Canada

Mountain Pine Beetle Initiative
Canadian Forest Service

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True Shape and Defects Data from MPB Affected Stems

Progress Report 2004/2005

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MPBI Project # 8.34

Abstract

The objective of this project is to collect true shape data and internal defect data from MPB affected trees suitable for use in project P.O.#8.07. The project is on schedule.

A sample of MPB affected stems will be collected at a cooperating sawmill in the Quesnel region. Forintek's vision based defect detection system will be installed in the mill's processing line and, in conjunction with the sawmill's true shape scanning system, will be used to collect true shape and MPB defect data from the sample. The defects of interest are the blue stain in the sapwood and the checks due to the drying of the trees. Prior to processing, the stems will be bucked into short lengths and individually identified such that images of the original stems, complete with defects, can be re-assembled. The defect data will be transposed into a format suitable for Forintek's sawmill modelling program, Optitek™. This information is required by CFS Project P.O. #8.07 *"Quantifying Lumber Value Recovery from Beetle-killed Trees"* which will predict lumber value recovery as function of log shape and internal defects under a variety of scenarios.

Keywords: mountain pine beetle, beetle-killed wood, log defects, checks, blue stain.

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1 Introduction

Logs from trees killed by the mountain pine beetle include two main defects: blue stain and radial drying checks.

Blue stain discolors the sapwood but it has no affect on strength and other material properties. Logs that are harvested in the early stage of MPB attack may be only partially stained both along the length and also across the log cross-section. Logs that are harvested in later stage of MPB attack are likely to be stained along the entire length and sapwood part of the log cross-section. Market value of lumber with blue stain defect may be lower than unstained lumber.

Radial checks are caused by drying of the MPB killed trees before they are harvested. The number and severity of checks (i.e. depth, width and length) increases with the time-since-death. Lumber cannot be made from the parts of log including deep wide checks. Lumber can be made from the parts of log including short narrow checks but its grade will be lower.

Using sawmill simulation software such as Optitek^{TM} to determine the impact of blue stain and radial checks defects on sawmill lumber value and volume recovery requires accurate blue stain and check data from sufficiently large sample (approximately 100) of MPB affected stems. The challenge in selecting the means and the procedure for collecting of data has been the need to collect with high accuracy huge quantity of data, inspect this data, put the data into the format required by the sawmill simulation software, and do all this on time and within budget and manpower limitations. To cope with the huge quantity of data we have elected to automate collection of data using Forintek research machine vision system. The system will be installed in a sawmill to minimize the logistical and resource costs. The data will be inspected and formatted at Forintek.

2 Project Objectives and Progress

2.1 Overview

The project is on schedule.

Table 1. Overview of project progress for 2004/2005.

Deliverables	Progress
True shape and internal defect data in electronic format - May 31, 2005	Reconfigured most of the Forintek machine vision system for detection of blue stain and checks defects. Made arrangement with a collaborating sawmill and the system integrator to facilitate collecting of log true shape data and defects during the mill tests.
Final report – July 31, 2005	

2.2 Project Objectives

1. To collect true shape data and internal defect data from a sample of MPB affected trees suitable for use in project P.0.8.07. (See above).

2. To prepare a report detailing data collection methods and results.

2.3 Progress to date

- Reconfigured most of the machine vision system software to detect blue stain and checks defects in the log faces.
- Started development of software to detect checks in the log sides.
- Assembled the system hardware, including four cameras and illumination sources, in research lab.
- Made arrangement with a collaborating sawmill for the mill tests and data collection in May – June period.
- Have worked with the mill system integrator to facilitate collecting of log true shape data during the mill tests.
- Visited the sawmill and made measurements and arrangements with the mill personnel about the installation of the machine vision system.

3 Dissemination of Results

None were planned.

3.1 Papers Written

None were planned.

3.2 Presentations/Conferences

None were planned.

4 2005/2006 Project Work Plan

Table 2: Overview of project activities planned for 2005/2006.

Activity	Progress
Complete reconfiguration of machine vision system and development of software to detect checks in the log sides.	in progress
Test system in research lab/pilot plant.	in progress
Install and test system in sawmill.	Site visit and planning of work
Collect log true shape and defects data in sawmill	N/A
Inspect and format data at Forintek	N/A
Prepare report	N/A

5 Contribution of Research Group Members

FORINTEK has provided the use of its machine vision research system and is supporting reconfiguration of the system for the detection of blue stain and checks. Forintek has provided the use of the lab and pilot plant for the system reconfiguration and testing.

6 Collaboration with Partners

- Tolko Industries Ltd. will provide the sample of stems, and it will assist with the mill tests and data collection.
- MPM Engineering Ltd. will assist with providing the log true shape data during mill tests.
- LMI Technologies Inc. has provided machine vision cameras and other hardware at nominal costs.

7 Problems

One of the project key personnel with expertise in machine vision system technology unexpectedly left Forintek. A new software engineer has been hired and is now being trained to continue the work in the machine vision area.

8 Financial Summary

A summary of funding and expenditures broken down by the same budget categories approved in Appendix A of the funding agreement.

9 Acknowledgements

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