

All about Tools

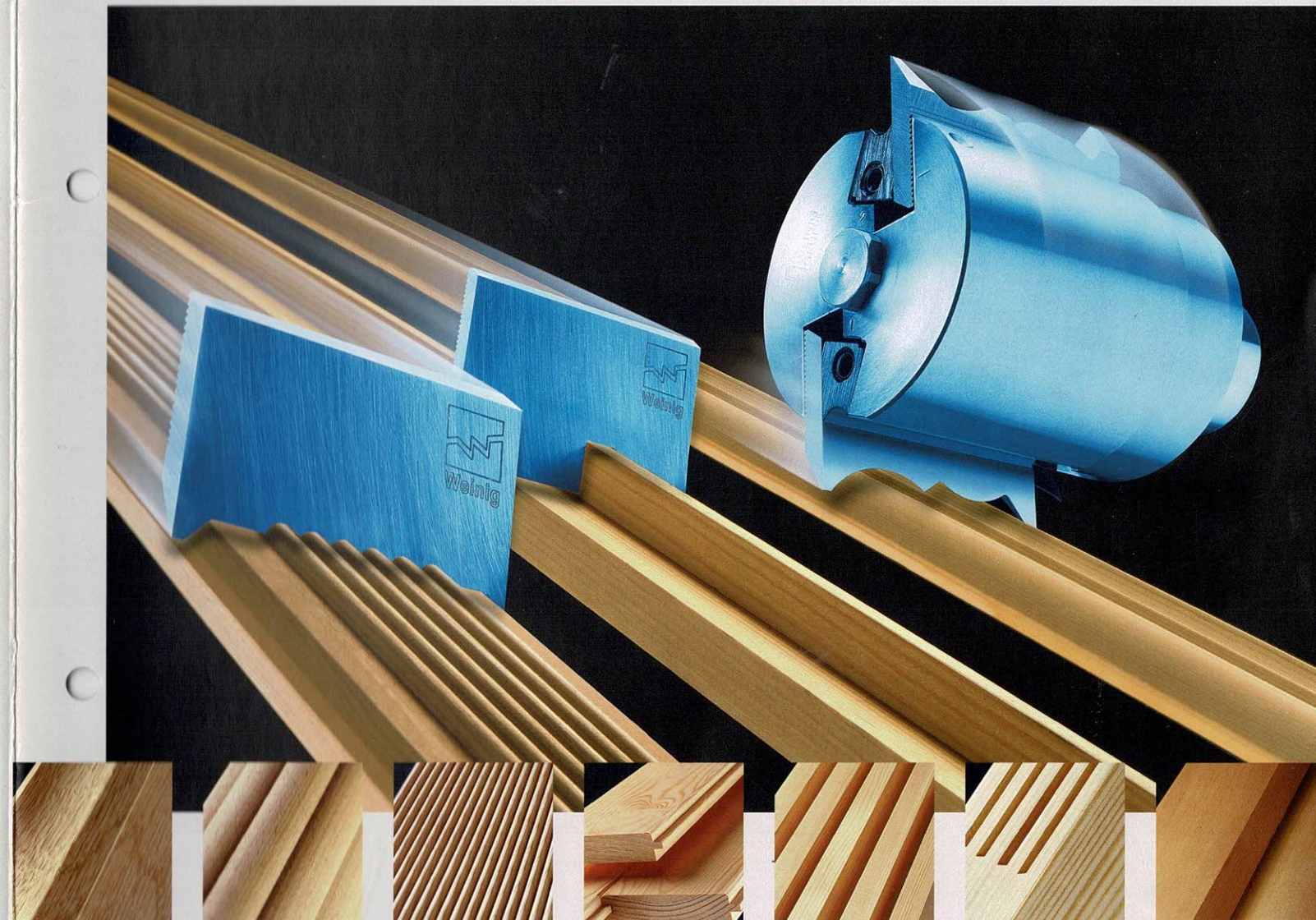


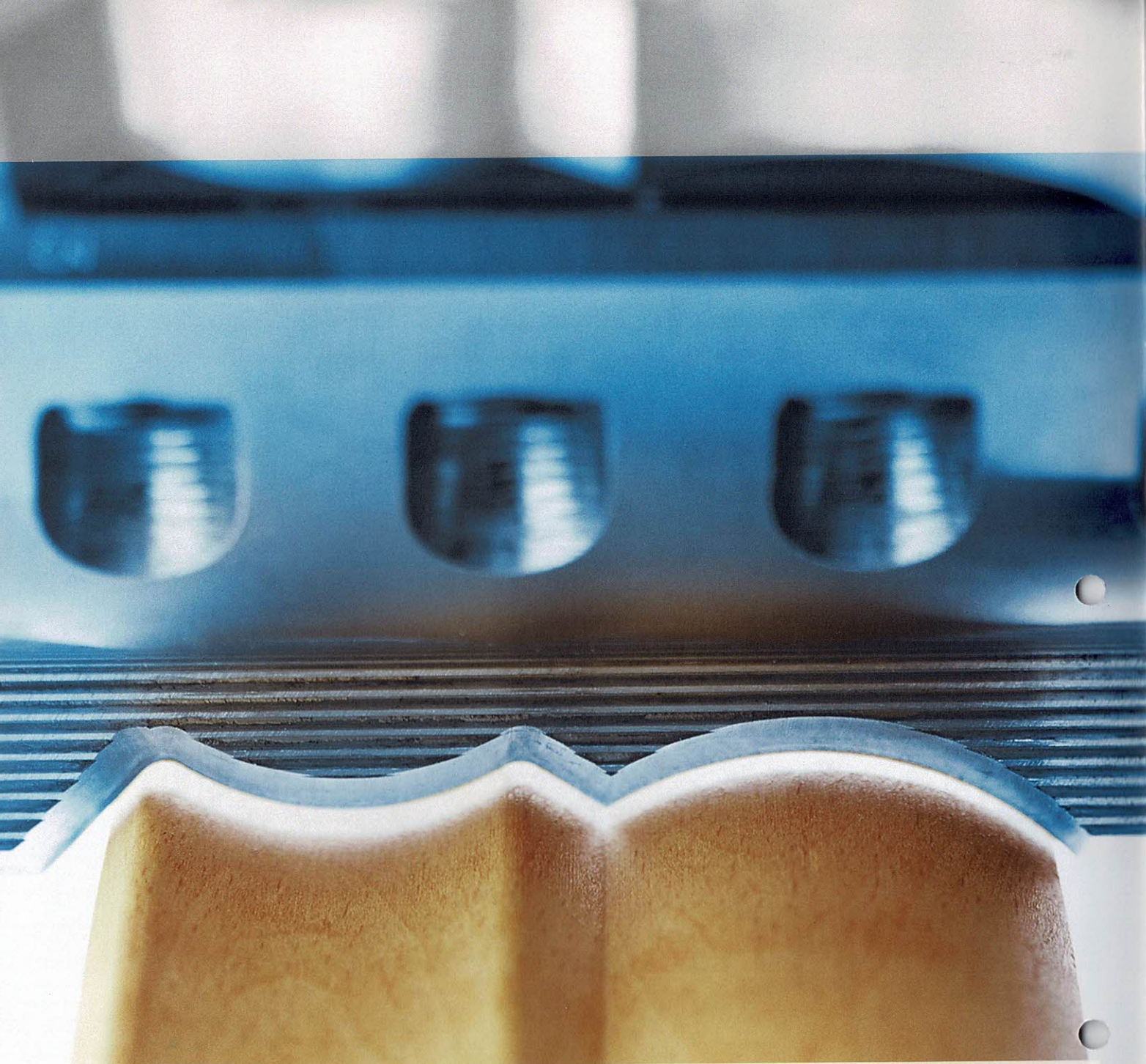
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All about Tools

Original WEINIG Tools
Your Guaranty for Super Workpieces





The cutterhead defines the workpiece quality.

The best machine only works as well as the tool it is equipped with. A high quality WEINIG moulder in combination with a precision tool produce top quality and performance. WEINIG offers you all the tools that are used for planing and profiling:

- PowerLock tools
- Hydro clamping
- Conventional tools.

The Rondamat Series is our knife grinder for extreme precision in knife production. With it you are able to manufacture and regrind profile and planer knives for any desired profile. Fast, exact and reasonably priced.

Tool measuring and display systems complete our tool grinding systems.

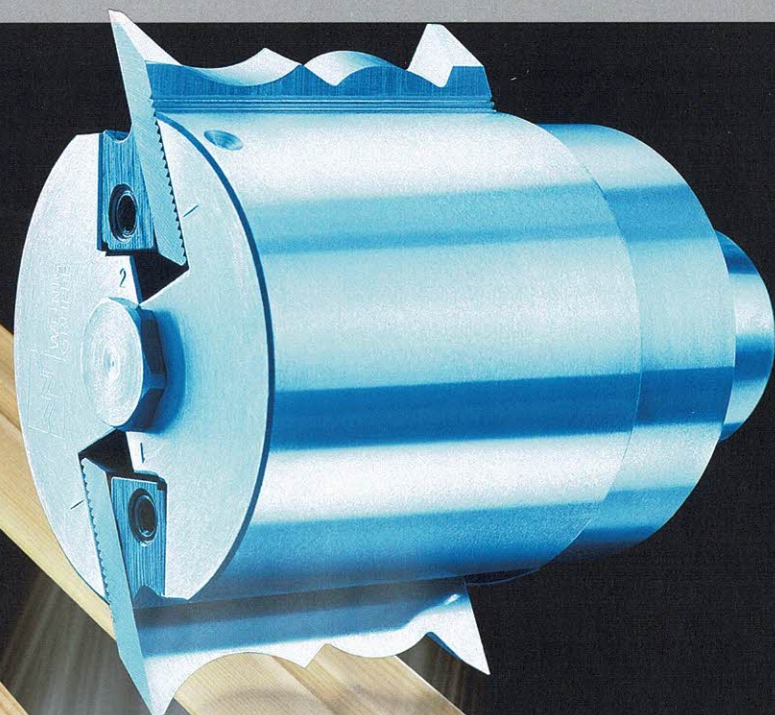
This complete solution guarantees you the highest profile precision and at the same time enormous savings in set-up time.

As the worldwide leader in moulders and tooling for moulders, we know what we are talking about. The WEINIG GROUP supplies you with the optimal tool for every type of machine.

In this brochure you will find valuable information about tooling that will enable you to be more profitable and responsive to the market.

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WEINIG cutterheads

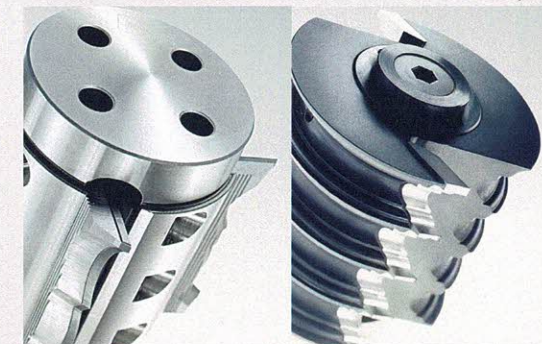
Depending on your production requirements knives can be easily and quickly exchanged. With the very same cutter-head you can produce a multitude of profile shapes or planed surfaces.

The Original WEINIG Cutterheads: Extremely Flexible and Absolutely True to Profile

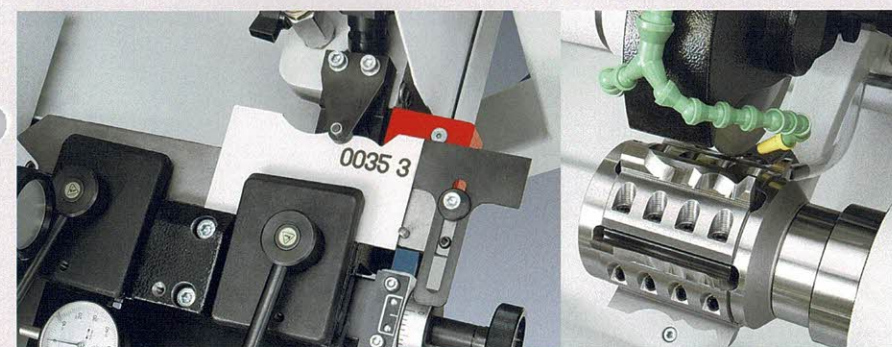
Corrugated Knife tools are assembled tools consisting of a cutter head and removable knives. With the same cutter-head you can produce a multitude of profile shapes or use straight knives for planing by simply changing the profile knives with knives that have a different profile. For different wood species or substrates you can select the most suitable knife material.

Mill-to-Pattern tools, on the other hand, are compound tools, i.e. cutting edges and supporting body are permanently bonded. This results in the following disadvantages:

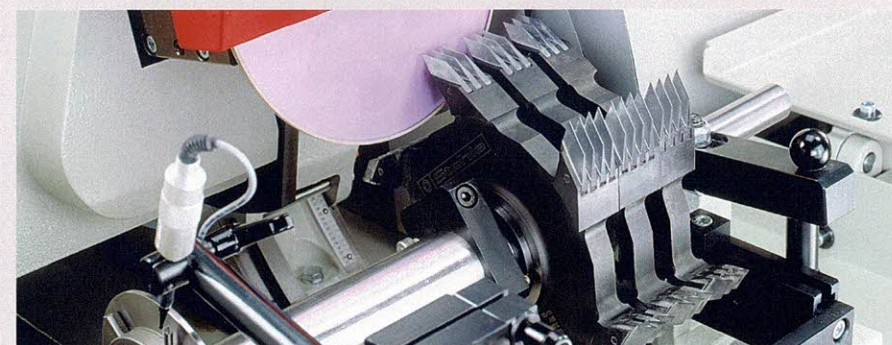
The individual tool can only be used for one profile and must also be exchanged when the material being processed requires different knife materials. If the knives have been worn out by regrinding, the entire tool must be replaced or refurbished.



The use of corrugated knives is more efficient and allows the user to react quickly to customer demands. WEINIG manufactures only cutter heads that utilize removable knives.



Corrugated knives are profiled and reground in the back of the knife according to a profile template. Thus absolute profile accuracy and optimal cutting angles are assured – for a tool accurately ground and smooth running!



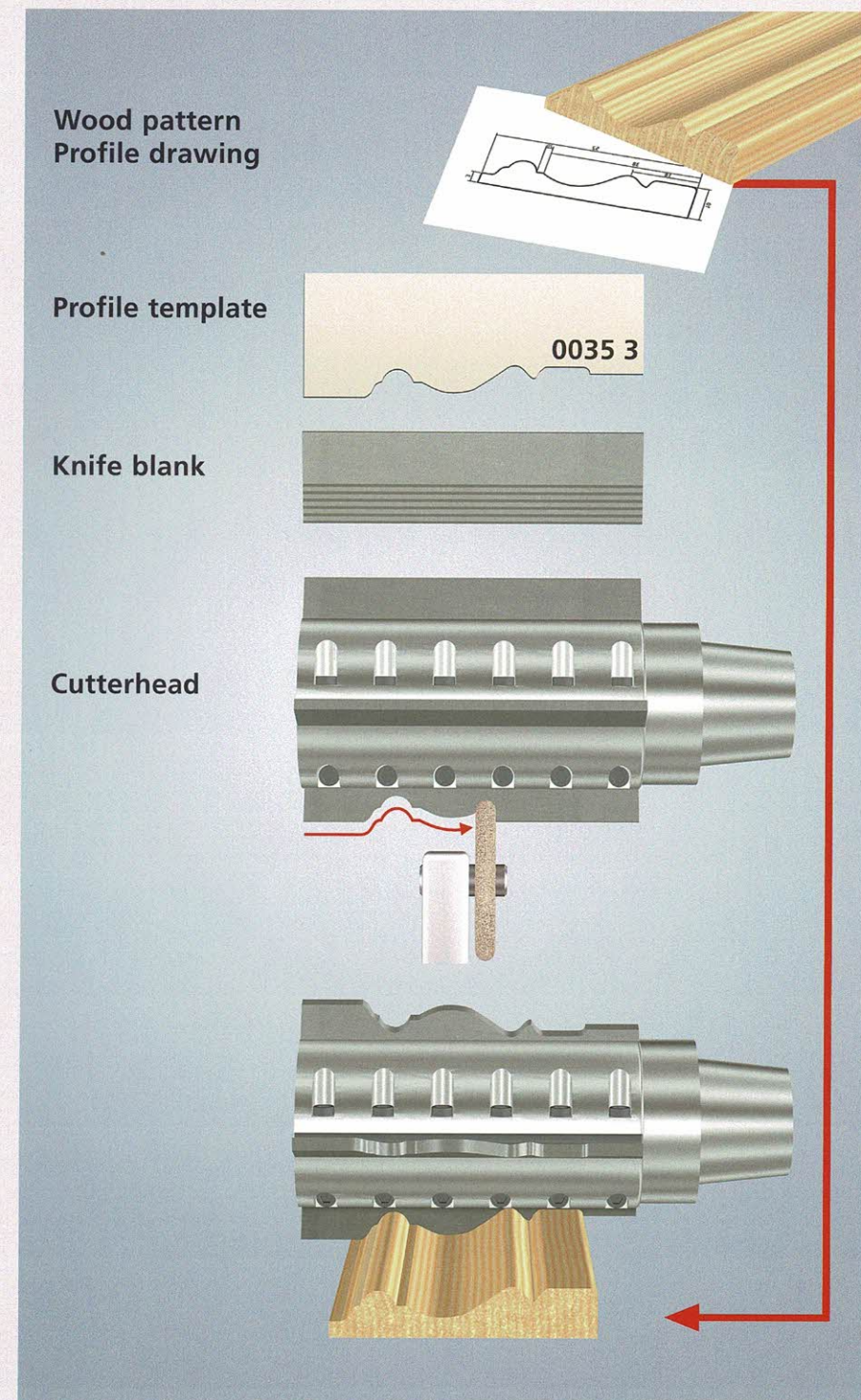
Mill-to-Pattern tools are ground on the face. Individually or as cutter sets. They are used for special production, such as dowels, grooves and finger jointing tools. Because of the clearance angle on the back of the knife, the profile could change with every regrinding of the knife face. Profile accuracy is not guaranteed.

WEINIG Tool Grinding Systems: More Flexibility and Independence

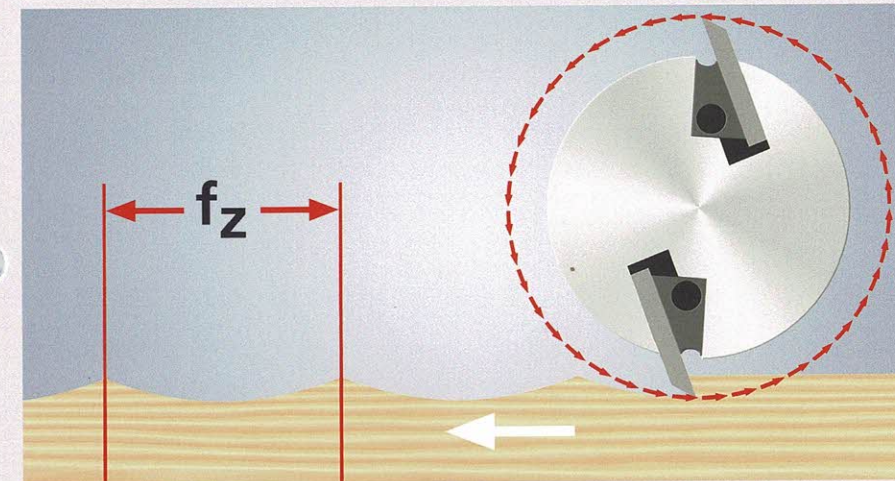
WEINIG's Rondamat-Series is a tool-grinding machine program geared to individual requirements and conditions. It offers extraordinary precision – for processing hardwood or softwood, MDF or plastic material.

- With original WEINIG cutterheads you are flexible and independent, because now you can produce your profile knives yourself. Fast, without any problems, at reasonable prices and without any long delivery times. This applies to every order, every batch size and every profile, however individual it may be.

With a few easy steps you can produce a tool within a short period of time. According to a drawing or an existing profile you produce a profile template in the scale 1:1. According to this you profile the knife blank in a few minutes with the Rondamat profile grinder. HSS, as well as stellite or carbide knives can be profiled or sharpened with the correct grinding wheels.



Knife Marks Matter: Knife Marks and Surface Quality

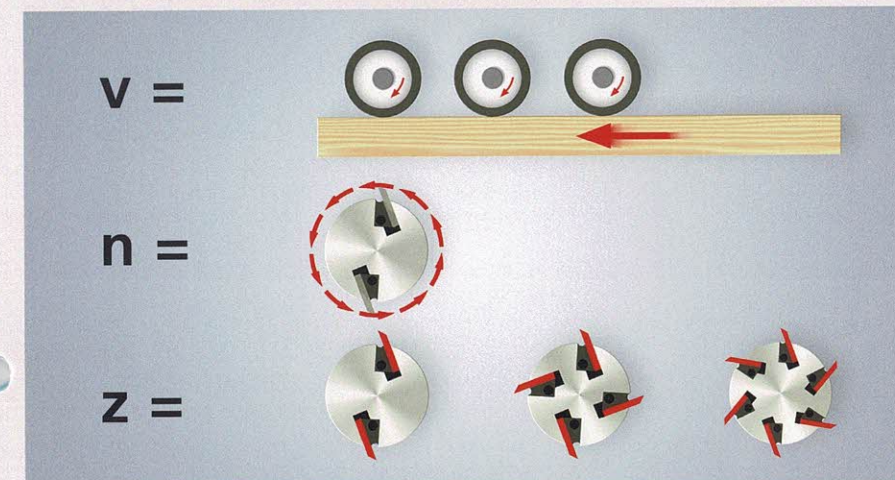


The knife mark

When planing with a rotating tool a knife mark, shaped like a wave, is created on the planed or profiled surface. The length of the knife marks corresponds to the distance between the entry and the exit of the individual knife blades. This distance is called the knife mark spacing.

The longer a knife mark, the more clearly the waves become visible on the planed surface.

The shorter a knife mark, the smoother and finer the surface of the workpiece will be.



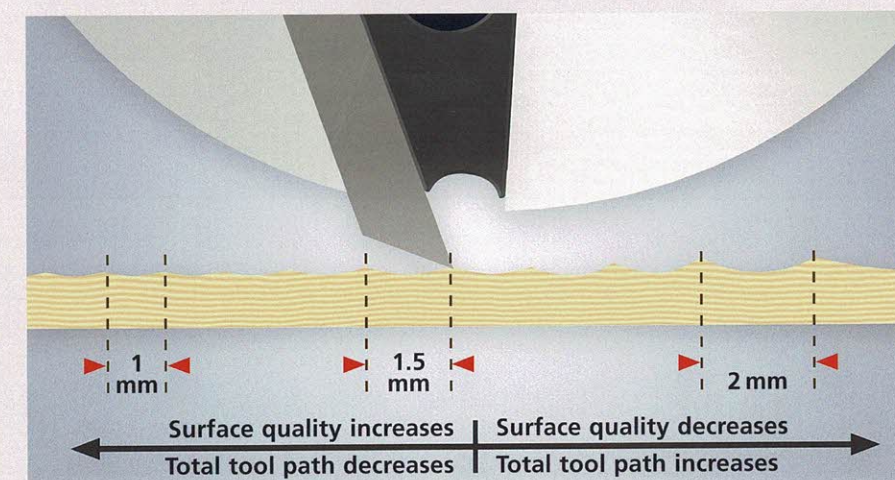
The length of the knife mark f_z depends on the feed speed v , the rpm n of the spindles and the number of knives z in the tool unit.

The distance between knife marks can be calculated according to the following formula:

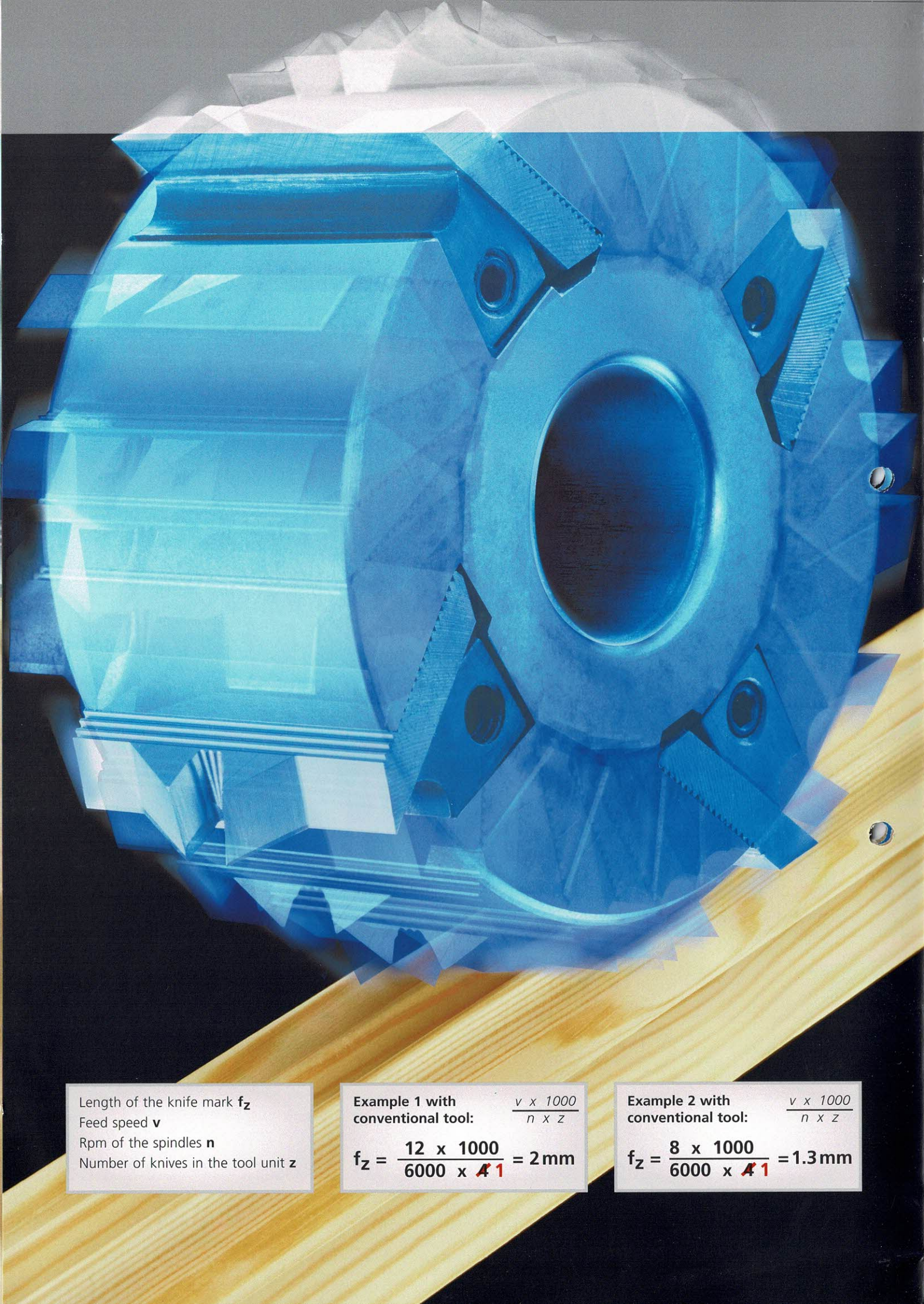
$$f_z = \frac{v \times 1000}{n \times z}$$

Diagram 3 shows clearly how the surface quality increases with reduced knife mark spacing.

Proportionally the wear on the knife tip increases reducing the running time.



Which knife mark length is the right one depends upon the desired surface quality. Particularly smooth surfaces such as for furniture production require a small spacing between knife marks. For construction timber a longer spacing between knife marks can be accepted. Experience shows that good surfaces are achieved with knife mark spacing of approx. 1.5 – 1,7 mm.



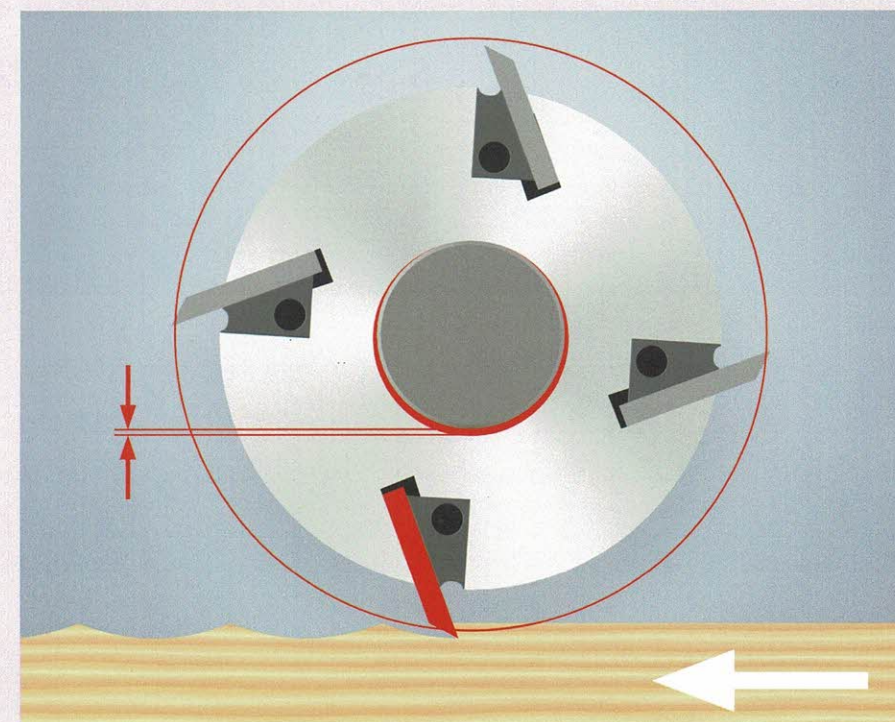
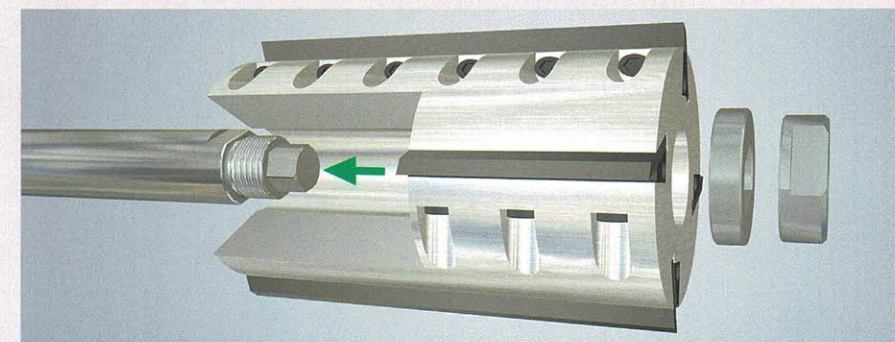
WEINIG Cutterhead Technology: Conventional, Hydro or PowerLock?

We offer for every desired surface quality and feed speed the suitable WEINIG cutter head: a tool with conventional clamping, a tool with classic hydro-clamping or a modern PowerLock tool. With this variety we can comply with your requests and requirements.

Tools with conventional clamping

They are fastened with a spindle nut on the front of the spindle. Because of this limits are set on the surface quality and the feed speed. The reason: In order to fasten the cutter head, a fit tolerance of up to 0.05 mm is required. This causes a slight movement of the cutter head on the spindle. The result: Although all the cutting edges are in use, only the one projecting farthest determines the surface finish.

Therefore only a **1** may be used for **z** into the formula $f_z = \frac{v \times 1000}{n \times z}$. Because of this "single-knife-finish" additional knives do not produce a shorter knife mark or an improvement of the surface. If however, the feed speed **v**, is reduced then the distance between knife marks is shortened. Good surface quality is only achieved with relatively low feed speeds (8–12 m/min).



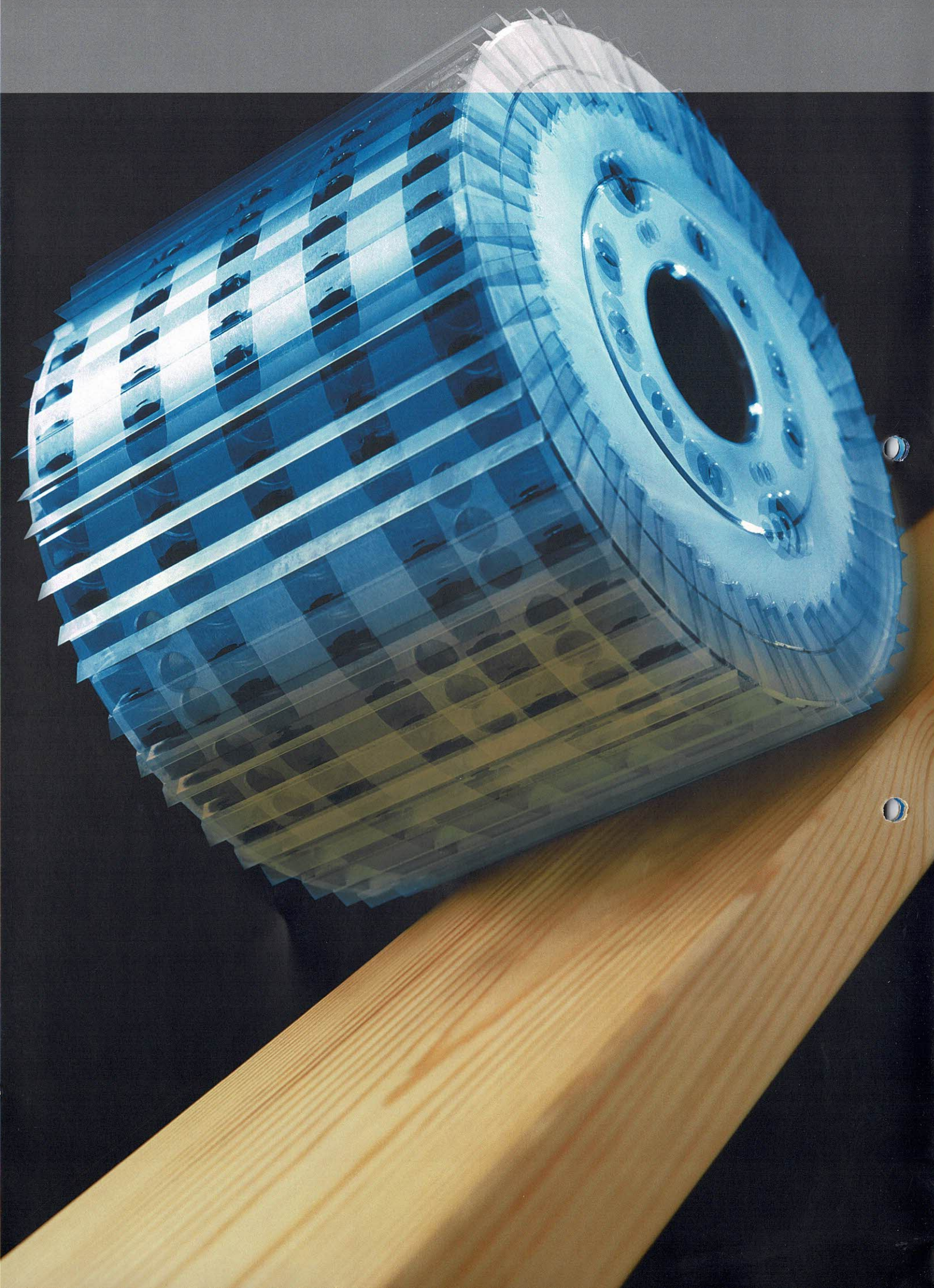
Length of the knife mark f_z
Feed speed **v**
Rpm of the spindles **n**
Number of knives in the tool unit **z**

Example 1 with
conventional tool: $\frac{v \times 1000}{n \times z}$

$$f_z = \frac{12 \times 1000}{6000 \times 4} = 2 \text{ mm}$$

Example 2 with
conventional tool: $\frac{v \times 1000}{n \times z}$

$$f_z = \frac{8 \times 1000}{6000 \times 4} = 1.3 \text{ mm}$$



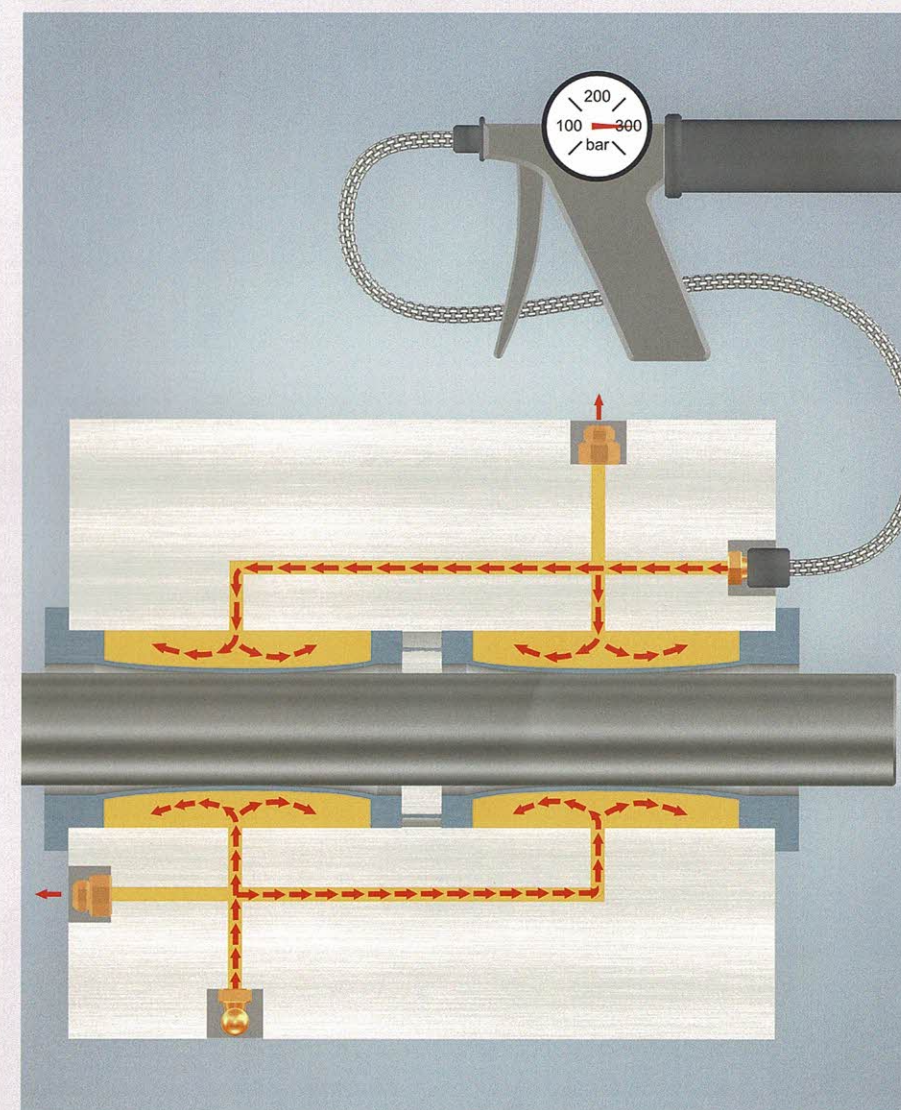
Original WEINIG Hydro Tools: High Surface Quality at High Speed

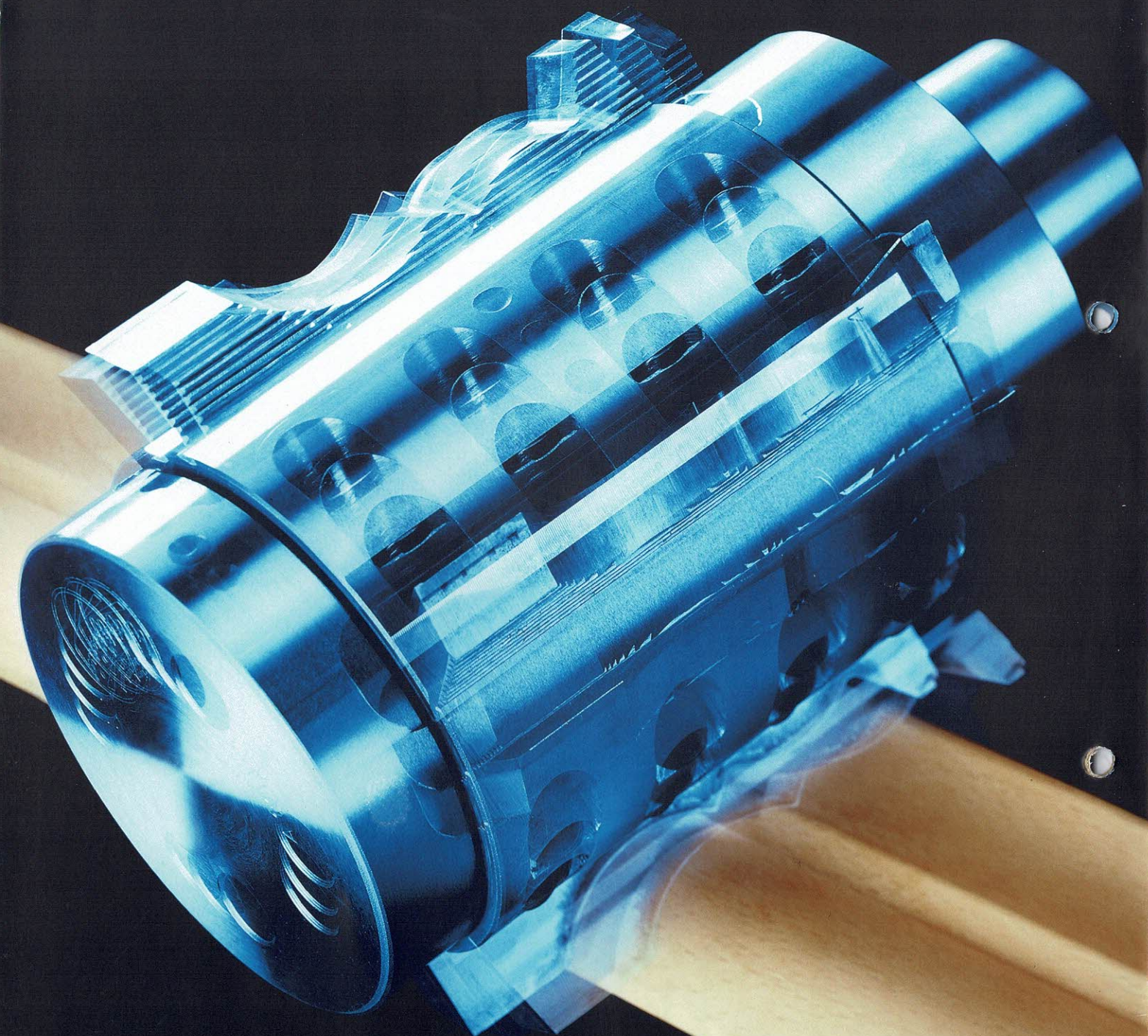
The Hydro Tools from WEINIG provide for outstanding surface quality with top feed speeds in long run production. This tool system does not leave any room for clamping tolerances.

Tools with hydro clamping

They are not mechanically, but hydraulically clamped. Chambers built into the cutter head are filled with grease. With a high-pressure grease gun the pressure in these chambers is increased to 300 bar. Because of this the walls of the grease chambers expand and the cutter head is clamped absolutely with zero clearance and centered. On the spindle of the grinder exactly as on the machine. After relieving the pressure the clamping is released and the tool can be easily removed from the spindle.

Thanks to the hydro clamping the accuracy achieved on the grinder can be fully and completely transferred to the moulder. After hydro clamping there is no fitting tolerance for this tool either.





Longitud del paso de corte (f_z)
 Velocidad de avance (v)
 Número de giros de los husillos (n)
 Número de cuchillas en el cuerpo de la herramienta (z)

Ejemplo con una herramienta PowerLock: $\frac{v \times 1000}{n \times z}$
 $f_z = \frac{20 \times 1000}{12000 \times 1} = 1,67 \text{ mm}$

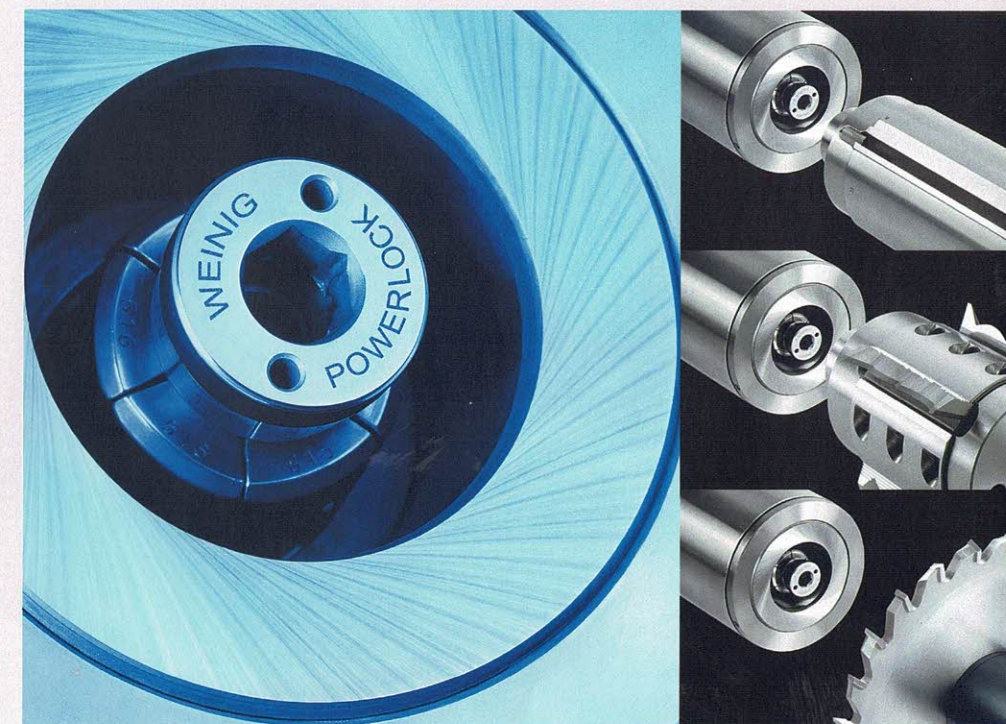
The WEINIG PowerLock System: Flexibility, Performance, Quality and highest stability

PowerLock tooling enables speeds up to 12,000 rpm meaning a doubling of the feed speeds in comparison to conventional machines. The tools are exchanged within seconds. With PowerLock you can double the linear meter capacity per day, significantly reduce the costs per unit of output and shorten delivery times – with an outstanding surface quality.

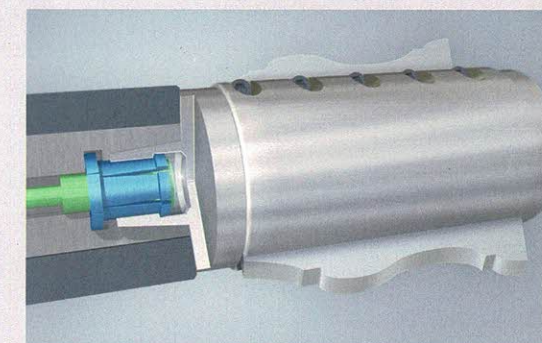
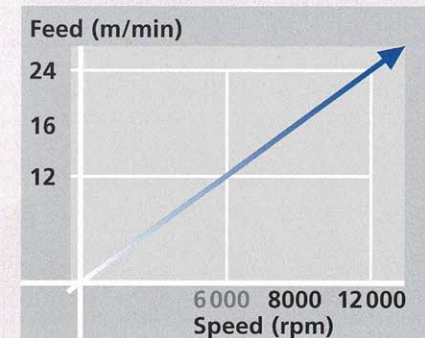
Tools with PowerLock clamping

They are not clamped conventionally, but with the PowerLock clamping system, free of play, centered and with highest stability – in the moulder and in the tool grinding machine. The clamping is released by pressing a button and the tool can be removed from the machine quickly and easily.

Thanks to PowerLock clamping the accuracy and concentricity achieved on the grinder can be completely transferred to the moulder. There is no fit tolerance and therefore no movement of the tool!

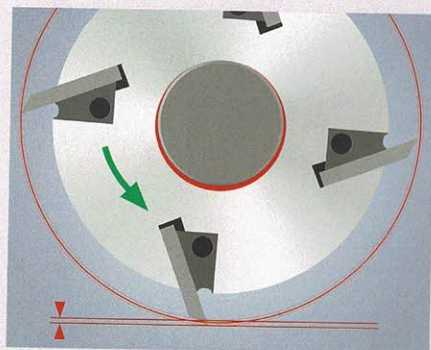


3 tons of clamping force form a solid unit between the PowerLock cutterhead and the tool holder. Result: the PowerLock-System has over double the stability of the Hydro-System. This advantage combined with 12,000 rpm ensures perfect surface quality at higher feed feeds.



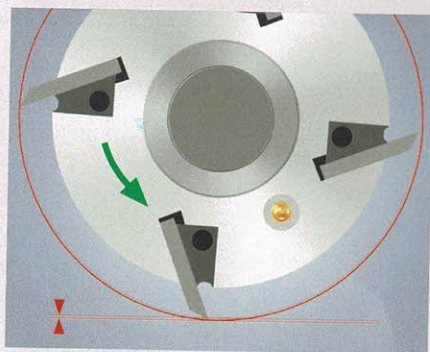
Only the Result Counts: Potential for Improved Performance

Concentricity of the cutter head, feed speed per minute and the number of the knives in the cutter head determine the surface quality of the workpiece. The cutting circle of the individual knives must be exactly identical so that all the knives produce a finish cut. The WEINIG tool system offers the solution.

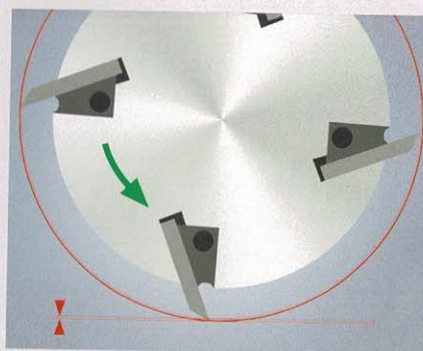


Conventional tool: 0.05 mm

The existing concentricity tolerance of the moulder spindle results in a difference of 0.05 mm in the cutting circle of the individual knives.



Hydro Tool: 0.005 mm



PowerLock Tool: 0.003 mm

Thanks to the concentric clamping of PowerLock and Hydro Tools the result is a deviation of only 0.003 – 0.005 mm in the cutting circle of the individual knives.

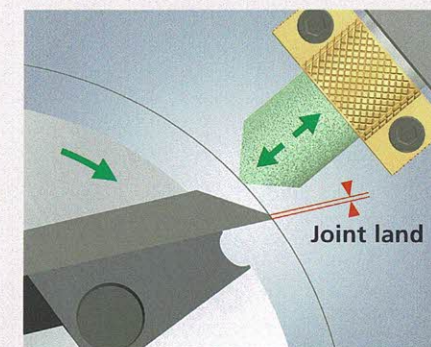
But even this minimal tolerance does not mean that each knife produces the same length of cutter-mark.

In order that **all the** knives in the cutter head have an absolutely uniform cutting circle, the tool must be jointed in the moulder. At operating speed, the knives are touched by a joint stone. This procedure removes all the remaining tolerances within the tool cutting circle. Now each knife produces precisely the same length of knife mark.

Jointing Technology from the Expert: Top Quality with high feed speed

In order to ensure high surface quality of the workpiece, the joint land at the knife tip may not exceed a certain width. For softwood it should not amount to more than 0.5 mm, for hardwood to more than 0.7 mm.

For HSS or stellite knives, ceramic stones are used. For carbide knives, use special WEINIG jointing stones.



Requirements for jointing

... at the moulder:

- heavy cast iron machine base
- steady feed speed
- high-performance spindles
- optimal spindle speed
- jointing equipment

WEINIG Powermat and Hydromat moulders all have these requirements.

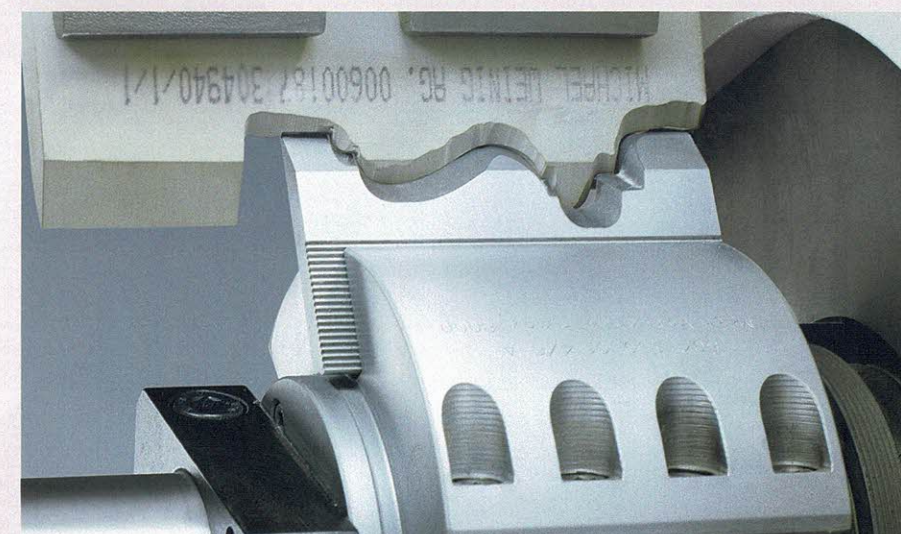
... at the tool:

- PowerLock or Hydro Tool
- Precise straight or profile knife grinder (WEINIG Rondamat series)
- Optimally ground tool with ideal concentricity tolerance below 0.01 mm
- High back clearance angle on the knife

Illustrations:

Straight jointer with automatic joint stone feed

Profile jointer with automatic joint stone feed.



At a glance: Knife mark spacing for jointed tools

V = 800										6.67	4.76	4.17
V = 600								6.25	5.56	5	3.57	3.13
V = 400						5.56	4.76	4.17	3.7	3.33	2.38	2.08
V = 280					4.67	3.89	3.33	2.92	2.59	2.33	1.67	1.46
V = 200				4.17	3.33	2.78	2.38	2.08	1.85	1.67	1.19	1.04
V = 180		5	3.75	3	2.5	2.14	1.88	1.67	1.5	1.07		
V = 160		4.44	3.33	2.67	2.22	1.9	1.67	1.48	1.33			
V = 140		3.89	2.92	2.33	1.94	1.67	1.46	1.3	1.17			
V = 120	5	3.33	2.5	2	1.67	1.43	1.25	1.11				
V = 100	4.17	2.78	2.08	1.67	1.39	1.19	1.04					
V = 80	3.33	2.22	1.67	1.33	1.1							
V = 60	5	2.50	1.67	1.25	1							
V = 40	3.33	1.67	1.11									
V = 20	1.67											
Z =	2	4	6	8	10	12	14	16	18	20	28	32

Distance between
knife marks f_z (mm)
Feed speed v (m/min)
Speed of the spindles n (1/min)
Number of knives in the tool unit z

$$f_z = \frac{v \times 1000}{n \times z}$$

Table for Hydromat
 $n = 6,000 \text{ rpm}$

- ☐ The knife is scraping, not cutting, high wear of the knives
- ☐ High surface quality for tongue and groove boards, mouldings ...
- ☐ Lower surface quality, planed timber, construction timber ...

Table for Powermat 2000
 $n = 10,000 \text{ rpm}$

Powermat with feed speeds up to 100 m/min.

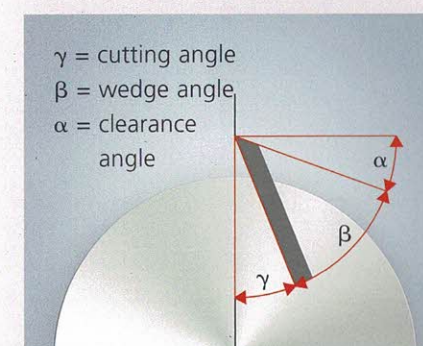
These are the PowerLock advantages:

- low setting time
- fewer knives in the tool
- less grinding needed
- higher productivity
- and more profit

V = 100		2.5	1.67
V = 80	4	2	1.33
V = 70	3.5	1.75	1.17
V = 60	3	1.50	1
V = 50	2.5	1.25	
V = 40	2	1	
V = 30	1.5		
V = 25	1.25		
V = 20	1		
Z =	2	4	6

Details that matter: Basics of planing and moulding

For high surface quality it is important that all the factors of the tool contacting the wood are optimal. Usually machining is performed with the tool rotating against the feed direction. Certain composite materials (e.g. chipboards), or difficult species may require that the tool rotates in the feed direction.



Cutting angle

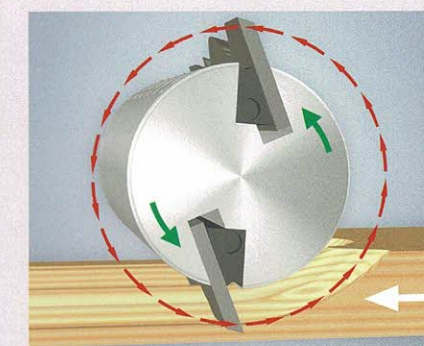
The cutting angle is integrated into the tool and cannot be changed. Tools with different cutting angles are available for various applications.

Wedge angle

With unjointed tools the wedge angle amounts to 50°, with jointed tools 40°.

Wedge and clearance angle

Both can be changed using a Rondamat knife grinder.

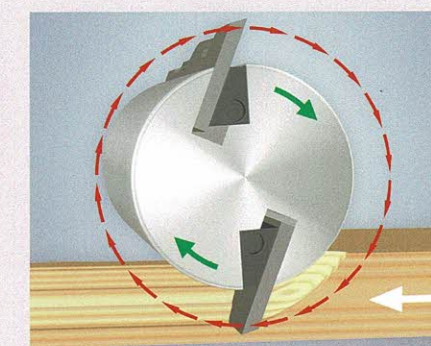


Counter rotation

The cutting motion of the tool and the direction of feed of the workpiece are in opposite directions. This proven procedure creates a long chip with increasing thickness.

Advantage: By making a chip which breaks away before the knife exits the timber (pre-splitting), the cutting forces and power required to machine the material are reduced and longer total tool life achieved. Less machining power is needed.

Disadvantage: Risk of tear-out in case of twisted or reverse grain in the workpiece.



Synchronous rotation

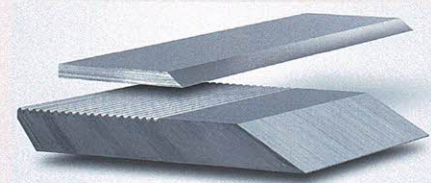
The cutting motion of the tool and the feed direction of the workpiece are in the same direction. This procedure, which is only used in special cases, produces a wood chip with decreasing thickness.

Advantage: Even in case of twisted grain timber good surface quality free from tear-out is achieved.

Disadvantage: Reduced tool life and higher motor power requirement because of the lack of the pre-splitting effect. In addition, safety devices are required at the out feed of the moulder.

Planer knives and profile blanks: The correct knife material is important

The correct knife material will provide long service life and high quality surfaces. On this page we show you which materials are used in timber technology.



High Speed Steel HSS

HSS is an alloy steel including elements of carbon, tungsten, molybdenum, vanadium, cobalt and chromium. In wood processing it is the cutting material used most often.

Ranges of application: softwood and most hardwoods.

Total tool life with softwood 500 – 3000 running meters *



Stellite

Stellite is a material using cobalt with components of chromium, tungsten and iron. Stellite has a higher wear resistance than HSS and can be ground with normal corundum grinding wheels.

Ranges of application: wet timber with long fibers; meranti, oak, poplar.

Total tool life with softwood 500 – 1500 running meters *



Carbide

Carbide is a material with carbide particles embedded in a tough metallic binder (cobalt and nickel). Different mixtures provide a wide spectrum of application.

Ranges of application: hardwood, softwood and laminated wood; MDF as well as plastic material.

Total tool life with hardwood 500 – 1500 running meters *



Diamond

The synthetically produced diamond, the hardest of all the known cutting materials, is increasingly used in wood processing and for very abrasive materials. Because of high service life diamond is an economical alternative. Once dull, the diamond tools must be sharpened by the manufacturer.

* Total tool life can vary, depending on knife mark spacing, chip removal, mineral content of the timber, moisture content, and foreign objects in the timber. Therefore all the statements are subject to these variables.

WEINIG Planing and profiling knives The correct knife material for the application

The correct choice in knife material ensures long tool life and high surface quality. In the field of metalurgy only certain materials are suitable for cutterhead knives. On this page we will show you which ones these are.



Reversible knife system

Straight knife that can be used on 2 sides (no regrinding). The exchange of the knife is quick and without the need for a setting device. This system is ideal for customers without a grinder or for the quick exchange of the knife during production.



Thin planer knife

Straight knife that can be reground often – in or outside the planer head. A precision setting device is required for this purpose. This tool system is very economical.



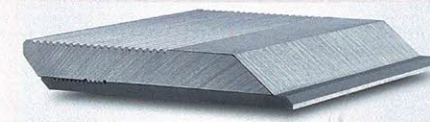
Profile knife blank

Profile knife that is produced and reground in the cutter head. The corrugated back enables the fast knife changes particularly when using the CentroLock System. For profile depths up to 35 mm.



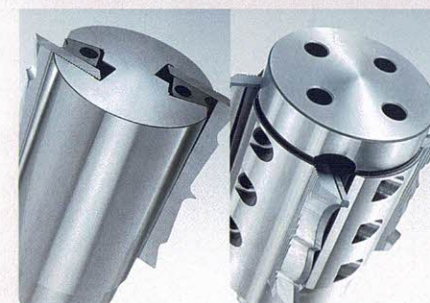
Profile knife blank – equipped with braised carbide

Profile knife system as described above. Disadvantage is the small profile depth caused by the carbide insert. The basic grinding is carried out with a special grinding wheel (diamond).



DoubleBack knife blank with a separate carbide insert and supporting plate of steel.

In contrast to the systems described above: Easy regrinding because only the carbide insert is ground and can be readjusted on the supporting plate by means of micro-corrugations. For profile depths up to 30 mm.



The WEINIG CentroLock Knife Clamping enables the fast exchange of knives with only one screw. This system is flexible if frequent knife exchanges are necessary. The cutter heads work more quietly and can be cleaned faster since they do not have any gib screws. Special gibs are required for knives or blanks of different thickness.

Conventional WEINIG Knife Clamping uses gibs and gib screws. The use of knives and blanks of different thickness is possible without additional gibs.

WEINIG as Complete Supplier: Everything from one Source

At WEINIG you find the optimal tool for your demands. In addition, we offer you a complete solution to produce workpieces with precise profiles and with first-class surface quality.



Conventional tool
equipped with planer knives



Classic hydro tool,
equipped with planer knives



Modern PowerLock tool,
equipped with profile knives

Working with original WEINIG cutterheads means

- improving quality
- saving time
- reducing costs

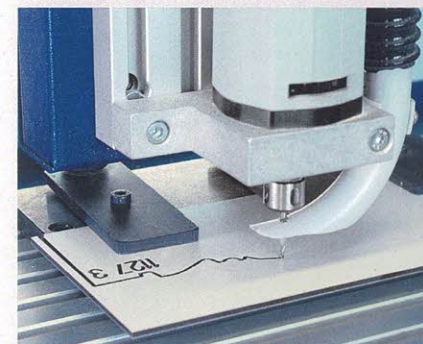
The original WEINIG accessories offer you valuable advantages.

WEINIG offers More: Accessories for First-class Surfaces

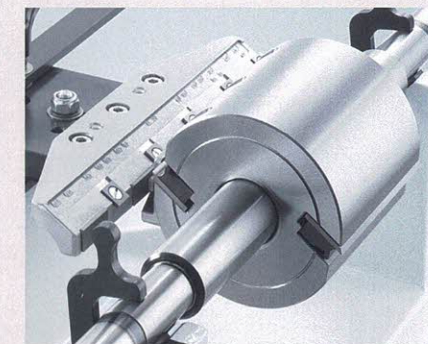
The WEINIG tool concept also contains all the proper accessories. From your individual requests we provide custom-made solutions for your production process and with these you will be prepared for the challenges of the future. Modern set-up systems such as PowerCom or the Memory System are naturally also available. Ask our experts.



Operator-friendly control by
touch-screen



WEINIG template maker
Producing templates CNC controlled –
simple, accurate and repeatable.



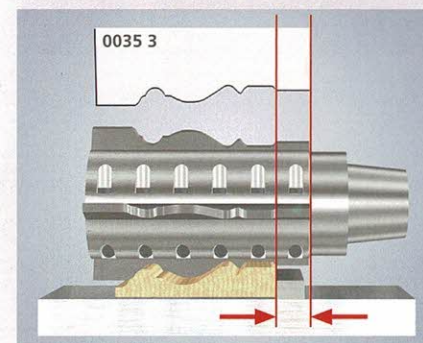
Precision setting stand
for planer cutter heads



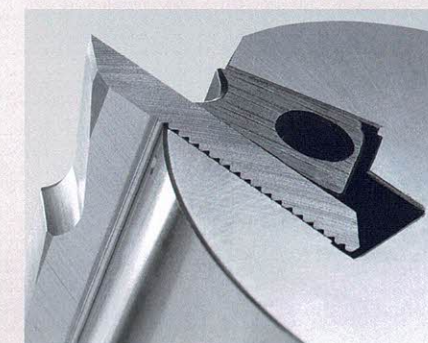
WEINIG OptiControl
Optical measuring with electronic
digital readouts for the tool values.
OptiControl PowerCom with direct data
transfer to the moulder.



WEINIG Jointer Pre-setting stand
With this you are able to pre-set the
joint stones into a cassette outside the
moulder.



Axial-constant ground tooling
saves setting time. No axial adjustments
are necessary because the profile is
referenced to the table or fence in the
grinding process.

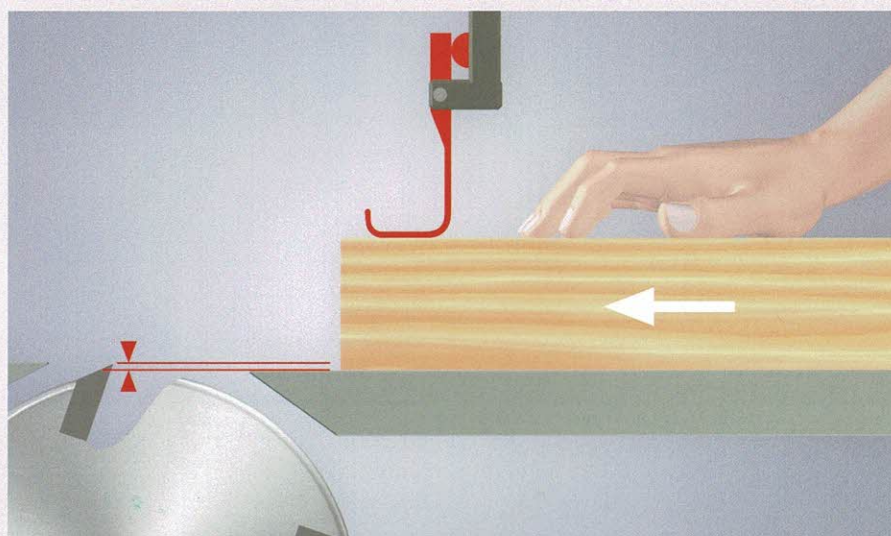


Fast exchange of knives and secure
clamping with **WEINIG CentroLock**.

Certified WEINIG tools: Safety with High Performance

The WEINIG tool systems comply with **all** demands for high performance and safety. All the tools have been tested and approved according to the regulations of DIN EN 847-1.

It applies to all the tools: They must be permanently stamped with the producer's label and the permitted RPM. The speed stated on the tool may never be exceeded.



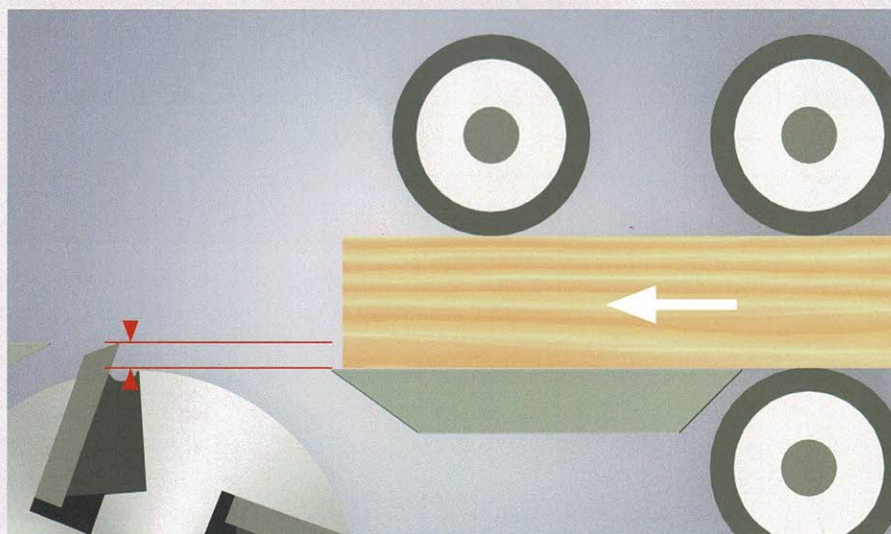
For manual feed only tools with this test mark are authorized:

MAN. Feed
n = max. (No.)

Demanded features:

- Chip removal limited to max. 1.1 mm
- Planing only
- Limited table to knife opening

Use of these tools in moulders is not restricted, however, the feed speed is reduced due to the limited chip removal.



For mechanical feed only tools with this test mark are authorized:

mech.Feed
n = max. (No.)

The chip thickness is not limited. Because of the kick-back risk, tools for mechanical feed are not allowed to be used for manual feeding.



You can expect a lot from us: WEINIG GROUP – Your partner for the future

You can concentrate on your business, let us do everything else! The WEINIG GROUP is not only the leading manufacturer for the solid wood processing industry, we lead this industry in technology and ideas! WEINIG offers comprehensive services and system solutions – all the way to complete turnkey production plants – making the WEINIG GROUP the all-around ideal partner where the focus is always on flexible, profitable production.



The WEINIG ExpoCenter

In our ExpoCenter we can demonstrate to you how our top technology can benefit your operation. Here you can get a close-up view of all our machines.



Training

We want to ensure you get the maximum benefit from your investment as fast as possible. World-class WEINIG training takes care of that. Effective operator training classes taught by experienced WEINIG experts make sure that the machine will be fully productive within the shortest time frame.



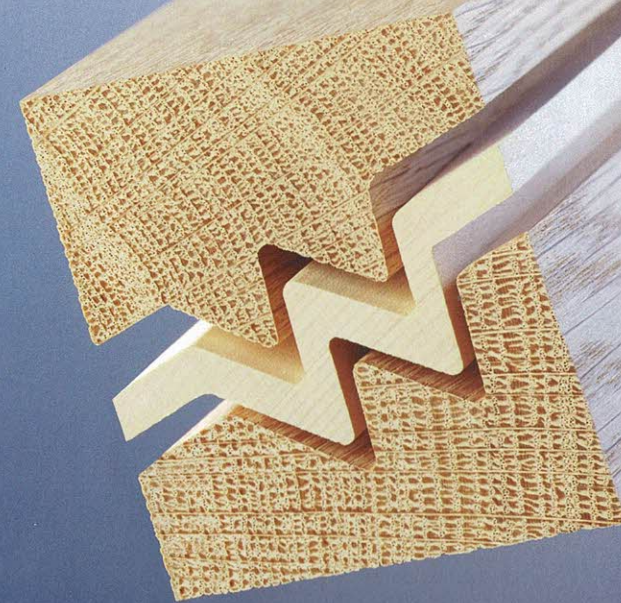
Kaizen

WEINIG's own manufacturing process is successfully organized according to the Kaizen method. In a continuous improvement process, quality and efficiency are increased step by step. You can benefit from this at your plant. We will gladly pass on to you our many years of experience.



Service

With sales and service companies located on all continents and a large, mobile team of service technicians, we guarantee a worldwide standard of service that is unique in the industry. Fastest spare parts delivery everywhere and employees who speak your language are part of our reputation for the finest customer support anywhere.



WEINIG

World market leader for automatic moulders

WACO

The No.1 for high-speed planers and moulders

GRECON

High-capacity finger jointing lines

DIMTER

The specialist for optimizing cross-cut saws and laminating presses

RAIMANN

Top technology for length cutting

CONCEPT

Your experts when it comes to turnkey projects

The WEINIG GROUP: We seamlessly combine all components of solid wood processing

Including full turn-key production plants

To build innovative machines is one thing, to offer system solutions is something else. More and more, our customers want the entire factory. That's a case for our team at WEINIG CONCEPT. Here the competence of the WEINIG GROUP combines in a special way. From planning to the turn-key production

plant, our professionals handle it all. Worldwide. For you.

A strong team

Every member of the WEINIG GROUP is a leader in their product specialty. This creates valuable synergy that ultimately benefits you and your business.

