Layers of wood laminated together in alternating perpendicular direction – that’s cross-laminated timber (CLT) in a nutshell, and it’s becoming an increasingly viable alternative to concrete and steel as a building material.

Its benefits are manifold. As an orthotropic material, timber has the useful property of strength in multiple directions. But, unlike glue-laminated (glulam) wood – which is stacked in one direction – when the layers are cross-laminated, the resulting material’s flexural strength is greatly enhanced. It’s one of the simplest examples of a composite material.

The speed of build is a big draw for developers. At the Future City, Future Wood conference in London, Hermann Kirchmayr, Head of Technical Support and Development at global forestry product company Stora Enso, demonstrated the company’s recent R&D project – a three-storey house that successfully resisted an earthquake simulation and a buckling test under 40t of weight, having been assembled in just two days. A total of 32 earthquakes, one of which reached forces of 0.8g, were simulated using a shake table. Particular attention was paid to connections between the wooden elements, which are put under heavy strain. The tested building was just under eight metres tall, with a surface area of around 90m² distributed across three rooms over three storeys.

Thomas Demschner, R&D Engineer at Stora Enso, is a structural engineer with a past in tunneling and concrete research. ‘When I first learned about CLT I was more than surprised – I was amazed,’ he says. ‘Back then, I thought the peak of technology in structural timber was a glulam or laminated veneer lumber beam.’

Demschner demonstrated the case of a 100m-tall windmill constructed in 2012 in Hannover, Germany, by TimberTower. ‘The shaft of the tower is made from CLT, and it’s the only load-bearing element in the shaft,’ he says. TimberTower claims that the windmill made a weight saving of around 272t compared with sheet steel, and at the end of its working life can be easily recycled.

Alongside sustainability, design freedom was the phrase of the day. Images of new residential builds were particularly striking – a cantilevered three-storey family home in Škofja Loka, Slovenia (above left), engineered by CBD, performs a balancing act that appears to defy logic, and would have been costly with a concrete and steel construction – Bruno Dujic, CEO of CBD, says that while the buildings could have been made from steel and concrete, the higher weight and therefore load on the foundation would have added structural complications. CLT forms the two aboveground storeys, which rest upon a concrete basement floor.

Use of CLT is rising rapidly – development giant Lend Lease is one of the large-scale adopters of the technology, with CLT projects in the UK including a new housing development in Battersea, London, and a large-scale redevelopment of the city’s Elephant and Castle area underway.