Processing recommendation

HOMAPAL laminate (NF-Metal) SRM

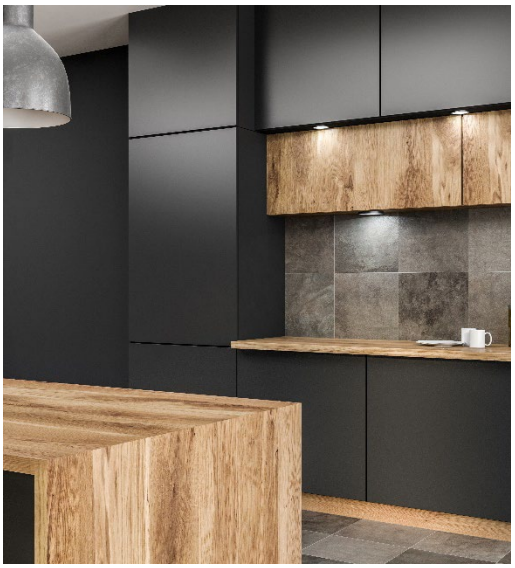
Processing of HOMAPAL laminate (NF-Metal) SRM

The HOMAPAL laminate (NF-metal) SRM is a new type of laminate with a particularly scratch-resistant surface. SRM stands for “Scratch Resistant Matt”. This laminate can be glued to standard wood-based panels such as chipboard or MDF. In particular, the demanding laminates with integrated non-ferrous metal foils (aluminium, copper and brass) are to be described in this processing recommendation.

General machining guidelines
When machining HOMAPAL laminate (NF-Metal) SRM, 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	75 - 90
Hogging	60 - 80
Cutting	40 - 70
Boring	0.5 - 2.0

Machining method	Tooth feed rate f_z in mm
Sawing	0.05 - 0.12
Hogging	0.12 - 0.16
Cutting	0.40 - 0.70
Boring	0.05 - 0.15



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.

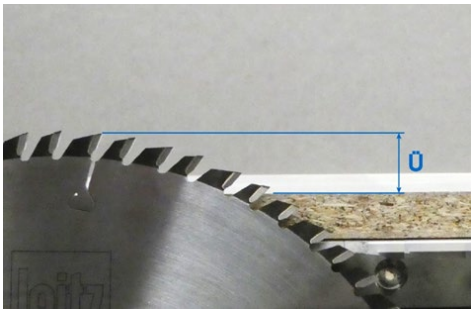
Cutting material
Basically, both tools with carbide cutting edges (HW) and diamond cutting edges (DP diamond polycrystalline) can be used. The use of tools with diamond cutting edges (DP) is recommended in order to extend the tool life at high cutting volume.

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

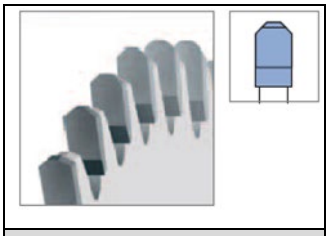
Depending on the sawblade protrusion, the entry and exit angle and thus the quality of the cutting edge change. If the top cutting edge becomes rough, set the sawblade higher. If the cut on the bottom side is rough, the sawblade must be set lower. In this way the most favourable height setting must be 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. 15 - 20
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 75 - 90 m/s.

Recommended saw tooth shape



TR/TR
(trapezoidal tooth/
trapezoidal tooth)

Sizing circular sawblades
Best machining results are achieved with the Leitz RazorCut circular sawblades. For long tool life, DP-tipped WhisperCut circular sawblades are recommended. Suitable dimensions of both circular sawblades are included in the Leitz Lexicon.

Panel sizing sawblades
With RazorCut circular sawblades, the best machining results are achieved at high feed rates. DP-tipped TR/TR circular sawblades are recommended for long tool life. Dimensions of both types of circular sawblades are included in the Leitz Lexicon.

Scoring sawblades
With HOMAPAL laminate (NF-metal) SRM, the use of a pre-scoring circular sawblade is necessary to achieve a good edge quality on the tooth exit side. Existing scoring circular sawblades can possibly be reused. For best tool life, DP-tipped scoring circular sawblades are recommended.

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. Furthermore, 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 (fz) is between 0.4 and 0.7 mm. The DP-WhisperCut EdgeExpert version is recommended for perfect cutting results.

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Jointing cutter Diamaster WhisperCut

Dimensions DxSBxBo [mm]	RPM n [min^{-1}]	No. of teeth Z	Feed speed v_f [m/min]	Leitz ID		Machine
				LH	RH	
85x43x30	12,000	3	14 - 25	**192076**	**192077**	Ott
100x32x30	12,000	3	14 - 25	**192090**	**192091**	IMA
100x43x30	12,000	2	8 - 18	**192082**	**192083**	Stefani, Holz Her
100x43x30	12,000	2	8 - 18	**192080**	**192081**	Hebrock, EBM
100x43x30	12,000	3	14 - 25	**192088**	**192088**	Biesse
100x43x30	12,000	3	14 - 25	**090885**	**090886**	Brandt
125x32x30	9,000	3	14 - 25	**192092**	**192093**	IMA
125x43x30	9,000	3	14 - 25	**075627**	**075627**	Homag, Biesse
125x43x30	9,000	3	14 - 25	**192094**	**192095**	IMA

Other dimensions available on request

Jointing cutter Diamaster WhisperCut EdgeExpert

Dimensions DxSBxBo [mm]	RPM n [min^{-1}]	No. of teeth Z	Feed speed v_f [m/min]	Leitz ID		Machine
				LH	RH	
125x43x30	9,000	3	14 - 25	**192249**	**192249**	Biesse
125x63x30	9,000	3	14 - 25	**192250**	**192250**	Biesse
125x43x30	9,000	3	14 - 25	**192249**	**192249**	Homag
125x43x30	9,000	3	14 - 25	**192251**	**192252**	IMA
125x63x30	9,000	3	14 - 25	**192301**	**192302**	IMA

Other dimensions available on request

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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) 6,000 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]	Leitz 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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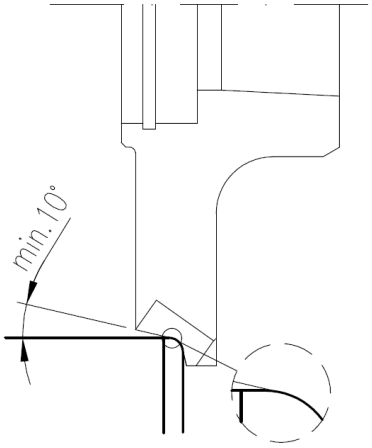
Edge finishing on edge banding machines

Radii cutters and scrapers on edge banding machines must be set so that the tools do not touch the tool material and do not damage the protective foil.

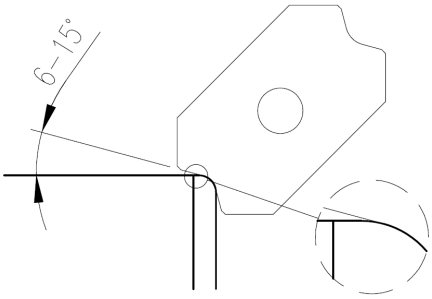
Radii cutter / bevel cutter

Radii cutters should have a profile run-out of at least 10°. The setting of the radii and bevel cutters must be selected so that there is no contact with the protective foil.



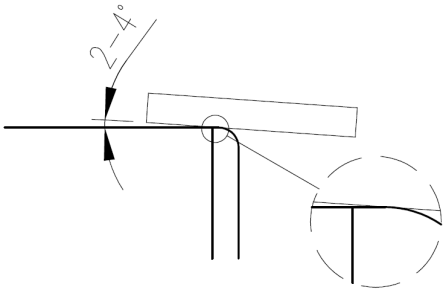
Profile scrapers

Profile scrapers are equipped with a profile relief and can easily be used for finishing the HOMAPAL laminate (NF-Metal) SRM with exact adjustment. In order to avoid possible damage to the protective foil, scrapers with a larger profile relief of up to 15 degree are recommended.



Flat scrapers

Flat scrapers should preferably have an inclination of 2 - 4° from the edge to the plate and should not touch the protective foil.



All dimensions available on request

Processing recommendation

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CNC Stationary machines

Spiral solid carbide cutters (VHW) or preferably diamond tipped (DP) routers are best suited for machining on router and machining centres. Tools with alternating cutting angles are absolutely necessary.
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.
For the best possible cutting results, the components must be recut after sizing (oversize max. 2 mm) in a second working cycle (finishing cycle). Pre and re-cut must be carried out against feed (GGL).

Recommended application data:
RPM n = 20,000 – 24,000 min^{-1}
Full cut feed rate (v_f):
Z1 = 6 - 8 m/min Z2 = 12 - 16 m/min Z3 = 18 - 24 m/min

Dimensions DxNLxS [mm]	No. of teeth Z	Direction of rotation	Version	Leitz ID
12x24x12	2 + 2	RH	Diamaster Pro, Nesting	**191060**
16x28x20	2 + 2	RH	Diamaster Pro	**191042**
20x28x20	2 + 2	RH	Diamaster Quattro	**091235**
20x28x20	3 + 3	RH	Diamaster Plus³	**191051**
25x30x25	3 + 3	RH	Diamaster Plus³ EdgeExpert	**191073**

Other dimensions available on request

Boring

Due to the surface finish of the HOMAPAL laminate (NF-Metal) SRM, bores are difficult to produce on the visible side, so that boring is only possible on the opposite side without tearing. For boring, carbide tipped or solid carbide (VHW) spiral drills, dowel drills and hinge boring bits are recommended. Due to the higher stability on CNC machining centres, the application of hinge boring bits in the main spindle instead of in the drill unit is recommended.

Dowel drill
Row hole borings for shelf supports are not recommended due to insufficient edge quality. For all other applications, the following tools can be used according to the tables below.

RPM n [min^{-1}]	4,000 - 6,000
Feed speed v_f [m/min]	0.5 - 2

Dimensions DxNLxGL [mm]	No. of teeth Z	Version	Leitz ID	
			LH	RH
5x35x70	Z 2 / V 2	HW-dowel drill Standard	**033440**	**033441**
8x35x70	Z 2 / V 2	HW-dowel drill Standard	**033446**	**033447**
10x35x70	Z 2 / V 2	HW-dowel drill Standard	**033448**	**033449**
5x35x70	Z 2 / V 2	HW-solid-dowel drill Excellent	**033496**	**033497**
8x35x70	Z 2 / V 2	HW-solid-dowel drill Excellent	**033500**	**033501**
10x35x70	Z 2 / V 2	HW-solid-dowel drill Excellent	**033540**	**033541**

Other dimensions available on request

Through-hole boring bit

RPM n [min^{-1}]	4,000 - 6,000
Feed speed v_f [m/min]	0.5 - 1

Dimensions DxNLxGL [mm]	No. of teeth Z	Version	Leitz ID	
			LH	RH
5x35x70	Z 2 / V 2	HW-through-hole drill Standard	**034074**	**034075**
8x35x70	Z 2 / V 2	HW-through-hole drill Standard	**034076**	**034077**
5x35x70	Z 2 / V 2	HW-solid-through-hole drill Excellent	**034100**	**034101**
8x35x70	Z 2 / V 2	HW-solid-through-hole drill Excellent	**034104**	**034105**

Other dimensions available on request

Hinge boring bit

RPM n [min^{-1}]	3,000 - 4,500
Feed speed v_f [m/min]	0.5 - 2

Hinge borings can preferably be drilled with solid carbide hinge boring bits. The following Leitz tools are recommended for this purpose:

Dimensions DxNLxGL [mm]	No. of teeth Z	Version	Leitz ID	
			LH	RH
15x70	Z 2 / V 2	HW-solid hinge boring bit	**037203**	**037204**
20x70	Z 2 / V 2	HW-solid hinge boring bit	**037205**	**037206**
25x70	Z 2 / V 2	HW-solid hinge boring bit	**037207**	**037208**
26x70	Z 2 / V 2	HW-solid hinge boring bit	**037209**	**037210**
30x70	Z 2 / V 2	HW-solid hinge boring bit	**037211**	**037212**
35x70	Z 2 / V 2	HW-solid hinge boring bit	**037213**	**037214**

Other dimensions available on request

Dimensions DxNLxGL [mm]	No. of teeth Z	Version	Leitz ID	
			LH	RH
15x70	Z 3 / V 3	HW-solid hinge boring bit	**037284**	**037285**
20x70	Z 3 / V 3	HW-solid hinge boring bit	**037270**	**037271**
25x70	Z 3 / V 3	HW-solid hinge boring bit	**037272**	**037273**
26x70	Z 3 / V 3	HW-solid hinge boring bit	**037274**	**037275**
30x70	Z 3 / V 3	HW-solid hinge boring bit	**037276**	**037277**
35x70	Z 3 / V 3	HW-solid hinge boring bit	**037280**	**037281**

Other dimensions available on request

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. Due to the high quality requirements and special finish quality of the HOMAPAL laminate (NF-Metal) SRM, a shortening of the tool life compared to conventionally coated panels is expected with reference to the influencing factors mentioned above.

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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