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A SHORT NOTE ON ACCELERATING THE SURFACE CHECKING OF WOOD

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Summary

Preservative treated wooden decking often checks badly when it is exposed outdoors, and new preservatives are needed that are more effective at preventing treated wood from checking. We have built a machine that simulates the environmental conditions that cause severe checking of wood, and we have also developed software for rapidly assessing the checking of treated timber. We used both methodologies to compare the checking that developed in southern pine decking timber subjected to 5 days of accelerated weathering or 7 months of natural exterior exposure. Checking in boards subjected to 5 days of accelerated weathering was approximately two thirds of that which developed in boards exposed to 7 months of natural weathering. The checking in boards subjected to accelerated weathering resembled, but was not identical to that found in boards exposed to natural weathering. The machine we have built should help to reduce the time needed to develop preservatives that are more effective at preventing the checking of wood, but further research is needed to optimise the artificial weathering cycles and automate various functions of the machine to make it more suitable for commercial product development and testing.

1. Introduction

The market for decking timber is very important for companies manufacturing treated wood, and in North America alone it exceeds 5 billion board feet per year (Shook and Eastin 2001; Freedonia 2005). Such timber is used to build increasingly sophisticated decks that extend household living space into gardens. Consumers expect decks to look nice and maintain their appearance over time, but such expectations are difficult to meet because most wood preservatives do not prevent treated wood exposed outdoors from checking (Mackay 1973; Fowlie et al. 1990). To overcome this problem, preservatives need to be developed and tested that are much better at preventing wood from checking. Currently, there is no accepted test methodology for assessing the checking of treated timber or accelerating the development of checks so that information on the effectiveness of treatments at restricting checking can be obtained more quickly. Accelerated tests need to ensure that results obtained from such testing resemble those derived from field trials (Gates and Grayson 1999). We have built a machine that simulates the environmental

conditions that cause severe checking of wood (Weizenegger 2006), and we have also developed software for rapidly assessing the checking of treated timber (Christy et al. 2005). In this paper we describe the use of these methodologies to compare the checking that developed in southern pine decking timber subjected to 5 days of accelerated weathering or exposed outdoors for 7 months. This study forms part of a larger, long-term, program, which is examining ways of reducing the checking of preservative-treated wood exposed outdoors (Christy et al. 2005; Evans et al. 1997, 2000, 2003).

2. Methodology

Sixteen sample boards, 137 x 35 mm in cross section and 400 mm long, were prepared from untreated Southern pine (*Pinus* sp.) decking boards purchased commercially. These boards were conditioned at 20°C and 65% relative humidity for 1 week and then exposed to accelerated weathering over a 5 day period in a machine that simulates the environmental conditions that cause severe checking of wood (Weizenegger 2006). Half of the boards had their growth rings orientated concave to the exposed surface and the remaining boards had their growth rings orientated convex to the exposed surface. A similar number of untreated southern pine boards measuring 140 x 38 x 600 mm were exposed to natural weathering. These boards were conditioned, as above, and screwed to small test racks. Each rack contained two matched decking board samples with their growth rings orientated either convex or concave to the exposed surface. The eight test decks containing these samples were exposed outdoors for 7 months in Vancouver. After artificial or natural weathering, an area measuring 27.94 x 38 mm of the exposed surface of each board was scanned using a desktop scanner, and high-contrast greyscale images of the boards at 600dpi resolution were obtained and saved as TIFF files. These images were analysed by software written to quantify checking in weathered southern pine decking samples (Christy et al. 2005).

3. Results and Discussion

The checking that developed in boards exposed outdoors for 7 months or subjected to 5 days of accelerated weathering is shown below in Table 1.

Table 1. Comparison of the checking that developed in southern pine samples exposed to 5 days of accelerated weathering or 7 months of natural weathering

Check Parameter	Accelerated weathering			Natural weathering		
	Concave[a]	Convex[b]	Ratio (b/a)	Concave[a]	Convex[b]	Ratio (b/a)
Number	96.8	125.0	1.29	166.6	208	1.25
Length*	1032	1363	1.32	1299	2038	1.57
Width	30.2	37.5	1.24	46.7	61.0	1.31
Area	383	512	1.34	440	713	1.62
Largest check	56.3	64.9	1.15	72.2	84.9	1.17

*Check size parameters represent total length (mm), width (mm), area (mm^2) and length of largest check (mm)

Checking in boards exposed to 5 days of accelerated weathering was approximately two thirds of that found in boards subjected to 7 months of natural weathering. Boards with growth rings orientated convex to the exposed surface checked more than boards with growth rings orientated concave to the exposed surface, as expected (Urban and Evans 2005), however the difference was generally more pronounced in samples exposed to natural weathering. Nevertheless, the checking in boards subjected to artificial or natural weathering looked quite similar (Weizenegger 2006).

4. Conclusions

A machine built to simulate the environmental conditions that cause severe checking of wood was able to significantly accelerate the development of checks in southern pine. The checking that developed in boards subjected to accelerated weathering resembled, but was not identical to that found in boards exposed to natural weathering. The machine we have built should help to reduce the time needed to develop preservatives that are more effective at preventing the checking of wood, but further research is needed to optimise the weathering cycles and automate various functions of the machine to make it more suitable for commercial product development and testing.

5. Literature

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