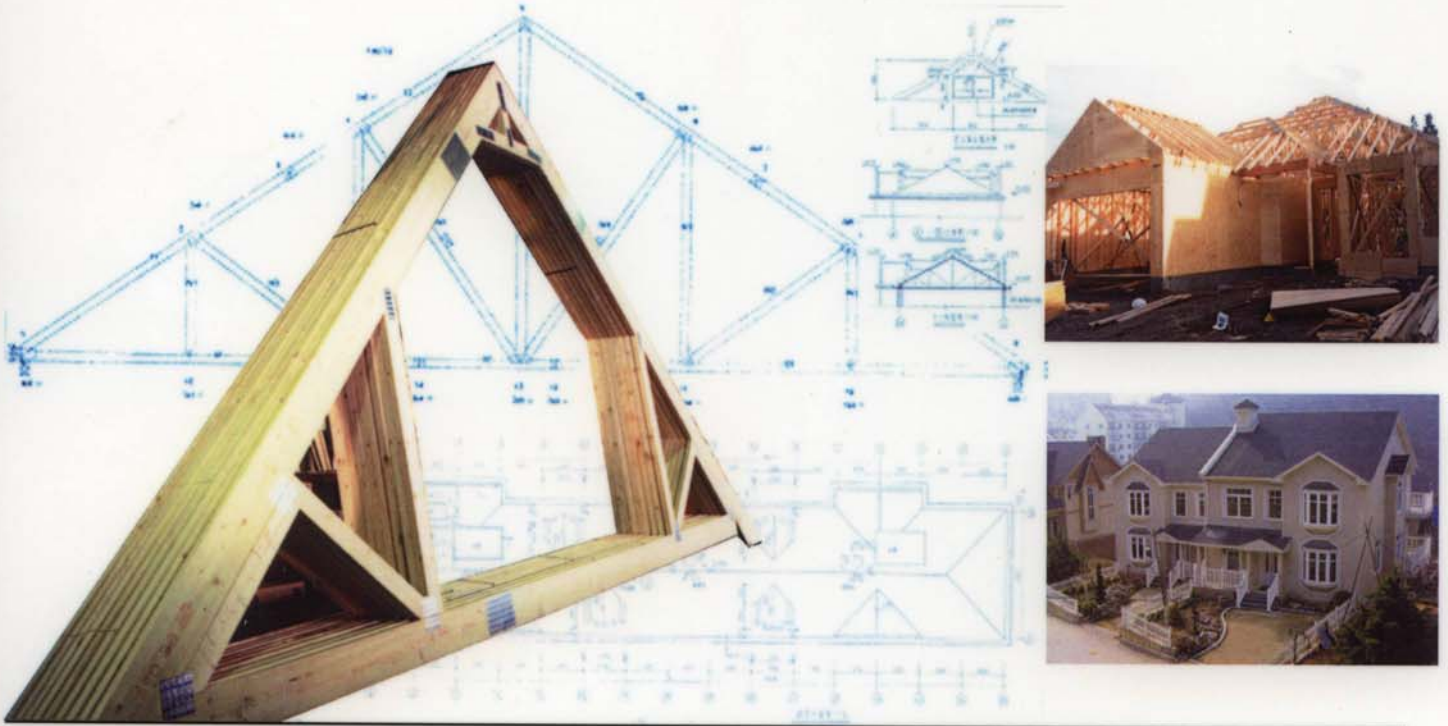




# People's Republic of China



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## OPPORTUNITIES FOR WOOD ROOF SYSTEMS CHINA

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Edited by:

David Cartwright  
Marketing Consultant

March 2004



Canada Wood  
加拿大木业协会



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## 1.- Executive Summary

This report identifies, qualifies and describes the opportunities that currently exist to develop the market for solid wood materials and components in the growing market for wood roof systems. The single family and the low-rise multifamily segments of the Chinese housing market are given special attention. The reconstruction of older style housing as well as religious and institutional structures is discussed. The challenges that have to be addressed are identified. Given the importance that Chinese businessmen place on the cost component of a given system or technology, special effort was made to compare the cost competitiveness of wood roof systems over concrete and steel.

China has a long history of building in wood. In recent years there has been an increasing awareness of, and interest in, the wood construction systems used in North America. The desire to adapt the best features of the North American life style has created a desire to learn more about this technology. Due to the efforts of Canadian and American forest and wood industry associations, Chinese builders, architects, engineers and consumers are changing their prejudice about traditional wood housing and wood roof systems.

China's average family has experienced a rapid rise in their income. Their primary area of investment is in their residence and, as a result, there has been a housing boom particularly in key eastern cities including Shanghai and Beijing. In urban Shanghai, the area of residential buildings constructed annually is close to, or exceeds, 20 million m<sup>2</sup>. This rate of construction is expected to last until 2010. The residential buildings are high-rise buildings, medium-high-rise buildings, low-rise apartment blocks, townhouses and single-family houses commonly known as villas.

The potential market for wood roof trusses and systems is believed to reside in the following sectors:

- Villas
- Low-rise apartment blocks (roof replacement program or new construction)
- Rural housing
- Building restoration program (primarily temples and traditional wood housing)

A recent housing survey indicated that in 2001 Shanghai had over four million square meters of villa style housing. The main structural system used in villa buildings is a brick-and-concrete composite construction. Occasionally other structural systems are adopted including light steel and platform frame wood structures.

At this time the luxury housing market, particularly in Shanghai and Beijing, appears to offer the best market opportunity for wood roof systems. The penetration of this market could lead subsequently to a greater use of this form of roofing in the low-rise apartment roof construction and roof replacement markets.

During the twenty-year period from 1970-1990 numerous low-rise (up to six floor) apartment buildings were constructed throughout China. Many of these have developed

serious roof leakage problems. A program to replace the flat roof of these buildings with a peaked roof has gained acceptance and is beginning to be implemented in numerous cities. The potential for the introduction and use of wood roof systems in this program is a good one given the lightweight and cost effectiveness of this roof.

In Shanghai, over the past three years, about 4,000 buildings have been renovated in the manner described above. It is forecast that 1,000 buildings encompassing approximately 2 million square meters of roofing area, will be renovated annually.

The rural roof housing market is a potential market that warrants consideration. While wood in the rural areas of China has been used since time immemorial, today its use is presently discouraged given the lack of a domestic, inexpensive source of wood. Canada's solid wood exports have to date not gained a foothold in this sector given its comparative cost and the difficulty of shipping products into rural areas.

The reconstruction and preservation of heritage sites including temples, housing and other national monuments offers a market niche for wood roof systems. While it may not pose a good opportunity for wood trusses manufactured from CLS dimension lumber supplied from Canada, it does offer an opportunity to manufacturers of larger sized timbers particularly western red and yellow cedar.

The design, construction, inspection and acceptance of roof systems is regulated by the following major codes and standards:

- Code of Urban Residential Areas Planning & Design (GB50180-93)
- Design Code for Residential Buildings (GB50096-1999)
- Code for Seismic Design of Buildings (GB50011-2001)
- Code for Fire-proof Design of Buildings (GBJ16-87)
- Design Code for Timber Structures (GBJ5, new revision to be announced)
- Code for Construction Quality Acceptance of Timber Structures (GB50206-2002)
- Standard for Methods Testing of Timber Structures (GB/T 50329-2002)

All of these codes allow the use of the wood roof system. However, fire proofing, termite protection, preservation and connection stability are major issues dealt with in the codes.

The cost comparison component of the report includes three areas of analysis:

- Cost of manufacturing steel and wood trusses
- Cost comparison of peaked roofs built on a low-rise apartment building in concrete and steel
- Cost comparison of roof systems built on a low-rise apartment building and single family, villa style, residence in wood and concrete.

The cost of steel trusses manufactured in China is generally higher than the cost of manufacturing equivalent wood trusses in Canada. The differential favoring wood trusses over steel trusses is expected to increase as the Chinese wood truss industry develops and

gains a foothold in this market. At this time the wood truss technology is at a very early stage of development.

The cost of constructing peaked apartment roofs using steel trusses is from 15-81% higher than the cost of building the roofs in concrete. The differential in price is a function of the design of the roof that may or may not lend itself to one or the other construction material.

The cost of building a pitched roof with poured in place concrete on the selected six-story apartment block is higher than the equivalent roof built out of wood. The cost of the concrete roof was calculated at 252.97 RMB/m<sup>2</sup> of unfolded roof area. The equivalent wood roof was 191.06 RMB/m<sup>2</sup>, a savings of 61.91 RMB/m<sup>2</sup>.

The cost of building a pitched wood roof on the selected single family, villa style residence is lower than the equivalent roof constructed out of concrete. The cost of the wood roof was calculated at 102.68 RMB/m<sup>2</sup> of total constructed area while the comparable cost of the concrete roof was 116.65 RMB/m<sup>2</sup>.

The result of the cost analysis, favoring wood roof systems, warrants a well-organized market development effort by Canadian exporters of solid wood products, machinery, equipment and technology. The key ingredients of such a program should address the following issues:

- Transfer of technology
- Development of appropriate codes
- Demonstration projects
- Involvement in a large-scale commercial project.

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