Has wood – like wool – become a fibre of the past? Has wood, which has served us well for the million years of human history, now been supplanted by precision materials? By materials with standardised properties that engineers and architects are happy to incorporate into their designs?

As I said in the book The Leading Edge: “Ever since human beings began living in houses, wood – if available – has been a preferred building material. At first, round poles were bound together to form the structure, which was often clad with such things as branches, mud, straw or hides. Later, the round poles were wastefully squared, and mortise-and-tenon joints were employed. Although more precise than poles, even a first-rate carpenter working with these rough-hewn beams would be doing well to achieve specifications of within quarter of an inch.

“People who lived in houses made of beams shaped by broadaxe and adze were jealous of those whose tidier accommodation was made of sawn timber (ie lumber), which was originally made by pit-sawing using human muscle-power. Sawn timber was relatively straight, with a fixed width and breadth, so it became possible to retain tighter specifications and to adhere more closely to geometrical shapes. Today, it often comes as a shock to discover the hand-hewn amorphous constructions of earlier periods (or of contemporary Third World houses) were not, and are not, valued to the same extent as the level floors, flat surfaces, straight edges and right angles of a more industrial civilisation. It takes a lot of skilled and expensive labour to overcome the slight variations in thickness and width of the less machined wood. As any builder knows, the time taken to ensure absolute accuracy is well spent: mistakes at ground level will always compound further on, or else require considerable extra effort to correct.

“But even sawn and gauged lumber is not perfect; somewhere between the sawmill and the finished building, wood tends to shrink, check, collapse, bow, crook, cup or twist. It required the advent of reconstituted wood – synthetic wood if you like – to achieve precision levels almost as good as can be detected by the human eye, and approaching those obtained in the engineering profession, using steel.”

When you think of wood as a structural material, do not think in terms of traditional New Zealand houses. The low population density of Australasia has led to wooden single-storey homes, but this is far from typical in the modern world. More people now live in cities than in the country, and in multi-storey dwellings at that. But dwellings are only a part of our built environment: there are all the commercial buildings, including factories, shopping malls and office blocks, as well as transport infrastructure such as bridges and airports. In these structures, wood is often used only cosmetically, or for accessories such as furniture. Even then, an extremely thin veneer of wood may be sufficient to disguise the essentially non-biological nature of the underlying material.

Just as MDF and similar products meet modern requirements for consistency and precision for panels, so LVL and CLT achieve the same purpose for structural timber. These consist of veneer sheets (typically three millimetres thick) joined with a phenolic adhesive – in future probably bio-based thanks to Scion’s new research. This material is stronger, stiffer, more homogenous and more reliable than sawn wood – and can be produced in the long lengths and large cross-sections suitable for large commercial buildings.

Foresters should be aware of these developments. The glimmer of light on the horizon in the form of multi-storey wooden buildings is not the last dying ray in our sunset industry, but may be the start of a glorious new dawn. We may be commencing an era of sustainable resources, a period where the environmental consequences of manufacture, use and disposal of materials is of crucial importance.

Is it possible that wood, with all its acknowledged virtues of sustainability, can make a comeback and challenge the dominance of concrete and steel? Can it tackle these products head-to-head in an arena where the judges are civil engineers and architects? We are fortunate in New Zealand to have some formidable experts who have risen to the challenge. At the University of Canterbury, attendees at the NZIF conference saw the good work being done by Andy Buchanan and his team. The STIC demonstration building involves rocking walls designed to absorb earthquake shocks, and then to spring back – leaving the building largely intact, except for easily replaced sacrificial steel plates. Could this be the basis of the Christchurch rebuild?

A vital point to note is that it is not a question of wood totally supersedes steel or concrete – each material has its virtues. For example, the Buchanan structure uses LVL beams post-tensioned with steel wires, and concrete diaphragm floors sitting on those beams. Wood has a superb strength to weight...
Editorial

ratio, and has many environmental virtues. But steel may have ten times the tensile strength of wood, while concrete is effective at soundproofing. Nature uses composite materials throughout the plant and animal kingdoms, so we should not allow lobbying by interested parties to blind ourselves to the wonders of mixing and matching our materials. It is not a question of wood OR concrete and steel, the ideal is a happy alliance of all these materials and more.

Winter of discontent

Despite the above upbeat remarks about the future of wood, the Conference underlined my personal sense of failure. I have spent most of my working life as a researcher on carbon forestry (going nowhere) and on silviculture (ditto). I have investigated the minutiae of pruning, thinning, stocking and rotation age. In Mark Dean’s paper you will read about the trend to undifferentiated wood: radiata pine increasingly sells for a similar price regardless of quality, internal or external. At current price differentials, the best option may be to plant and then walk away; by doing that, you achieve highest volume and best structural quality. Not that devotees have ever suggested that radiata pine is an ideal or even an adequate structural species.

In other words, was the FRI silvicultural research group wasting its time for all those years? Or – appalling thought – would New Zealand have been better off without its very existence? Without such research, foresters might just have planted and walked away, exactly as they did with the Kaingaroa old-crop. We would have had more wood to sell and it would have been of superior (structural) quality.

But Graham West assured me that this is not the case. Vertically integrated companies, he said, are not selling export logs regardless of quality. For example, they are cutting out furniture blanks for a substantial premium. Even pruned logs are selling at 50% higher than the equivalent unpruned, because the Chinese are eagerly making such things as radiata pine cots, for babies born in the Year of the Dragon. If every “Dragon Baby” had a new such cot, this could account for an industry worth US$1billion – and we may regret not pruning more trees in recent years.

It’s not just a matter of vertical integration. I am told that Austrian foresters make 15 times as much income from a similar harvest volume as New Zealand – despite not being vertically integrated. It must be a matter of marketing – at which endeavour New Zealanders have always been atrocious (Fonterra aside). I guess the global market has yet to learn about pruned logs, and that radiata’s best use is for appearance. Oh well, even if my years of research have not yet reached the intended destination, I have enjoyed the journey.