Harvesting head calibration: efforts and benefits
Context

• Investments to improve LRF

• Quality bonuses

• Contractors DO NOT calibrate heads

• Lack of control over errors

• Overlengths avoid too-short logs

• Also poor quality (branches, split logs, …)
Objectives

1. Quantify the required effort for the contractor to maintain the measuring apparatus of the head properly calibrated (man-hours, machine-hours)

2. Evaluate the financial gain for the contractor ($/m^3, $/yr)

3. Evaluate the gain in value at the mill ($/yr)
Methods - Sites

[Map showing sites in Quebec and surrounding regions, with specific sites marked by red dots.]
Methods - Participants

• Own Ponsse H7 Heads
• Own (willing to) an electronic caliper
• Desire to participate
• Recognized for the rigorous maintenance of machines

Upper delimming knife in bad condition, October 2017.

Feed roller in bad condition, October 2017.
Methods - Training

Delimbing knives

Feed rollers

Measuring wheel

www.ponsse.com

Training session with Ponsse-Finland, March 2017
Methods - Protocol

- Daily
- 3 trees per species (6-9 logs)
- ≤ ±4% (volume)

Compass caliper 3: Ponsse calibrage 7.20.0
Methods – Data collection

• June 2016 – February 2017
  • Measurement errors without calibration
  • .ktr files

• June 2017 – September 2018
  • Measurement errors while applying the protocol
  • Efforts – logbook
  • .pri/.hpr and .ktr files
Results - Efforts

Man-hour / week

<table>
<thead>
<tr>
<th></th>
<th>A + B</th>
<th>C</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg</td>
<td>2.32</td>
<td>2.26</td>
<td>2.30</td>
</tr>
</tbody>
</table>

Machine-hour / week

<table>
<thead>
<tr>
<th></th>
<th>A + B</th>
<th>C</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg</td>
<td>0.63</td>
<td>0.88</td>
<td>0.71</td>
</tr>
</tbody>
</table>
Results –

- Three categories of data:
  - 1) Prior to calibration (Before calibration)
  - 2) Protocol
    - Within limits (calibrated in specs)
    - Outside limits (calibrated off specs)
Results – Average length compliance rate

- Before calibration: 51%
- Calibrated off-specs: 69% (± 2 cm), 81% (± 5 cm)
- Calibrated in-specs: 74% (± 2 cm), 96% (± 5 cm)
Results – Average diameter compliance rate

Before calibration: 35%
Calibrated off-specs: 43% (± 4 mm), 71% (± 8 mm)
Calibrated in-specs: 57% (± 4 mm), 84% (± 8 mm)
# Results – Mean and SD

<table>
<thead>
<tr>
<th>Machine</th>
<th>Categories of results</th>
<th>Length Mean (cm)</th>
<th>Length SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before calibration</td>
<td>-1.91</td>
<td>5.21</td>
</tr>
<tr>
<td>Machine A</td>
<td>Calibrated off-specification</td>
<td>1.20</td>
<td>3.33</td>
</tr>
<tr>
<td></td>
<td>Calibrated in-specification</td>
<td>1.83</td>
<td>2.48</td>
</tr>
<tr>
<td>Machine B</td>
<td>Before calibration</td>
<td>1.18</td>
<td>4.16</td>
</tr>
<tr>
<td></td>
<td>Calibrated off-specification</td>
<td>1.38</td>
<td>3.31</td>
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<tr>
<td></td>
<td>Calibrated in-specification</td>
<td>1.57</td>
<td>2.03</td>
</tr>
<tr>
<td>Machine C</td>
<td>Before calibration</td>
<td>1.33</td>
<td>1.69</td>
</tr>
<tr>
<td></td>
<td>Calibrated off-specification</td>
<td>0.59</td>
<td>1.35</td>
</tr>
<tr>
<td></td>
<td>Calibrated in-specification</td>
<td>0.55</td>
<td>1.09</td>
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</table>

<table>
<thead>
<tr>
<th>Machine</th>
<th>Categories of results</th>
<th>Diameter Mean (mm)</th>
<th>Diameter SD</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Before calibration</td>
<td>-6.88</td>
<td>20.18</td>
</tr>
<tr>
<td>Machine A</td>
<td>Calibrated off-specification</td>
<td>-3.29</td>
<td>8.49</td>
</tr>
<tr>
<td></td>
<td>Calibrated in-specification</td>
<td>-0.94</td>
<td>6.82</td>
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<tr>
<td>Machine B</td>
<td>Before calibration</td>
<td>-0.63</td>
<td>12.78</td>
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<tr>
<td></td>
<td>Calibrated off-specification</td>
<td>-1.17</td>
<td>7.37</td>
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<td></td>
<td>Calibrated in-specification</td>
<td>-0.10</td>
<td>6.31</td>
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<tr>
<td>Machine C</td>
<td>Before calibration</td>
<td>-4.25</td>
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<tr>
<td></td>
<td>Calibrated off-specification</td>
<td>-0.04</td>
<td>13.74</td>
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<tr>
<td></td>
<td>Calibrated in-specification</td>
<td>-0.89</td>
<td>7.85</td>
</tr>
</tbody>
</table>
Conclusion

- Objectives
  - Efforts for the contractors
  - Gains for the contractors and at the mill

- Less intensive than expected
- Gains for the contractors averages 0.30 – 1.00 $/m³
- Other gains: productivity, fuel consumption

- Contractors keep doing it!

- Next? Gains at the sawmill
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