Time of Wetness (ToW) simulation based on testing moisture dynamics of wood

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Within the framework of CEN/TC 38 (European Committee for Standardization / Durability of wood and wood-based products) the WG 28 (Working Group Performance classification) have been established to harmonize, especially for use class 3 applications, views on durability aspects of wood species, preservative treated and modified wood. The related EU project PerformWood established the concept that natural durability and/or enhanced durability is not solely based on the presence of active ingredients having an impact on both fungi and insects. The material resistance complementary to this is also based on the time of wetness factor. Based on earlier results for plywood experiments were set up for solid wood. For plywood a simulation of time of wetness measured by continuous moisture measurements (CMM – Figure 1) (Van den Bulcke *et al.* 2009, 2011) was possible by using a floating test including wetting and drying components. For solid wood a soaking/submersion test procedure was added as a second test to distinguish between optimal design of a commodity and design including water trap. These methods have been used in a round robin and results were presented earlier by Brischke *et al.* (2014).

To complement this work some 52 wood species, 17 sets of modified wood and 8 wood based panels were assessed according this protocol soon to become a European standard test method. The method is based on one hand floating specimens with a face on water with edges sealed and on the other hand a submersion test with open end grain cross sections (Figure 2). The dimensions are aligned with common field test specimens. Results showed that absorption and desorption figures after 24 hours could differentiate wood species and still allowed to classify similar material in the same class. Based on curve fitting this approach can seemingly be improved and also parameters that explain better the water uptake rate and release rates next to total absorption and residual moisture content can be included. Data are presented using the unit g/m² for the floating test and kg/m³ for the submersion test but these values can easily be translated in percentages moisture content. The results as earlier presented by Van Acker *et al.* (2014) are now being compared with continuous moisture measurements to underpin the meaning of the critical parameters in relation to actual time of wetness.

Figure 1: Continuous Moisture Measurement (CMM) set up at UGent – Woodlab

Figure 2: Floating test (left) and submersion test (right)

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