Recommendation for processing Unilin decorative panels

The guidelines in this manual apply to the following

- types of decorative panel:
  - HPL bonded on two sides to MDF or chipboard
  - Melamine faced chipboard (MFC)
  - Melamine faced MDF

- Surface structures:
  - Flat structures
  - Deep structures and synchronous structures

1. Cutting

The recommendations apply to **circular saw blades**.
Factors that can affect the cleanness of the cut:

- Sawing speed
- Saw blade adjustment angle (protrusion)
- Type of sawing machine: panel sizing saw and sizing saw with main saw and pre-scoring saw
- Type of saw blade and saw teeth: Saw blades with teeth with carbide or polycrystalline diamond cutting edges are suitable and the saw blade must have sufficient teeth.
- Age of saw blade: the guidelines of the saw blade manufacturer must be followed carefully in terms of sharpening and replacement.
- Avoid vibrations by exerting pressure on the panels while sawing.

When sawing, the decorative, visible side of the panel should be facing upwards.

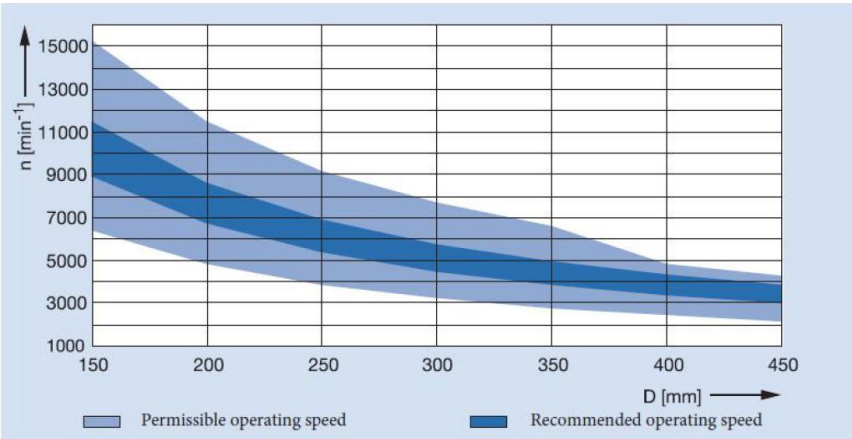
The guidelines and values specified in this manual are recommendations and should be adapted and tested in accordance with the instructions from the manufacturer of the sawing machine and saw blade.

Chipping of the cut on the decorative side is caused by incorrect adjustment of the sawing machine and/or use of an unsuitable or damaged (worn) saw blade.

1.1 Cutting speed

The recommended cutting speed is 60 to 90 m/sec with a sawing machine RPM of between 3,000 and 6,000 revolutions per minute and a feed rate of 10 to 30 m/min.

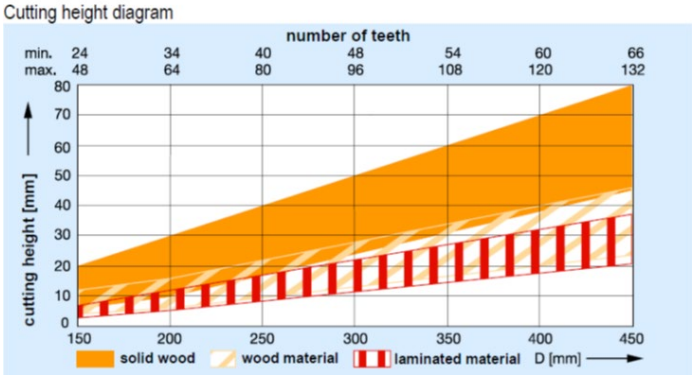
For example, for a saw blade with a diameter of D=350 mm and a sawing machine revolutions of n=4,500 revolutions per minute, the cutting speed is 82.43 m/sec. (4,500 rpm x (0.35 m x 3.14 pi)/60 min)

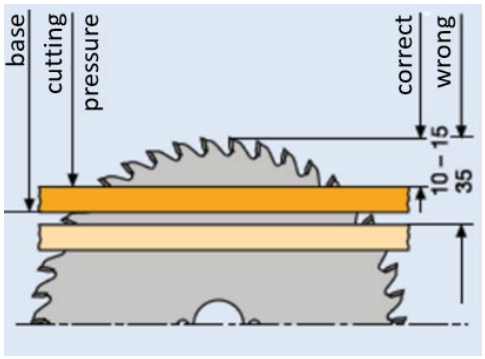


Speed diagram – depending on the diameter of the circular saw blade

1.2 Saw blade adjustment height

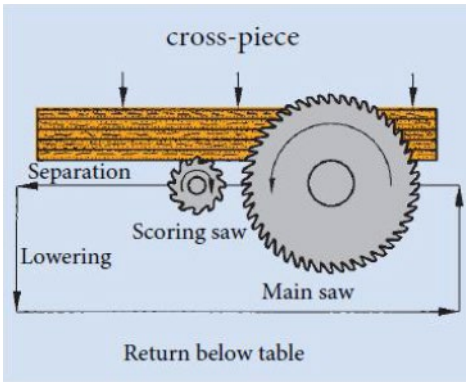
The recommended cutting height is 10 to 20 mm (= protrusion: distance between upper tooth and panel surface), depending on the diameter of the saw blade (250 to 400 mm) and the number of teeth (50 to 108).



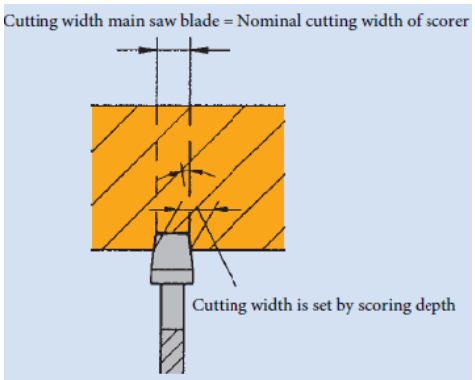


1.3 Sawing machine type: main saw and scoring saw

When cutting decorative panels, we recommend using a pre-scoring saw to ensure maximum quality while sawing. The cutting width of the pre-scoring blade should be set wider than the main saw blade so that the teeth on the main saw blade can no longer affect the cutting edge.



Sizing saw with scoring unit and pressure beams



Conical scoring saw blade application schedule When resharpening the tool (always by set), the cutting widths must be adjusted to one another.

- A panel sizing saw is used for sawing to size and sizing a panel.
- A sizing saw is used to divide a panel or packs of panels.

1.4 Type of saw blade and tooth

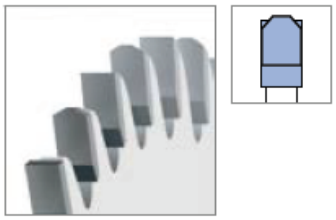
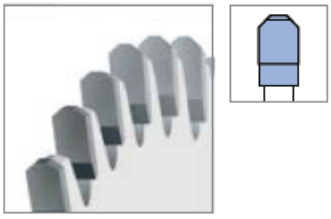
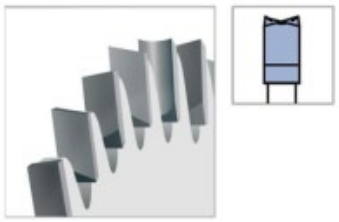
Type of saw blade:

- Panel sizing saw blade
- Sizing saw blade

Cutting material:

- Carbide cutting edges (HW)
- Diamond cutting edges (DP)

Recommend tooth shapes:

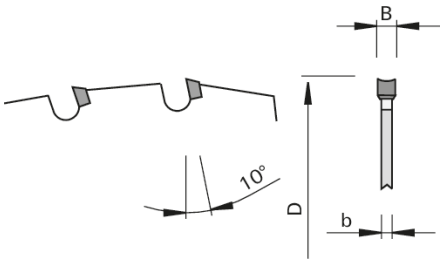
			
FZ/TR (flat tooth/trapezoidal tooth	TR/TR (trapezoidal tooth/trapezoidal tooth)	HZFA/WZFA (bevelled hollow tooth/alternate top bevel tooth)	HZ (hollow tooth)

The hollow tooth (HZ) or bevelled hollow tooth/alternate top bevel tooth (HZFA/WZFA) shapes give the best results when cutting melamine faced panels. The flat tooth/ trapezoidal tooth (FZ/TR) shape gives the best results when cutting HPL. For a longer service life, a saw blade with diamond cutting edges is a better option.

1.5 Panel sizing saw

Panel sizing circular saw: e.g. Leitz Excellent Whispercut

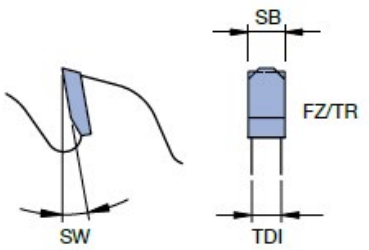
- Suitable for shortening and cutting to size, with scorer
- Special group toothing; extreme noise reduction (to 10 dB)
- Bevelled hollow tooth/alternate top bevel tooth (HZFA/WZFA)
- Teeth of polycrystalline diamond (DP)



Saw blade diameter (mm)	Cutting width B (mm)	Blade thickness b (mm)	Bore diameter (mm)	Number of teeth	Tooth shape	Cutting angle SW (°)
250	3.2	2.4	30	50	HZFA/WZFA	10
303	3.2	2.4	30	60	HZFA/WZFA	10
350	3.2	2.4	30	70	HZFA/WZFA	10

Panel sizing circular saw blade: e.g. Leitz Premium FZ/TR

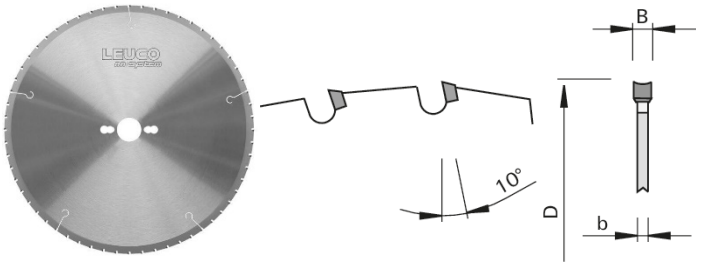
- Suitable for shortening and cutting to size, with scorer
- Flat tooth/trapezoidal tooth (FZ/TR)
- Teeth with carbide cutting edges (HW)



Saw blade diameter (mm)	Cutting width SB (mm)	Blade thickness TDI (mm)	Bore diameter (mm)	Number of teeth	Tooth shape	Cutting angle SW (°)
250	3.2	2.2	30	80	FZ/TR	10
300	3.2	2.2	30	96	FZ/TR	10
350	3.5	2.5	30	108	FZ/TR	10

Panel sizing circular saw blade: e.g. Leuco DP “HR” – NN system DP Flex

- Suitable for shortening and cutting to size, with scorer
- Hollow tooth (HZ)
- Teeth of polycrystalline diamond (DP)



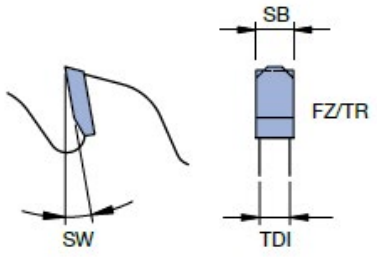
Saw blade diameter (mm)	Cutting width B (mm)	Blade thickness b (mm)	Bore diameter (mm)	Number of teeth	Tooth shape	Cutting angle SW (°)
250	2.5	2.0	30	50	HR	10
303	2.5	2.0	30	95	HR	10
350	2.5	2.0	30	72	HR	10

Other dimensions are available

1.6 Sizing saws

Sizing circular saw blade: e.g. Leitz Excellent RazorCut TR/TR

- Suitable for dividing individual panels and packs of panels with max. 60 mm height, with scorer
- Trapezoidal tooth/trapezoidal tooth (TR/TR)
- Teeth with carbide cutting edges (HW)

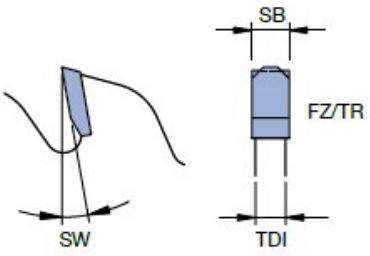


Saw blade diameter (mm)	Cutting width SB (mm)	Blade thickness TDI (mm)	Bore diameter (mm)	Number of teeth	Tooth shape	Cutting angle SW (°)
300	4.4	3.2	30/60	60/72	TR/TR	15
350	4.4	3.2	30/60/75	72	TR/TR	15
400	4.4	3.2	30/75/80	72	TR/TR	15

Saw blades are available to a diameter of 520 mm

Sizing circular saw blade: e.g. Leitz Premium FZ/TR

- Suitable for dividing individual panels and packs, with scorer
- Flat tooth/trapezoidal tooth (FZ/TR)
- Teeth with carbide cutting edges (HW)

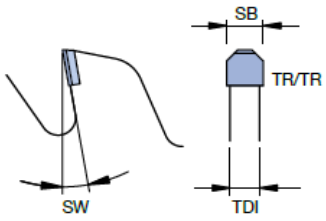


Saw blade diameter (mm)	Cutting width SB (mm)	Blade thickness TDI (mm)	Bore diameter (mm)	Number of teeth	Tooth shape	Cutting angle SW (°)
300	4.4	3.2	30 75	60/72/60/60	FZ/TR	15
350	4.4	3.2	30/60/75/80	72	FZ/TR	15
400	4.4	3.2	30/60/75/80	72	FZ/TR	15

Saw blades are available to a diameter of 750 mm

Sizing circular saw blade: e.g. Leitz Excellent

- Suitable for dividing individual panels and packs, with scorer
- Trapezoidal tooth/trapezoidal tooth (TR/TR)
- Teeth of polycrystalline diamond (DP)

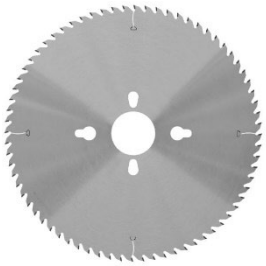


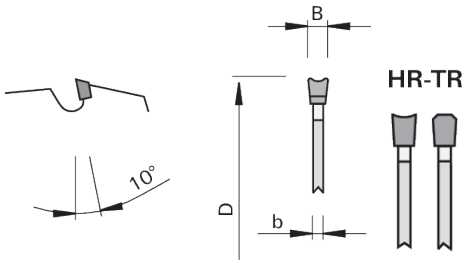
Saw blade diameter (mm)	Cutting width SB (mm)	Blade thickness TDI (mm)	Bore diameter (mm)	Number of teeth	Tooth shape	Size angle SW (°)
300	4.4	3.2	30	60	TR/TR	15
350	4.4	3.2	30/60	72	TR/TR	15
400	4.4	3.2	30	72	TR/TR	15

Saw blades are available to a diameter of 450 mm

Sizing circular saw blade: e.g. Leuco HW – Q-CUT “G6”

- Suitable for shortening and cutting to size, with scorer
- Hollow tooth/trapezoidal tooth (HZ/TZ)
- Teeth of polycrystalline diamond (DP)





Saw blade diameter (mm)	Cutting width B (mm)	Blade thickness b (mm)	Bore diameter (mm)	Number of teeth	Tooth shape	Cutting angle SW (°)
300	4.4	3.2	60	72	HR/TR	10
350	4.4	3.2	30/60/75	72	HR/TR	15
400	4.4	3.2	30	72	HR/TR	15

Other dimensions are available

2. MILLING

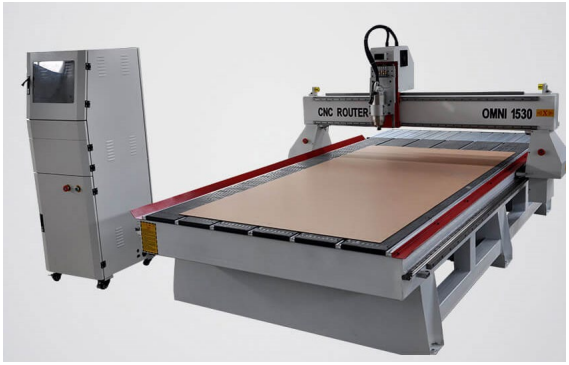
2.1 Type of milling machines

a. Portable hand router

- A router is a versatile machine which can be used to process a decorative panel by f.e. milling grooves and profiling edges. You can also mill out all kinds of shapes using a template. When gluing HPL to chipboard or MDF board, the HPL sheet can protrude a few millimeters over the chipboard or MDF board. This protruding HPL edge can be routed with a router.
- An effective extractor connected to the router, is important to prevent the milled chips from ending up on the panel surface and causing scratches.
- To avoid damaging the decorative panel surface during milling, the surface of the router sole must be completely flat and non-abrasive.

b. Throughfeed milling machine and stationary CNC milling table

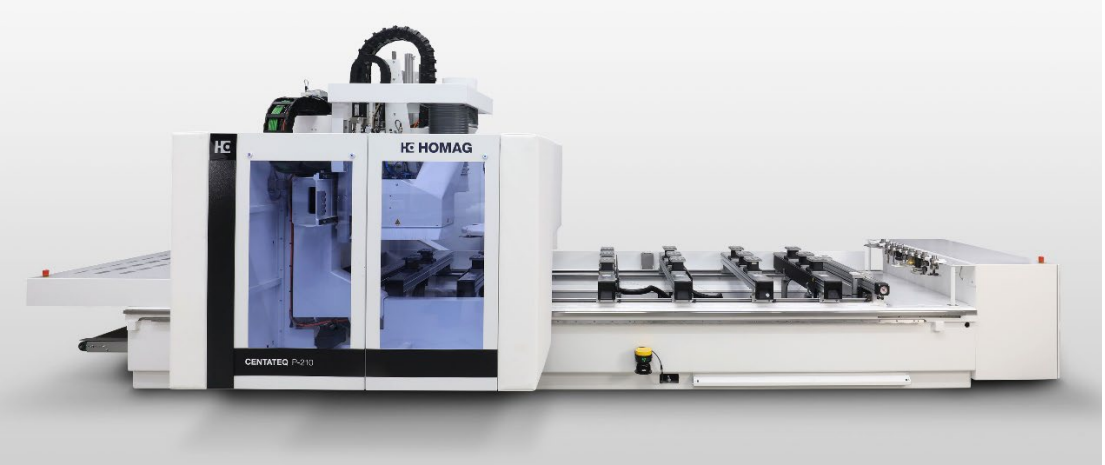
- When using a **throughfeed milling machine**, the decorative panel is guided by a feed module through the machine, past the fixed milling cutter.



- When using a **stationary CNC milling table**, the decorative panel is permanently clamped. The machining movement is performed by the path-controlled axes of the milling tool and/or the milling table.

c. CNC machine (machining centers)

CNC is an abbreviation for Computer Numerical Control and is a name for computer-controlled machines that are used to process f.e. sheet material. A major advantage of a CNC machine is that these machines can be programmed and can therefore repeat an operation and produce large series of exactly the same panel. A CNC machine can mill, saw, drill,…
The decorative panels to be processed can be clamped to modular units by using vacuum technology.



ADVICE: We recommend using a throughfeed milling machine, a stationary CNC milling table or a CNC machine to obtain the best milling result.

2.2 Milling tool type

General recommendations when milling decorative panels :
- To obtain a sharp milling cut without chipping, it is extremely important to work with appropriate and sharp tools, i.e. cutting blades/teeth must not be damaged or missing.
- The decorative panel to be processed must be attached/tensioned to the maximum extent on the vacuum modules or table. Regular cleaning of these vacuum units is necessary to obtain good adhesion.
- Prevent overheating of the milling tools

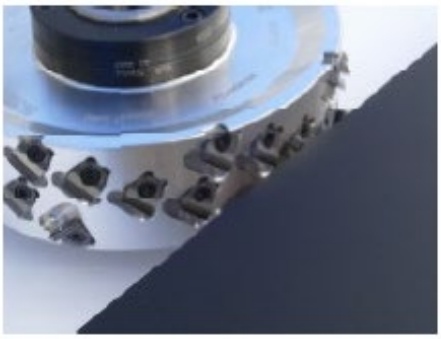
a. Milling tools suitable for throughfeed milling machines and stationary CNC milling tables

i. **Diamond tipped** cutterhead with a cutting angle between 30° and 70°
For chipping-free and low-noise milling of the edges of a panel in parallel and counterclockwise direction (alternating milling), especially with delicate surface structures. The cutterhead with varying cutting angles, has a light metal body and can be used multiple times due to exchangeable diamond-mounted cutting edges.
The orientation of the cutting edges is also extremely important: cutting should always be done with the cutting edges and the cutting pressure directed towards the plate i.e. on the upper side, the cutting edges must point downwards and on the underside, the cutting edges must be pointing upwards.

E.g . Leuco Diarex / Diamax smart jointer
Link website: LEUCO - Jointing and Rabbeting Cutters

E.g. Leitz Whisper Cut interchangeable cutterhead version
Link website: Diamaster WhisperCut - Leitz

DP-jointing cutter WhisperCut



DP-WhisperCut EdgeExpert

ii. Hoggers with **diamond tipped** cutting edges
These compact hoggers generate little friction and pressure on the saw cut and are suitable for longitudinal and transversal cutting, formatting of panels.

E.g. Leitz DT Premium
Link website: Compact hogger DT Premium - Leitz

E.g. Leuco PowerTec Air face

Link website: LEUCO - PowerTec airFace S Hoggers DP for LEUCO s-System Ø 160 mm and Ø 192 mm (DZ)

b. Milling tools suitable for stationary CNC milling tables and CNC machines (machining centers)

i. Diamond tipped router bits

E.g. Leitz Diamaster Pro
Router for formatting and grooving without marking the edges.

E.g. Leitz Diamaster Plus
Router for formatting and grooving with increased tool life. For chip-free edges on both sides.

E.g. Slidemaster EdgePro³
Router for formatting and grooving in nesting process at high feed rates. For chip-free edges on both sides.

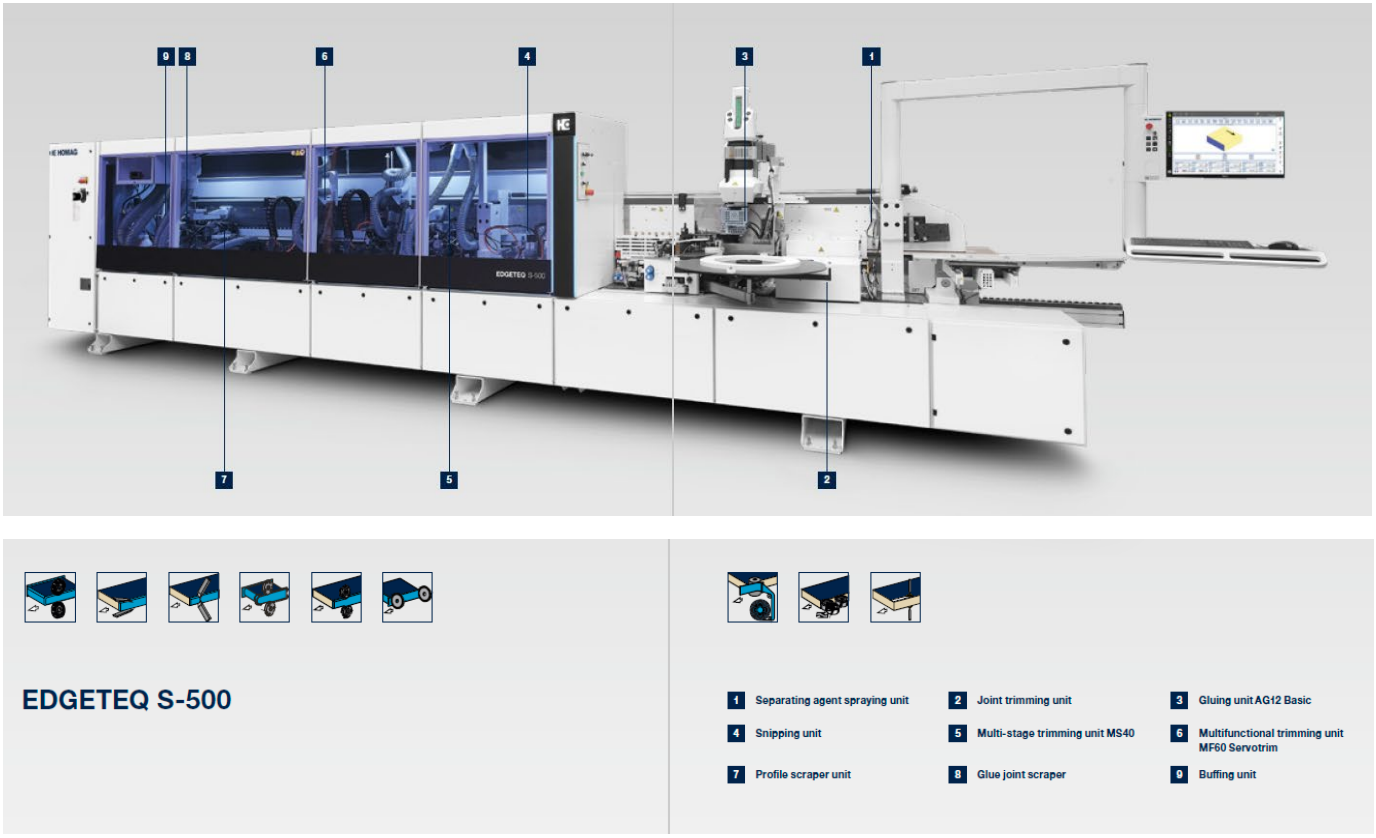
Link website: Diamaster EdgeExpert - Leitz

3. EDGE BANDING

An edge tape is used to finish a decorative panel with a chipboard or MDF core. To apply this edge tape, one can use an edge banding machine. Depending on the type of edge tape and surface structure of the decorative panel, a series of edge processing is carried out in the edge banding machine. It is extremely important that all edging processing is performed with the correct and sharp tools (see our recommendations in Chapter 1 on Sawing and Chapter 2 on Milling) and with the correct settings.

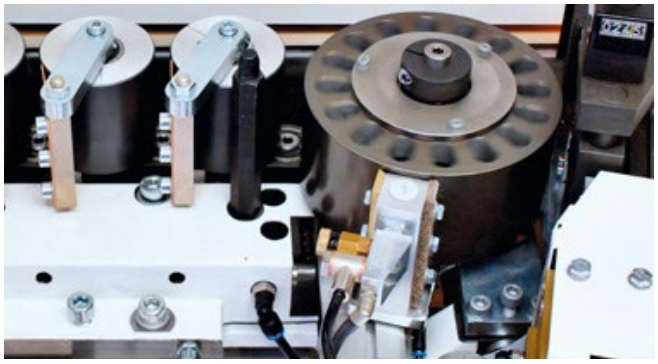
Overview of possible operations in an edge banding machine : e.g. HOMAG machine type Edgeteq

Website: Edge banding machines EDGETEQ S-380: 8–20 m/min feed speed | HOMAG



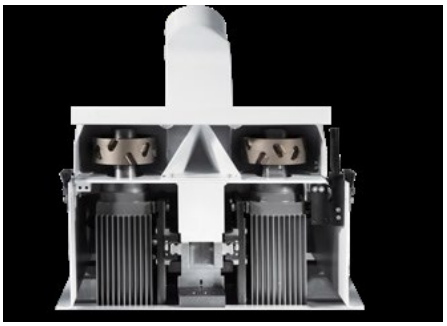
In the photo above, the ABS edging tape on a roll is fed in on the right side of the machine.

a. **Step 1: Spraying unit** to apply separating agent to the decorative surface. This liquid avoids the adhesion of the hot melt glue residuals that is used to glue e.g. ABS edge tape.



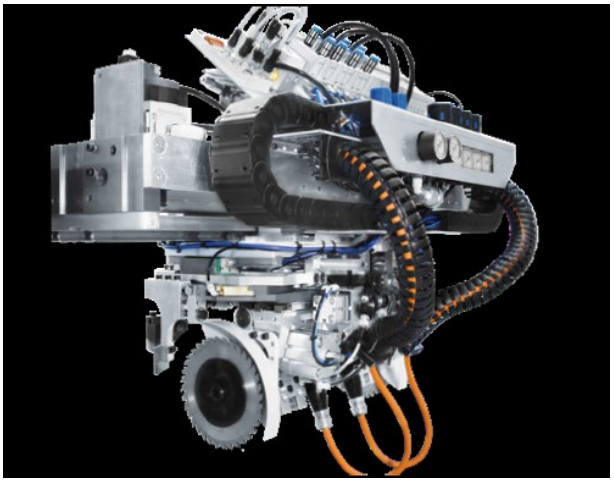
b. **Step 2: Joint trimming unit** to trim the thickness of panel material that corresponds with the thickness of the edge tape that will be applied (e.g. if an ABS edge tape with a thickness of 1 mm is used, then a thickness of 1 mm will first be trimmed by the joint trimming unit).

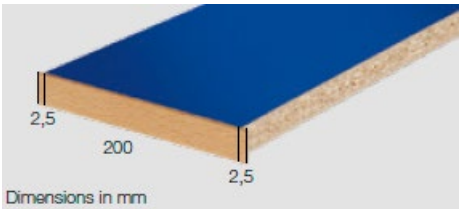
The use of good milling tools is extremely important to avoid chipping when milling: see advice in chapter 2 on milling where we recommend the use of diamond tipped cutting edges. Examples of suitable milling tools can be found in the milling chapter. Orientation of the cutting edges is also extremely important: cutting should always be done with cutting edges and cutting pressure towards the plate i.e. on the upper side, the cutting edges must point downwards and on the underside, the cutting edges must point upwards.



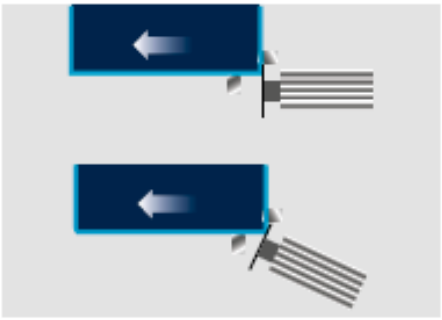
c. **Step 3: Gluing unit** for e.g. hot melt EVA glue. Other glue types (eg PUR) and modules for other glue techniques (hot air) are possible to add on the most recent types of edge taping machines.

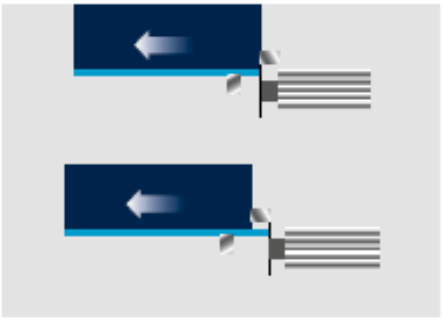
d. **Step 4: Snipping unit** for snipping the edge tape overhang lengthwise.



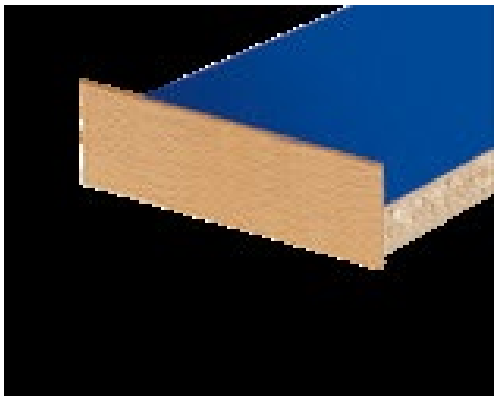


Possible operations with the snipping unit:

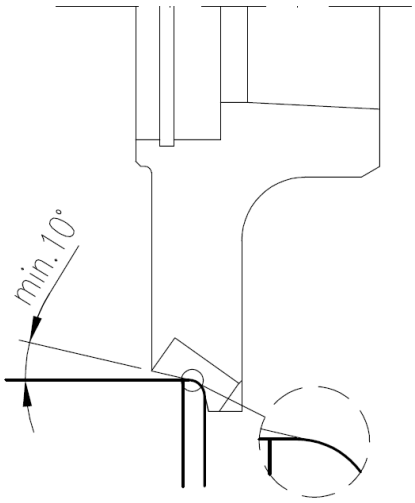




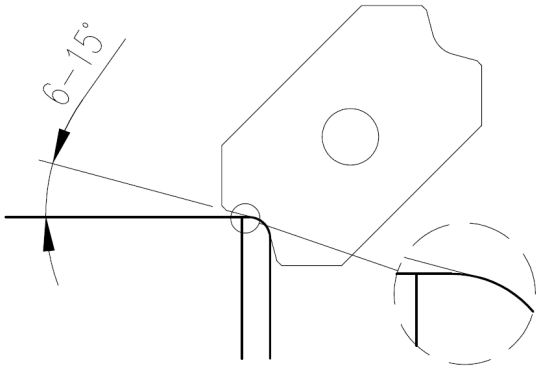
e. **Step 5: Trimming units** to cut off excess in width. As a general principle, the edge tape is taken 5 mm thicker compared to the panel thickness: e.g. edge tape width 23 mm for panel thickness 18 mm > excess of 5 mm is trimmed with a straight cutting edge.



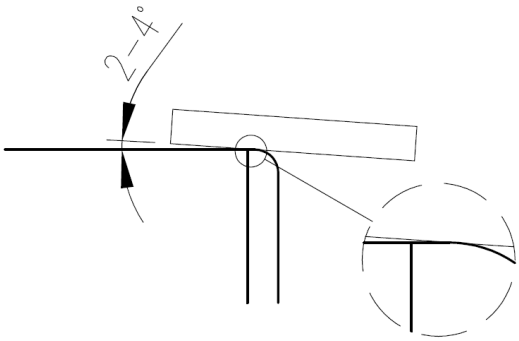
f. **Step 6: Profile trimming units** to chamfer edge tape at an angle of minimum 10°.



g. **Step 7: Profile scraper** to obtain a chamfer of the edge tape at an angle of 6° to 15°.



h. **Step 8: Flat** scraper (glue joint scraper) to remove glue residues.



i. **Step 9: Polishing unit** to neatly rub the finished side.

4. DRILLING

For drilling in decorative panels, it is recommended to work with carbide drill bits or with carbide tip.

There are the following types of drilling bits:

- Dowel drilling bit
  E.g. Leitz HW- solid excellent

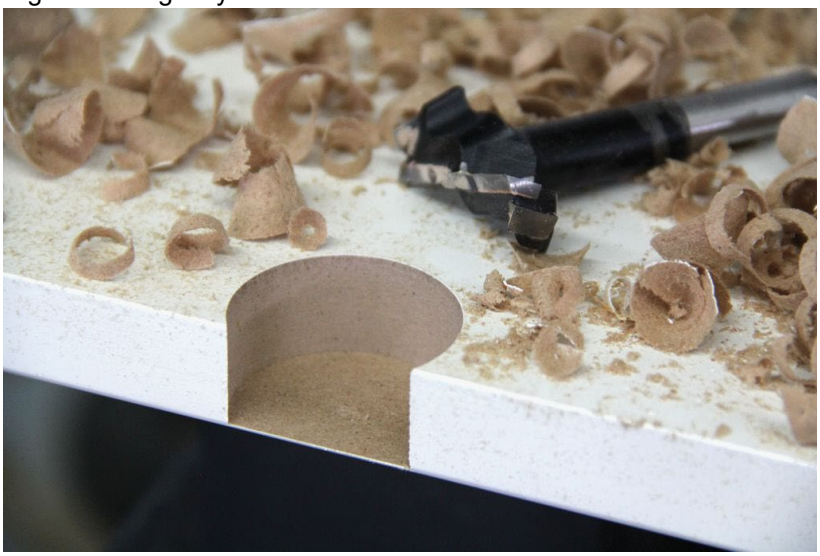
E.g. Leuco VHW Topline

- Through-hole drilling bit
  E.g. Leitz HW tipped - Premium

E.g. Leuco VHW Topline

- Hinge drilling bit
  E.g. Leitz HW solid

E.g. Leuco Light cylinder bore bit



This overview is for information purposes only. Please contact your UNILIN Panels advisor for additional information.