Internal Report

Water Absorption Thickness Swell (WATs) of Ambara™

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To: Steve Getsiv
From: Micah Sutfin
Distribution: Bill Christou, Keaton Smith, Kimberly Smith, Laurens van Kleef, Madi Muller, Matt Kenton, Steve Osterman
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Subject: Water Absorption Thickness Swell (WATs) of Ambara

Background

Nova has recently introduced a new thermally modified species, Ayous (*Triplochiton scleroxylon*) into our product mix. In order to characterize physical properties of this modified species, basic physical testing was performed. Testing included the Water Absorption Thickness Swell (WATs) method, a standard ASTM test found in D1037 used to determine dimensional stability of wood and wood-based products.

Experimental

Two mixed grain (MG) and 2 vertical grain (VG) specimens were selected from 4 separate boards in efforts to minimize sample bias. Prior to exposure boards were cut to 144x22x201 mm (width,thickness,length). These measurements were used as the initial conditions for determining mass and dimensional increases throughout the testing process.

After the sample boards were cut, they were submerged in a water bath with spacers between sample groups to account for equal treatment. Width and thickness were measured from two locations on each board while length and mass (g) were taken from one data point per board. Measurements were recorded on a weekly basis until dimensions and mass were constant. A depiction of measurement locations can be observed in *Figure 1*. Note that results for percent length increase were excluded from this report as they were insignificant.

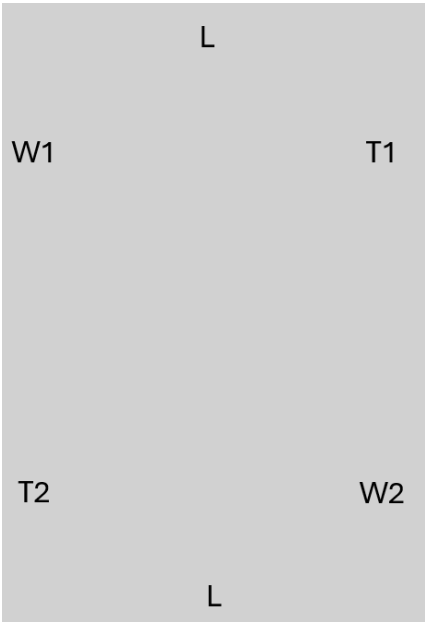


Figure 1, Measurement locations: Width 1 (W1), Width 2 (W2), Thickness 1 (T1), Thickness 2 (T2), Length (L)

Results

Percent Width Swell

Following a 4-week period of exposure MG boards swelled in width 0.72 and 0.71% while VG boards swelled to a mere 0.42 and 0.56%. Differences in percent width swell between grain orientations can be accounted for by the relative distribution of early to late wood. These data are also consistent with what we already know about the anisotropic nature of solid wood. That is, the majority of dimensional changes occur in the tangential (flat grain) grain direction. A graphical display of percent width swell can be observed in *Figure 2*.

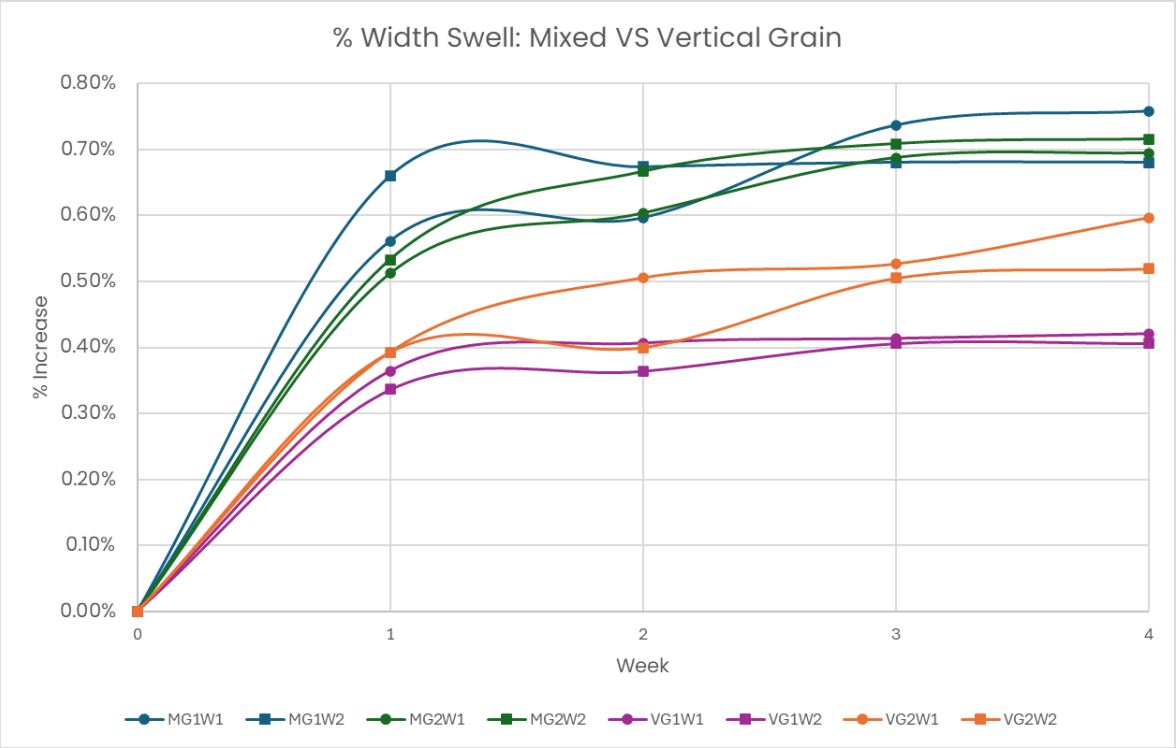
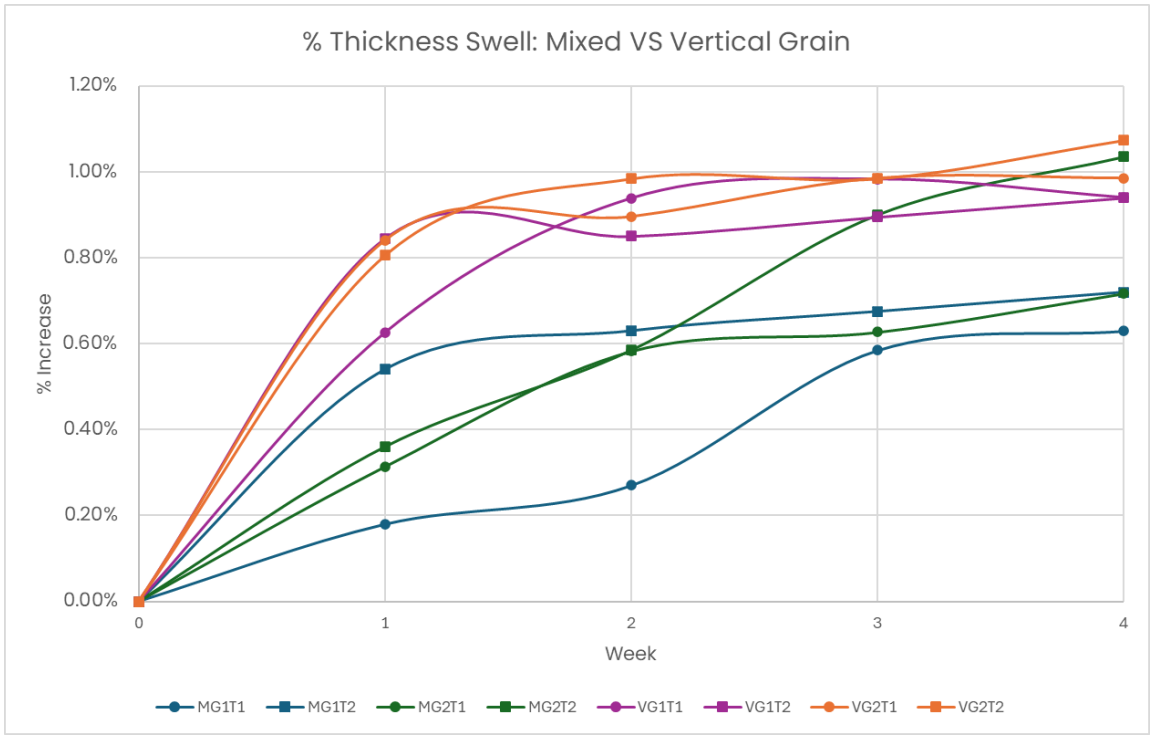


Figure 2, Percent Width Swell: Mixed VS Vertical Grain

Percent Thickness Well

Results for percent thickness swell were the inverese of the percent width swell with the VG specimens increasing realtivley more than their MG counterparts.



Percent Mass Increase

Most of the percent mass increase was observed in the first week, with values ranging from 47-64% for MG and VG sample groups. Following a four-week period mean %mass increase was observed to be 87.34 and 80.29 for MG and VG, respectively. While 87.34% appears to be substantial mass increase, this is typical with many low-density species regardless of thermal modification. The primary difference between mass increase in unmodified wood and thermally modified wood is that unmodified will uptake free and bound water, meaning dimensional changes will continue to occur in the wooden substrate. Thermally modified wood maintains the ability to absorb liquid water but because it is free water and not bound within the cell wall dimensional changes are practically eliminated.

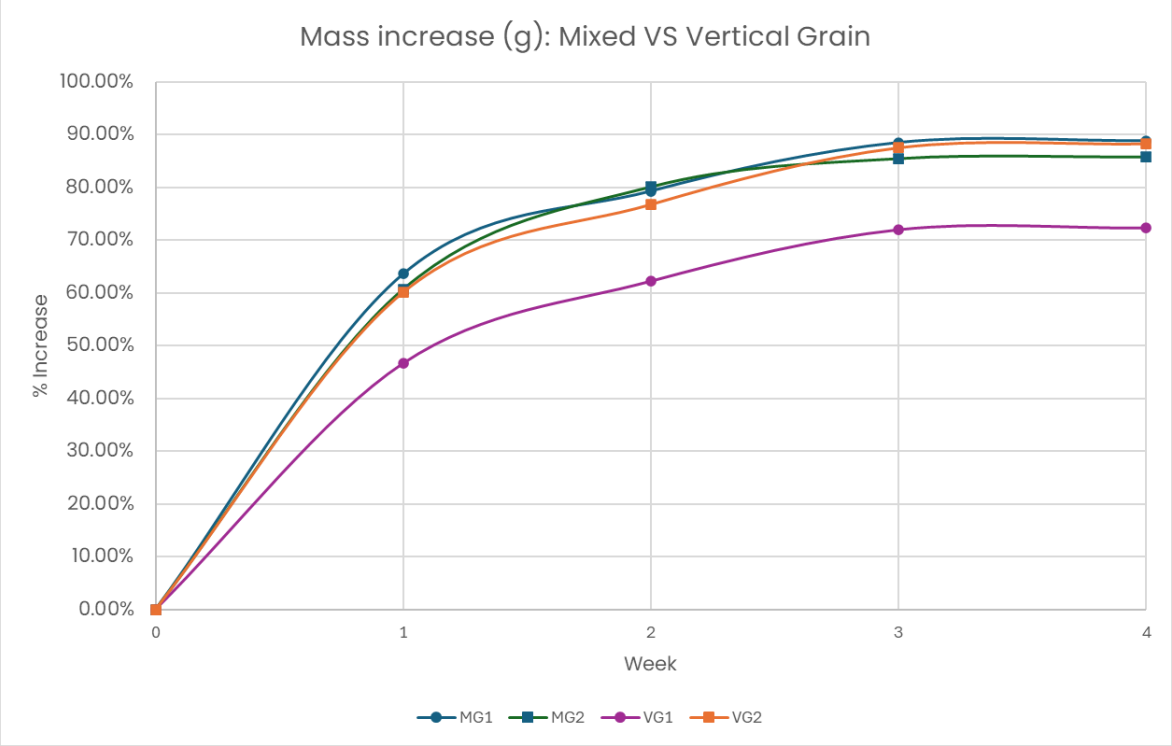


Figure 3, Percent Mass Increase: Mixed VS Vertical Grain

Appendix:

D1037.33852.pdf