



Using stress-waves to detect defects in pine beetle logs

FORESTRY INNOVATION INVESTMENT LTD.

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B.C.'s forest companies may soon have an effective new tool that will help them grade mountain pine beetle logs and gain higher value from the resource while avoiding unnecessary processing.

A preliminary study, by Canadian Forest Products Ltd. (Canfor) and the University of British Columbia (UBC) on behalf of Forestry Innovation Investment Ltd., shows that stress-wave technology has good potential for detecting biological defects in beetle-affected wood before it's processed.

With the pine beetle expected to kill a significant portion of B.C.'s lodgepole pine trees by about 2014, any tools to meet the challenge of using millions of cubic metres of pine beetle wood are useful.

Stress-wave technology is not new. It is currently used in other commercial applications to detect defects such as decay in utility poles and cracks in concrete structures.

However, this is the first time it has been tested on beetle-affected logs. This technique is relatively simple and the equipment is inexpensive.

In the study, 16-foot logs were tested at Canfor's Plateau mill log yard. They were cut from beetle-infested trees harvested from the company's woodland operations southwest of Vanderhoof, B.C.

The selected logs contained a variety of biological defects of various severity including checks, (both straight and spiral), as well as stain, sap rot and heart rot. Lumber cut from the logs was tested as well.



"The fact that stress-wave technology can detect biological defects before the wood is processed – and the equipment already exists – has huge practical implications for the forest industry." – Igor Zaturecky, Lead, WOOD PRODUCTS RESEARCH & DEVELOPMENT, CANADIAN FOREST PRODUCTS LTD.

IT'S A FACT: STRESS-WAVES ARE SIMPLY A TYPE OF SOUND WAVE.

Once the bolts were cut, a specialized hammer was used to initiate a stress-wave on one end of the log. Then a receiving device called an accelerometer attached to the opposite end detected the stress-wave signal. The processing unit automatically calculated the time it took the stress-wave to pass through the log.

UBC experts then statistically correlated the stress-wave transit times to biological defects, moisture content and other characteristics of the wood.

The nature and extent of defects that can most critically impact dimension lumber produced from beetle-affected logs – rot and checking – were predictable at relatively high levels of accuracy.

The ability to detect one notorious type of



“The ultimate goal is to one day develop a portable detection system that could be used long before the logs get to the mill so that the right log goes to the right end use early in the process,” says Zaturecky.

The six-month study, completed in April, is only

one of numerous studies being conducted on behalf of Forestry Innovation Investment Ltd. to improve opportunities for using mountain pine beetle wood.

Dr. Frank Lam, UBC Wood Science professor who oversaw the statistical analysis of the data, says the results

are positive enough to justify pursuing more advanced studies. His department will work to refine the use of stress-wave technology.

FOR THE FULL REPORT GO TO WWW.BCFII.CA/MPB/ AND DOWNLOAD THE REPORT "MPB 2006-11: STRESS-WAVE TECHNOLOGY FOR DEFECT DETECTION OF MPB INFESTED LOGS & LUMBER".

defect, known as spiral checking, was of particular interest. Spiral checking is a major cause for lumber downgrade, breakage and lower lumber recovery.

“I’ve been in mills and seen wood processed into lumber that was full of spiral checking. In one shift there’s so much breakage and waste it’s unbelievable, and that happens over and over,” says Igor Zaturecky, Lead for Canfor’s Wood Products Research & Development.

With stress-wave technology, forest companies can avoid that waste. If the technology can be adapted for log sorting, then beetle-affected logs unsuitable for dimension lumber could be redirected to other purposes, such as OSB manufacturing or bio-energy.

Forestry Innovation Investment Ltd. is a British Columbia government corporation investing in initiatives to help market BC forest products, and promote our sustainable forest practices to the world. FII's Mountain Pine Beetle Program supports government's Mountain Pine Beetle Action Plan and its objective to maximize the economic value of mountain pine beetle wood. FII does this through marketing activities and research into new products and manufacturing processes for mountain pine beetle wood.

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