Log Scanning
- State of the Art in Sweden

Harald Nylinder, Setra Group
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Sweden’s share of the world’s:

- Forest area
- Pulp production
- Pulp exports
- Paper production
- Paper exports
- Sawn timber productions
- Sawn timbers exports

The chart shows percentages for each category.
Log diameter

Diameter distribution, Pine 2008

Share, %

Length class, top diameter, mm
Log length

Length distribution, Pine 2008

- Share, %
- Length class, cm

-310 310 340 370 400 430 460 490 520 550 580
100% shortwood
<table>
<thead>
<tr>
<th>Year</th>
<th>1990</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of mills prod &gt;10 000 m(^3)/year</td>
<td>260</td>
<td>207</td>
<td>175</td>
<td>150</td>
</tr>
<tr>
<td>Average production per mill, 1 000 m(^3)</td>
<td>45</td>
<td>80</td>
<td>100</td>
<td>110</td>
</tr>
<tr>
<td>Total production, million m(^3)</td>
<td>11.7</td>
<td>16.3</td>
<td>17.6</td>
<td>17.0</td>
</tr>
<tr>
<td>Export, million m(^3)</td>
<td>6.5</td>
<td>11.1</td>
<td>12.2</td>
<td>11.5</td>
</tr>
</tbody>
</table>

100 Mbft ≈ 160 000 m\(^3\)
On the ice before spring
Back in the old days
Sorting by dimension and quality
Log Scanning

Basis for payment & for optimizing the process
<table>
<thead>
<tr>
<th>Spruce grades</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Knots, whole mantle surface</td>
<td>Max 60 mm regardless of knot type</td>
</tr>
<tr>
<td>Growth rings</td>
<td>Min 12</td>
</tr>
<tr>
<td>Straightness</td>
<td>Max 20 cm loss of saw yield</td>
</tr>
<tr>
<td>Indication of top rupture</td>
<td>Not allowed</td>
</tr>
<tr>
<td>Blue stain</td>
<td>Not allowed</td>
</tr>
<tr>
<td>Open scar</td>
<td>Scar which affects the scaling cylinder is not allowed</td>
</tr>
<tr>
<td>Bark-encased scar</td>
<td>Length max 2 x top end diameter</td>
</tr>
<tr>
<td>Forest rot</td>
<td>Not allowed</td>
</tr>
<tr>
<td>Pine grades</td>
<td>Grade</td>
</tr>
<tr>
<td>-------------</td>
<td>-------</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Log type</td>
<td>Butt log</td>
</tr>
<tr>
<td>Knots, whole mantle surface</td>
<td>Max 20 mm, all knot types. Max 5 knots</td>
</tr>
<tr>
<td>Knot within 15 dm from butt end</td>
<td>A minimum of two distinct whorls or one sound knot</td>
</tr>
<tr>
<td>Knot swelling</td>
<td>Max 5</td>
</tr>
<tr>
<td>Growth rings 2-8 cm from pith</td>
<td>Minimum 20</td>
</tr>
<tr>
<td>Straightness</td>
<td>Max. 20 cm loss of saw yield</td>
</tr>
<tr>
<td>Indication of top rupture</td>
<td>Not allowed</td>
</tr>
<tr>
<td>Blue stain</td>
<td>Not allowed</td>
</tr>
<tr>
<td>Forest rot</td>
<td>Not allowed</td>
</tr>
<tr>
<td>Top diameter (cm)</td>
<td>28-30</td>
</tr>
<tr>
<td>------------------</td>
<td>-------</td>
</tr>
<tr>
<td>10-11</td>
<td>1,15</td>
</tr>
<tr>
<td>12-13</td>
<td>1,25</td>
</tr>
<tr>
<td>14-15</td>
<td>1,21</td>
</tr>
<tr>
<td>16-17</td>
<td>1,18</td>
</tr>
<tr>
<td>18-19</td>
<td>1,16</td>
</tr>
<tr>
<td>20-21</td>
<td>1,15</td>
</tr>
<tr>
<td>22-23</td>
<td>1,13</td>
</tr>
<tr>
<td>24-25</td>
<td>1,13</td>
</tr>
<tr>
<td>26-27</td>
<td>1,13</td>
</tr>
<tr>
<td>28+</td>
<td>1,13</td>
</tr>
</tbody>
</table>
Volume is measured under the bark

Bark thickness can be measured:
- Manually, (most common)
- With laser triangulation
- With X-ray
3D lazer scanners
9 X-ray scanners in Sweden

SCA Bollsta Såg, Microtech
SCA Munksunds, Rema
SCA Tunadals Sågverk, Microtech
Martinssons AB, Rema
Holmen Iggesunds sågverk, Rema
Setra Kastets sågverk, Rema
Setra Skinnskattebergs Trä, Rema
StoraEnso Ala sågverk, Rema
Moelven Valåsens Sågverk, Rema
X-ray scanner RemaContol

7 units in Sweden, 5 in Finland and one in Estonia.
Property variables from Rema X-ray scanner

- Bark thickness
- Volume
- Hartwood Diameter
- Ring Width
- Species (fir or pine)
- Stocktyp (root, intermediate, top)
- Density
- Distance between knotty woods
- Volume free from knots
- Rot
- Foreign objects (metal, stone)
- Strength
Microtech, 3 direction
Two units in Sweden
Property variables from microtec scanner

- 1 Min Knot Cluster Distance [mm]
- 2 Max Knot Cluster Distance [mm]
- 3 Mean Knot Cluster Distance [mm]
- 4 Number of Knotty Whorls
- 5 Mean Max Knot Diameter [mm]
- 6 Mean Knot Volume in Cluster [cm³]
- 7 Knotty whorls quality [1-10]
- 8 Knot Volume [%]
- 9 Heartwood Top Diameter [mm]
- 10 Heartwood Taper [(mm/10)/m]
- 11 Heartwood Volume [%]
- 12 Mean Density [Kg/m³]
- 13 Ring Width [mm/10]
- 14 Top break
- 15 Top break position [cm]
- 16 Foreign Object
- 17 Bark Thickness [mm/10]
- 18 Bark Thickness Top [mm/10]
- 19 Bark Thickness Middle [mm/10]
- 20 Bark Thickness Bottom [mm/10]
- 21 Rot
- 22 Top Break Peak Value [abs]
- 23 Mean Inter-Cluster Distance [mm]
- 24 Min Inter-Cluster Distance [mm]
- 25 Max Inter-Cluster Distance [mm]
- 26 Percentage of Knots Free Length [%]
- 27 taper butt/mid
- 28 volume m³fub
- 29 volume m³top
- 30 Metall
- 31 Bark Share
• One of Sweden’s largest lumber product companies

• Leading player in Europe

• 1,100 employees

• Annual sales of 0.6 billion $

• Approx 60% is exported to Europe, North Africa, the Middle East and Japan
Setra’s production units

- Sawmills, Spruce
- Sawmills, Pine
- Integrated production, sawmills and processing, Spruce & Pine
- Processing units
- Modular building factories
Setra's largest markets,

- 30 000-100 000 m³
- < 30 000 m³

Setra sales offices: Denmark, UK, Germany, France, Spain, Greece, Italy, Tunisia and Japan
Skinnskatteberg mill
210 000m³
Sound knots
Heart wood

Horndal mill
30 000m³
Clear wood
- Logs are measured and divided into sawclasses depending on diameter, length, and quality.

- Measurement is also performed as a foundation for payment by the Swedish Timber Measurement Council.
Turning logs – top end first
Optimizing
Centering & circular rotation
Thank You!

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