Running Thin Kerf Saws

Introduction

Potential Savings

Thin Kerf Sawing

- Saws
- Grinding
- Saw guides and arbours
- Feed systems

Compromises and Limits

- Plate thickness
- Side clearance
- Fibre loss
- Vibration

Conclusions

Savings

Ripping Boards

- Extra piece
- Large savings (greater than 10%)

Cutting Logs or Cants

- Longer and wider side boards
- Savings are approximately 1% to 2%
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Saws

Tolerances

- Think race car, not old pickup truck

Levelling and Tensioning

- Levelling critical
- Thin saws cannot hold much tension

Bending Stiffness

- Proportional to cube of thickness \( h^3 \)
- 10% reduction in thickness …..
  …..results in 30% reduction in stiffness

Tooth Design

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**Tolerances**

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>0.070”</td>
<td>+0.000”/-0.002”</td>
</tr>
<tr>
<td></td>
<td>(1.78 mm)</td>
<td>+0.00/-0.05 mm</td>
</tr>
<tr>
<td>Hook Angle</td>
<td>30°</td>
<td>&gt;6.5°</td>
</tr>
<tr>
<td>Back Clearance Angle</td>
<td>8°</td>
<td>&gt;6.5°</td>
</tr>
<tr>
<td>Side Clearance</td>
<td>0.022”</td>
<td>&gt;0.002”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No more than 0.002” difference from side to side.</td>
</tr>
<tr>
<td>Radial Side Clearance Angle</td>
<td>2°</td>
<td>&gt;6.25°</td>
</tr>
<tr>
<td>Tangential Side Clearance Angle</td>
<td>3°</td>
<td>&gt;6.25°</td>
</tr>
<tr>
<td>Eye Specification</td>
<td>6” Lobe (Retec) Spline</td>
<td>clearance 0.005” &gt;0.002”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.13 &gt;6.05 mm</td>
</tr>
<tr>
<td>Runout at rim</td>
<td>0.005” TIR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.13 mm</td>
<td></td>
</tr>
<tr>
<td>Hardness</td>
<td>44 Rc</td>
<td>43 - 45 Rc</td>
</tr>
</tbody>
</table>
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Tooth Shapes

Grinding

• Sharpness
• Dubbing
• Side clearance angles and side clearances
• Precision alignment and calibration of the grinders
• Quality control program for ensuring tooth and plate preparation
# Running Thin Kerf Saws

## Guides and Arbours

### Arbours
- no grooves – shift arbours often

### Guides
- Uniform clearance (stiffness)
- Consistent lubrication (heat)

## Feed System

- Move the wood in a straight line
- Control the wood at all times
- Proper feed speed
- Debris
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Compromise & Limits

- Plate Thickness
- Side Clearance
- Fibre Loss
- Vibration
  - Critical speeds
  - Washboarding

Fibre Loss

TKT Engineering Inc. www.thinkerf.com

TKT Engineering Inc. www.thinkerf.com
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Effect of Thickness

Sawing deviation factor
\[ S = \frac{fk}{h^3} \]

<table>
<thead>
<tr>
<th>Plate thickness</th>
<th>0.080&quot;</th>
<th>0.040&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side clearance</td>
<td>0.018&quot;</td>
<td>0.015&quot;</td>
</tr>
<tr>
<td>Kerf</td>
<td>0.115&quot;</td>
<td>0.070&quot;</td>
</tr>
<tr>
<td>Feed speed</td>
<td>350 ft/min</td>
<td>70 ft/min.</td>
</tr>
<tr>
<td>Factor f*</td>
<td>78610</td>
<td>76560</td>
</tr>
</tbody>
</table>

\[ \left( \frac{0.040}{0.080} \right)^3 = 0.125 \Rightarrow 87.5\% \text{ loss in stiffness} \]

\[ \left( \frac{0.9}{1.0} \right)^3 = 0.729 \Rightarrow 27\% \text{ loss in stiffness} \]

Side Clearance

Saw kerf can also be reduced by decreasing the side clearance.

The factors that determine the minimum side clearance are:
1. The amount of spring-back of the wood fibres.
2. The smoothness of the cut surface.
3. Variable plate thickness.

0.005” – 0.010” side clearance is now used in some gang edgers.
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Vibration

**Critical Speeds**
- Saw loses stiffness
- More than one critical speed
- Affected by blade temperature and amount of tension

**Washboarding**
- Common in thin saws

There are several changes that may stop the washboarding:
1. Change the blade rotation speed, often by up to 20%.
2. Change the number of teeth or use variable pitch saws.
3. Reduce the plate thickness even further.
4. Increase the radial side clearance angle.

Conclusions

Attention to details
- Maintenance
- Alignment
- Sharpening and saw preparation
- Proper design

Reducing kerf should be the last step in improvement program.
1. Maintenance and alignment of the feed system, guides, collars, etc.
2. Grinding accuracy.
3. Proper control of the wood during sawing
4. Improvement of surface finish
5. Find the minimum side clearance.
6. Evaluate whether the saws should run for shorter times.