

Engineered wood products: Alternatives to traditional methods

By John Halkett



Enhanced strength, lower weight and improved cost competitiveness of engineered wood products is challenging both solid timber and other building materials like steel, concrete and plastics in construction markets.

Asia is beginning to follow the trend, now well established in temperate forest regions, of replacing large cross-section structural timber beams and joists with engineered wood products. As supplies of timber from larger tropical forest trees become more difficult to access, engineered wood alternatives are increasingly likely to fill this structural

timber market space in Asia, as has happened elsewhere.

Engineered wood products provide the building industry with an “intelligent” structural alternative to traditional solid timber for an expanding range of building needs. The continuing commitment to engineered wood product development and growth in market share, in Asia and

elsewhere, will include new products and new ways to satisfy housing and other building applications.

Growth in use of LVL

The enhanced strength, lower weight and improved cost competitiveness of engineered wood products is challenging both solid timber and other building materials like steel, concrete and plastics in most construction markets.

Laminated Veneer Lumber (LVL) has emerged as a significant engineered wood product for housing and other construction activities, according to a recent study by the BIS Shrapnel Forestry Group.

The study, “Laminated Veneer Lumber

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(LVL) and other Engineered Structural Wood Products 2001-2006", forecasts global consumption of LVL to increase by more than 30 per cent, from 2.3 million m³ in 2001, to more than 3 million m³ by 2004.

The spectacular growth in demand for LVL is expected to continue as the timber industry switches from using large trees from primary forest to smaller logs from regrowth forests and plantations.

The advantages of engineered products, such as LVL, over solid wood include stability, consistency in quality, and better use of wood fibre and guaranteed performance. LVL also offers the forest industry an opportunity to reverse the trend to non-wood substitutes encroaching on market share.

So far, the largest use of LVL in North America, Europe and Australasia has been in the manufacture of I-joists for the construction of raised flooring. However, its penetration into other end uses is growing rapidly. These include wide span beams, roof trusses, and windows and door headers.

Mr Andre Neumann, the principal author of the BIS Shrapnel study, says the North American pattern of replacing sawn timber

with LVL in structural applications is being mirrored elsewhere.

"The uptake of LVL has been notable in Japan, where its use has been growing in spite of a decline in housing activity. The main areas of use are for semi-structural applications like stair parts, wall studs and floor joists. The use of LVL in structural posts and beams in traditional houses is also growing."

"The emerging economies of Asia have the potential to consume substantial volumes of LVL, as investment in infrastructure development, industrial production and housing grows," he says.

He adds that continued product improvement will enable LVL and glulam (glued laminated wood) to compete more aggressively against steel in some areas, with LVL considered more environmentally acceptable. LVL is also expected to continue to erode the market share of sawn timber in a number of end uses markets.

According to Mr Geoff Sanderson, managing director of Australian Ausply, LVL has become more popular because of the dramatically improved engineering properties and excellent strength-to-

weight ratio.

"LVL is much stronger and stiffer than the parent material," he says. "The improved structural properties can be utilised in the chords of trusses, the outer laminates in glue laminated beams, or as the flanges in plywood webbed box, C or I beams."

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New plants and expanding markets

The expanded engineered wood product manufacturing trend in the broader Asian region has recently been demonstrated by global leader in engineering wood products, Weyerhaeuser's Trus Joist. The company commissioned its first manufacturing plant outside of North America in Australia in February 2003.

The A\$11-million Trus Joist Australian operation manufactures the patented TJI Joist from radiata and slash pine. The plant will be a key to Trus Joist's strategy of growing its business to service both the Australian market and other markets around the Pacific Rim.

According to Mr Tom Denig, president of Trus Joist International, the Australian plant includes the latest innovations in wood processing technology.

"The new plant has been designed to meet the growing demand for engineered wood products in the Australasian market as well as an export potential into Japan and other countries in Asia," says Mr Denig.

In officially opening the Trus Joist plant, Australian Forestry Minister, Senator Ian Macdonald said: "The joists manufactured here to be used in flooring systems, utilise up to two-thirds less wood than sawn timber joists. They are lightweight, have



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strength uniformity and the ability to span long distances, making them an ideal substitute for sawn timber.”

Trus Joist’s Australian manager Al Huber



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says alternatives like steel are promoted as “stronger, stiffer, straighter” building choices, but the structural quality of any building material is more an issue of overall performance.

“Although it is a wood-based product, engineered wood products are manufactured to minimise timbers’ natural,

strength-reducing defects, such as knots and resin pockets and to reduce bowing twisting, shrinking and other changes in shape,” says Mr Huber.

Housing and construction are continuing to drive demand for timber in many parts of Asia, including China. The Beijing Government is continuing to demonstrate an enthusiasm for maintaining the high level of economic growth evident over the past two decades.

One mechanism used to maintain this growth has been to support the housing sector. US\$60 billion of public spending went into housing construction across China in 2001.

It is predicted that over the next decade about 20 million Chinese will move into new homes each year. This represents almost the entire population of Malaysia.

Mr Mike Thompson, president of Weyerhaeuser Asia, says the prospects for greatly expanded engineered wood product sales in Asia are good.

“The market is strong and we have high hopes in Japan. We also have marketing initiatives in China where wooden framed housing demand has been triggered both by economic growth and a desire by a more affluent population to live in something larger and more

attractive than the traditional ‘concrete bunker’ house,” he says.

Benefits over solid timber

Engineered wood products have some real benefits over solid timber alternatives. Reduced “pressure” on forest resources is achieved by:

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- Improving log conversion rates by up to 75 per cent.
- Using structurally efficient shapes. The “I” configuration of engineered joists reduces the wood fibre required in flooring and roofing systems by at least 50 per cent.
- Enhancing engineered performance characteristics. Wider on-centre spacing of engineered timber joists enables less material to be used.
- Waste is reduced because engineered wood product manufacturing processes minimise defects like knots, wane and resin pockets. Job site waste is also reduced.

It is now acknowledged that tropical timber products have been losing market share to temperate softwood products for some years. Worldwide, the market share of primary tropical product imports has fell from around 24 per cent in 1993 to 16 per cent in 2000. This trend reflects the decreasing availability of tropical timber, prices, construction trends, the more ready supply of other timbers, plus product development including engineered wood products.

While the quality, decorative and other properties of tropical species will keep these world-renowned timbers in demand, increasingly substitution of tropical timbers with products from plantation-grown species will likely occur.

Composite and engineered wood products capable of being manufactured from smaller, lower quality forest resources offer greater flexibility in construction uses and will be an increasing feature of Asian forest product markets in the future. **AT**