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## **Timber engineering educational needs in China**

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# Timber engineering educational needs in China

## Abstract

The author briefly introduces Chinese timber engineering's history and its education's beginning, intermittent and revival. Several problems of the education of timber engineering are put forward which are need to be solved urgently. It is sure that Chinese education of timber engineering will have a great future.

## 1 History of Chinese timber engineering

China has a long history civilization and Chinese ancient architecture is an important part of it. Chinese ancient architecture can be regarded as a special culture which has different styles after developed through a long history. The timber architecture constitutes a great resplendent part of Chinese ancient architecture and a lot of timber palace and halls, temples and pagodas are also in existence, for example: the most centuries-old timber architecture in existence is the BaoGuo temple and the most centuries-old timber pagoda is Ying Xian timber pagoda, etc.

The frame system which has a different character of tenon-and-mortise connections or called Sunmao connections have been existing for almost 3500 years in china. The tenon-and-mortise connections compared with the simple bandaging connections can strengthen the entirety of the timber members which is very important to the behavior of the structure under the earthquake. Many great timber works have been appeared in the latter several dynasties and also a special structure form which called bracket set or Dougong has come into being. It should be noticed that the timber construction techniques came to its paramount in Tang Dynasty through thousands of years' development, for example: during the timber construction, the whole process can be divide into 5 steps which is called lofting, members facture, trial erection, formal erection and completion of projects; during the processes of design and construction, a standardization method like the modularization method which is prevailing presently was applied in that old times and actually it can help the constructors to improve the construction efficiency.

At the end of 18th century, with western science and technology spreads into china, the Chinese timber post and beam system was replaced gradually by the wall-supported timber truss system because of the large expense of materials of conventional timber architecture. After People's Republic of China established, a whole new world should be rebuilt. Because the timber construction has a short construction period and the wood raw materials can be easily obtained, many half-timbered buildings were constructed. But with the acceleration of construction, our country met the problems about the forest's overcutting and destroying and our forestry resources became more and more deficient. In 1980s, our country's structure wood had been almost cut away and at the same time the government did not consider to import structure timbers, so Chinese timber engineering met its winters. This situation lasted until 1998, our country began to take a series of measures to encourage importing timbers, thus a lot of importing dimension lumbers and engineering wood are applied in constructions and our timber engineering market revives.

## 2 History of Chinese education of timber engineering

In the old times, the construction principles of Chinese ancient civil engineering come directly from the engineering practices, and these principles or called experiences can be accumulated and transferred from generation to generation. Though some books about the civil engineering had been published like "Yin Zao Fa Shi, Lixie, 1103" and "Gong Cheng Zuo Fa, Qinggongbu", it can be concluded that there is no education system of timber engineering during Chinese ancient times.

It can be regarded that the Chinese education of timber engineering began at the end of 19th century and it first appeared in Beiyang University (now Tianjing University) in 1895. Several years later many new-born universities set civil engineering courses, for example: Tongji University set it in 1914 and almost 30 students took the course, later in 1930 Tongji University set the civil engineering department. But in those turbulent times, the Chinese education of civil engineering was just at the beginning and many researchers and scholars were engaged in introducing the theories from foreign countries, so the education of timber engineering was at its early age.

In 1950s after the civil war, many things should be conducted and the timber engineering education was among them. Tongji University had set up the staff room of timber engineering before 1960s and a few courses about timber engineering had been given to the students. In 1960s, the staff room of steel and timber engineering had been united and the amount of students and teachers became more and more. At that times the one aspect of timber engineering's course and research was about the conventional timber structures or connections such as timber trusses, timber roof trusses, notch and tooth joints and bolted joints, and the other aspect mainly focused on our country's ancient timber structures. It is clear that at that time our timber engineering markets along with the education had no contact with other countries', therefore the advanced techniques, products and methods about the modern timber engineering could not be introduced into china. In the early 1980s, because the timber industry was blocked, the timber engineering education and the corresponding courses in many universities had to be eliminated or reduced, thus after the middle 1980s many universities did not set timber engineering courses. Because there is no courses about timber engineering, many students whose major is civil engineering knew little about the modern timber engineering's structure forms, design methods and construction ways, thus there was almost no research works or thesis about it in 1990s.

### 3 Revival of timber engineering education and its main content

With the acceleration of Chinese reforming and opening-up in the latter 1990s, a lot of foreign timber engineering enterprises came into china and they conducted so many market research works as to promote the timber engineering, at the same time, Chinese government took much encouraging measures for the timber engineering market. In this situation, many specialists and scholars from a lot of universities realized that the modern timber engineering is suitable for the development of Chinese timber market, thus many of them began to engage in the teaching and research works of timber engineering. Presently many universities such as Tongji University, Harbin Institute of Technology and Chongqing University have set courses about timber engineering for undergraduate students and have set research subject about timber engineering for graduate students; especially in Tongji University, an elective course called Advanced Timber Engineering has been set for undergraduate students for several years and its content is about the fundamental theories of modern timber engineering, besides this, teachers would invite several famous professors from University of British Columbia to give some lectures to broaden students' horizons.

After all, the modern timber engineering in china is just at its beginning, many universities' students and some engineering design workers know little about it and they are worry about many aspects such as the wood strength, fire resistance and insect prevention, all these unnecessary worries block its development in china. So the universities' courses about timber engineering along with some lectures or examples should be taken to make more and more people know the timber engineering for its further development in china.

## 4 Continuing education of timber engineering

When some universities began to popularize the modern timber engineering, many relative enterprises held different lectures and training classes about timber engineering in which many foreign experts and technicians were invited to give some design works and construction guides, for example, CANFOR (Canfor Wood Products Marketing Ltd.) associating with some famous domestic technique companies and material producers commit Shanghai Institute of Technology to create CANFOR college to train construction technicians for free for the building developers that are interested in opening the market of timber structure buildings in china, and the CANFOR college also got great supports from Chinese Academy of Forestry. It is true that all these lectures and training classes are very necessary to transfer much market information timely because these sponsors themselves are very sensitive to the alteration of the whole market. This continuing education of timber engineering actually does some help to the development of timber engineering in china.

## 5 Problems and prospects of Chinese education of timber engineering

At the beginning of the new century, China joins WTO, with liberalization of the commerce; the whole architecture industry meets not only challenges but also chances. As a suitable construction form in china, modern timber engineering along with the timber engineering education will step into the right way in the near future. But presently there are also several problems need to be solved.

In the aspect of subjects' cooperation, timber's material subject has few cooperation with the structure subject as a result, many of students or few teachers are short of a comprehensive understand of the relation between the wood material and timber engineering. Many teachers or researchers from colleges of forestry just pay attention to the research of wood material, and they are not care for the wood's performance under different forces or it effect for the whole structure, while others from colleges of civil engineering just take the reverse. So it is necessary to enhance the cooperation of wood material subjects and timber engineering subject.

In the aspect of the teaching staffs, we are short of teachers or professors who are familiar with the timber engineering. According to statistics, there are almost 300 universities or colleges that have set the civil engineering department, but among them no more than 10 have set the timber engineering courses. In Tongji, the amount of teachers who are engaged in the education and research works of civil engineering is about 100; while no more than 5 teachers among them are take the timber engineering education or research, and furthermore their research works are mainly focusing on steel structures or concrete structures. So it is necessary to make more teachers and researchers know the modern timber engineering.

In the aspect of the courses' content, it just focuses on the fundamental theories or formulas while the practices or experiments which are always necessary parts for the steel or concrete structure courses can not been seen during the timber courses. It is important for the students especially those who are major in engineering to have a try during the courses.

Though many problems about the Chinese education of timber engineering should be solved, there are both challenges and chances for the educationists and we all believe that the Chinese education of timber engineering will have a great future.