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In situ investigations on vertical density profile development during hot-pressing

Matthias Gruchot
R&D Team Leader
Swedspan International
Bratislava, Slovak Republic

Joerg B. Ressel
Professor
University of Hamburg
Hamburg, Germany

The vertical density profile in wood based panels is one of the most important material parameters. It correlates with many properties essential for the end use of the panel, i.e., bending strength, internal bond. Currently it is possible to simulate the density profile during the hot-pressing process of the furnish mat. Some software packages based on physical-mathematical models are available, for instance *Vertical Hot Press (VHP)*. However, it is not yet possible to measure the vertical density profile continuously over the panel thickness during hot-pressing and thus to verify the process simulation. Currently only one method is known from the literature to investigate the density profile development at three positions within the mat during the hot-pressing process.

In the research work presented in this paper, a novel method for the *continuous measurement of the vertical density profile formation during the hot-pressing process - i.e., in situ* - based on a laboratory x-ray scanner and a miniature hot-press has been designed. This hot-press with an inner diameter of 50 mm (mat sample diameter) is mounted inside the scanner, so that the wide spread x-ray beam passes through the sample perpendicular to its surfaces. The measurements were done, so far, on wood furnish material for medium density fiberboard (MDF), which is the most sensitive panel type for density profile formation due to the small particle size.

The development of the measuring method and the design of the hot-press will be presented in this paper. Furthermore, some results showing the continuous density profile formation measurements will be shown and discussed.

This method provides a powerful tool for a deeper understanding of the hot-pressing process and for further development of pressing schedules, as well as adaptations of physical-mathematical models of the hot-pressing process to improve the board properties.