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Cutting Tools for Kaindl CDF C-s2, d0 Boards and Kaindl Dekor CDF C-s2, d0 Boards

Cutting

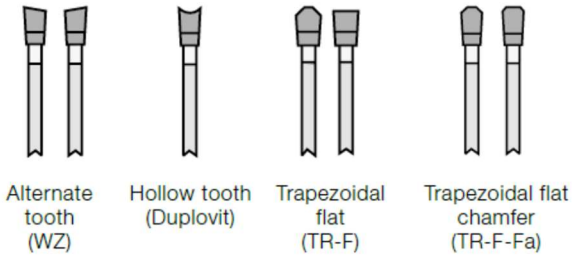
Different factors are responsible for a good cutting result:
Decor side to the top (board dividing and format saws), proper saw blade projection, feed rate, tooth sharp, tooth division, speed, and cutting speed. Depending on the volume to be cut, carbide-tipped (HW) or diamond-tipped (DP) disk saw blades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

Format saws

HW-saw blades with the tooth shapes alternate tooth (WZ) and hollow tooth (Duplovit) are particularly suitable for format saws with low volumes to be cut.

Good edges on both sides can only be achieved by using a corresponding scoring tool.

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.



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 the tooth shapes trapezoidal flat tooth (TR-F) and/or trapezoidal flat chamfer (TR-F-Fa).

Tooth engagement on the décor 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

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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 0,07-0,15 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 shaping rectangular recesses on the board surface, it must be observed that the corners are pre-drilled with a drilled hole before reaming the surface.

When using joining cutters, tools in the shaft angle design are recommended. In order to machine edges, files are suitable; in this, the filling direction should be from the decor side to the support material. In order to round edges, fine files and abrasive paper (grain size 100 to 150) or scrapers can be used with good success. Shaped edges should be machined as follows:

1. Slight beveling of the sharp and partially non-smooth edges using abrasive paper
2. Shaping the edge with a scraper
3. Re-bevelling using the abrasive paper
4. Careful removal of the loose abrasive products

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)

Clamping devices	Use as-new collet chuck, hydraulic clamping system or shrinking chuck in order to ensure precise and smooth tool movement
Tool	Carbide-tipped or diamond-tipped blades
Diameter	Select as high as possible; when shaping pockets or recesses, the tool should be designed with base blade/drilling blade in any case
Cutting speed	Depending on the diameter (10-30 m/sec)
Tooth feed rate	0,3-0,6mm, against the feed as far as possible
Clamping	As low-vibration as possible, secure cut parts against falling down

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Table- top cutter and cutters for tunnel machines

Tool	Blade heads with carbide alternate boards or diamond tipped (DP) cutter with axially parallel, better herring-bone toothed blade position (shaft angle)
Diameter	Select as high as possible
Cutting speed	50-60 m/sec Example: Ø 100 mm >12.000 rpm Ø 125 mm >9.000 rpm Ø 150 mm >7.500 rpm Ø 180 mm >6.000 rpm
Tooth feed rate	0,4-1,2 mm, against the feed as far as possible

Chippers for tunnel machines

Tool	Both the Kaindl CDF C-s2, d0 Board and the Kaindl Decor CDF C-s2, d0 Board can be machined accurately with the double chipper procedure; in this, chippers with low cutting pressure are recommendable
Cutting speed	80 m/sec
Tooth feed rate	0,08-0,15 mm with standard chipper 0,2-0,35 mm with Power Tec chippers

Hand-held overhead cutter

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

Drilling

Clamping devices	No-clearance supports with secure support
Tool	The following are suitable • Carbide-tipped (HW) drills • Drills made of full-carbide (HWM)
Feed rate	1,5-2 m/min
Speed	4.500-6.000 rpm

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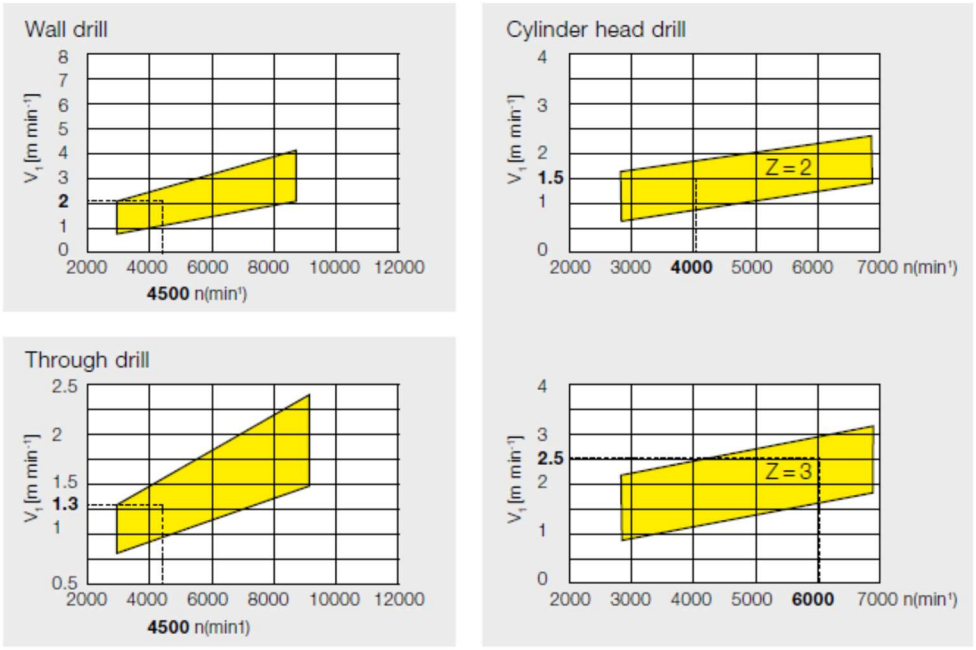
Speed graphs

In order to determine the feed rate depending on the speed



Through-holes

- Drills with low cutting pressures and good chip transport must be selected.
- Reduce the exit speed (50%).
- Drills with back guidance result in a better cutting edge.

Blinde holes

- For visible drill holes, use a drill with centering pin and nickers
- At a diameter of < 8 mm removing the chips is recommendable at hole depth of >10 mm for Kaindl CDF C-s2, d0 Board and Kaindl Decor CDF C-s2, d0 Board. Depending on the feed rate and speed, caking may occur otherwise. This is not the case with the chipboards.
- Hole line bores with small diameters (Ø 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.

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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.

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[1)]	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[2)]	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^{-1})	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 = 60m/sec.
2) WPL blade head Ø 180mm at 6000rpm: V_c = 54m/sec.

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Troubleshooting Support

Problem	Detection	Possible causes	Remedy
Material burns	- Smoke and odour development during sawing cutting or drilling. - Dark discolouration of the core material	- Feed rate too low - Incorrect or no stop (saw) - Tool blunt - Number of teeth and/or blades too high - Speed too high	- Increase feed rate - Improve saw guidance - Sharpen the tool - Use tool with proper number of teeth/blades - Reduce the speed
Cracking of cutting edges	- Visual inspection of the cutting edges	- Saw/cutter blunt or ground incorrectly - Feed rate too high - Incorrect height setting (saw) - Poor support of the board (shaping) - Vibrations (shaping)	- Check tool and have it ground (properly) - Reduce the feed rate - Set proper projection - Check the tool guidance
Short service life of the tool	- Detection of the hours of operation, of the cut meters, or the number of drilled holes	- Tool ground improperly - Speed or feed rate too high - Incorrect height setting (saw) - Incorrect tooth shape (saw) - Incorrect blade geometry (drill) - Inappropriate cutting material	- Have tool ground properly - Reduce speed or feed rate - Set proper projection - Use proper saw - Use proper drills - Use quality tools
Scratches on the decor	- Visual inspection of the blade surface	- Pushing the board over a rough surface	- Use a packing plate when feeding the board - Use a stationary machine moving tool support

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Application examples

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

Blank cut on board dividing saw 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^{-1}	Vc = 85 m/sec
vf = 20 m/min	fz = 0,08 mm

Cutting on stationary CNC machine Board thickness 19mm DP shaft cutter Ø 20 x SL28, shaft Ø 25 x 55, GL 95mm Z = 3+3 high-performance cutter CM positive	
Joining cut (reduction 3 mm)	
n = 24.000 min^{-1}	Vc = 25 m/sec
vf = 20 m/min	fz = ~ 0,28 mm
Separating cut	
n = 20.000 min^{-1}	Vc = 21 m/sec
vf = 10-12 m/min	fz = ~ 0,2 mm
Circular cut	
n = 20.000 min^{-1}	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:

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

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

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

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LEUCO TOOLS for machining Kaindl CDF C-s2, d0 Boards and Kaindl Decor CDF C-s2, d0 Boards:

Disk saw blades for board dividing saws

Dimensions	Z	Machine	Cutting material	Tooth shape	ID no.
Ø 320 x 4,4 x Ø 65	60	Selco EB 80	HW	TR-FL	191954
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	72	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 350 x 3,5 x Ø 30	84	WS	HW Board 03	G5-Saw	189677

Cutters for table-top cutters and tunnel machines

Dimensions	Z	Cutting material	Comment	ID no.
Ø 125 x 56 x Ø 30	2x3	HW WPL	WP-joining cutter for manual feed	177004
Ø 125 x 43 x Ø 30	3+3	DP	DP joining cutter low noise	184029
Ø 100 x 43,5 x Ø 30	3+3	DP	DP joining cutter Smart Jointer for Brandt	183914
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 lenght	ShaftØ x lenght	Total lenght	Number of blades	Cutting material	Comments	ID no.
Ø 20xSL 33	Ø25x50	80	2+2	HW WPL	Alternate board shaft cutter	184252 RE
Ø 18xSL 55	Ø18x50	110	2+2	HW solid	Finishing cutter positive/negative	180874 RE
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

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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 35, s Ø 10, GL70	DP diamond Z=1	183017	183016
Ø 6x 35, s Ø 10, GL70	DP diomond Z=2	183019	183018
Ø 8x 35, s Ø 10, GL70	DP diamond Z=2	183021	183020

s Ø= shaft diameter, GL= total drill lenght

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	DP diamond Z=2	183011	183010
Ø 6x 35, s Ø 10, GL70	DP diamond Z=2	183051	183052
Ø 8x 35, s Ø 10, GL70	DP diamond t Z=2	183013	183012
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 lenght

Abbreviation

CDF	Compact Density Fibreboard
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

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