

MATERA Laminate

General purpose guidelines

When processing polytec Matera surfaces such as sawing, drilling, milling and sizing, please note the choice of suitable tools and cutting parameters. Tooling must be sharp when working with Matera surfaces, choosing blunt or the incorrect tools may lead to excess burring, tearing and melting of the surface.

The following table serves as an aid for the correct cutting speed and feed per tooth.

Type of processing	Cutting Speed Vc in m/s
Saws	60 – 90
Cutters	60 – 80
Milling Machines	50 – 70
Routers	10 – 35

Type of processing	Feed per tooth Fz in mm
Saws	0.02 – 0.12
Cutters	0.12 – 0.18
Milling Machines	0.30 – 0.55
Routers	0.15 – 0.25

The parameters from the table relate to the diameter of the tool (D), the number of teeth (Z), rotational speed (n) and the feed rate (V_f).

For the calculation of the cutting speed [m/s], the following formula applies:

$$V_c = D \cdot \pi \cdot n / 60 \cdot 1000$$

D = diameter [mm]
n = rotational speed [min⁻¹]

Circulation of the feed per tooth [mm]

$$F_z = V_f \cdot 1000 / n \cdot Z$$

V_f = feed rate [m/min⁻¹]
n = rotational speed [min⁻¹]
Z = number of teeth

Circulation of the feed rate [m/min⁻¹]

$$V_f = F_z \cdot n \cdot Z / 1000$$

F_z = feed per tooth
n = rotational speed [min⁻¹]
Z = number of teeth

Cutting material

In principle, carbide blades as well as diamond blades can be used. To ensure an appropriate tool lifetime when cutting high amounts of material, we recommend using diamond blades.

Cutting with circular saw blades

In general please note the following;

- The face side is always up
- Note the saw blade overhang (U)
- Set the appropriate rotational speed and feed per tooth for the feed rate
- Use a scoring blade for the back of the sheet

Depending on the saw blade overhang, the entry and exit angle changes and thus also the quality of the cut edge. If the top cut edge is chipped, the height of saw blade should be increased.

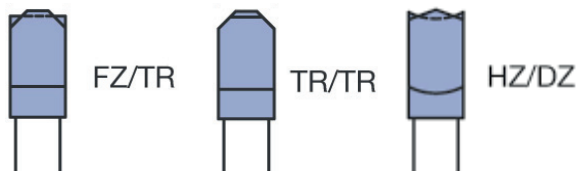
For panel saws and panel sizing machines, saw overhang (U) should be set according to the diameter of saw blade (D).



Circular saw diameter D	Saw Overhang U
250mm	approx. 5 – 10mm
300mm	approx. 5 – 10mm
350mm	approx. 8 – 12mm
400mm	approx. 8 – 12mm
450mm	approx. 10 – 15mm

Saws with a higher number of teeth are generally recommended for a good processing quality. For circular saws, the recommended cutting speed V_c is between 60 and 80 m/s. For diamond circular saw blades, the cutting speed can be increased to V_c 90 m/s.

Recommended saw tooth forms



Panel saws

With the tooth form hollow tooth/tooth roof (HZ/DZ) deliver the best cutting results. Also flat tooth/trapezoid tooth (FZ/TR) offers a good cutting quality with a somewhat higher tool life as opposed to hollow tooth/tooth roof (HZ/DZ).

Panel sizing machines

Saw tooth combinations with flat tooth/trapezoid tooth (FZ/TZ) or trapezoid tooth/trapezoid tooth (TZ/TZ) are recommendable.

Panel saws and panel sizing machines with scoring unit and pressure beams

Scoring saw blades:

For coating work material, the use of a scoring unit on the tooth entry side is recommended in order to achieve a good cut edge quality. The kerf of the scoring saw blade should be slightly larger than the main circular saw blade so that the exiting saw tooth can no longer touch the cut edge. Since a secure, flat support for the work material can only be guaranteed with a pressure beam, split scoring saw blades are to be used on table and panel saws.

Milling tables and milling machines in continuous feed systems:

Milling heads with HW exchangeable milling cutters or with diamond milling cutters are basically suitable for processing Madera panels. To avoid chipping the top layer of the panels, use alternating axle angles. It is an advantage to use a joint cutter with a larger axle angle ($>30^\circ$). Sizing tools with a tooth count (Z) as opposed to standard tools tend to offer a better cutting quality. Furthermore, ensure a smaller chip removal between 0.7 to 2.0 mm in order to reduce tool wear.

When working with manual feed milling tables, only tools marked "MAN" or "BG-Test" are to be used. Furthermore due to safety reasons, rotational speed range should not be lower than the stated on the machine. Tools with manual

feed must only be used in up-milling mode.

The use of tools with higher true-running accuracy and balancing quality is an advantage for good milling results. This is achieved through the use of centralizing interfaces, such as hydro tension systems, HSK interfaces or wrapping equipment.

Joints

For joints we recommend setting the operating parameters so that the feed per tooth Fz is between 0.25- 0.55 mm.

Sizing – cutting tools for continuous feed systems

Diamond compact cutters that cause low friction and cut pressure are recommendable. In combination with Hydra clamping elements, the highest radial and axial run out is guaranteed. A cutting speed with 80m/s at 6.000 U/min¹ and a diameter of 250mm is recommended. The optimal feed per tooth for this is between 0.12-0.18mm.

Scrapers on edgeband gluing machines

The scrapers on edgeband gluing machine are to be set so that they do not touch the surface. Scrapers set too deep can lead to significant damage to the edges.

Flat scrapers

Flat scrapers should have an inclination from the edge of the panel of 2-4° and should not touch the Madera surface or any potentially applied protective foil.

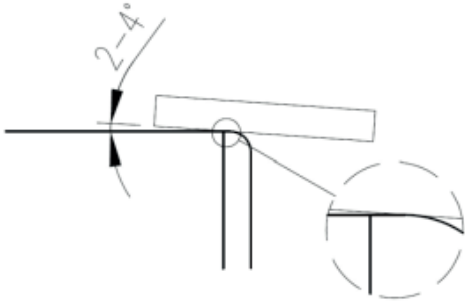
Profiled scrapers

Profiled scrapers have a profile outlet and can be used with optimal settings to rework Madera surface without any problems. To prevent damage to the Madera surface, scrapers with a profile outlet enlarged by 15° should be used.

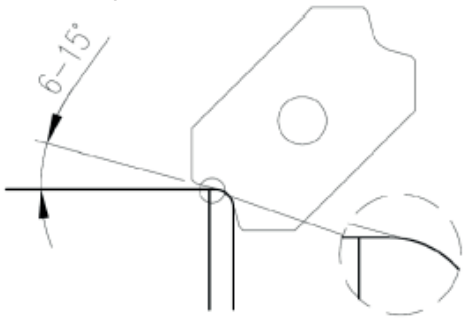
Trimming

When trimming the Madera surface to meet a flush edge, it is recommended to over-trim the edge and file back manually. Always file away from the surface, never pulling back or touching the corresponding surface.

Flat scrapers



Profiled scrapers



Processing with CNC stationary machines

Sizing and cutting joints with routers

Spiral solid carbide cutters (VHW) or preferably diamond tipped (DP) end mills are best-suited for the processing with routers and machining centres.

To achieve a chip-free top layer, diamond routers with a spiral cutting edge with alternating axle angles are to be used. Using routers with an enlarged axle angle ($>30^\circ$) is an advantage.

It is highly recommendable for the processing of Matera to use routers with a large axle angle of up to 50° for the best edge quality, for example required for zero-joint edge banding.

Sizing tools with a higher tooth count tend to offer as opposed to standard tools a better cutting quality. Pre-milling the work material is recommended for finishing work in order to reduce tool wear through low chip removal (between 0.5 and 2.0 mm).

Ensure good workpiece clamping on the machine. To support vacuum suction cups, additional mechanical clamps can eventually be used. It is recommended to use stable and hydro chucks for the highest true-running accuracy and balancing quality for the perfect cutting quality. A good processing result can only be achieved with sufficient stiffness of the machine, e.g. on gantry cutting machines.

Operating Conditions

Rotational speed:

N 18,000 – 24,000 min^{-1}

Feed rate:

V_f 8 – 10 (Z2) and 14 – 18 (Z3) m/min

Feed per tooth:

F_z 0.50 – 0.25mm

F_z 0.40 – 0.60mm

Postforming

The recommended forming temperature range for postforming Matera laminates is 140°C to 170°C at the point of roll.

There are a number of postforming processes available, whichever process is used however, the heating of the laminate must be meticulously controlled and monitored throughout the daily working period. Fluctuations in ambient temperature, heater voltage or machine speeds may upset critical heating conditions, resulting in cracking due to insufficient heat or blistering from too much heat.

The application of heat sensitive liquids or waxes to the area to be heated is a very effective way of checking the forming temperature. These liquids/waxes melt instantly at the prescribed temperature, giving an accurate visible indication when the laminate surface has reached the required temperature.

Hand-held infra-red thermometers can also be used, but care must be taken to ensure that the instrument is measuring only the temperature of the laminate surface and is not influenced by surrounding sources of heat or cold.

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Date of last update: 16 May 2017