NEW CANADIAN WOOD PRODUCTS

Intact forests of the world
Canadian forests occupy 350 million ha, of which
- 0.6 million ha (120 million cubic metres) are harvested annually
- 3 million ha lost to fire
- 15 million ha defoliated or killed by insects
Douglas Consultants

BC, mainly in reaction to the beetle-kill problem, has authorised wood construction for 6-storey buildings. Quebec still considers it on a case-by-case basis.

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So there's lots of innovation in Canada, eh?

Used to be 10 to 15 years behind Europe in wood technology, but it gives Canada a chance to take a fresh look at the conventional ways of doing things, and they are now catching up, and taking a few short cuts to get ahead in some fields.

Europe has traditionally built for the very long term, with concrete and stone.

Canada, at least since the introduction of the 2 by whatever, or, as we say here, whatever be 2, has traditionally built in light-frame timber.
Some Canadian innovations and developments

- Lamloc
- Torrefaction
- Relam
- CLT 2.0

Originally developed for floors in freight-train wagons

Assembly of lightly-interlocked wood elements, with no glue

Fixed together with a twisted aluminium dowel

Provides floor and ceiling finishes

No floor cracking or squeaking

Choice of wood, often maple

Obviously not the best for acoustical isolation

Very localised production and use on a few commercial projects
Torrefaction is the process of heating the wood, in the absence of oxygen, to temperatures above the point of combustion, to cook and convert the cellulose into something somewhat unpalatable to insects and moulds, without the use of chemicals.

It's not new, and it's not a Canadian innovation, but at least one Canadian torrefactor has developed a pretty good technique.
By playing with the timing, the temperature, the length of time and the rate of heating and cooling, you can obtain gradations of colour. Different species of wood give different colours. The torrefactor I work with is primarily an equipment fabricator, known mainly for his drying kilns. He has developed his expertise in torrefaction equipment and especially the torrefying process, through a lot of trial and error and now can treat pretty well all hardwood species, and a lot of softwoods.

I like this product because it’s an intelligent way of building strong timber in 2 by whatever, where “whatever” really means “whatever”. While the thickness is dependant on the “2 by” wood it is fabricated from, the width and length can be fabricated, without any wastage apart from saw cuts, to any width from 2.5 to 16 inches (63 to 406 mm) in 1/16” or 1 mm increments, in any length from 5’-8” up to 32 feet (from 1.7 to about 10 metres) in the same increments.
They start with buying low-grade timber, cutting it into lengths of 4 feet, and rejecting those that are defective to go into wood pellets for heating. The good pieces are then given a special edge-profile and glued side-to-side in a continuous process, creating a never-ending panel 4 feet wide.

An overall view of the repeated longitudinal joints showing the special edge-profile and side-glued joint.
Strips are then cut from this panel in widths which are a convenient multiple of the planned final width.

These strips are then finger-jointed end to end, creating an endless strip of that convenient width, and that endless strip is then cut into the desired final length, then into the final width, and load-tested for MSR rating.
The final result is a tailor-made high-strength element that has exactly the minimum depth for the required application, without a millimetre more than necessary. Less than 1% glue.

There has been a lot of experimentation required to come up with the present parameters, especially for the finger-joint geometry. The geometry involves finding the right dimensions for the hydraulic rebound, to provide a repository for any excess glue - same principle as a condom.
The main use so far in my practice has been for high walls and long-span trusses.

In the walls of a 30 m x 45 m garage, for example, we were able to use the Relam 18f product in 2x8 nominal dimensions to replace a 2x10 SPF No.2 quality. We stuck to the standard 2x8 dimensions to allow for standard 2x8 SPF top and bottom plates, for maximum economy.

It is usually economical to use Relam for the top and bottom chords of the prefabricated roof trusses, and in that position, we can specify the minimum dimensions that satisfy the loads, for example 37x121 mm.

I guess this is my favourite product, because firstly, just like everyone else (here), I like wood, and secondly, because chez Douglas, we love prefabrication. Everyone by now has heard of CLT, Cross-Laminated Timber, developed in Europe about 15 years ago, and enjoying fairly rapid growth in that region, where they fabricate 600,000 cu. m. annually.
CLT is usually fabricated by quickly assembling the glued layers of wood and applying pressure, either with a hydraulic press or with a vacuum, while the glue sets. Then the CNC machine cuts the panels to final shape and size and routes out the wiring recesses in the surface layer, and other surface treatments.

There are already two major CLT producers in Canada, with huge plants and huge capacities, and, consequently, huge investments. They are not yet up to full production, and are waiting for the market to catch up. Others are looking at the possibilities and waiting for the market. But one of them, CLT Canada, has taken a completely different approach.
CLT Canada uses a layer-by-layer treatment, allowing for creating holes, cut-outs, grooves, recesses, in each individual layer, and gluing each layer in a separate process, with everything, including the glue, controlled by the CNC machinery. They can create wiring recesses, for example, inside the finished panel, obviating the need, when fire resistance is not required, for adding gypsum panels. They can easily use different species for each layer, and can create lots of different finish colours, including the gradations with torrefied wood. Some of the hardwood species, with very few knots, create a high-quality finish product.

The three challenges:

- The CLT technology has been developed.
- The product has been defined and developed.
- But the business has not yet developed. The market is not there yet, at least not in North America, Australia and New Zealand.
The original technology has been developed and adapted to the strategy of matching the equipment and process to the market, and this is the major all-important difference. They have entered into an agreement with a major equipment manufacturer to develop a plant that can grow with the market, and, of course, they would love to be a part of the potential of the Australian and New Zealand markets.

The companies who have developed these products are interested in assisting in eventually setting up manufacturing facilities in this part of the world. They recognise that others are quite capable of independently developing similar products, and so they prefer to work with people who know the business here and they would like to be a part of a local enterprise and to license the technology in a way that would make it more attractive to local businesses than to develop these products themselves.