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Editorial

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Welcome to the first issue of *Construction Material's* special editions focussing on timber in construction. I'm the new kid on the block and it is with enormous pleasure that I write my first Editorial as a member of the Editorial Advisory Panel. My main area of expertise is the examination and assessment of timber in historic buildings and, more recently, timber structures in our railway infrastructure. Timber is one of man's oldest and most versatile building materials and, arguably, until recently has been overlooked in an industry dominated by steel, concrete and glass. Timber is now enjoying something of a renaissance.

Structural timber products are being improved and developed continuously, creating new opportunities for their use in construction. For example, weak, highly variable, low-value timber of small cross sections may be transformed into strong, reliable, value-added construction materials such as glued laminated timber (glulam) and cross-laminated timber (CLT). In short, innovation and manufacturing can add value to previously considered low-value raw materials with limited end use.

The increasing popularity of using timber can be attributed to the combination of benefits that timber offers, such as construction versatility, an excellent strength to weight ratio, and the ability to reduce carbon emissions that result from construction activity. Timber has the ability to significantly reduce a scheme's carbon footprint; providing new trees are planted to replace felled trees, the use of timber does not contribute to increasing levels of atmospheric carbon.

In a world increasingly dominated by the climate change debate, carbon and carbon dioxide emissions have been recognised as contributory factors in climate change. A large proportion of carbon emissions come from the construction industry. The use of timber can have a positive impact on carbon emissions. Forests act as carbon sinks. Moreover, increasing our use of timber and adding value to it can tilt the balance in favour towards more widespread forest management for timber production. Timber used in construction can lock up carbon and can also substitute more carbon-intensive materials. Timber, when procured from well managed forests, is a renewable and sustainable building material. With sustainability being one of the key words dominating the construction industry, let's jazz up this zeitgeist with the first of two issues focusing on timber as a construction material.

The first paper in this issue is a briefing note presenting the case for British timber in construction. Smith (2015) states that the availability of UK-grown softwoods and hardwoods is expected to increase. The UK is one of the world's largest importers of timber and although we are self-sufficient in low-grade timber, we rely heavily on imports for high-value end use and engineered timber. The briefing summarises Forestry Commission statistics which indicate that there are opportunities for the UK to become more self-sufficient in high-value timber products. However, this will require significant investment beyond sawmilling and kiln drying if these predicted volumes of timber are to be utilised. The key challenge appears to be creating demand for a wide range of higher value timber products. The resource is there and growing. How does the UK timber industry attract investment and create demand for these products?

Within the UK there is a marked disparity in the end uses of UK-grown timber compared with imported materials (Bawcombe and Harris, 2015). The second paper in this edition evaluates the properties of Douglas fir grown in the south-west of England. The principal driver behind this research was the concern that the best end use was not being made of Douglas fir within the south-west region. The authors believe that this is reflected in other areas of the UK. The paper demonstrates that mechanical strength testing data derived from small clear specimens of Douglas fir from the south-west of the UK are comparable to those from international locations. The paper also evaluates different silvicultural practices and their impact on timber quality. It could be argued that the best time to implement effective forest management would have been more than 40 years ago. The next best time is now!

CLT is an innovative engineered material that can be used for almost all superstructure elements (Crawford *et al.*, 2015). The third paper presents the key factors required for using UK-grown timber for CLT production. The authors also evaluate the structural performance of CLT manufactured from UK timber against a commercially available imported product. UK CLT could span 98% of the equivalent European product but was only capable of 85·6% of capacity when assessed for buckling in wall design.

CLT buildings of seven storeys or more can have low mass in comparison with to conventional structural forms. Reynolds *et al.* (2015), the authors of our fourth paper, propose that an understanding of dynamic lateral stiffness and damping has been insufficiently researched and that better understanding of dynamic performance is essential when designing for wind-induced vibration. The paper highlights that output-only modal testing can be used to identify modal parameters for a CLT building during different stages of construction, and such studies are vital to inform the design of taller timber buildings. How high can we go with CLT?

Our fifth paper by Leyder *et al.* (2015) introduces the ETH House of Natural Resources in Zurich. The building comprises three innovative structural systems. The building will serve as a 'living lab' for the implementation of a permanent sensor network for monitoring the long-term performance of the building and, also, its performance during construction. The authors predict that the research will help predict the structural responses of innovative hybrid timber structures in response to significant loads such as high winds or earthquakes. The ETH building will be the first Swiss demonstration building utilising engineered hardwood. It comprises a post-tensioned timber frame, a composite beech laminated veneer lumber, a concrete floor and a timber floor slab made of CLT and beech laminated veneer lumber.

Timber structures face a number of risks associated with flooding and/or wetting and these are set to increase as weather patterns – particularly rainfall – changes as a result of climate change. The risks associated with fungal decay are well documented. However, not as well understood are the risks associated with a reduction in the mechanical properties of the timber components in a flooded building. The issue closes with a paper written by Bradley *et al.* (2015), which presents the results of experiments to identify optimum drying conditions for conventional timber-frame buildings affected by flooding. The authors observed that the oriented strand board (OSB) sheathing was most likely to deteriorate after flooding, and that connection failure was always attributable to the OSB. The authors identified drying conditions that could result in the greatest recovery of strength if flooding damaged OSB. However, how this loss in strength affects overall racking resistance and the stability of the building requires further research.

Enjoy the first issue of this special edition!

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