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Log Scanning Trials

Progress by Measurement Canada and scanner scaling technical committees

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Coeur d' Alene , Idaho

Introduction

- Overview of scanner scaling.
- Recent scanner scaling trials.
- State of scanner scaling in British Columbia.

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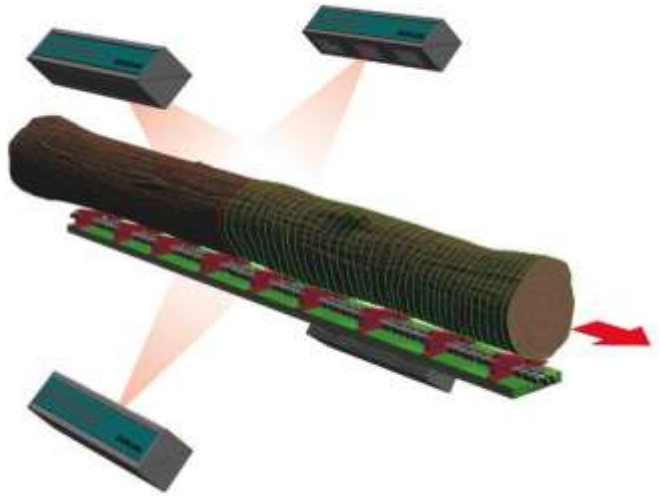
Scanner scaling using 3D log scanners

- Scanners emit a low power laser line on the log‘s surface.
- Cameras in the scanning heads and associated software produce a 3 dimensional image of the log.
- Scanners produce accurate measurements of log diameter. Additional hardware measures log length.



Images courtesy of Springer Microtec

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Scanner scaling background

- Regulatory agencies and groups have been developing scanner scaling regulations and procedures.

- Measurement Canada (MC)
  - Log scanners (Timber Dimensional Measuring Device) must be certified by MC.

- British Columbia Ministry of Forests and Natural Resource Operations (BCMFLNRO)
  - Has been developing B.C scanner scaling procedures.

- Canadian Standards Association and B.C. Log Scanning Technical Review Committee.
  - They have helped MC and BCFLNRO develop scanner certification and scanner scaling procedures.

Trials have been conducted testing scanner accuracy on log diameter and length

Tests were conducted to:

- Develop diameter and length accuracy requirements.
- Assist Measurement Canada in developing procedures for certifying and testing scanners.
- Confirm the scanner at the expected site of a scanner scaling pilot project could accurately measure diameter and length.

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Scanner test at Western Forest Products Ladysmith sawmill

- The scanner was calibrated.
- Circumferences and lengths of 10 logs were manually measured.
- Each logs was scanned 3 times. The scanner measurements were compared to the manual.

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Ladysmith trial results

- Researchers manually measured 73 diameters and 10 lengths.

	Maximum difference (mm) [1]	Maximum difference (inches)
Length	24	0.94
Diameter	8	0.31

[1] manual- scanner

- Each log was scanned 3 times to test the repeatability of scanner length and diameter measurements

	Maximum difference (mm)	Maximum difference (inches)
Length	26	1.02
Diameter	9	0.35

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Scanner test at Interfor's Acorn sawmill

- The Acorn sawmill scanner was tested in August 2014.
  - This will likely be the first site for a scanner scaling pilot project.
  - Interfor wanted to confirm the scanner could pass Measurement Canada tests.

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Acorn sawmill scanner test methodology

- The lengths and diameters of 8 logs were manually measured.
- Each log was scanned twice with butt end forward and twice with the top end forward.
- Testing conducted on one log:
  - Half the log was scanned.
  - Then scanning was stopped.
  - The infeed chain direction was reversed and the log was backed up for 1 m.
  - Scanning resumed with the log moving forward again.

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Scanner length measuring accuracy

Log #	Manual measure (cm)	Scanner measure (cm)	Difference [1, 2] (cm)	Difference [1, 2] (inches)
1	1261	1258	3	1.2
2	1121	1119	2	0.8
3	1268	1260	8	3.1
4	1262	1269	-7	-2.8
5	1251	1248	3	1.2
6	1128	1126	2	0.8
7	1130	1133	-3	-1.2
8	1259	1255	4	1.6

[1] **manual measure – scanner measure**

[2] **maximum error from 4 scans**

- The maximum difference between the manual length and scanner length on any log was 8 cm (3.1 inches).

- The difference between the manual and scanner lengths was less than 10 cm (3.9 inches) on 100% of the logs.

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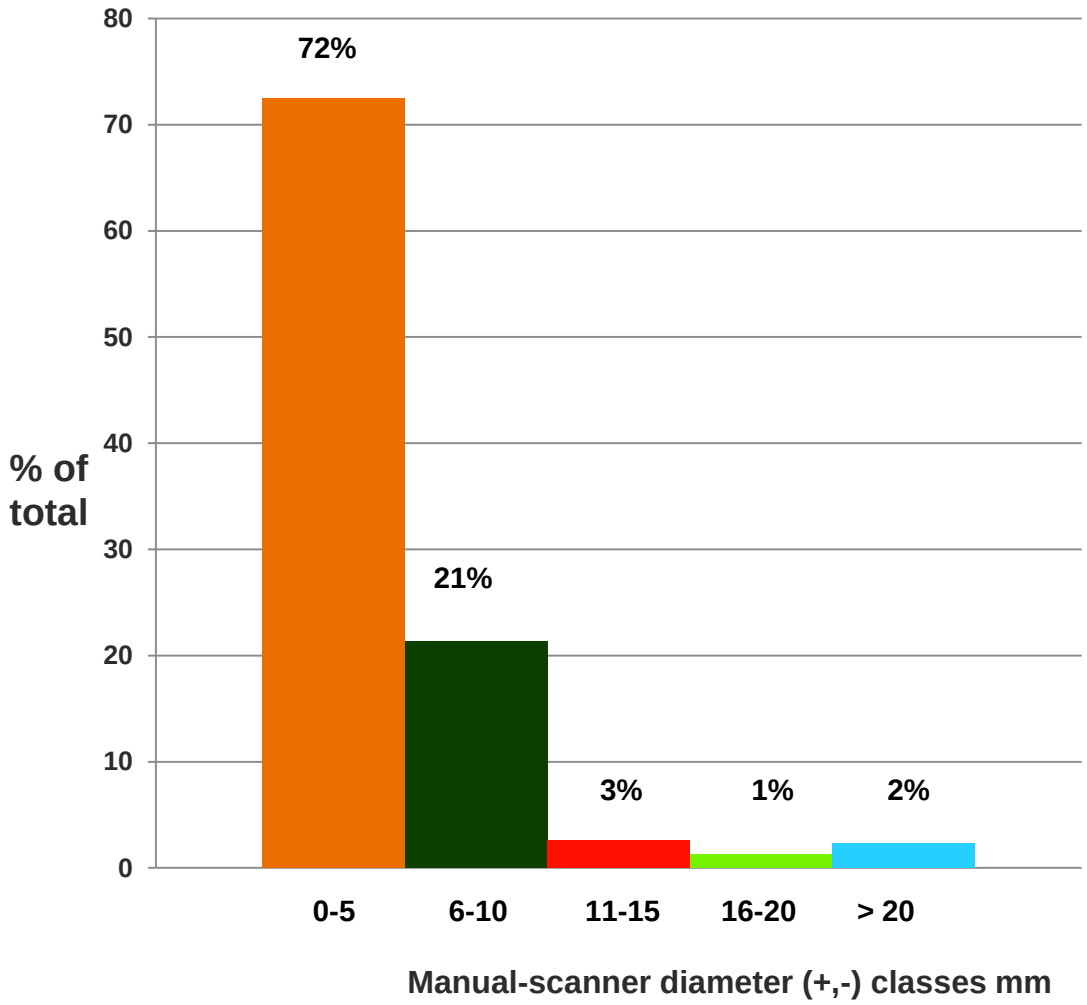
Manual diameter- scanner diameter



- The difference (+ or -) between the manual and scanner measurements was 1.0 cm (0.39 inches) or less in 93% of the diameters.

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Poor scanner diameter measure occurred in 2 scans of one log

- One log's crooked shape produced poor contact with the feed rollers causing it to move during scanning.
- Extreme movement meant the log moved out of the "scan window" affecting diameter measure.
- Springer Microtec feels minor modifications to their software can ensure accurate diameter measure when there is excessive log movement.

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Factors not affecting scanner measurement

- Scanner measuring accuracy was not affected when:
  - Logs were scanned butt forward compared to top forward.
  - Scanning occurred concurrent with debarking.
  - A log's forward movement was stopped and then restarted during scanning.

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Acorn mill trial summary

- The difference between the manual and scanner length measurements (manual – scanner) was less than 10 cm (3.9 inches) in 100% of the lengths.

- The difference between the manual and scanner diameter measurements (manual – scanner) was 1 cm (0.39 inches) or less In 93% of the diameters.

- The difficulty obtaining an accurate diameter measuring over protruding knots or missing wood will help Measurement Canada in developing test procedures .

Summary of Ladysmith and Acorn scanner trials

- The trials showed both scanners would meet B.C. Provincial scaling accuracy requirements of 1.0 cm (0.39 inches) on diameter and 10 cm (3.9 inches) on length.

- They helped Measurement Canada develop procedures for testing scanners at sawmills.

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Status of Measurement Canada scanner certification

- Measurement Canada has finalized procedures for testing and certifying scanners.

- Scanner certification requires 2 steps:
  - Scanner testing at Measurement Canada's Ottawa lab
  - Testing the scanner after site installation

- Scanner manufacturers can now apply to have their scanner certified by Measurement Canada.

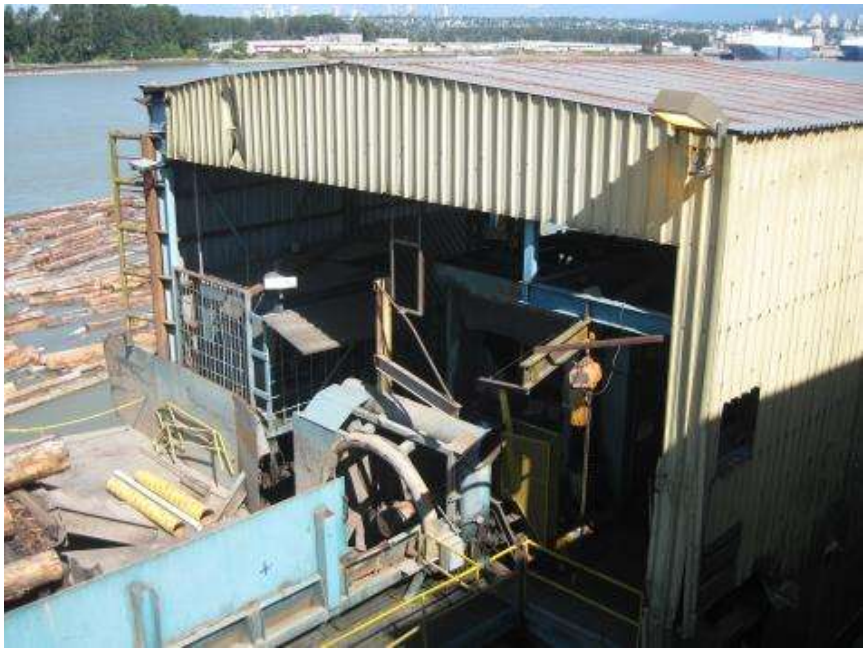
Meeting a major B.C. Provincial requirement for scanner scaling

- Provincial regulations require volume by species and grade. The scanner only provides volume.
- 2 procedures were developed for meeting species and grade.

1. A scaler observes each log as it is scanned and records species and grade.
2. The species and grade proportion from a scaled sample load is applied to the scanned volume of many loads.

Scanner scaling pilot project

- B.C. Ministry of Forest Lands and Natural Resource Operations is now accepting applications for scanner scaling pilot projects.
- The pilot project will be for a one year period.
- Interfor's Acorn sawmill is planning to begin a scanner scaling pilot project this summer.



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