Machining recommendation

REHAU RAUVISIO noir

Machining of REHAU RAUVISIO noir boards

RAUVISIO noir with its robust HPL surface is a versatile material with a noble matt finish and a velvety soft surface, which is ideal for mechanically demanding horizontal use, e.g. as a worktop in the kitchen or as a counter in a shop.

General machining guidelines
When machining REHAU RAUVISIO noir, the reference values from the table for the selection of the cutting speed (v_c) and the tooth feed rate (f_z) should be observed, depending on the machining method.

Machining method	Cutting speed v_c [m/s]
Sawing	60 - 90
Hogging	60 - 80
Cutting	40 - 70
Boring	0,5 - 2,0

Machining method	Tooth feed rate f_z [mm]
Sawing	0,05 - 0,12
Hogging	0,12 - 0,16
Cutting	0,40 - 0,70
Boring	0,05 - 0,15

Photo: REHAU Industries SE & Co. KG

These parameters are in relation to the tool diameter (D), number of teeth (Z), RPM (n) and feed speed (v_f) used on the processing machine. The right selection of these factors is responsible for a good machining result.

The following formulas apply to the calculation of cutting speed, tooth feed rate and feed speed:

v_c – Cutting speed [m/s]
$v_c = D \cdot \pi \cdot n / 60 \cdot 1000$
D – Tool diameter [mm]
n – RPM of tool [min^{-1}]

f_z – Tooth feed rate [mm]
$f_z = v_f \cdot 1000 / n \cdot z$
v_f – Feed speed [m/min]
n – RPM of tool [min^{-1}]
z – Number of teeth

v_f – Feed speed [m/min-1]
$v_f = f_z \cdot n \cdot z / 1000$
f_z – Tooth feed rate [mm]
n – RPM of tool [min^{-1}]
z – Number of teeth

General tool
For optimum edge quality, tools with new or newly repaired cutting edges are recommended.

Cutting material
Basically, both tools with carbide cutting edges (HW) and diamond cutting edges (DP diamond polycrystalline) can be used. The use of tools with diamond cutting edges (DP) is recommended in order to extend the tool life at high cutting volume.

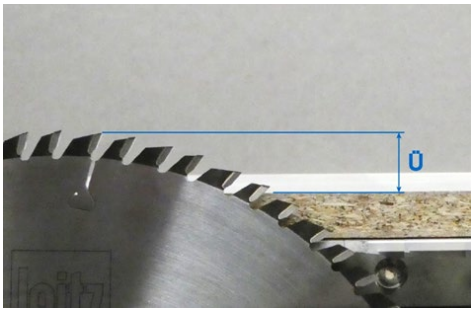
Cutting the panels with circular sawblades

General note:

- Visible side (decorative side with foil) upwards
- Make sure that the sawblade protrudes correctly (see table)
- Adjust RPM and number of teeth to feed speed
- The use of a scoring sawblade is recommended for precise cuts on the bottom side of the panel

Depending on the sawblade protrusion, the entry and exit angle and thus the quality of the cutting edge change. If the top cutting edge becomes rough, set the sawblade higher. If the cut on the bottom side is rough, the sawblade must be set lower. In this way the most favorable height setting must be determined.
The following sawblade protrusions (Ü) must be set for sizing and panel sizing saws, depending on the diameter (D):

Circular sawblade diameter D [mm]	Protrusions Ü [mm]
250	ca. 5 - 10
300	
350	
400	
450	



Sawblades with a high number of teeth are generally recommended for good machining quality.
For circular sawing, the recommended cutting speed (v_c) is 60 - 90 m/s.

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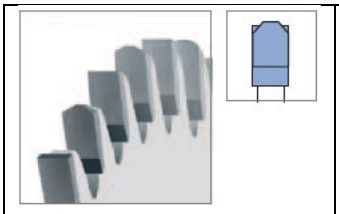
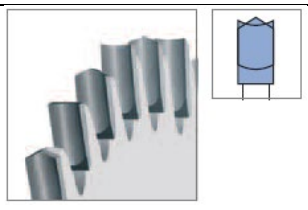
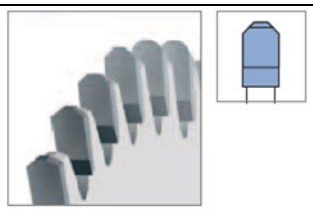
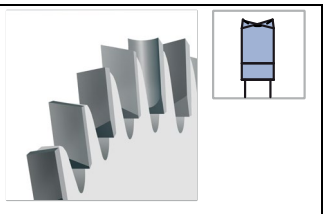
Recommended saw tooth shapes

			
FZ/TR (flat tooth/trapezoidal tooth)	HZ/DZ (hollow tooth/ inverted-V tooth)	TR/TR (trapezoidal tooth/ trapezoidal tooth)	HZFA/WZFA (bevelled hollow tooth/ alternate top bevel tooth)

Sizing sawblades

with the saw tooth shape hollow tooth/inverted-V tooth (HZ/DZ) ensure the best cutting results. The saw tooth shape flat tooth/trapezoidal tooth (FZ/TR) also provides good cutting results with a slightly higher tool life compared to HZ/DZ. WhisperCut circular sawblades with DP cutting material are recommended for easy machining. WhisperCut circular sawblades produce up to 10 dB(A) less noise and can be used with standard splitting wedges on machines with scoring unit.

Panel sizing sawblades

with saw tooth shape combinations such as flat / trapezoidal tooth (FZ/TR) or trapezoidal / trapezoidal tooth (TR/TR) are recommended for this purpose. The Leitz RazorCut (TR/TR) saw type achieves the best cutting quality here.

Dimensions DxSBxBO [mm]	Tooth shape	No. of teeth Z	RPM n [min^{-1}]	Feed speed v_f [m/min]
300x3.2x30	FZ/TR	96	4,000	Manual feed
303x3.2x30	HZ/DZ	68	4,000	Manual feed
380x4.8x60	FZ/TR	72	4,500	20 - 40
380x4.8x60	TR/TR	72	4,500	20 - 40

Other dimensions available on request

Scoring sawblades

With REHAU RAUVISIO noir, the use of a scoring unit is recommended to achieve good cutting edge quality on the tooth exit side. The cutting width of the scoring sawblade must be set slightly larger than that of the main circular sawblade so that the exiting tooth of the main saw can no longer touch the cutting edge. Divided scoring sawblades are used on circular saw benches and sizing saw machines.

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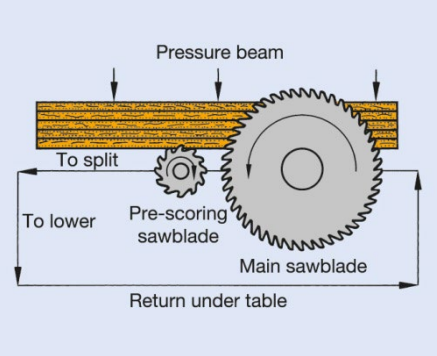
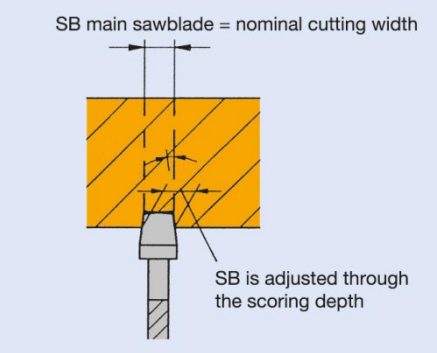


Panel sizing system with scoring unit and pressure device



Application diagram of conical scoring saw-blade. When repairing the tools, it is recom-mended to sharpen the scoring saws with the main saws in a set.

All dimensions available on request

Jointing on table milling machine or throughfeed systems

In order to produce edges free of break-outs on the cover layers of the panel, jointing tools with alternate shear angles should be used. Diamond cutterheads such as Leitz WhisperCut® with a shear angle of 30° to 50° are recommended. The chip removal should be as low as possible and not exceed 2 mm.
For good cutting results, it is advantageous to use tools with high concentricity and balancing quality which are achieved by using centering adaptors such as hydraulic clamping systems, HSK holders or shrink-fit clamping systems.
Only tools marked “MAN” or “BG-Test” may be used when working with manual feed on table milling machines. Further-more, for safety reasons, the speed range specified on the tool must not be exceeded or fallen short of. The tools for manual feed may only be used when running against the feed.

The application parameters of the jointing cutters should be selected so that the tooth feed (f_z) is between 0.4 and 0.7 mm.
The DP-WhisperCut® version is recommended for perfect cutting results.

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Dimensions DxSBxBO [mm]	RPM n [min^{-1}]	No. of teeth Z	Feed speed v_f [m/min]	ID, DP WhisperCut®		Machine
				LH	RH	
85x43x30	12,000	3	14 - 20	**192209**	**192210**	Ott
100x43x30	12,000	2	9 - 16	**192082**	**192083**	Stefani, Holz Her
100x43x30	12,000	2	9 - 16	**192233**	**192234**	Hebrock, EBM
100x43x30	12,000	3	14 - 20	**192088**	**192088**	Biesse
100x43x30	12,000	3	14 - 20	**090885**	**090886**	Brandt
125x32x30	9,000	3	10 - 20	**192092**	**192093**	IMA
125x43x30	9,000	3	10 - 20	**075627**	**075627**	Homag, Biesse
125x43x30	9,000	3	10 - 20	**192094**	**192095**	IMA

Other dimensions available on request

For the highest quality requirements, the use of Leitz EdgeExpert tools is recommended.

Dimensions DxSBxBO [mm]	RPM n [min^{-1}]	No. of teeth Z	Feed speed v_f [m/min]	ID, DP WhisperCut® EdgeExpert		Machine
				LH	RH	
125x43x30	9,000	3	10 - 20	**192249**	**192249**	Biesse
125x63x30	9,000	3	10 - 20	**192250**	**192250**	Biesse
125x43x30	9,000	3	10 - 20	**192249**	**192249**	Homag
125x43x30	9,000	3	10 - 20	**192251**	**192252**	IMA
125x63x30	9,000	3	10 - 20	**192301**	**192302**	IMA

Other dimensions available on request

Leitz Diamaster WhisperCut® EdgeExpert

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Hoggers for throughfeed machines

Diamond compact hoggers, which generate little friction and cutting pressure, are recommended. The Leitz Diamaster DT Premium type mounted on a hydraulic clamping element is particularly suitable for maximum radial and axial runout and excellent machining quality and tool life. The cutting speed (v_c) is 80 m/s at the usual speed (n) 6000 min^{-1} and diameter (D) 250 mm. The application parameters and the number of teeth of the hoggers should be selected so that the tooth feed (f_z) is between 0.12 - 0.16 mm.

Dimensions DxSBxBO [mm]	RPM n [min^{-1}]	No. of teeth Z	Feed speed v_f [m/min]	ID, DT Premium	
				LH	RH
250x10x60	6,000	24	15 - 24	**190410**	**190411**
250x10x60	6,000	36	25 - 35	**190418**	**190419**
250x10x60	6,000	48	35 - 45	**190426**	**190427**
250x10x60	6,000	60	45 - 55	**190434**	**190435**

Other dimensions available on request

Leitz DT Premium hogger

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Groove processing

For groove processing, tools with a high number of teeth should preferably be selected for optimum edge quality. The tooth feed rate (f_z) should be in the range of 0.03 - 0.06 mm when machining with feed (GLL).

Diameter D [mm]	RPM n [min^{-1}]	No. of teeth Z	Feed speed v_f [m/min]
180	6,000	36	7 - 14
200	6,000	48	8 - 16

Other dimensions available on request

CNC Stationary machines

Spiral solid carbide cutters (VHW) or preferably diamond tipped (DP) routers are best suited for machining on router and machining centres.
Good workpiece clamping on the machine must be ensured. To support the vacuum suction devices, additional mechanical fixtures can be used if necessary. We recommend stable and rigid Leitz Thermo-Grip® shrink chucks for maximum concentricity, balancing quality and perfect cutting quality. A good machining result can only be achieved with sufficient rigidity of the machine. Rigid portal machines are perfect.

Recommended application data:
RPM n = 20,000 - 24,000 min^{-1}
Full cut feed rate (v_f):
Z1 = 8 m/min Z2 = 16 m/min Z3 = 24 m/min

Dimensions DxNLxS [mm]	No. of teeth Z	Direction of rotation	Version	ID
16x28x20	2 + 2	RH	Diamaster PRO	**191042**
20x28x20	2 + 2	RH	Diamaster QUATTRO	**091235**
20x28x20	3 + 3	RH	Diamaster PLUS³	**191051**
20x32x20	2 + 2	RH	Diamaster QUATTRO EdgeExpert	**191071**
12x24x12	2 + 2	RH	Diamaster PRO, Nesting	**191060**

Other dimensions available on request

Leitz Diamaster EdgeExpert

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Boring

Preferably diamond-tipped or solid carbide (VHW) spiral drills or dowel and hinge boring bits are used for drilling.

On CNC machining centers, it is recommended to use the hinge boring bits in the main spindle instead of in the drilling beam. Drilling for dowel and hinge boring holes takes place on the counter-drawing side of the “mineral fiber material side”.

Application data

Dowel drill
RPM n = 4,000 - 6,000 min^{-1}
Feed speed v_f = 0.5 - 1.5 m/min
Drilling mode: L - S

Through-hole boring bit
RPM n = 4,000 - 8,000 min^{-1}
Feed speed v_f = 0.5 - 1.5 - 0.5 m/min
Drilling mode: L - S - L

Hinge boring bit
RPM n = 3,000 - 6,000 min^{-1}
Feed speed v_f = 1 - 2 m/min
Drilling mode: L - S

Examples of Leitz dowel drill, through-hole boring bit and hinge boring bit (HW, DP)

Dowel drills, through-hole boring bits and hinge boring bits

Design	D [mm]	NL [mm]	GL [mm]	Z	ID	
					LH	RH
HW-solid dowel drill Excellent	5	35	70	Z2/V2	**033496**	**033497**
HW-solid dowel drill Excellent	8	35	70	Z2/V2	**033500**	**033501**
HW-solid through-hole boring bit Excellent	5	35	70	Z2	**034100**	**034101**
HW-solid through-hole boring bit Excellent	8	35	70	Z2	**034104**	**034105**
DP-through-hole boring bit	5	30	70	Z1	**091186**	**091185**
DP-through-hole boring bit	8	30	70	Z1	**091192**	**091191**

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Design	D [mm]	NL [mm]	GL [mm]	Z	ID	
					LH	RH
HW-solid hinge boring bit	15	70		Z2/bevel	**130073401**	**130073400**
HW-solid hinge boring bit	20	70		Z2/bevel	**130073403**	**130073402**
HW-solid hinge boring bit	25	70		Z2/bevel	**130073405**	**130073404**
HW-solid hinge boring bit	26	70		Z2/bevel	**130073407**	**130073406**
HW-solid hinge boring bit	30	70		Z2/bevel	**130073409**	**130073408**
HW-solid hinge boring bit	35	70		Z2/bevel	**130073411**	**130073410**
DP-hinge boring bit	15	70		Z2/V2		**191023**
DP-hinge boring bit	25	70		Z2/V2		**191197**
DP-hinge boring bit	35	70		Z2/V2	**091184**	**091183**

Performance times

Tool performance times are influenced by a variety of factors, so that no performance time statements or rights can be derived within the scope of this machining guideline. The information on the tools and machining parameters are recommended guide values. Machine or process constellations can lead to deviating parameters. An optimal adaptation of machine, tool and material as well as customer-specific requirements can only be carried out on site together with a Leitz application engineer.

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Explanation of abbreviations

A	=	dimension A
a_e	=	cutting thickness (radial)
a_p	=	cutting depth (axial)
ABM	=	dimension
APL	=	panel raising length
APT	=	panel raising depth
AL	=	working length
AM	=	number of knives
AS	=	anti sound (low noise design)
b	=	overhang
B	=	width
BDD	=	thickness of shoulder
BEM	=	note
BEZ	=	description
BH	=	tipping height
BO	=	bore diameter
CNC	=	Computerized Numerical Control
d	=	diameter
D	=	cutting circle diameter
D0	=	zero diameter
DA	=	outside Diameter
DB	=	diameter of shoulder
DFC	=	Dust Flow Control (optimised chip clearance)
DGL	=	number of links
DIK	=	thickness
DKN	=	double keyway
DP	=	polycrystalline diamond
DRI	=	rotation
FAB	=	width of rebate
FAT	=	depth of rebate
FAW	=	bevel angle
FLD	=	flange diameter
f_z	=	tooth feed
$f_{z\,eff}$	=	effective tooth feed
GEW	=	thread
GL	=	total length
GS	=	Plunging edge
H	=	height
HC	=	tungsten carbide, coated
HD	=	wood thickness (thickness of workpiece)
HL	=	high-alloyed tool steel
HS	=	high-speed steel (HSS)
HW	=	tungsten carbide (TCT)
ID	=	ident number
IV	=	insulation glazing
KBZ	=	abbreviation
KLH	=	clamping height
KM	=	edge breaker
KN	=	single keyway
KNL	=	combination pinhole consists of 2/7/42 2/9/46,35 2/10/60
L	=	length
l	=	clamping length
LD	=	left hand twist
LEN	=	Leitz standard profiles
LH	=	left hand rotation
M	=	metric thread
MBM	=	minimum order quantity
MC	=	multi-purpose steel, coated
MD	=	thickness of knife
min^{-1}	=	revolutions per minute (RPM)
MK	=	morse taper
m min^{-1}	=	metres per minute
m s^{-1}	=	metres per second
n	=	RPM
$n_{max.}$	=	maximum permissible RPM
NAL	=	position of hub
ND	=	thickness of hub
NH	=	zero height
NL	=	cutting length
NLA	=	pinhole dimensions
NT	=	grooving depth
P	=	profile
POS	=	cutter position
PT	=	profile depth
PG	=	profile group
QAL	=	cutting material quality
R	=	radius
RD	=	right hand twist
RH	=	right hand rotation
RP	=	radius of cutter
S	=	shank dimension
SB	=	cutting width
SET	=	set
SLB	=	slotting width
SLL	=	slotting length
SLT	=	slotting depth
SP	=	tool steel
ST	=	Cobalt-basis cast alloys, e.g. Stellit®
STO	=	shank tolerance
SW	=	cutting angle
TD	=	diameter of tool body
TDI	=	thickness of tool
TG	=	pitch
TK	=	reference diameter
UT	=	cutting edges with irregular pitch
V	=	number of spurs
v_c	=	cutting speed
v_f	=	feed speed
VE	=	packing unit
VSB	=	adjustment range
WSS	=	workpiece material
Z	=	number of teeth
ZA	=	number of fingers
ZF	=	tooth shape (cutting edge shape)
ZL	=	finger length