Internal defect detection sounds a promising note

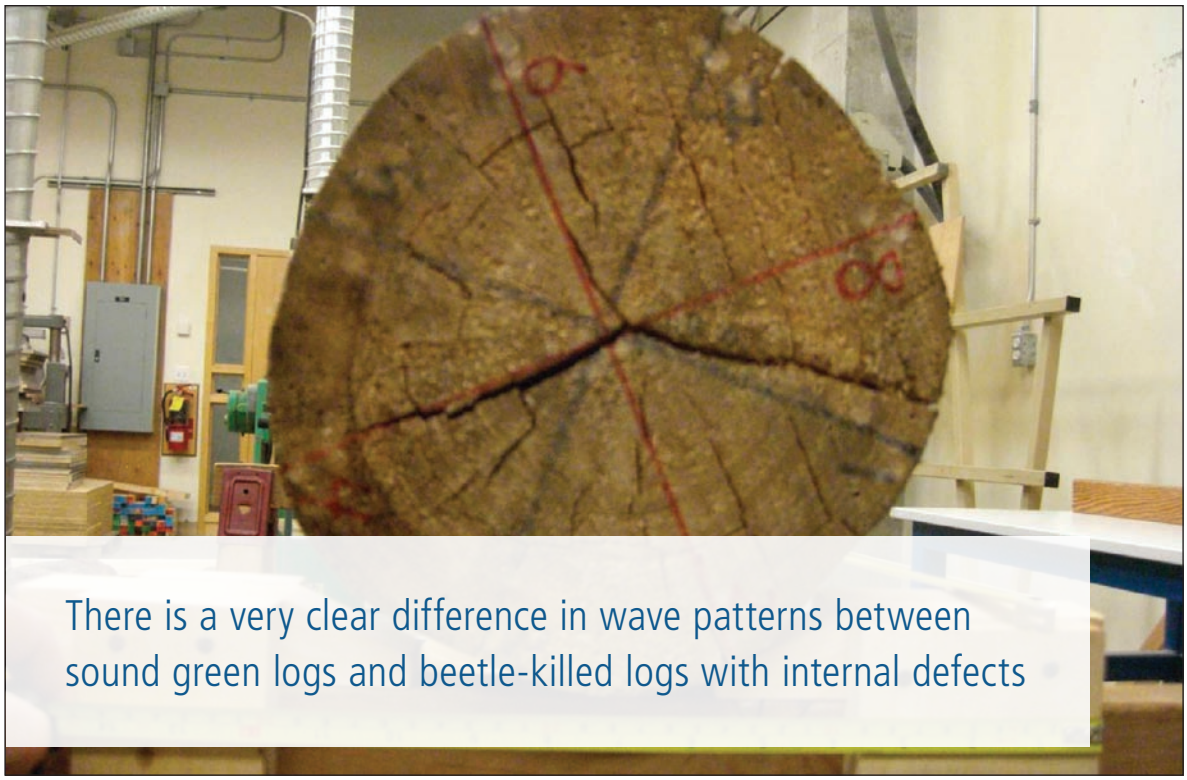
Researchers continue to develop and improve ways to classify logs according to potential internal defects prior to the sawmilling process.

A report released in spring 2007 shows that testing with stress waves offers good reliability in telling sound logs from logs with significant internal defects caused by the mountain pine beetle.

After early tests when a small system showed promise, the University of British Columbia set up a more robust system that uses a hammer to send shock waves through a log. A computer analyzes the time it takes those waves to move through a log, longitudinally and radially and their frequency patterns. There is a very clear difference in wave patterns between sound green logs and beetle-killed logs with internal defects such as checks (splits) and rot.

Researchers say the results show that a viable stress wave, or acoustic/ultrasonic, testing system can be created for the forest products industry. Such a system would help the industry improve utilization of beetle-killed wood, as well as productivity, cost savings and lumber grade recovery. Further studies are recommended towards development of a commercial log grading system.

One key to the system is that stress waves travel through the log at different speeds according to the moisture content of the



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fibre. A sound log will show patterns reflecting wide moisture differences between the sapwood and the heartwood. Logs attacked by the beetle are drier, and would reflect correspondingly different wave patterns - 5 to 12 times faster than those in sound logs.

In addition, stress wave patterns can be used to model and predict specific internal defects such as checks and rot.

Building on earlier work by Canfor and others, the researchers set out to see if the accuracy of stress wave testing could be improved, especially in terms of three-dimensional modeling. The work involved taking an existing time-delay measurement concept and upgrading it with additional features for this log testing application.

The upgraded system analyses two features of the stress wave pattern - time delay, from hammer impact to sensor reception, and frequency pattern. A sophisticated computer program was written to detect peaks in frequency domain and relative amplitude. The program detects the highest peak and then continues to find additional peaks until finding a final peak that is smaller than 10% of the first.

Detailed results for both sets of results on all logs tested can be found in the full report. The researchers note that results can be interpreted to show that cracks affected time delay and frequency response. "Although this information is very promising, at this stage it is too early to reach a calculating algorithm."

FOR THE FULL REPORT GO TO WWW.BCFII.CA/MPB/ AND DOWNLOAD THE REPORT "MPB-07-021: DETECTION METHODS OF INTERNAL CHECKS AND ROT IN MOUNTAIN PINE BEETLE LUMBER"

Forestry Innovation Investment is a British Columbia government corporation investing in initiatives to help market BC forest products and promotes our sustainable forest practices to the world. FII's Mountain Pine Beetle Program supports the 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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