Saw & Knife Tooling –
Developments in thin kerf optimising saws and cutting edge materials for knives & profile cutters

Gerd Heubeck
Kanefusa Corporation, Japan

Presentation Structure

Thin Kerf Optimizing Saw Blades
- Technology
- User Value

αMT – Advanced Material Technology
- What is it?
- User Value

How to use a moulder more efficiently
- SF- Saw Blade
- Splitting Technology
Thin Kerf Optimizing Saw Blades

Optimizing saw blades should …

- be able to keep up with the cycle time of the machine
- be as thin as possible to save material
- cut clean and precise
- have a long lifetime

Difference between a saw blade and a cutter

⇒ Lack of stiffness
⇒ Easy to be instable
Thin Kerf Optimizing Saw Blades

Problems of thin kerf saw blades

- Reduction of the plate thickness causes a reduction of the lateral stiffness which leads to instability
- Frictional heating reduces the lateral stiffness of the plate and causes instability

Conventional saw blade

- Outer slots
- Reduction of vibrations or thermal buckling
- Reduction of the saw blades lateral stiffness
Thin Kerf Optimizing Saw Blades

Yield Pro

- Outer Slots - short length
  - Improvement of lateral stiffness
- Inner annular slots (polymer injected)
  - Suppression of thermal buckling
  - Suppression of cutting vibration
  - Higher maximum allowable RPM

⇒ Plate of Yield Pro is ~ 20% thinner compared to a conventional plate
## Thin Kerf Optimizing Saw Blades

### Dimensions

<table>
<thead>
<tr>
<th>D [mm]</th>
<th>Yield Pro saw blade Kerf [mm]</th>
<th>Conventional saw blade Kerf [mm]</th>
<th>Difference [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>2.6</td>
<td>3.2</td>
<td>18.8</td>
</tr>
<tr>
<td>350</td>
<td>2.8</td>
<td>3.5</td>
<td>20.0</td>
</tr>
<tr>
<td>400</td>
<td>3.0</td>
<td>4.0</td>
<td>25.0</td>
</tr>
<tr>
<td>450</td>
<td>3.2</td>
<td>4.4</td>
<td>27.3</td>
</tr>
<tr>
<td>500</td>
<td>3.4</td>
<td>4.4</td>
<td>22.7</td>
</tr>
<tr>
<td>550</td>
<td>4.0</td>
<td>4.8</td>
<td>16.7</td>
</tr>
<tr>
<td>600</td>
<td>4.2</td>
<td>5.2</td>
<td>19.2</td>
</tr>
</tbody>
</table>

---

**Thin Kerf Optimizing Saw Blades**

### Advantages Yield Pro – Recovery Rate

- **0.7 mm saving per cut**
  - 25 cut/min. = 17.5 mm/min.
  - 7 hour/day = 7.35 m/day
  - 250 days/year = **1838 m/year**
  - Better recovery rates
  - Less waste must be exhausted

- **0.7 mm saving per cut**
  - 100 cut/min. = 70 mm/min.
  - 14 hour/day = 58.8 m/day
  - 250 days/year = **14700 m/year**
Thin Kerf Optimizing Saw Blades

Advantages Yield Pro – High Cycle Times

1. Thinner kerf produces less pressure
2. Maximum allowable RPM is about 1.6 times higher

⇒ Possible to run constantly cycle times of less than 0.2 sec.

Advantages Yield Pro – Cut Quality

Cycle Time 0.19 sec.
Actual Cutting Time 0.08 sec.
Thin Kerf Optimizing Saw Blades

Advantages Yield Pro – Noise

1. Thinner kerf produces less pressure

2. Polymers in the saw plate dampen vibrations

⇒ Runs quieter than conventional saw blades

Yield Pro – Range of Application

Cross Cutting Only

Machines
- Optimizing saws
- Miter saws
- Cut off saws

Materials
- Solid wood
- Picture frames
- Mouldings
- Aluminum sash
Suitable wedge angle $\beta$ according to cutting edge material

- $\beta > 75^\circ$
- $\beta > 60^\circ$
- $\beta > 45^\circ$

Ideal Ultra-Fine
- Toughness
- Hardness

Wood Manufacturing 2007

G. Heubeck
Kanefusa Corporation – A new Dimension of Performance
www.kanefusa.net
Advanced Material Technology

It’s not a coating, ...

... What Is It?

- It’s implanted into a substrate material
- It has totally different wear characteristics

⇒ It’s a new category of cutting edge material

G. Heubeck
Kanefusa Corporation – A new Dimension of Performance
www.kanefusa.net

Advanced Material Technology

- **HC-UP** is for Carbide substrates
- **HS-HP** is for a High Speed Steel substrates

G. Heubeck
Kanefusa Corporation – A new Dimension of Performance
www.kanefusa.net
Advanced Material Technology

Suitable wedge angle $\beta$ according to cutting edge material

Hardness

Toughness

Planer Knives – HS-HP Rake Side Treatment
Advanced Material Technology

Finger Joint Cutter – HS-HP Back Side Treatment

G. Heubeck  
Kanefusa Corporation – A new Dimension of Performance  
www.kanefusa.net
Advanced Material Technology

Regrinding

- Face Side
- Back Side

⇒ Can be sharpened on conventional grinding equipment

G. Heubeck
Kanefusa Corporation – A new Dimension of Performance
www.kanefusa.net

Advanced Material Technology

User Value – More Machine Uptime

<table>
<thead>
<tr>
<th>Knife quality</th>
<th>HSS</th>
<th>ST-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knife changes per week</td>
<td>15</td>
<td>3-4</td>
</tr>
<tr>
<td>Set up time per week</td>
<td>15 x 15min. = 225min.</td>
<td>3 x 15min. = 45min.</td>
</tr>
<tr>
<td>Set up time per year (46 weeks)</td>
<td>172.5h</td>
<td>34.5h</td>
</tr>
</tbody>
</table>

⇒ User in Austria gains 138 h run time per year

G. Heubeck
Kanefusa Corporation – A new Dimension of Performance
www.kanefusa.net
### Advanced Material Technology

### User Value – Fewer Regrinds

<table>
<thead>
<tr>
<th>Knife quality</th>
<th>HSS</th>
<th>ST-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grinds per week</td>
<td>15</td>
<td>3-4</td>
</tr>
<tr>
<td>Grinding time per week</td>
<td>15x1.5h = 930min.</td>
<td>3x1.5h = 210min.</td>
</tr>
<tr>
<td>Grinding time per year</td>
<td>1.035h</td>
<td>207h</td>
</tr>
</tbody>
</table>

⇒ User in Austria saves 828 h grinding time per year

---

### Advanced Material Technology

### User Value – Better Cut Quality

⇒ Better quality rates
⇒ Smooth and tear out free surface
Advanced Material Technology

User Value – Less Residue Adhesion

- Regular T.C.T. Saw Blade
- Cutting Path: 2000m, Spruce
- Runs quieter
- Faster feeding possible
- Less power consumption

User Value – Profiling

- Easier and faster to grind ST-1 Knives than carbide knives
- Borazon wheels are cheaper than diamond wheels
- Truer profile

G. Heubeck
Kanefusa Corporation – A new Dimension of Performance
www.kanefusa.net
Advanced Material Technology

User Value – Else

⇒ Runs quieter
⇒ Faster feeding
⇒ Less power consumption

Kanefusa Corporation – A new Dimension of Performance
www.kanefusa.net

How to use a moulder more efficiently

Splitting Technology

G. Heubeck
Kanefusa Corporation – A new Dimension of Performance
www.kanefusa.net
How to use a moulder more efficiently

SF- Saw Blade

- Polymer injected laser slots reduce saw blade vibrations
  - Runs quieter
  - Truer run out
  - Less micro chipping of the cutting edge
- αMT treatment on the teeth
How to use a moulder more efficiently

**SF- Saw Blade**

- **Conventional** tooth shapes leave deep knife marks in the wood which can easily be seen.

- **SF-Saw Blade** tooth shapes leave shallow knife marks in the wood which are almost invisible.

---

How to use a moulder more efficiently

**SF- Saw Blade**

- Super Finish wood manufacturing at 8 m/min.
How to use a moulder more efficiently

Splitting Technology

80 mm

80 mm

83 mm

166 mm

230 mm (Machine Table)

28%
Not used

G. Heubeck  Kanefusa Corporation – A new Dimension of Performance  www.kanefusa.net
How to use a moulder more efficiently

Splitting Technology

User A – Germany

Material: Spruce
In-feed Size: 38 x 190 mm
Machine: Ledinek Stratoplan
RPM: 5000
Feed Rate: 300-400m/min
SF- Saw Blade: 450 x 5.6 x 3.8 x 150 x 60z
Profile Cutter: 376 18z R3

- Lifetime SF-Saw Blade ~ 100,000 m
- Lifetime Cutter ~ 1,000,000 m

How to use a moulder more efficiently

Splitting Technology

User B – Sweden

Material: Spruce
In-feed size: 47 x 150 mm
Machine: Waco Giant
RPM: 5000
Feed Rate: 85 m/min
SF- Saw Blade: 225 x 3.0 x 2.0 x 59.96 x 24z
Profile Cutter: 125 x 8z R3

- After splitting the wood is ready for sale
How to use a moulder more efficiently

Splitting Technology

User C – Sweden

Material: Spruce, Pine
In-feed size: 38 x 90-180 mm
Machine: Waco Maxi
RPM: 6000
Feed Rate: 130 - 150 m/min
SF- Saw Blade: 225 x 3.0 x 2.0 x 59.96 x 32 z
Profile Cutter: ---

- After splitting the wood is ready for sale

User D – Germany

Material: Spruce
In-feed size: 40 x 150 mm
Machine: Weinig Hydromat 22
RPM: 5000
Feed Rate: 60 m/min
SF- Saw Blade: 250 x 3.4 x 2.4 x 59.96 x 36 z
Profile Cutter: 169 x 10z R5

- Sawn surface is as good a planned surface
- Wood is ready for sale
How to use a moulder more efficiently

Splitting Technology

Regular Moulder

High Speed Moulder

LIGNA 2007

- Timber Max
- Timber Tec
- TAF-Pro

Hall 12 B26
Thank you for your attention