting and teachers teach engineering there, can develop students' engineering quality and practice ability.

The aspect of the production engineering of the Northeast Petroleum University open two training bases — The Third Operation Zone of Daqing No.2 Oil Plant and Daqing Oil Production Technology Research Institute. There are 32 class hours in total in the engineering training course, which is taught with combining with engineering practice by workers on site. For example, there is good effect to teach about screw pump, as shown in Figure 1, according to screw pump work, we can obtain the influential factors of the screw pump checking period and the life of it. We produced the practical screw pump with the motion of the stator and rotor, as shown in Figure 2. We research the new product—equal wall thickness stator screw rod pump, which is made from uniformly rubber material on the surface of the equal wall thickness stator made of metal materials of the screw pump. This achievement solves the problems that is the uneven rubber thickness stator of the conventional screw pump, lead to gather caloric and decrease the lifetime of the screw pump. After detected with the indoor large equipment, all the technique indexes increase with wider amplitude. The engineering training inspire students' imagination and creativity in the engineering practice, which achieve the goal of *the outstanding plan*.

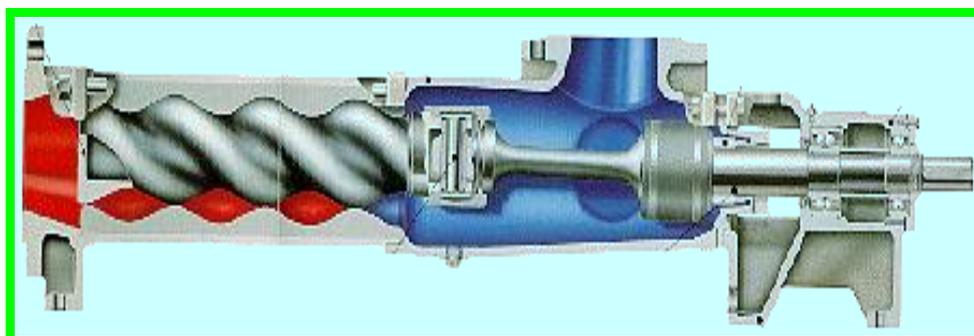


Fig.1. Screw pump work



Fig.2. The practical screw pump of our production

### 3.2 Promote the reformation of teaching method and evaluation mode

It adapt to develop the engineering requirement that we should reform traditional practice teaching method and evaluation mode. (1)In the reforms of the teaching methods, we should promote various researching methods based on problems, program and case study and so on, take measures of bringing projects, integrate practice with study, based on the interactive teaching, on—the—spot

teaching, communication between teachers and students teaching and the research — and — discussion teaching, reinforce relationship with actual engineering, develop student' ability of thinking, foster their studying interest and enthusiasm. For example, Oil Production Technology Research Institute adopt the scientific research means that each student can participate in different research group. As a result, each student can finally learn different knowledge or context from other. (2)In the reforms of evaluation, we should change the single traditional evaluation mode that exam the written examination with the standard answer, but adopt the combination with four methods that is studying notes, writing reports, defending on site and evaluated by teachers on site, to focus on evaluate students' abilities of knowledge application and creative thinking.

### *3.3 Enhance the management of practice teaching of the enterprise*

The key to enhance the management of practice teaching of the enterprise is that we should enhance the management of the learning stages of the enterprise and establish safeguard mechanism of the enterprise' practice management. Students can be safe when they study in enterprise, in virtue of going to enterprise every day for them who live in school. (1)Enterprise develops safety education, signs the treaty of enterprise, school and student and specifies their rights and obligations. (2)During the study in enterprise, students should be strictly followed to enterprise's safety regulations and relevant work system such as security, safety secrecy and so on. We should adopt double tutors on campus and off. Staffing technical practitioners as extramural academic advisor who is mainly in charge of the teaching of the link and instruction including the practice training and the enterprise's program. (3)We should enhance the evaluation of the teaching process, implement current, dynamic and whole process monitor, pay attention to students' learning and appearance in enterprise, timely analyze evaluation information and propose the recommendations, all of which can further enhance specifies' quality developed by enterprise. [5]

## **4. Effect analysis and suggestion**

By implement all of the measures above, students have improved in their practice abilities. But there are some problems in practice. (1)Part of tutor on site lacks responsibility and let students do lots of repetition at some of mechanical basement job, such as spending a couple of weeks copying the report of the pumping unit. Students reaped little benefits from these things. (2)Parts of tutor on site have so lower theoretical level that they never direct students by the angle integrated practice with theory. (3)Owing to short practice hours, the safety considered and so on. It is difficult for students to understand core parts of the practice. (4)It lacks the on — site training mechanism for young direction teachers inside to create talents with practice ability and develop the outstanding engineers. [6] I suggest you consider the problems mentioned above in the following development and develop the real outstanding engineers.

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