Continuous densification of solid wood – the band press approach

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The densification, i.e. transverse compression of solid wood can lead to improvements in the mechanical properties, and this opens up new applications for low-density wood species, in particular. For the past one hundred years, many efforts have been made to mass-produce densified wood products, but despite being available on the market, they still are niche products with annual production volumes of about 2000 m3 in Europe.

Hitherto, all commercially available densified wood products have been produced in a batch-type process, which limits the achievable process speed and integration into the largely continuous wood processing chain. In two previous studies, we explored a continuous surface densification approach using roller pressing equipment. Desired density profiles with a pronounced peak close to the surface could be obtained at process speeds of up to 20 m min-1. However, the short contact time between the wood and the rollers makes it virtually impossible to integrate a cooling stage and treatments to reduce the set-recovery into the process.

For these reasons, we propose the use of a band (belt) press. Such a machine will be installed in the Wood Science and Engineering division at Luleå University of Technology in the first quarter of 2020, and will function as a research and process development platform. The press is dimensioned for the densification of full-sized floor boards of up to 250 mm in width and 100 mm in thickness, at a processing speed of up to 60 m min-1. It is equipped with sensors to measure the pressing forces, moments, and the temperature, and its design allows for digital image correlation analysis of the densification process. We hope that the new band press will push densified wood products closer to large-scale industrial implementation and foster new collaborations with other research groups in the field of wood densification.

**Keywords:** wood compression, densification process, belt press, process development

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