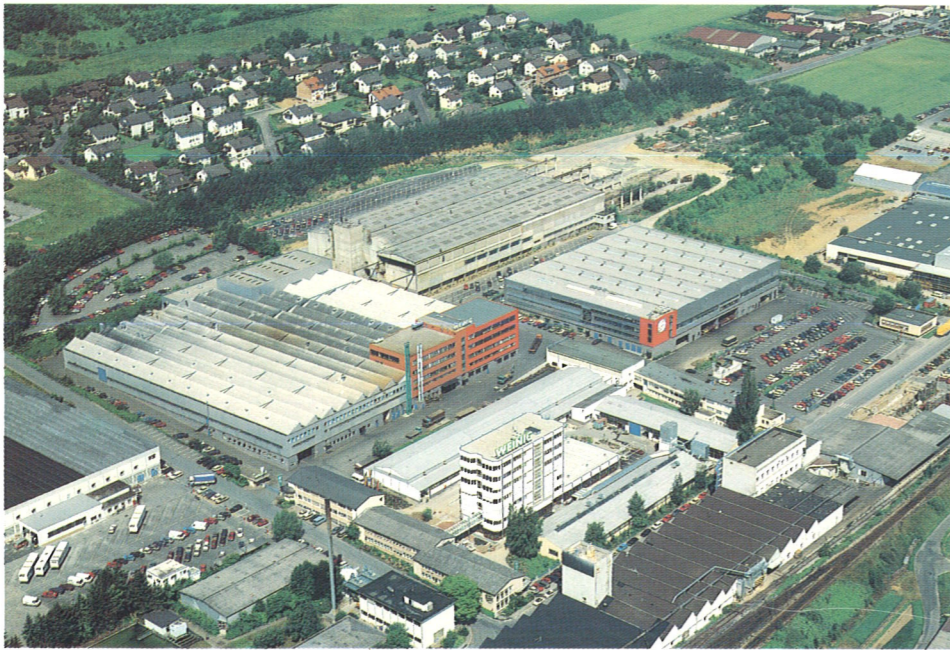




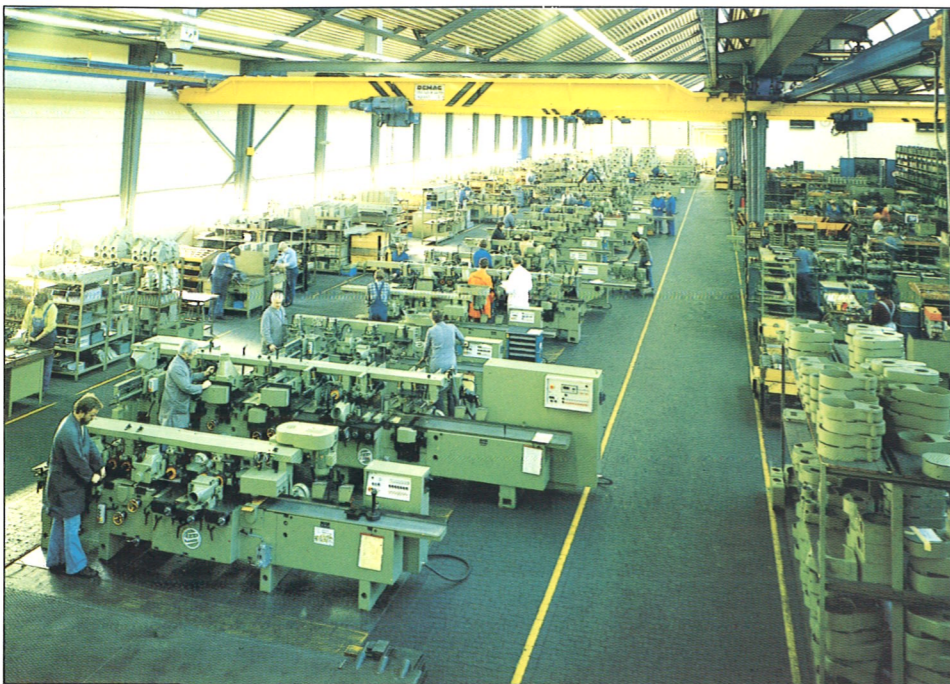
MICHAEL WEINIG

AKTIENGESELLSCHAFT

Factory address:
Weinigstrasse 2/4, D-97941 Tauberbischofsheim
Mail address:
P.O. Box 1440, D-97934 Tauberbischofsheim
Telephone (0) 93 41/86-0
Telefax (0) 93 41/70 80
Telex 689511
Germany

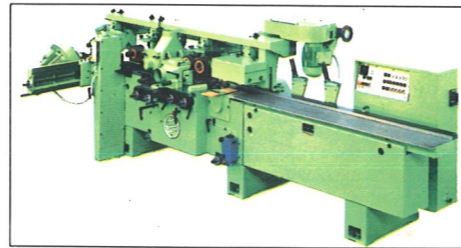


Aerial photograph of our factory in Tauberbischofsheim

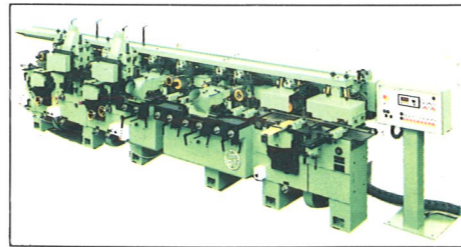


Large-batch production on a production line

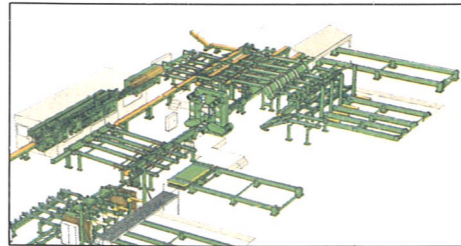
Subject to technical alterations.



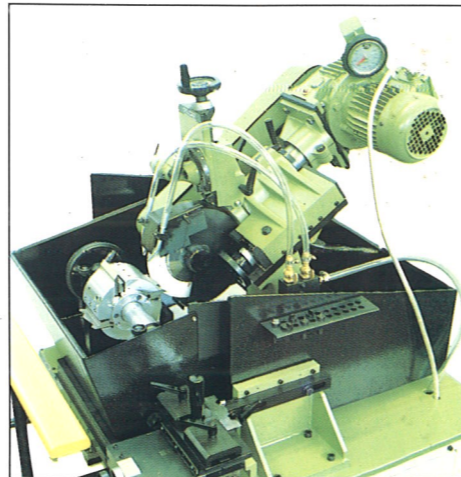
Unimat



Hydromat



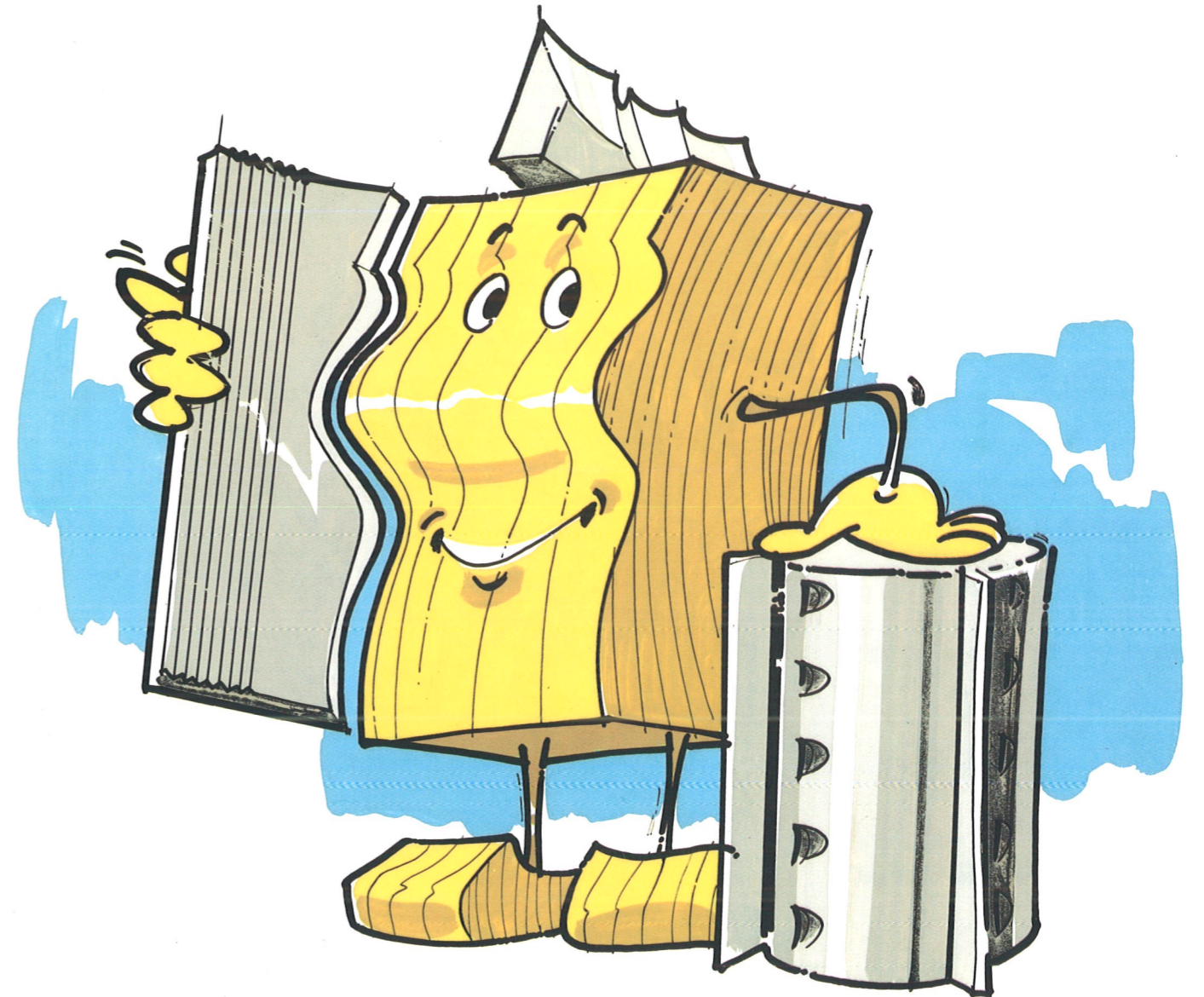
Material handling equipment



Knife grinder Rondamat

All about tools

A Weinig information bulletin



Contents

It's the tool that counts

The importance of the tool

Page

3

What is the choice

Solid profile cutters

4

Cutter blocks

5

Be self sufficient

Make your own profile cutters

7

When planing . . .

Cutter head

8

Peak-to-valley height

10

Conventional or hydro-clamping?

Tools with conventional clamping

11

Tools with hydraulic clamping

13

From one source

The WEINIG range of tools and accessories

17

At a glance

Summary of advantages

19

Better safe than sorry

Factory Safety Acts

21

That's it

What am I looking for?

Keyword register

23



That's it

That's all we briefly wanted to tell you about tools generally and ORIGINAL WEINIG CUTTER HEADS in particular, about their properties and advantages and how you can exploit them to the full.

Have you any questions or problems? Then please contact us.

Use the attached reply card or give us a ring (Phone 7 04/8 72-98 43).

Or contact your local Weinig agent or Weinig Company.

We are always at your service and shall be only too pleased to advise and help you.

If you wanted to know why we have gone for ORIGINAL WEINIG CUTTERS HEADS the answer is simple. You can't expect the leading manufacturer of moulders to put up with second best can you?

It's the tool that does the job.

What am I looking for!

Page

Face grinding 4

Solid cutters 4

Clearance angle 4

Hydro-clamping 13

Jointing 14

Jointing chamfer 15

Pitch 8

Cutter blocks 5

Conventional clamping 11

Profile template 5

Peak-to-valley depth 10

Back grinding 5

Concentricity 13

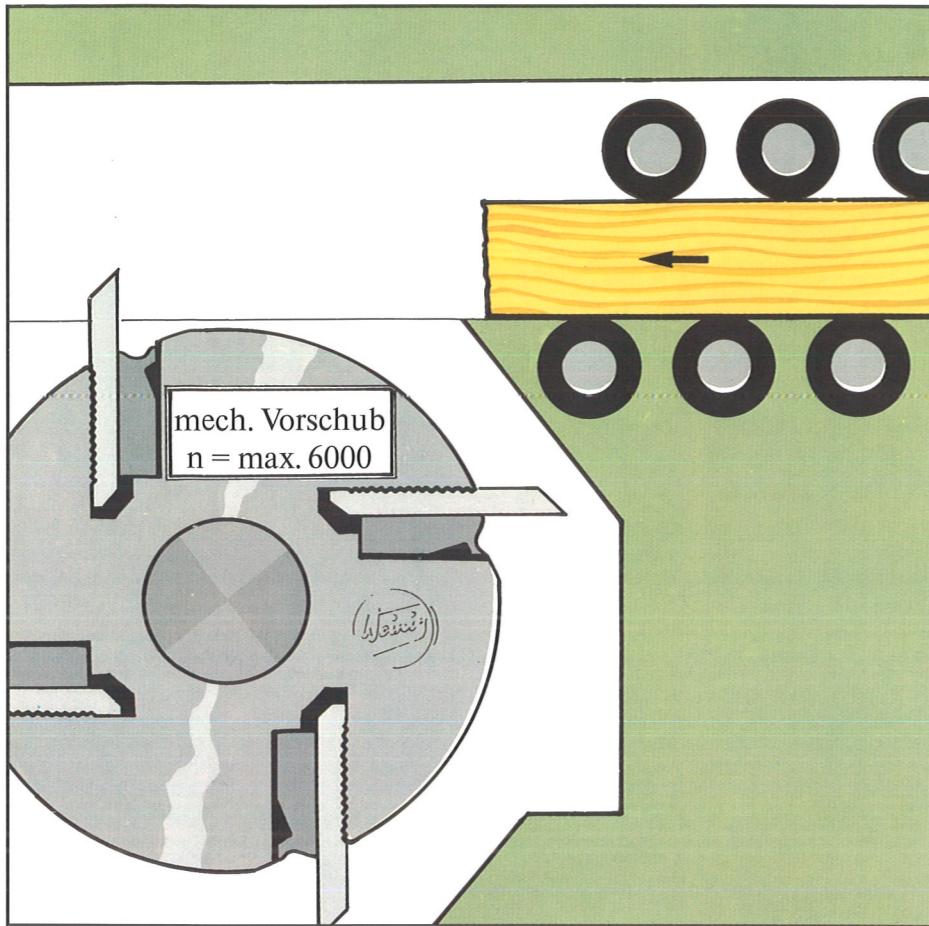
Time between resharpening 9

Accident prevention 21

Self-contained tools 4

Accessories 18

Made-up tools 5



The tools with this approval label are approved for **mechanical** feed systems (i.e. on moulders, planers and double ended tenoners.

There is no need for any restriction in the stock removal rate in this case. An open type of system can be used. Due to the danger of kick-back these tools for mechanical feed systems are not permitted for other types of feed.

The following is applicable for **all** tools.

They must bear a permanent mark showing manufacturer's name and the admissible speed per minute.

The speed given on the tools must never be exceeded.

The method of locking the knives within the cutter head must prevent the knife from moving during operation or rotation of the cutter head.

WEINIG tools fulfil these requirements in all respects of both performance and safety.

Weinig offer more

It's the tool that counts

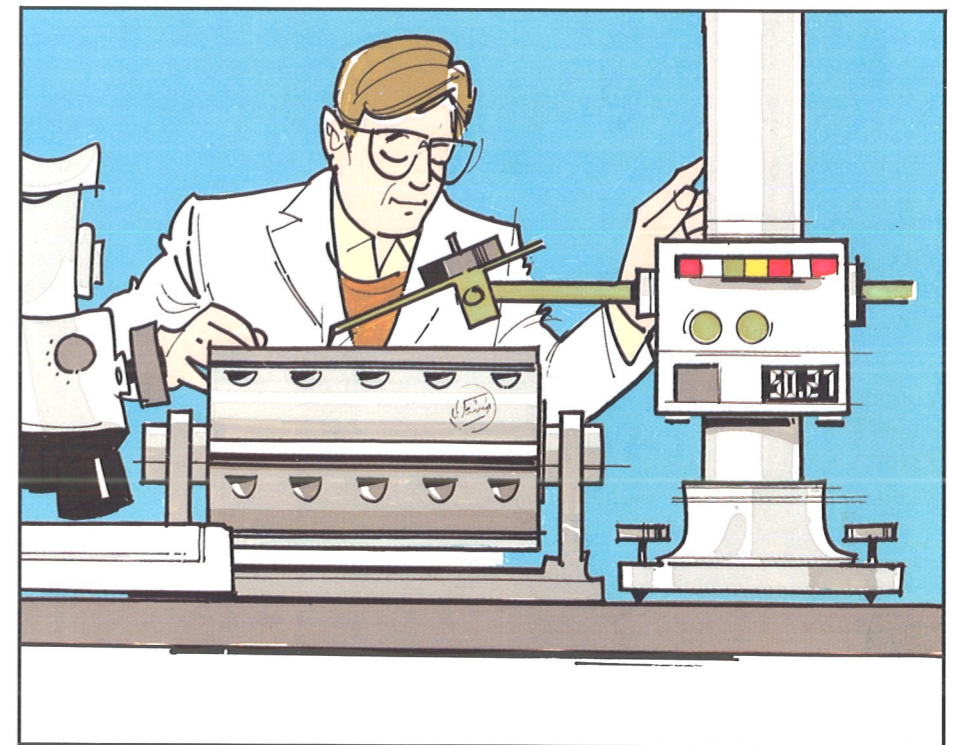
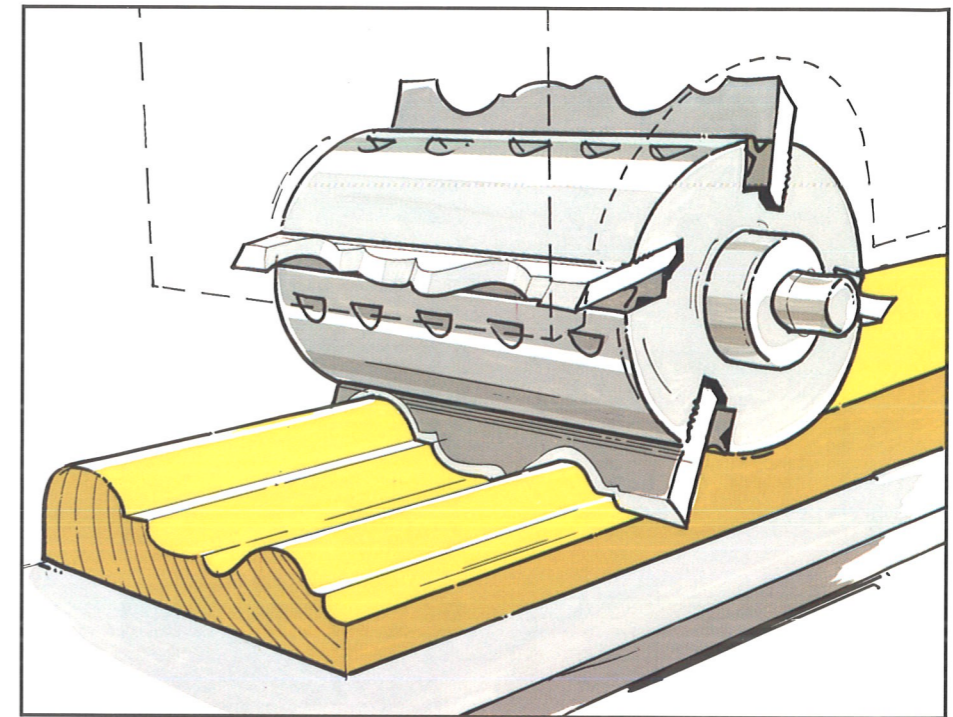
The best machine is only as good as its tools because it's the tooling that does the job when machining wood.

As a leading manufacturer and supplier of moulding machines worldwide we know what we are talking about and this is why all of our machines should be equipped with **Original Weinig Tooling**

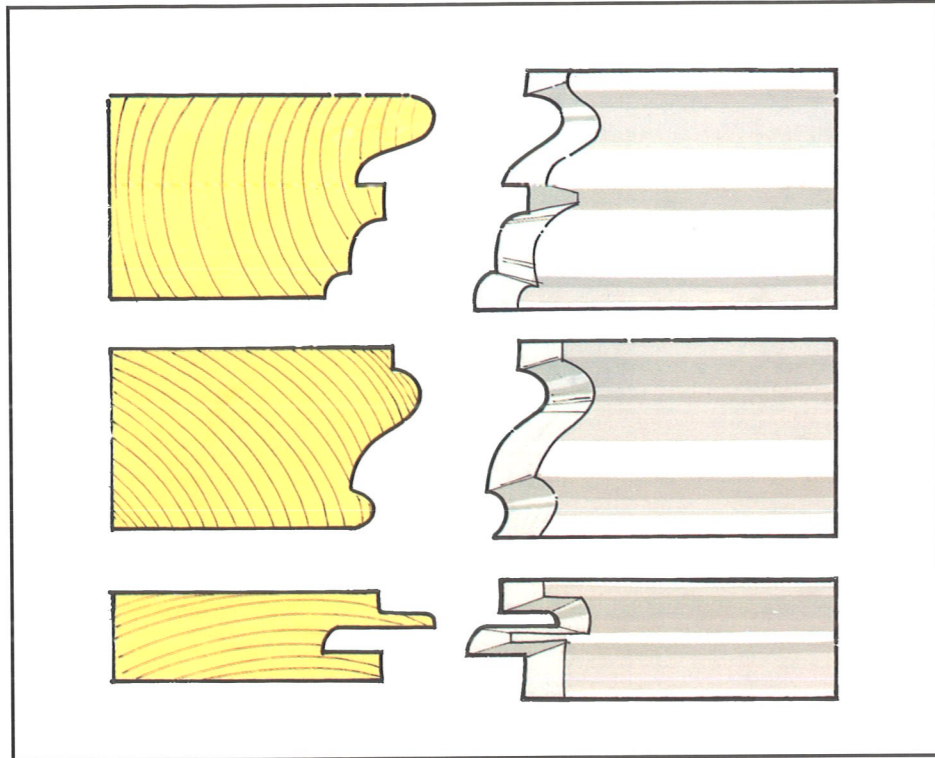
In addition:

This is why we have built a factory in the Swiss Jura mountains which produces nothing else but tools, tools and even more tools.

There in the heart of the watch and clock industry German expertise is combined with Swiss precision. There could be no better marriage to the benefit of both our moulding machines and our customers throughout the world.



What is the choice



Both solid profile cutters and loose knife cutter heads are employed for woodworking.

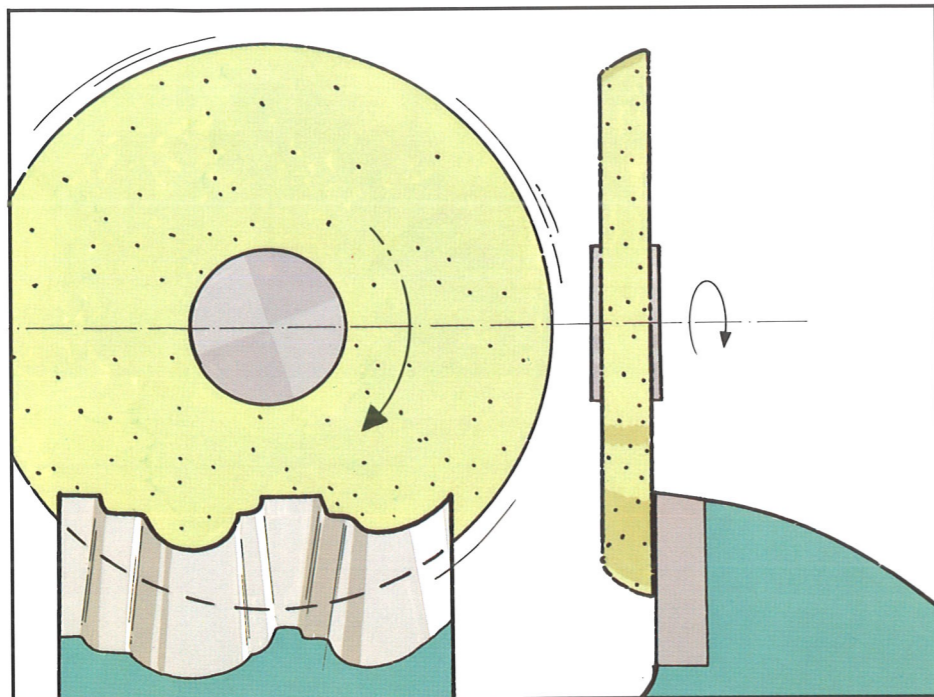
Solid profile cutters are self-contained, each being a complete cutter and head. This means to say that the tool can only be used for one single profile and cannot be changed.

Every individual profile needs its own tool and in some cases more than one, particularly when different types of timber require different grades of material to the cutting edge and of course after repeated grinding the tool is finished and lands on the scrap heap or at the best needs to be retipped usually at great expense in terms of down time and money.

Solid cutters are face ground. Due to the necessary clearance angle on the back of the tool the profile automatically changes every time tool is reground. In other words it is not possible to guarantee a true profile.

Solid cutters still have their place but only for very special products.

For example dowels and grooving cutters etc.



Better safe than sorry

The machine doesn't know the difference between a piece of wood and your hand.

The factory safety acts have been drawn up to prevent injury.

The following is to be observed particularly where tools are concerned.

Only tools with this approval label are permitted for **hand feed**.

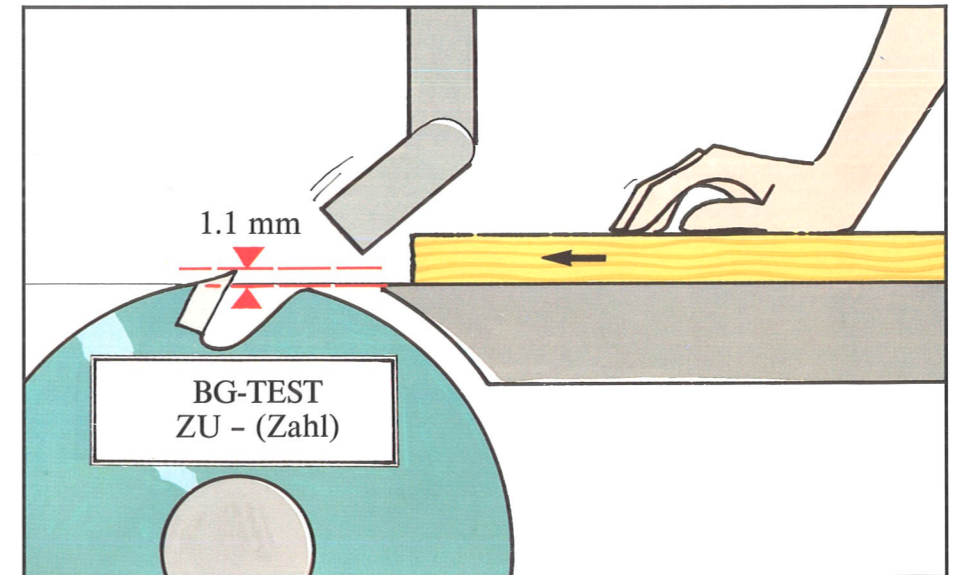
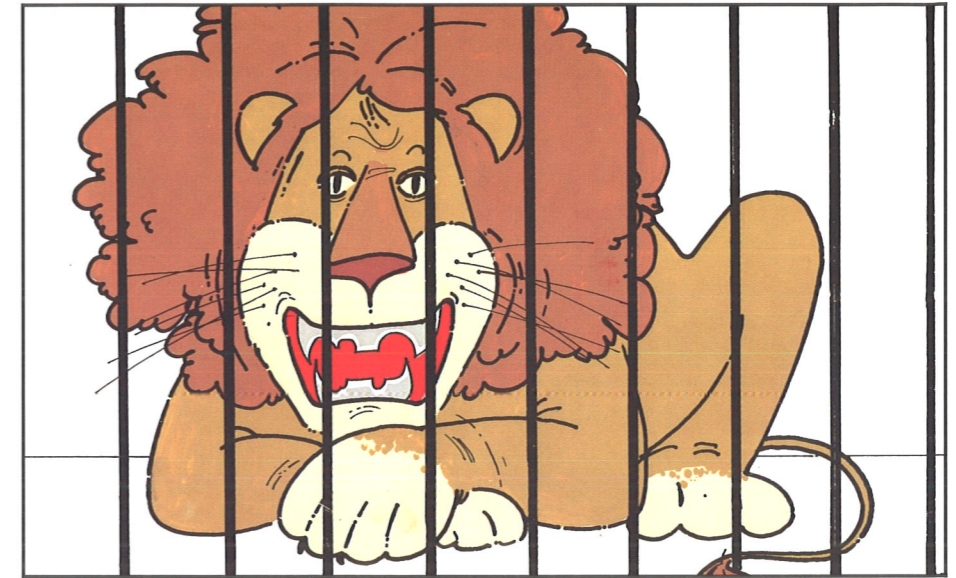
BG-TEST
ZU - (Zahl)

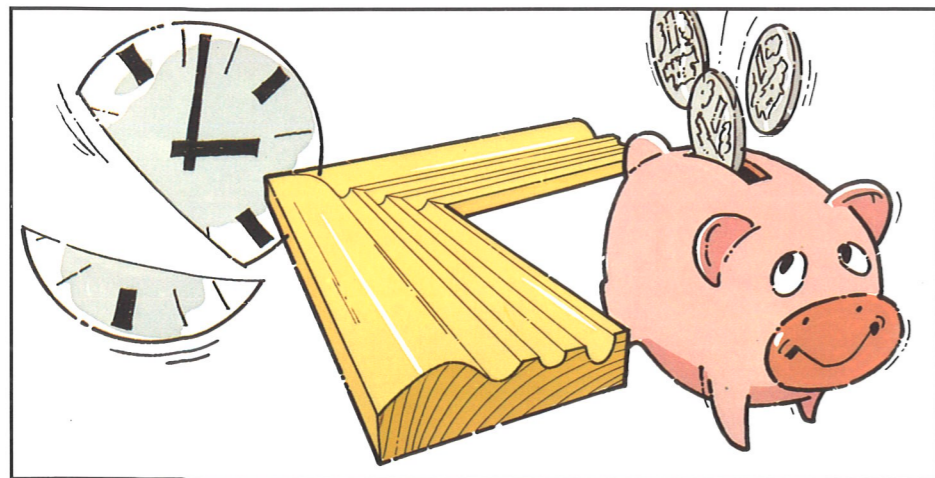
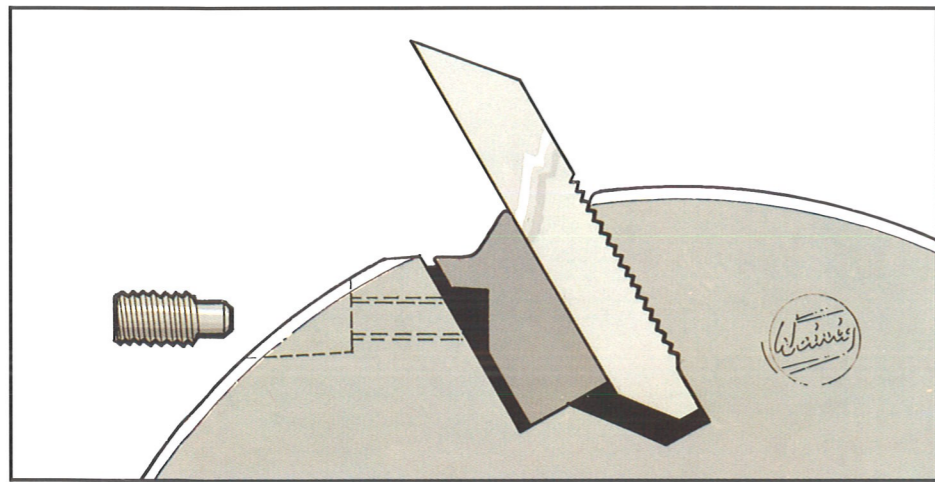
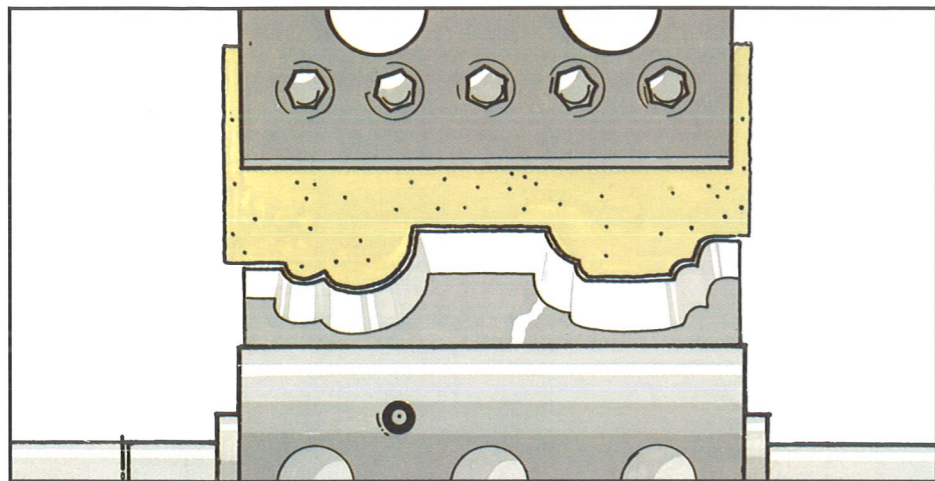
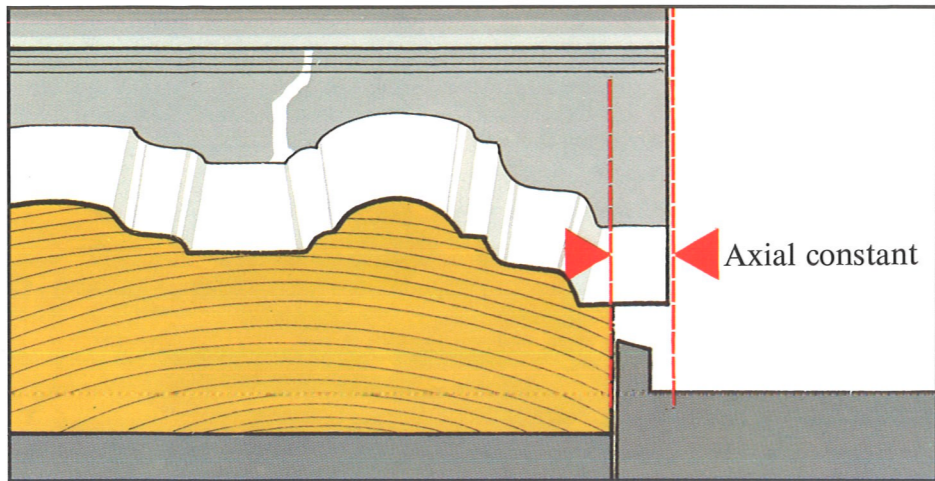
Standards set:

- Stock removal limited to maximum 1.1 mm
- Circular form as far as possible
- Close fitting table plates

It is not forbidden to use these tools on moulding machines with mechanical feed but the feed speed is automatically restricted by the limited chip removal rate.

Note: Safety rules and regulations may vary from Country to Country. Machines should always be operated and tooling used in accordance with the safety rules and conditions applying.





- Reduced set-up times through axial constant ground tools.

- More frequent jointing and less frequent sharpening as a result of the true concentricity of Weinig Hydro-heads.

- Quick knife fitting through precision serrations.

To sum it up:
ORIGINAL WEINIG CUTTER HEADS

- improve quality
- save time
- cut costs

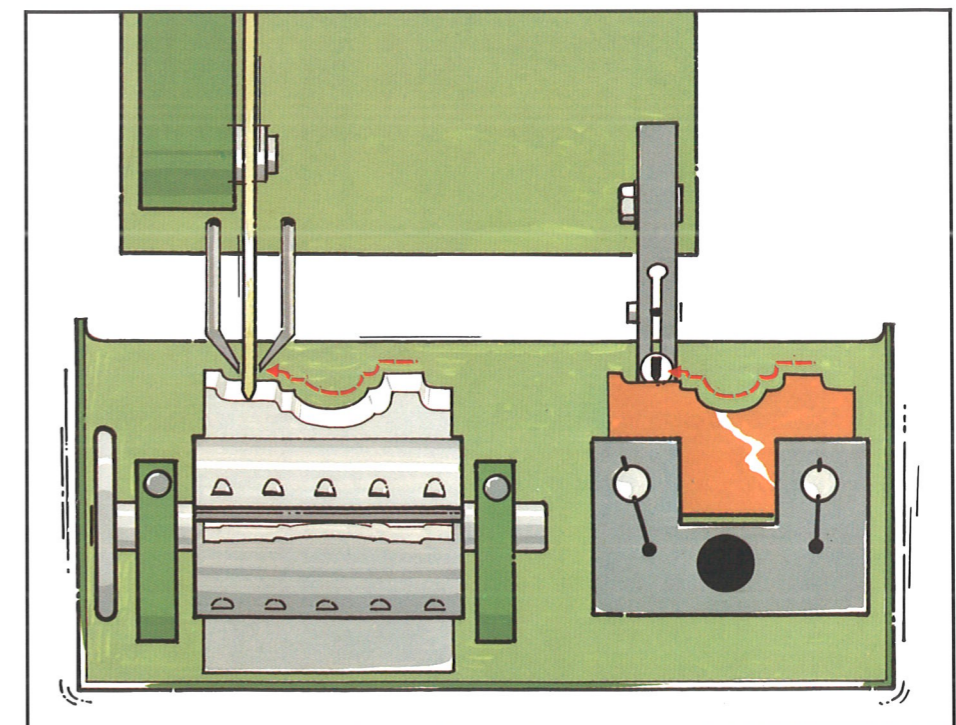
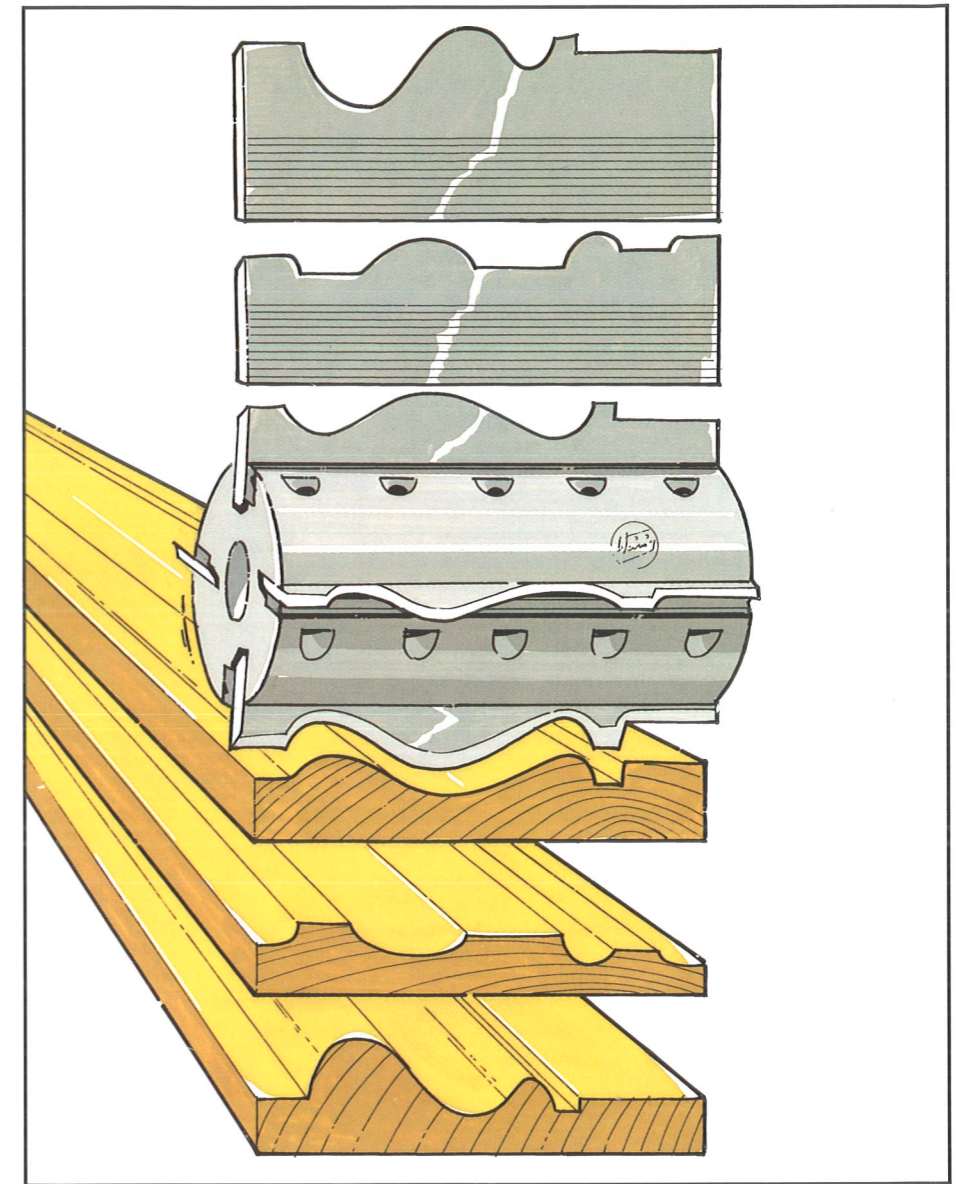
Loose knife heads are tools made up of the cutter head and knives. These can be smooth (ie planing knives) or have serrated backs (ie profile knives).

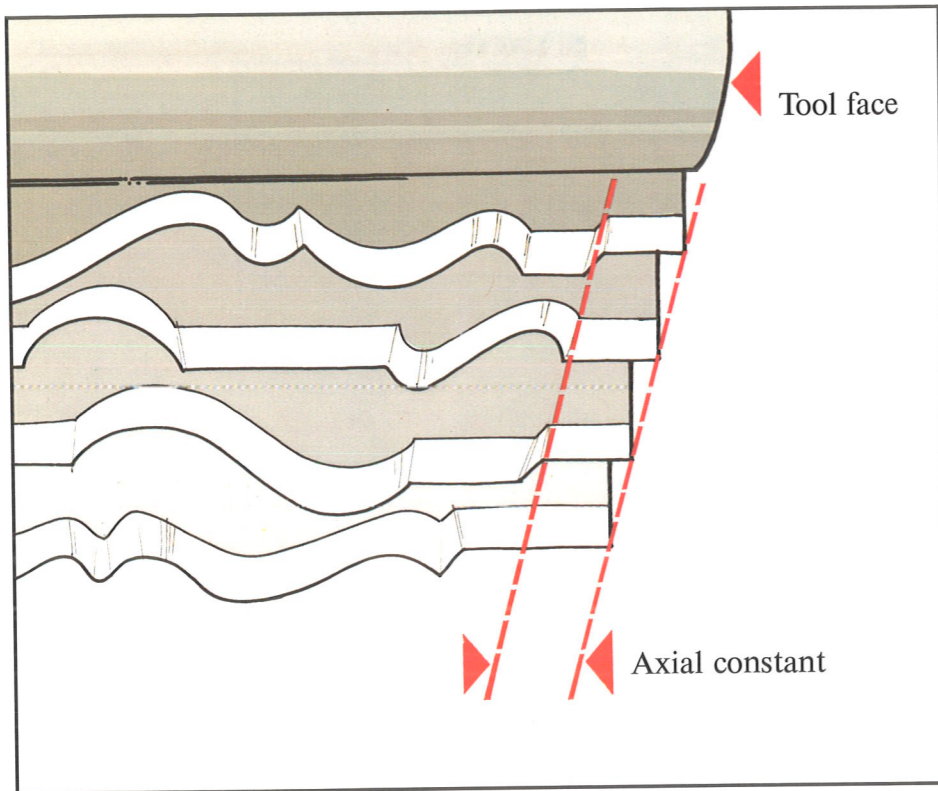
These knives can be replaced at any time in a matter of seconds.

Consequently, a number of profiles can be produced with one and the same tool body – simply by changing knives.

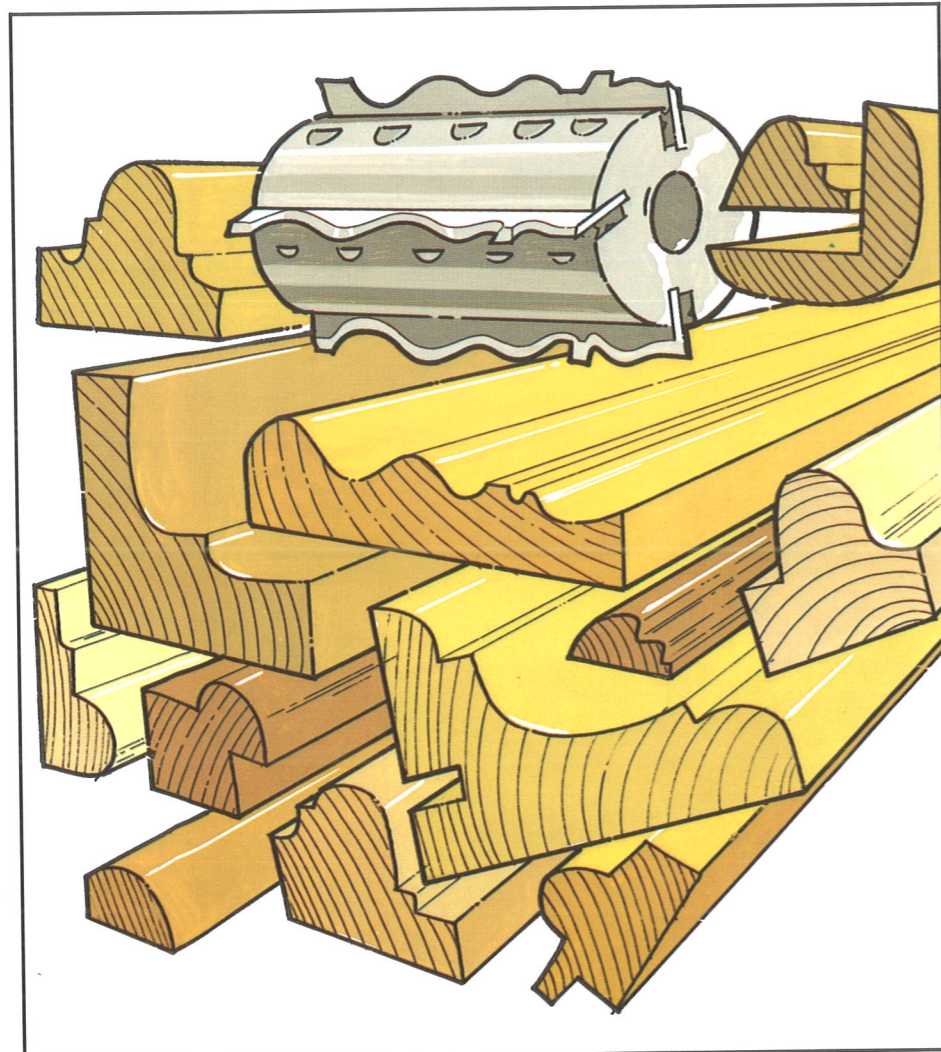
This system gives you more flexibility by allowing you not only to choose the right size of knife relative to the profile but also the knife material (H.S.S./T.C.T./Stellite) relative to the material to be moulded.

The grinding of the knives is always carried out in connection with the profile template directly at the cutting edge, this ensures absolute profile precision no matter how many times the knife is resharpened and clearance angles can be chosen to suit timber type and condition.





By maintaining the same distance between the end face of the cutter block and the start of the profile large savings in setting time can be made because the cutting spindle has to be adjusted in the axial plane every time a tool is changed. We call this axial constant.



The easy decision

Solid profile cutters or a loose knife tool.

Having read and seen the facts we are sure you are **now** of the same opinion as us.

So this is why we only produce a loose knife tooling system. Our **Original Weinig cutter heads** for both planing and moulding.

At a glance

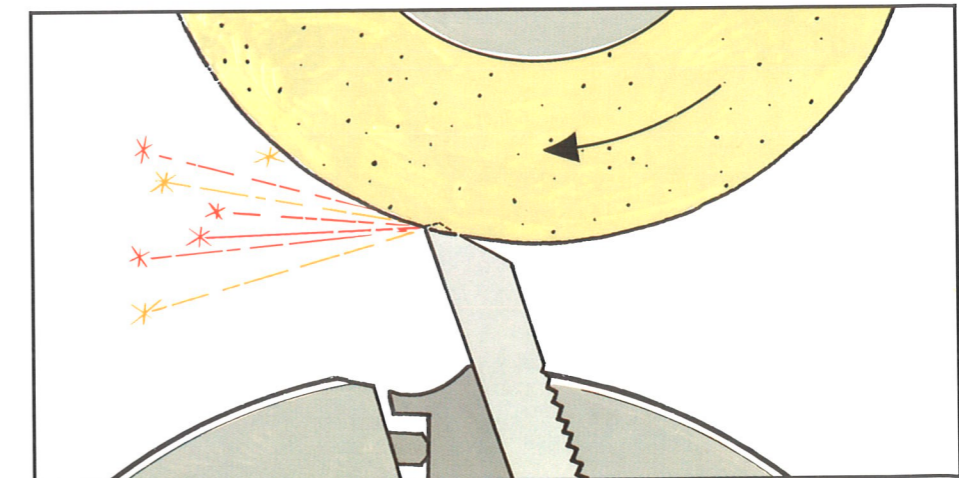
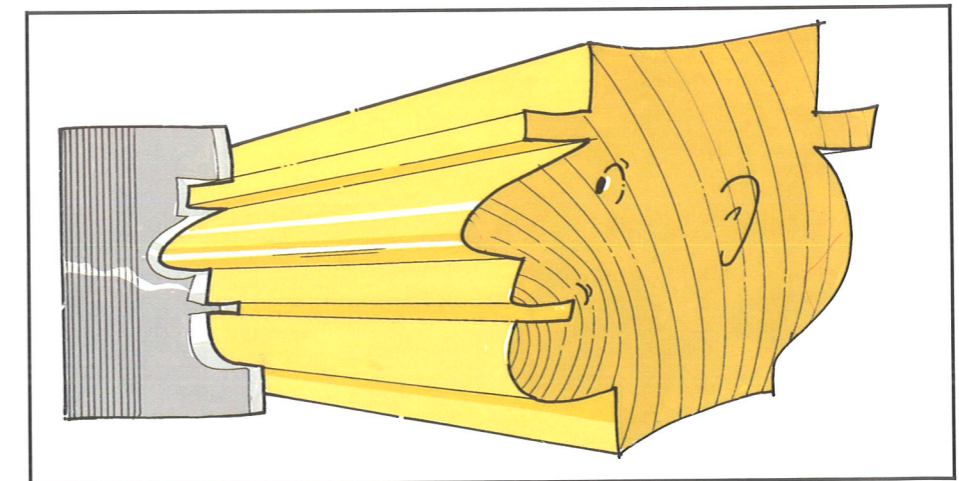
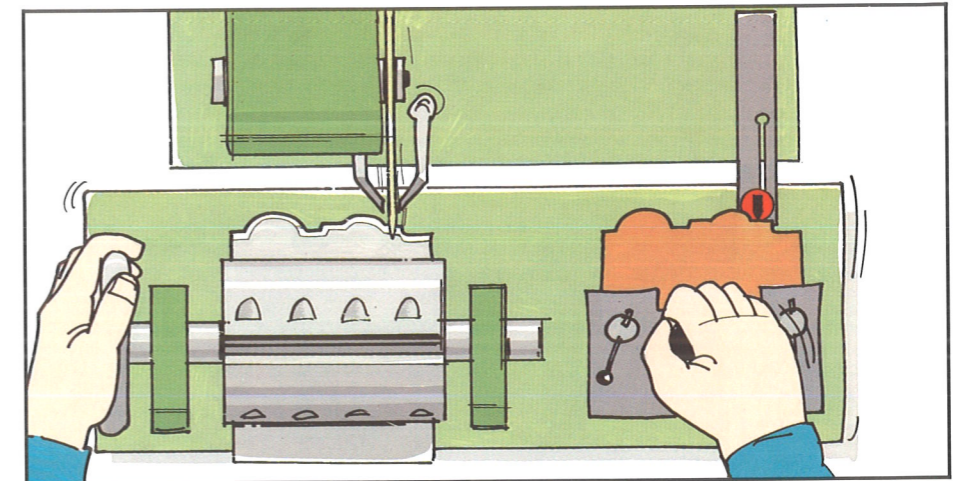
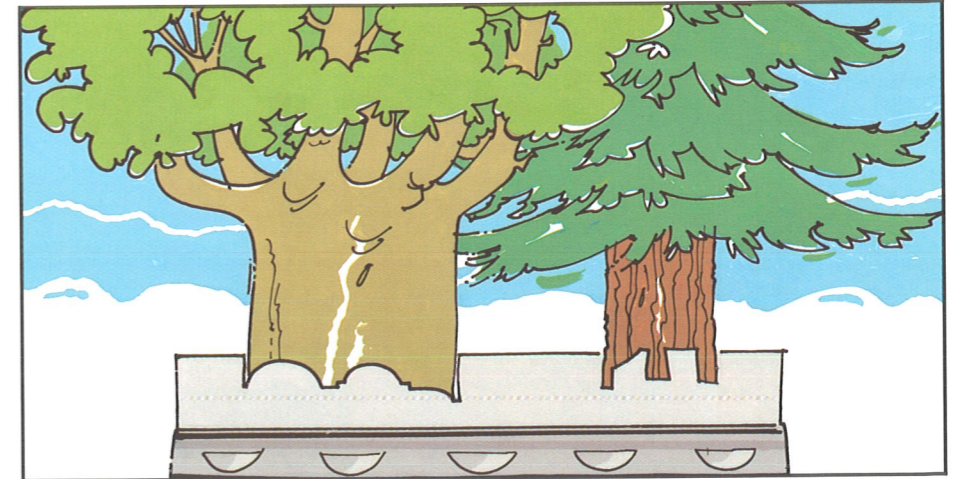
Only the original WEINIG CUTTER HEAD SYSTEM offers you such a wide range of possibilities.

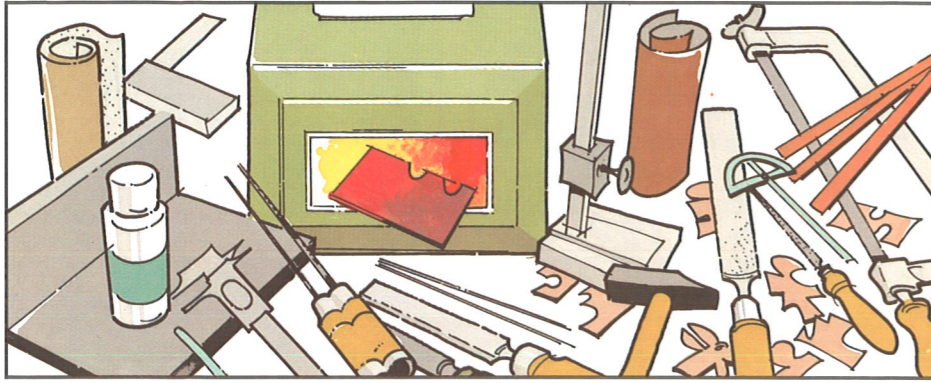
- Only **one** tool body for any profile in any type of wood

- Inexpensive production of the profile knives on the WEINIG RONDAMAT. All under your own control.

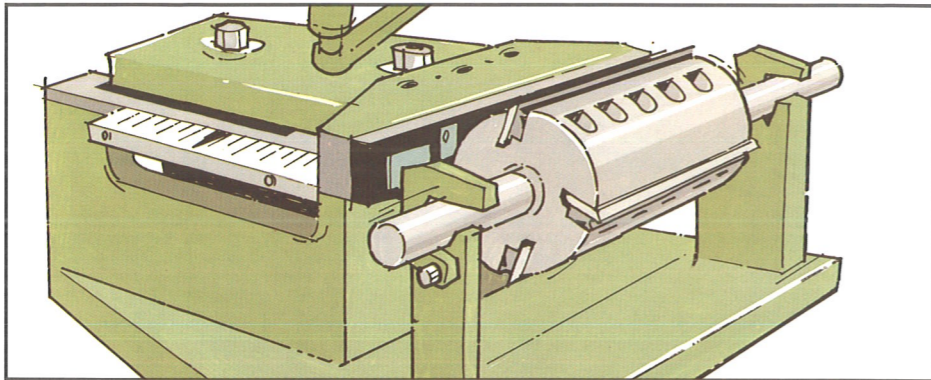
- Flexibility for individual profile accuracy

- Maximum concentricity and true-to-profile accuracy with minimum stock removal due to serrated back knives.

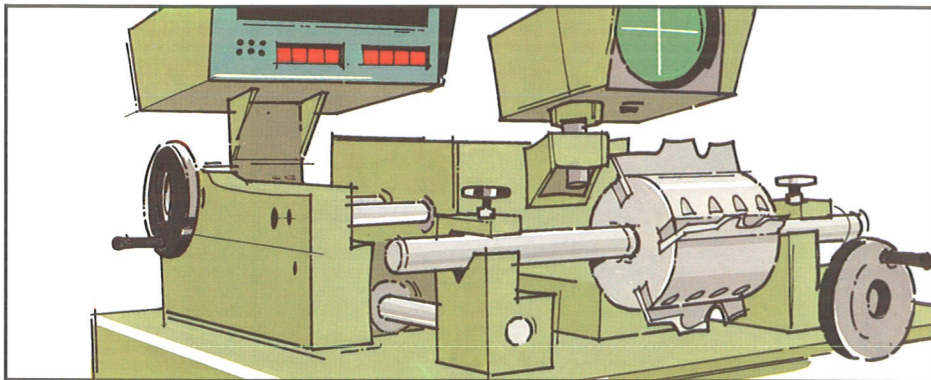




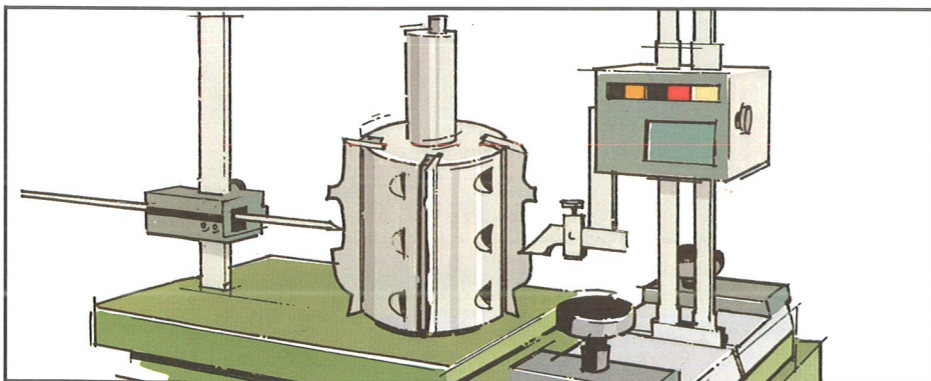
Weinig offer more
By this we mean every product you wish to produce with true to profile dimensions, first class quality of finish can be achieved **quickly, inexpensively, and without problems.**



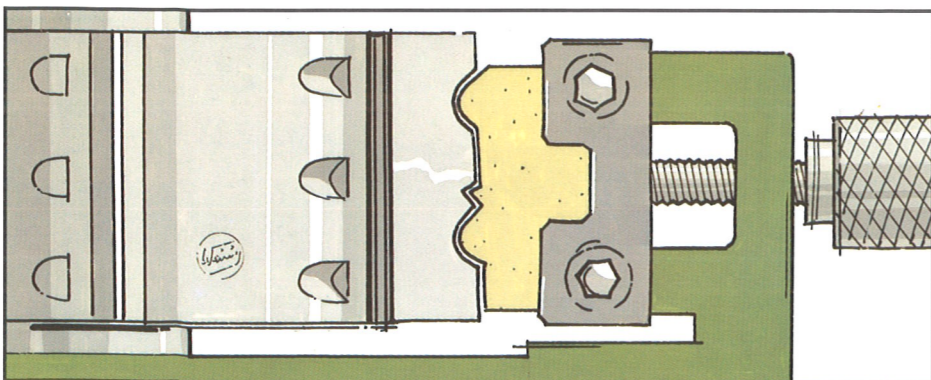
For example:
A complete range of tools and hardening oven for the production of templates.



A precision setting stand for both planing and profile knives.



Electronic measuring stand with magnifying scope, digital readouts and printout systems.



Vernier device for measuring the radius and height of the tool.

Jointer presetting device for precision profiling of jointing stones.

Be self sufficient

You are more flexible and independent with **Original Weinig cutter heads** because you can produce your own profile knives.

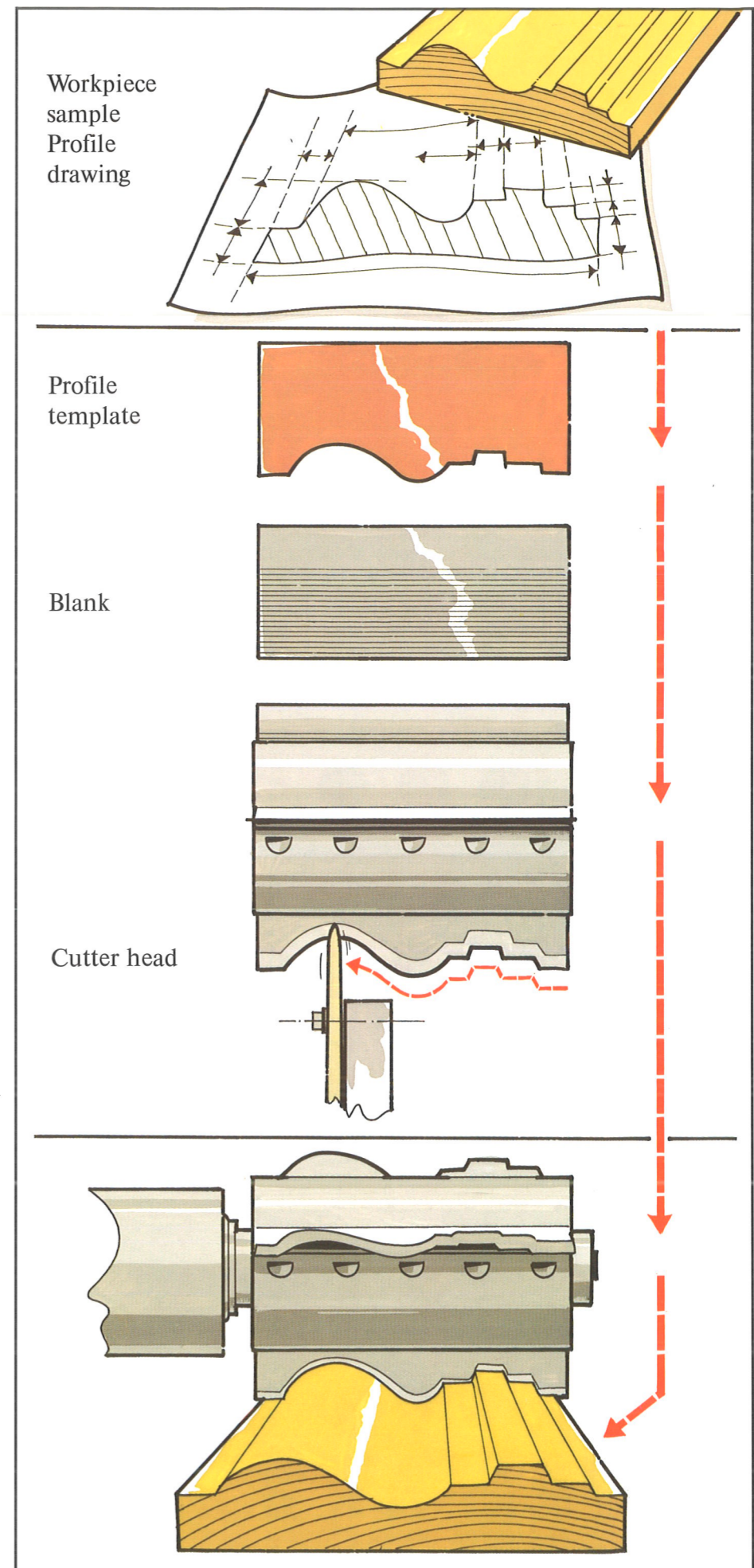
This is a quick, troublefree and inexpensive operation.

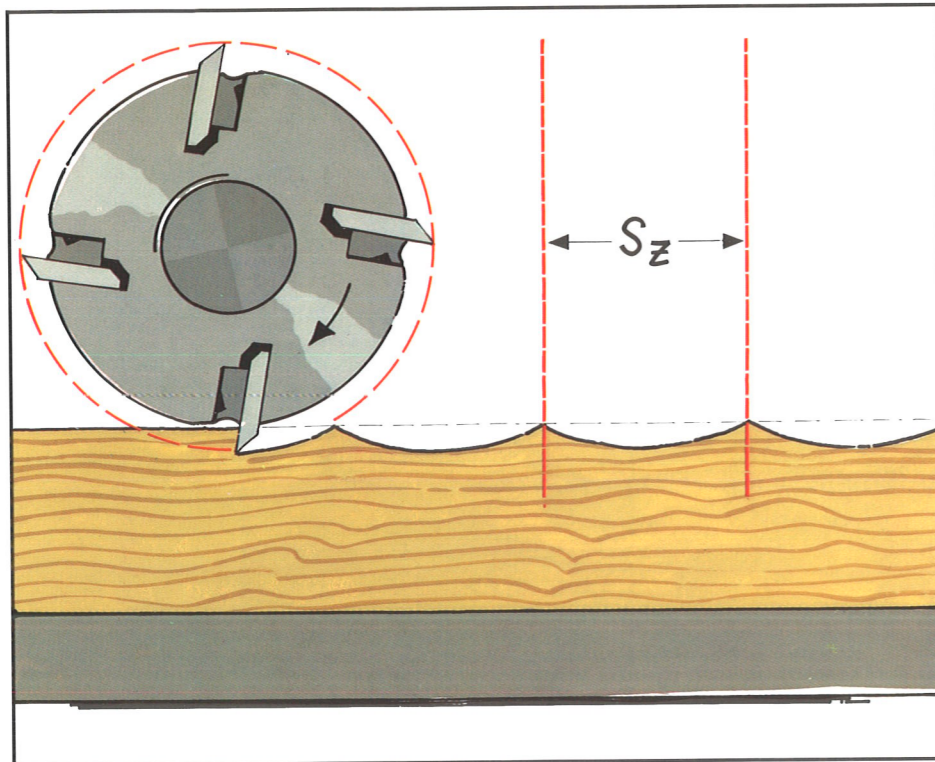
This is true for any order, any batch size and any type of profile.

It's a very simple operation: First you make a profile template from an existing profile of a drawing on a scale 1:1.

According to this template you can now profile within a few minutes the high speed steel, stellite or carbide-tipped blanks on our **Rondamat** grinding machine.

That's all. You then have a ready-to-use moulding tool.





When planing . . .

A series of ridges is produced when planing with a rotary cutter. The distance between one ridge and the next corresponds with the distance between the start and finish of the cut by the different cutting knives. This distance is called the **pitch**. It is also known as the arc mark, pitch mark or cutting mark.

The longer the pitch is the more visible it becomes and the more "wavy" the planed surface.

Or to put it the other way round: the surface finish of the workpiece is all the more smoother and better the shorter the pitch mark is.

The pitch of the cutter mark (s_z) depends upon the feed speed (v), with which the machine is running, the speed (n) of the spindles and the number of knives (z) in the cutting tool.

This can be calculated according to this formula.

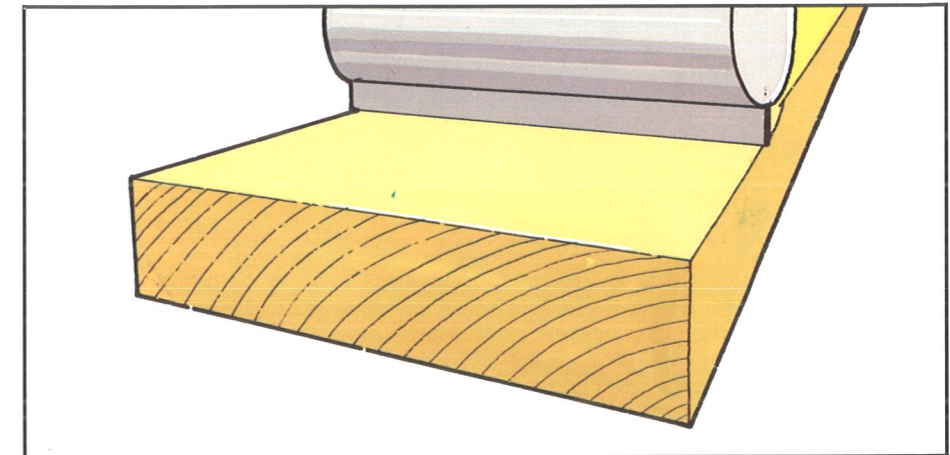
$$S_z = \frac{v \times 1000}{n \times z}$$

From one source

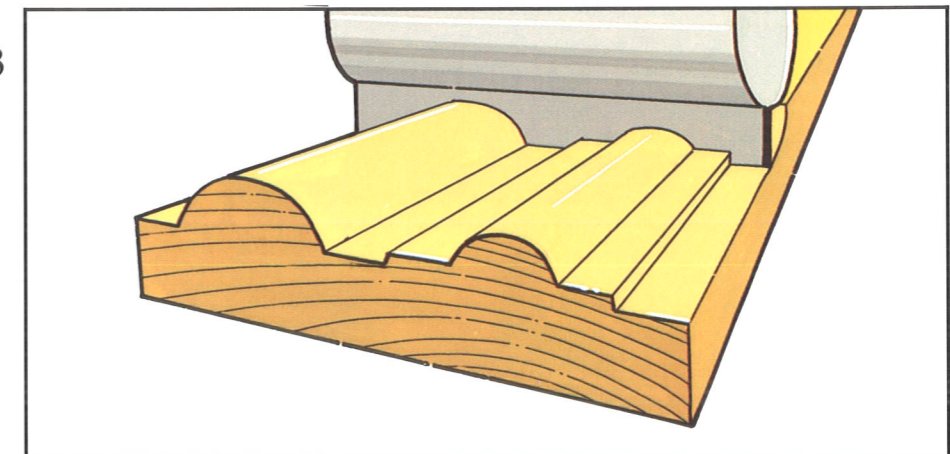
Whatever demands you may make on the quality of the surface finish and no matter how fast you wish to produce you will find the most suitable tool in the WEINIG TOOL SYSTEM.

- The WEINIG PLANER HEAD No. 500 suitable for feed speeds below 15 m/min., with accessories.
- The WEINIG HYDRO PLANER HEADS Nos. 501 and 502 suitable for higher feed speeds, with accessories.

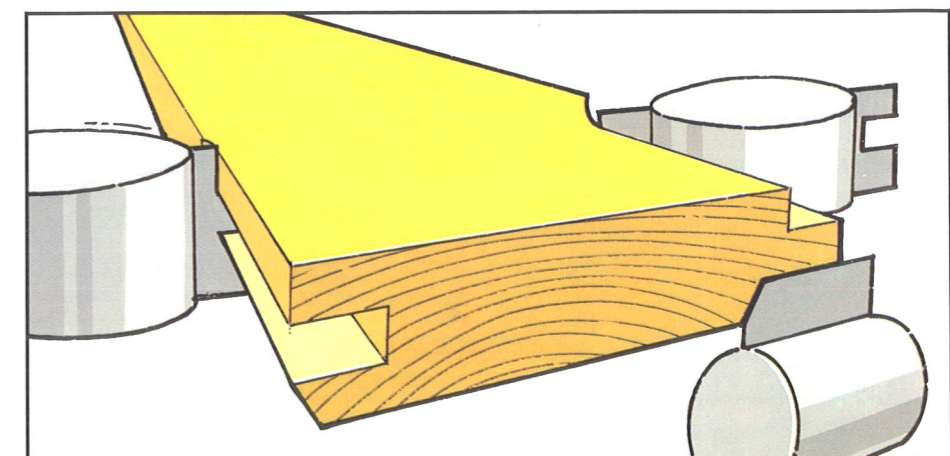
For four-sided planing



For profiling



For profiling of tongues and grooves



- The WEINIG PROFILE CUTTER HEAD No. 503 suitable for feed speeds under 15 m/min., with accessories.
- The WEINIG HYDRO PROFILE CUTTER HEAD No. 504 suitable for higher feed speeds, with accessories.

- WEINIG CUTTER HEAD No. 508 suitable for feed speeds under 15 m/min., with accessories.
- The WEINIG HYDRO TONGUE AND GROOVE CUTTER HEAD No. 508 suitable for higher feed speeds, with accessories.

Knife marks with jointed hydro-tools
 n = 6000 rpm.

$$s_z = \frac{V \times 1000}{n \times z} \text{ [mm]}$$

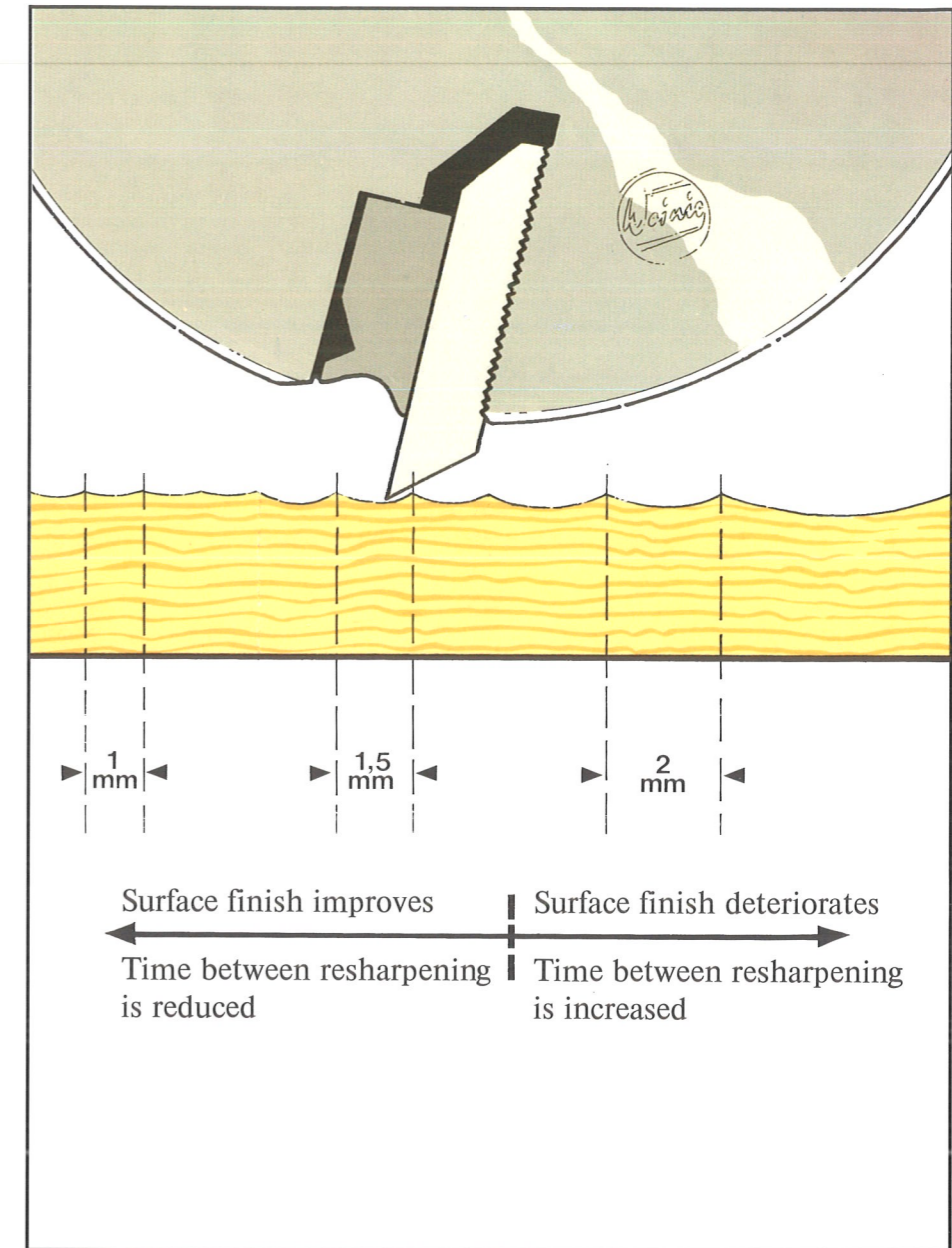
V = 200				5.55	4.16	3.33	2.77	2.38	2.08	1.67
V = 180				5.0	3.75	3.0	2.5	2.14	1.87	1.50
V = 170				4.72	3.54	2.83	2.36	2.02	1.77	1.42
V = 160				4.44	3.33	2.66	2.22	1.90	1.67	1.33
V = 150				4.17	3.12	2.50	2.08	1.78	1.56	1.25
V = 140				3.88	2.91	2.33	1.94	1.67	1.45	1.16
V = 120			5.0	3.3	2.5	2.0	1.67	1.42	1.25	1.0
V = 100			4.17	2.78	2.08	1.67	1.38	1.19	1.04	0.83
V = 80		4.44	3.33	2.22	1.67	1.33	1.11	0.95	0.83	0.66
V = 60	5.0	3.33	2.5	1.67	1.25	1.0	0.83	0.71	0.62	
V = 50	4.17	2.78	2.08	1.39	1.04	0.83	0.69	0.59		
V = 40	3.33	2.22	1.67	1.11	0.83	0.67	0.55			
V = 30	2.5	1.67	1.25	0.83	0.63	0.5				
V = 20	1.67	1.11	0.83	0.55	0.42	0.33				
	Z = 2	Z = 3	Z = 4	Z = 6	Z = 8	Z = 10	Z = 12	Z = 14	Z = 16	Z = 20

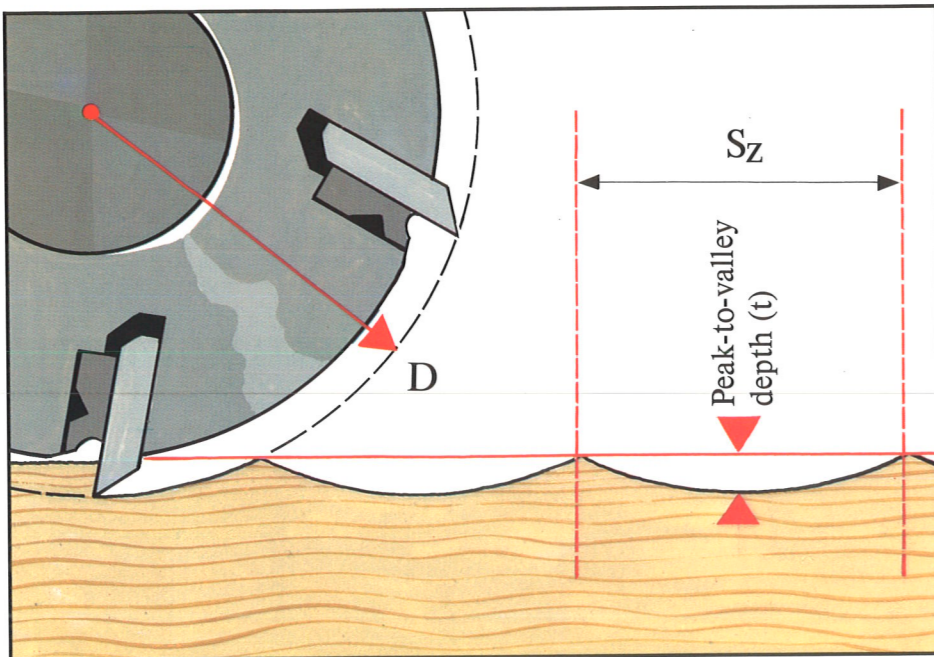
V = feed speed in m/min.
 s_z = cutter mark in mm

n = speed of spindles per minute
 z = number of knives

The pitch or distance between the cutter marks will be decided by the surface quality you require on the finished timber. For instance if a high quality finish is required as for furniture parts the pitch mark must be very short. On the other hand if no particular importance is attached to the quality of the surface finish, for example, for structural timber used in the building industry, a longer pitch mark can be accepted.

From experience it is known that a good surface finish can be obtained with a pitch mark of approx. 1.5-1.7 mm. With a still shorter pitch mark the quality of the surface finish will be better but the cutting edge will become blunt more quickly.





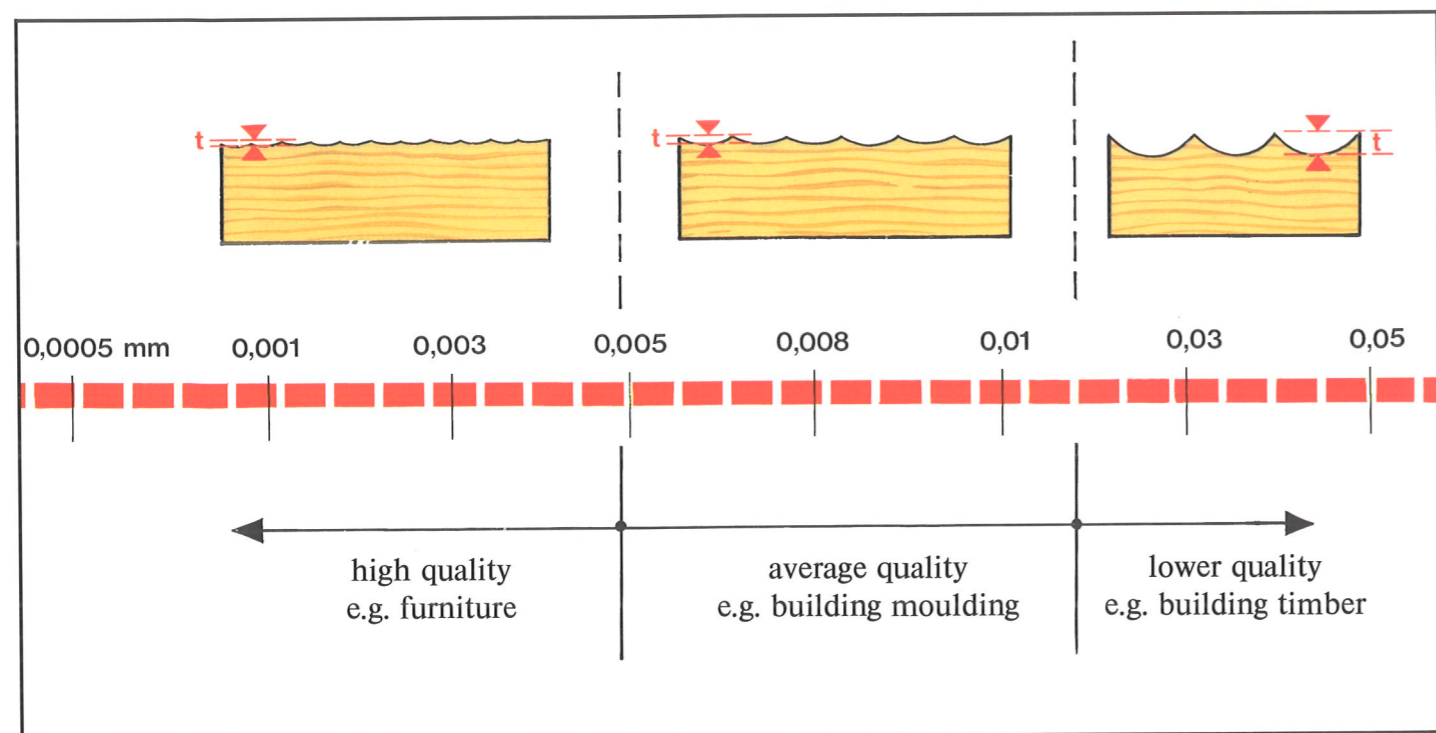
A further factor that determines the quality of the surface finish is the **peak-to-valley height**. That is the depth to which the cutting knives enter the wood. The workpiece surface is all the more better the smaller the peak-to valley height.

The peak-to-valley height (t) depends upon the length (or pitch) of the arcs (Sz) and the diameter or cutting circle of the tool (D). This can be calculated by applying this simplified formula.

$$t = \frac{S_z^2}{4D}$$

The peak-to-valley height (t) chosen determines the end product just like the cutter mark pitch.

Experience tells us that the basis for a good surface finish is a peak-to-valley height in the region of approx. 0.005 mm.



The moulding machine must have the following features as a basis for jointing:

- heavy-duty machine body
- smooth feed system
- high-capacity spindles
- optimal spindle speed
- jointing facility

The WEINIG HYDROMAT meets all these requirements.

In the case of jointed tools the pitch mark can be calculated from the number of cutters in the tool.

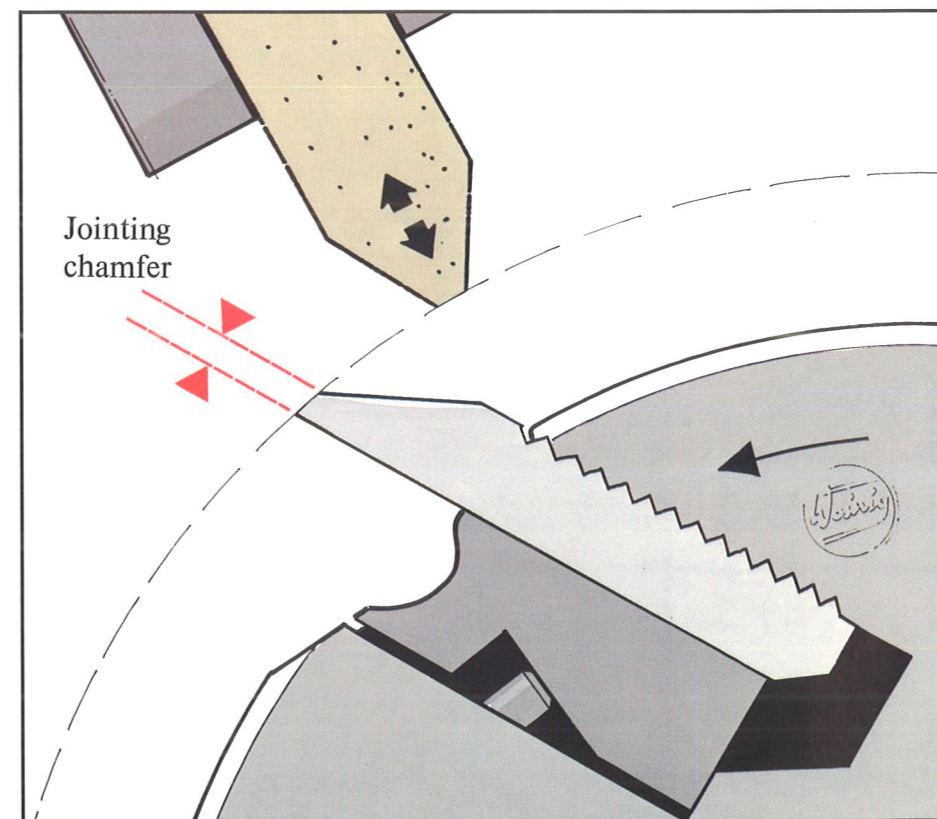
The jointing operation can be repeated several times which is to the advantage of the tool life. To always ensure a uniform high quality surface finish of the workpiece the chamfer or heel produced on the point of the knife when jointing must not exceed a certain width.

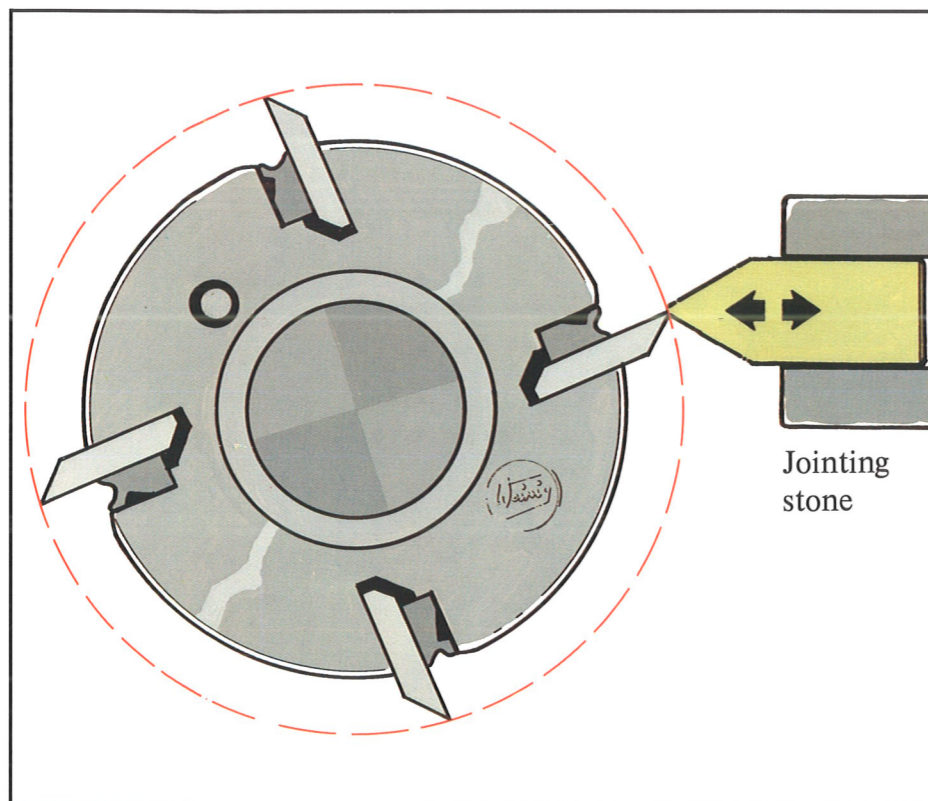
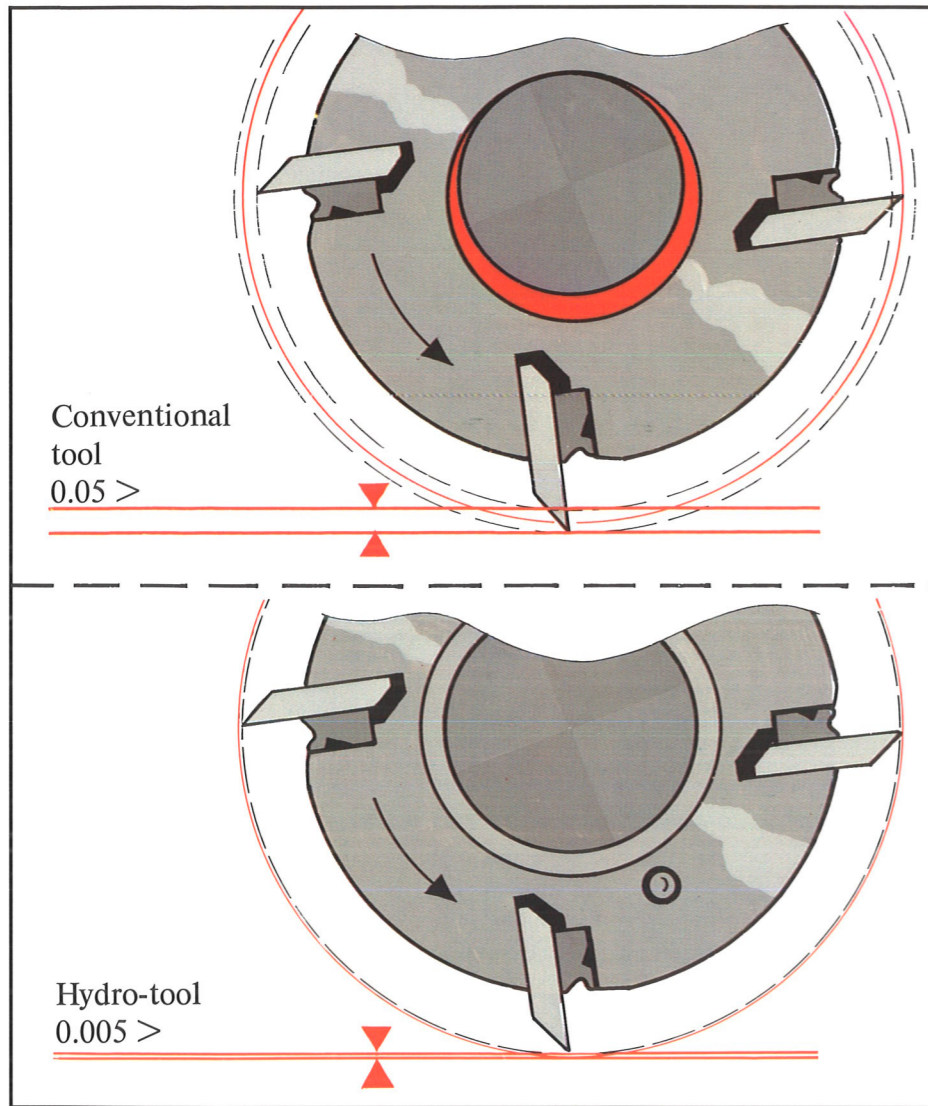
In the case of soft wood this must not exceed 0.5 mm or 0.7 mm with hard wood.

Ceramic bonded jointing stones are used for high speed steel or stellite cutters and jointing stones with a diamond insert are needed for carbide-tipped knives.

Example:

Feed speed (v)	= 40 m/min.
spindle speed (n)	= 6,000 rpm
Number of knives (z)	= 4
Pitch mark (sz)	= $\frac{40 \times 1000}{6000 \times 4} = 1.66 \text{ mm}$





As a result of the given true running tolerance of the cutting spindle there is only a difference of 0.002 to 0.005 mm in the cutting circle of the different cutting knives.

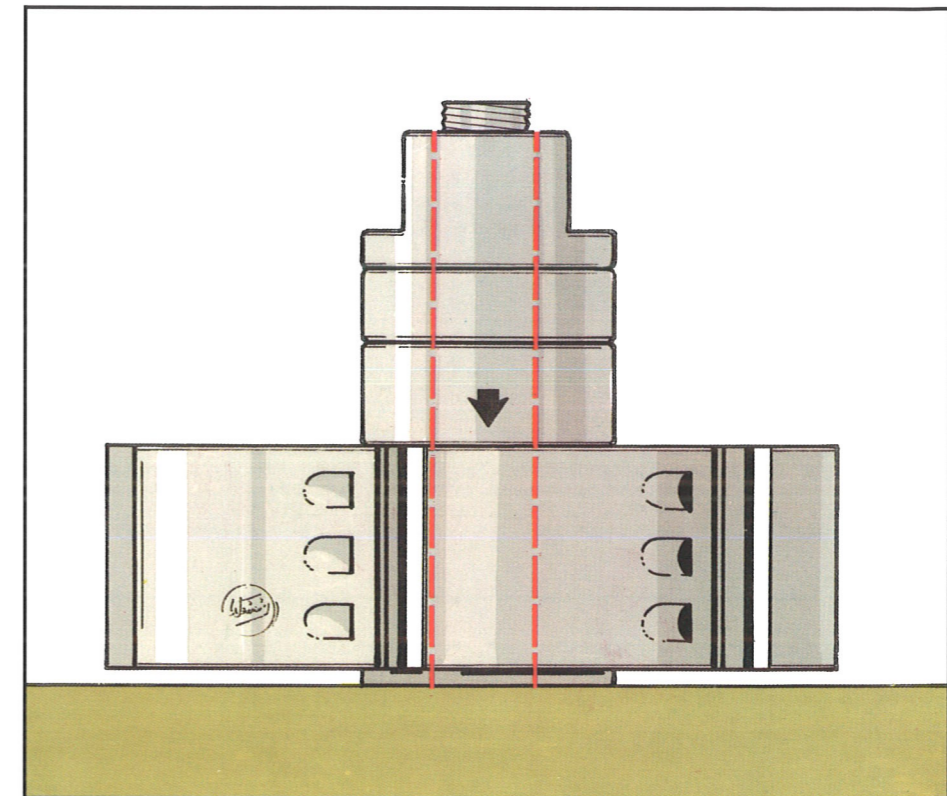
However, even this minimal tolerance means that still just **one** knife determines the surface finish of the workpieces.

To ensure that all cutting knives have an absolutely uniform cutting circle and as a result are all surface determining the cutting spindle tool has to be **jointed** on the moulder. This means that the knives are honed with a jointing stone at the running speed of the cutter spindle. In this way any given tolerances in the tool cutting circle are eliminated.

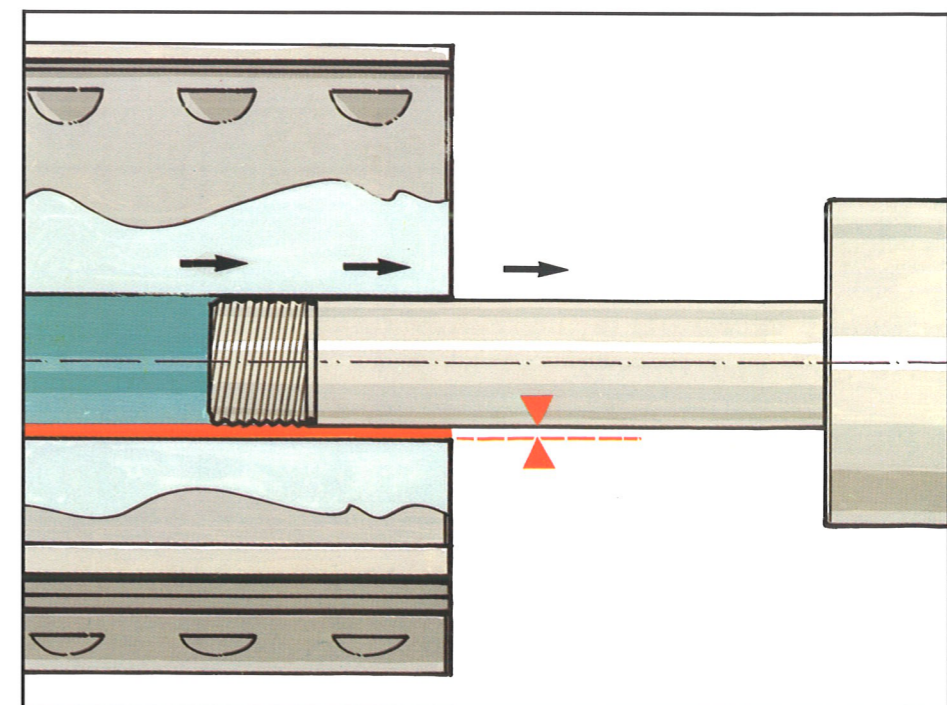
Conventional or hydro-clamping?

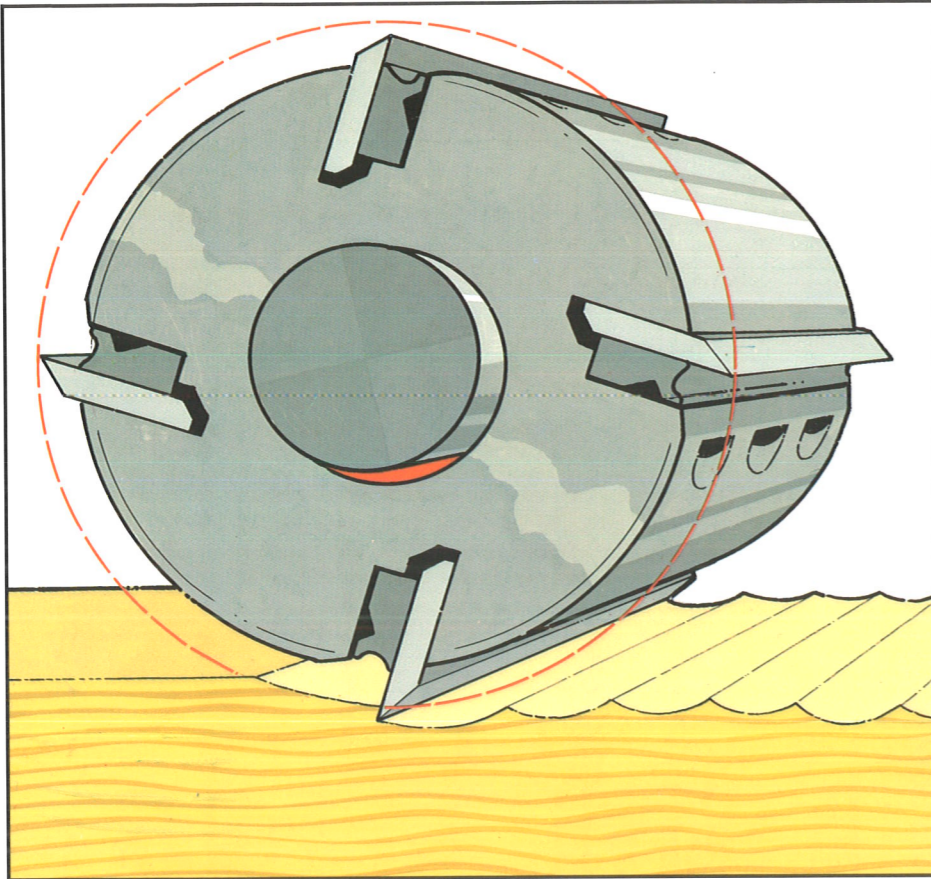
For us this is not a question of what we believe in. We offer the most suitable **Weinig cutter head** for any required surface finish and feed speed. We offer these tools with or without hydro-clamping and we shall be only too pleased to supply you with either system.

Tools with conventional clamping are mounted on the spindle and fastened with a spindle nut.



They can be mounted on all machines but limits are set in respect of the quality of the surface finish and the feed speed. Why? A certain tolerance in fit is necessary when mounting a cutter head. This can amount to as much as 0.05 mm.





Example:

Feed speed (v)	= 12 m/min.
spindle speed (n)	= 6,000 rpm
Number of knives (z)	= 4
Pitch mark (sz)	$= \frac{12 \times 1000}{6000 \times 4} = 2 \text{ mm}$

Example:

Feed speed (v)	= 8 m/min.
spindle speed (n)	= 6,000 rpm
Number of knives (z)	= 4
Pitch mark (sz)	$= \frac{8 \times 1000}{6000 \times 4} = 1.3 \text{ mm}$

This given tolerance causes the tool to run eccentrically on the spindle. The result is that although all the cutters are cutting only the cutting knife with the greatest projection determines the quality of the surface.

If the pitch mark is calculated according to the formula

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

then only a **1** is to be applied for z (number of cutting knives on the tool).

As a result of this “one knife finishing” it is not possible to achieve a shorter pitch mark with a conventional tool, is to say even if additional knives are employed there will be no distinct improvement in the surface finish.

If on the other hand the feed speed (v) is reduced, the pitch mark is shortened.

This means that a good surface quality finish is only obtained with conventional tools at a relatively slow feed speed, i.e. at 8-12 m/min.

We have developed the WEINIG HYDRO SYSTEM for high feed speeds and high quality surface finishes.

Tools with hydraulic clamping are not mounted mechanically but hydraulically. The channels and chambers in the cutter head are filled with grease. The pressure in the channels is increased to 300 bar with a high-pressure grease gun.

In this way the walls of the grease chambers are expanded and the cutter head is clamped firmly on the spindle in the **centre** and **without any play**. This applies both to the spindle on the tool grinding machine as on the moulding machine.

The tool can be easily and conveniently taken off the spindle once the pressure has been removed.

The concentricity or true running accuracy achieved on the grinding machine through hydro-clamping can be transferred completely to the moulding machine.

There is therefore no tolerance or play given with hydro-tools unlike conventional tools.

