

# Cutting Tools

Kaindl Info\_E  
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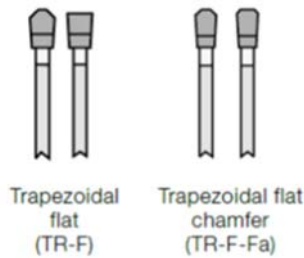
## Cutting

Different factors are responsible for a good cutting result:

Decor side to the top (board dividing and format saws), proper saw blade projection, feed rate, tooth sharp, tooth division, speed, and cutting speed. Depending on the volume to be cut, carbide-tipped (HW) or diamond-tipped (DP) disk saw blades are used.

### Format saws

Saw blades with the shapes trapezoidal flat tooth (TR-F) and/or trapezoidal flat chamfer (TR-F-Fa) achieve longer service lives at good cutting quality. Good edges on both sides can only be achieved by using a corresponding scoring tool.



Recommended cutting speed: 60-80 m/sec.

Feed rate per tooth: 0.03-0.08 mm

### Board dividing saws

On board dividing systems the best results can be achieved using Leuco Unicut Plus saw blades. Tooth engagement on the decor side of the board if only this side is machined visibly. Good edges on both sides can only be achieved by using a corresponding scoring tool.

The saw blade projection must be set depending on the diameter:

Saw blade	projection
Ø 300 mm	ca. 20 mm
Ø 350 mm	ca. 25 mm
Ø 400 mm	ca. 25 mm
Ø 450 mm	ca. 30 mm

The recommended cutting speed is 70-90 m/sec. The upper value must be selected for diamond-tipped disk saw blades. A feed rate of 0.08-0.25 mm per tooth must be aimed at.



## Shaping / edge machining

Tools with carbide-tipped or diamond-tipped blades must be used for shaping work. For HW swivel boards, it must be observed that a hard-wearing HW quality (recommended ISO standard K05) is used. HW quality HL Board 06 provides to be a well suitable quality during tests. When using joining cutters, tools in the shaft angle design are recommended.

## Processing on stationary CNC machines

Common HW and DP shaft tools can be used. However, the following items must be observed:

- Machine good side against the feed
- Always select the highest possible diameter (low risk of vibration)

<i>Clamping devices</i>	Use as-new collet chuck, hydraulic clamping system or shrinking chuck in order to ensure precise and smooth tool movement
<i>Tool</i>	Carbide-tipped or diamond-tipped blades
<i>Diameter</i>	Select as high as possible; when shaping pockets or recesses, the tool should be designed with base blade/drilling blade in any case
<i>Cutting speed</i>	Depending on the diameter (10-30 m/sec)
<i>Tooth feed rate</i>	0.3-0.6mm, against the feed as far as possible
<i>Clamping</i>	As low-vibration as possible, secure cut parts against falling down

## Table- top cutter and cutters for tunnel machines

<i>Tool</i>	Blade heads with carbide alternate boards or diamond tipped (DP) cutter with herring-bone toothed blade position (shaft angle)								
<i>Diameter</i>	Select as high as possible								
<i>Cutting speed</i>	50-60 m/sec Example: <table><tr><td>Ø 100 mm</td><td>&gt;12.000 rpm</td></tr><tr><td>Ø 125 mm</td><td>&gt;9.000 rpm</td></tr><tr><td>Ø 150 mm</td><td>&gt;7.500 rpm</td></tr><tr><td>Ø 180 mm</td><td>&gt;6.000 rpm</td></tr></table>	Ø 100 mm	>12.000 rpm	Ø 125 mm	>9.000 rpm	Ø 150 mm	>7.500 rpm	Ø 180 mm	>6.000 rpm
Ø 100 mm	>12.000 rpm								
Ø 125 mm	>9.000 rpm								
Ø 150 mm	>7.500 rpm								
Ø 180 mm	>6.000 rpm								
<i>Tooth feed rate</i>	0,6-0,8 mm, against the feed as far as possible								

### Chippers for tunnel machines

<i>Tool</i>	Kaindl Chipboards can be machined accurately with the double chipper procedure; in this, chippers with low cutting pressure are recommendable
<i>Cutting speed</i>	80 m/sec
<i>Tooth feed rate</i>	0,08-0,15 mm with standard chipper 0,2-0,35 mm with Power Tec III chippers

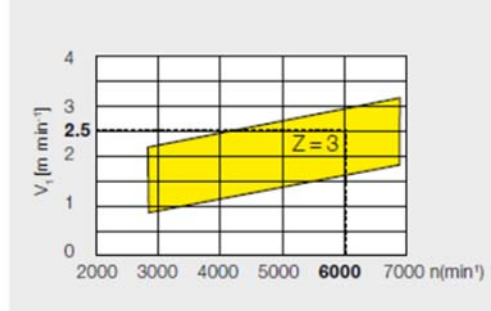
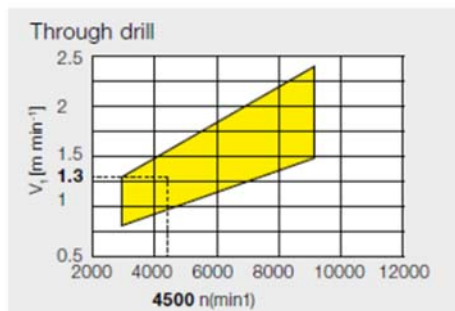
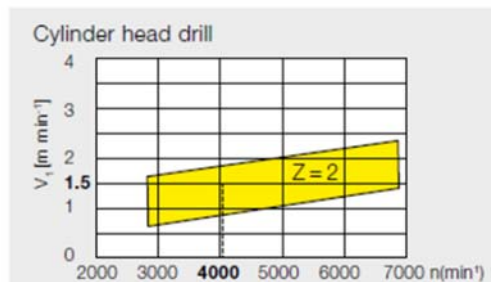
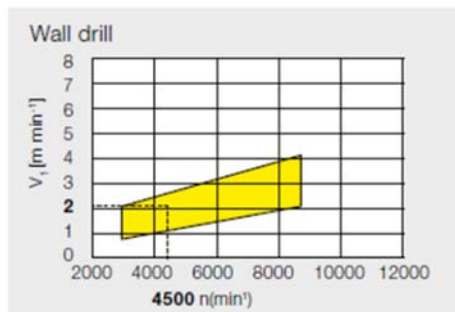
### Hand-held overhead cutter

<i>Tool</i>	Carbide-tipped cutter or tools with HW alternate boards
<i>Diameter</i>	Ø 10-25 mm
<i>Cutting speed</i>	Up to 10-25 m/sec
<i>Support</i>	As low-vibration as possible

### Drilling

<i>Clamping devices</i>	No-clearance supports with secure support
<i>Tool</i>	The following are suitable <ul style="list-style-type: none"> <li>• Carbide-tipped (HW) drills</li> <li>• Drills made of full-carbide (HWM)</li> </ul>
<i>Feed rate</i>	1,5-2 m/min
<i>Speed</i>	4.500-6.000 rpm

### Speed graphs





BOARDS. FLOORS. IDEAS.

### **Through-holes**

- Drills with back guidance result in a better cutting edge.

### **Blinde holes**

- For visible drill holes, use a drill with centering pin and nickers
- Hole line bores with small diameters ( $\varnothing$  2-3mm) can also be created very well using an HWM drill pin.

### **Fitting bores**

- HW-tipped cylinder head drills Z=2 or Z=3
- Longer service lives are offered by alternate board cylinder head drills.

Aufgrund der Vielfaltigkeit der Bearbeitungsmaschinen und der Komplexität der Aufgabenstellungen empfehlen wir die Abklärung der kundenspezifischen Anforderungen gemeinsam mit dem Werkzeughersteller Ihres Vertrauens.

### **Service life**

The service life of the tools and the work result naturally depend on several factors, e.g. the material, the tool, and the machine. The values mentioned always are reference values only. No rights must be derived from these values. Due to the diversity of processing machines and different complexity of assignments, we recommend clarifying the customer-specific requirements together with a technical adviser.

**Matrix: Cutting speed  $V_c$  depending on the tool diameter and the speed**

Tool Diameter (in mm) ↓	Cutting speed $V_c$ in m/sec (specified $V_c$ -Values are rounded approximate values)													
	450	24	47	71	94									
400	20	40	60	80	100									
380	19	38	57	76	95									
360	18	36	54	72	90									
340	17	34	51	68	85	102								
320	16	32	48	64	80	96								
300 <sup>1)</sup>	15	30	45	60	75	90	105							
280	14	28	42	56	70	84	98							
260	13	26	39	52	65	78	91	104						
240	12	24	36	48	60	72	84	96						
220	11	22	33	44	55	66	77	88	99					
200	10	20	30	40	50	60	70	80	90	100				
180 <sup>2)</sup>	9	18	27	36	45	54	63	72	81	90				
160	8	16	24	32	40	48	56	64	72	80	96			
140	7	14	21	28	35	42	49	56	63	70	84			
120	6	12	18	24	30	36	42	48	54	60	72	90		
100	5	10	15	20	25	30	35	42	45	50	60	75	90	
80	4	8	12	16	20	24	28	36	36	40	48	60	72	84
60	3	6	9	12	15	18	21	24	27	30	35	45	54	63
40	2	4	6	8	10	12	14	16	18	20	24	30	36	42
20	1	2	3	4	5	6	7	8	9	10	12	15	18	21
10	0,5	1	1,5	2	2,5	3	3,5	4	4,5	5	6	7,5	9	10,5
Speed (n) of the tool shaft (min <sup>-1</sup> )	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	12000	15000	18000	21000

Examples:

- 1) HW disk saw blade Ø 300mm at 4000rpm:  $V_c = 60\text{m/sec}$ .
- 2) WPL blade head Ø 180mm at 6000rpm:  $V_c = 54\text{m/sec}$ .

## Troubleshooting Support

<b>Problem</b>	<b>Detection</b>	<b>Possible causes</b>	<b>Remedy</b>
Material burns	<ul style="list-style-type: none"> <li>- Smoke and odour development during sawing cutting or drilling.</li> <li>- Dark discolouration of the core material</li> </ul>	<ul style="list-style-type: none"> <li>- Feed rate too low</li> <li>- Incorrect or no stop (saw)</li> <li>- Tool blunt</li> <li>- Number of teeth and/or blades too high</li> <li>- Speed too high</li> </ul>	<ul style="list-style-type: none"> <li>- Increase feed rate</li> <li>- Improve saw guidance</li> <li>- Sharpen the tool</li> <li>- Use tool with proper number of teeth/blades</li> <li>- Reduce the speed</li> </ul>
Cracking of cutting edges	<ul style="list-style-type: none"> <li>- Visual inspection of the cutting edges</li> </ul>	<ul style="list-style-type: none"> <li>- Saw/cutter blunt or ground incorrectly</li> <li>- Feed rate too high</li> <li>- Incorrect height setting (saw)</li> <li>- Poor support of the board (shaping)</li> <li>- Vibrations (shaping)</li> </ul>	<ul style="list-style-type: none"> <li>- Check tool and have it ground (properly)</li> <li>- Reduce the feed rate</li> <li>- Set proper projection</li> <li>- Check the tool guidance</li> </ul>
Short service life of the tool	<ul style="list-style-type: none"> <li>- Detection of the hours of operation, of the cut meters, or the number of drilled holes</li> </ul>	<ul style="list-style-type: none"> <li>- Tool ground improperly</li> <li>- Speed or feed rate too high</li> <li>- Incorrect height setting (saw)</li> <li>- Incorrect tooth shape (saw)</li> <li>- Incorrect blade geometry (drill)</li> <li>- Inappropriate cutting material</li> </ul>	<ul style="list-style-type: none"> <li>- Have tool ground properly</li> <li>- Reduce speed or feed rate</li> <li>- Set proper projection</li> <li>- Use proper saw</li> <li>- Use proper drills</li> <li>- Use quality tools</li> </ul>
Scratches on the decor	<ul style="list-style-type: none"> <li>- Visual inspection of the blade surface</li> </ul>	<ul style="list-style-type: none"> <li>- Pushing the board over a rough surface</li> </ul>	<ul style="list-style-type: none"> <li>- Use a packing plate when feeding the board</li> <li>- Use a stationary machine moving tool support</li> </ul>

### Application examples

<b>Blank cut on mitre saw</b>	
Individual board 16mm HW saw blade Ø 303 x 3,2 x Ø 30 Z= 84 Tr-F-Fa	
n = 4.000 min <sup>-1</sup>	Vc = 63 m/sec
vf = 10-15 m/min	fz = 0,03-0,04 mm

<b>Blank cut on board dividing saw</b>	
Package cut 4 x 25mm = 100mm DP saw blade Ø 450 x 4,8 x Ø 60 Z= 72 TR-F	
n = 3.600 min <sup>-1</sup>	Vc = 85 m/sec
vf = 20 m/min	fz = 0,08 mm

<b>Cutting on stationary CNC machine</b>	
Board thickness 19mm DP shaft cutter Ø 20 x SL28, shaft Ø 25 x 55, GL 95mm Z = 3+3	
n = 20.000 min <sup>-1</sup>	Vc = 21 m/sec
vf = 8-10 m/min	fz = ~ 0,17 mm

The following formulas are applicable for calculating tooth feed rate and cutting speed:

$$Vc = \frac{D * \pi * n}{6000}$$

$$fz = \frac{Vf * 1000}{Z * n}$$

Vc...Cutting speed (m/sec)

fz... Tooth feed rate or feed rate per tooth (mm)

Vf...Feed rate (m/min)

D...Tool diameter (cm)

n...speed (min-1)

z...number of teeth

## LEUCO TOOLS for machining Kaindl Chipboards:

### UniCut Plus Disk saw blades for board dividing saws

Dimensions	Z	Machine	Cutting material	Tooth shape	ID no.
Ø 350 x 4,4 x Ø 30	72	SCM, Panhans, Mayer, Schelling, HOLZHER	HW	TR-FL	189897
Ø 350 x 4,4 x Ø 60	72	Holzma 72, HPP350	HW	TR-FL	189898
Ø 380 x 4,4 x Ø 60	60	Holzma	HW	TR-FL	191955
Ø 380 x 4,8 x Ø 60	72	Holzma Typ 380/83/82	HW	TR-FL	189901
Ø 400 x 4,4 x Ø 30	72	Schelling, Mayer Irion, Scheer, HOLZHER	HW	TR-FL	189899
Ø 400 x 4,4 x Ø 75	72	Giben Prismatic 1, Giben Starmatic, Homag CH08 und CH12	HW	TR-FL	189900
Ø 450 x 4,8 x Ø 60	72	Holzma	HW	TR-FL	189902

### Disk saw blades for format saws

Dimensions	Z	Tooth shape	Cutting material	Design	ID no.
Ø 300 x 3,2 x Ø 30	72	Tr-F	HW Board 03	Low Noise	189684
Ø 303 x 3,2 x Ø 30	84	Tr-F-Fa	HW Board 06	Solid Surface	189531
Ø 303 x 3,2 x Ø 30	60	DA-D	HW Board 06		189690
Ø 303 x 3,2 x Ø 30	60	Tr-F	DP		189636
Ø 300 x 3,0 x Ø 30	100	G-5	HW Board 03	G5-Saw	189640

### Cutters for table-top cutters and tunnel machines

Dimensions	Z	Cutting material	Comment	ID no.
Ø 125 x 43 x Ø 30	3+3	DP	DP joining cutter low noise	184029
Ø 125 x 43,5 x Ø 30	3	DP	DP joining cutter Smart Jointer for Homag	183926
Ø 125 x 48 x Ø 30	3+3	DP	DP p-system with extreme shaft angle	184071

### CNC shaft cutter straight-edged

Cutting Ø/ Cutting length	ShaftØ x length	Total length	Number of blades	Cutting material	Comments	ID no.
Ø 12xSL 22	Ø12x40	69	1+1	DP diamond	Diamax	183444 RE
Ø 20xSL 28	Ø20x55	95	2+2	DP diamond	Diamax	183410 RE
Ø 20xSL 28	Ø25x55	95	3+3	DP diamond	High-performance cutter CM pos	183264 RE
Ø 48xSL 22	Ø25x62	85	4+2+4	DP diamond	High-performance cutter	181499 RE
Ø 25xSL 26,5	Ø25x55	105	2+2+1	DP diamond	p-system	184382 RE
Ø 60xSL 38	Ø25x55	105	4+4	DP diamond	p-system	184084 RE



### Chippers for tunnel machines

Dimensions	Z	Cutting material	Comment	ID no.
Ø 250 x 23/14,5 x Ø 60	16+8+4	DP	PowerTec III Chipper CM DP	183450 RE
Ø 250 x 23/14,5 x Ø 60	36+18+9	DP	PowerTec III Chipper CM DP	183456 RE s
Ø 250 x 23/8 x Ø 60	54+27	DP	UniTec-Chipper CM DP	182034 RE s
Ø 250 x 23/24 x Ø 60	54+27+9+9	DP	UniTec-Chipper CM DP	182046 RE s

### Through drill

Diameter mm	Design	LEUCO ID no. left	LEUCO ID no. right
Ø 5x 40, s Ø 10, GL70	VHW Mosquito	183153	183152
Ø 6x 40, s Ø 10, GL70	VHW Mosquito	183157	183156
Ø 8x 40, s Ø 10, GL70	VHW Mosquito	183157	183156
Ø 5x 30, s Ø 10, GL70	LEUCO Topline	178648	178649
Ø 8x 30, s Ø 10, GL70	LEUCO Topline	178650	178651

s Ø= shaft diameter, GL= total drill length

### Wall drills/ blind holes / fitting drills

Diameter mm	Design	LEUCO ID no. left	LEUCO ID No. right
Ø 5x 30, s Ø 10, GL70	VHW Mosquito	182390	182391
Ø 6x 30, s Ø 10, GL70	VHW Mosquito	183149	183148
Ø 8x 30, s Ø 10, GL70	VHW Mosquito	183151	183150
Ø 5x 35, s Ø 10, GL70	LEUCO Topline	177798	177799
Ø 8x 35, s Ø 10, GL70	LEUCO Topline	177802	177803
Ø 25 x s Ø 10, GL70	HW-tipped Z=2	178980	172252
Ø 35 x s Ø 10, GL70	HW-tipped Z=2	178982	172254
Ø 25 x s Ø 10, GL70	WPL-design Z=2+2		182570
Ø 25 x s Ø 10, GL57	DP diamond Z=2	182999	182998

s Ø= shaft diameter, GL= total drill length

### **Abbreviation**

CNC	'Computerized numerical control'
DP	Polycrystalline diamond
HC	Coated carbide
HS	High-alloyed steel
HW	Uncoated tungsten carbide
HWM	Drills made of full-carbide
SP	Alloyed tool steel
TR-F	trapezoidal flat tooth
TR-F-Fa	trapezoidal flat chamfer
WZ	alternate tooth