



Machining of wood-based materials and solid woods

The surface quality of the processed workpiece depends on the correct choice of tools, as well as on the technological data, e.g. milling direction, rate of feed or spindle revolutions per minute, which are defined by the machine operator or the programmer. The technological data need to be defined in accordance with the material that is machined.

When processing solid woods, special attention needs to be paid to the cutting direction, to the sequence of the machining operations, and to high cutting speeds - between 50 and 90 m/s depending on the kind of materials.

v_c = cutting speed in m/s

d = tool diameter in mm

n = revolutions in 1/min

There are guidelines for the cutting speed when machining different materials. The rate of feed, however, depends on the following factors: chip thickness, engine performance, tools, material to be processed, and grain direction. The cutting speed equals the tip speed of the cutter blade. It depends on the tool diameter and the spindle revolutions per minute, and is calculated according to the formula:

$$v_c = \frac{d * \pi * n}{1000 * 60}$$



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As the spindle revolutions can not be increased at will, the optimal cutting speed can often not be achieved, especially with tools that have a small tool diameter.

Cutting speed guidelines

Material	Cutting speed
Softwood	60 - 90 m/s
Hardwood	50 - 80 m/s
Chipboard	60 - 80 m/s
Coreboard	60 - 80 m/s
MDF	40 - 60 m/s

When processing thermoplastic synthetic materials, e.g. acrylic glass the workpiece must not be heated too much during the machining process, as this would lead to a smearing of the cutting edge. A heating of the material can be avoided by reducing the spindle revolutions.

Hard-tipped or polycrystalline diamond tipped tools are commonly used today when processing solid woods or wood-based materials. The tool manufacturers offer a multitude of tools for the various types of processing or materials, with a range from straight router bits to profile cutter heads. Polycrystalline diamond tipped tools are used in particular for material that is difficult to chip or heavily abrasive. The lower wear and tear makes up easily for the higher purchase costs.

