OPERATING MANUAL

Burnishing tool GW520

Please read this operating manual carefully. Correct assembly and handling of the tool will save you set-up time and allow you to achieve optimal results.

GENERAL INFORMATION

1. Basics of burnishing

This process is a smooth rolling process. A diamond installed in the head of the tool glides over the workpiece and shapes the existing roughness profile. If the flow limit of the material is reached, cold deformation of the edge layer begins and existing rough peaks flow into adjacent recesses and are thereby levelled out and compacted. This produces a smooth and resistant surface (Fig. 1). Treatment of hardened and high-strength materials is possible.

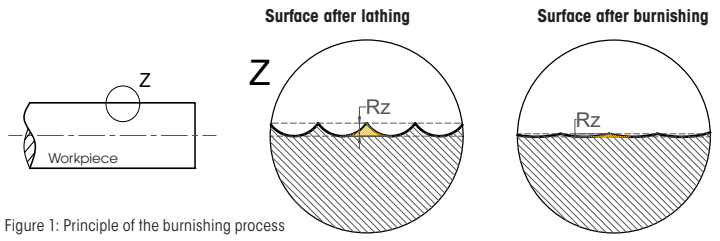

Figure 1: Principle of the burnishing process

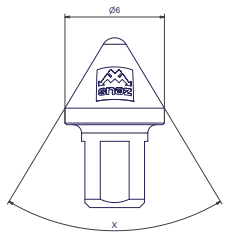

Figure 2: Diamond tip

Note: Diamond tips are not included in the scope of delivery.
The following tip dimensions (Fig. 2) can be purchased separately:
R0.4 mm (X=53°)/R0.6 mm (X=62°)/R0.8 mm (X=62°)/R1.0 mm (X=62°)

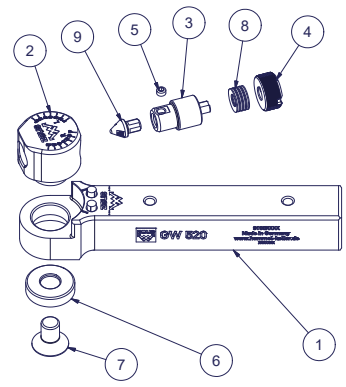

Figure 3: Exploded diagram of CNC-lathe version GW520-16U

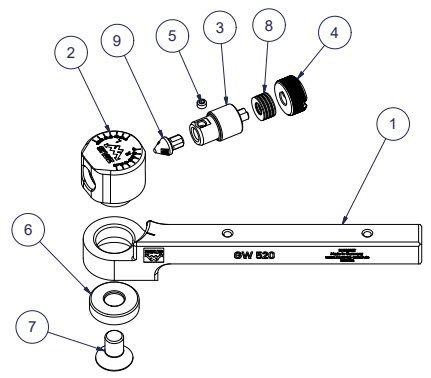

Figure 4: Exploded diagram of Swiss-type lathe version GW520-10R

This tool can be used on all machine versions.
Note: Left version of the tool (Swiss-type lathe variant) is available on request!

TOOL SETTING

2. Tool setting

1. Clamping position of tool
Clamp the tool at an angle of 90° to the workpiece. The centre height is the top edge of the shank.

2. Diamond tip assembly
To assemble or change the diamond tip, the threaded pin must be released first (Fig. 5, Pos. 5). Then the tip (Fig. 5, Pos. 9) can be removed. During assembly, it must be ensured that the diamond tip is aligned correctly and is clamped on the clamping surface by the threaded pin.

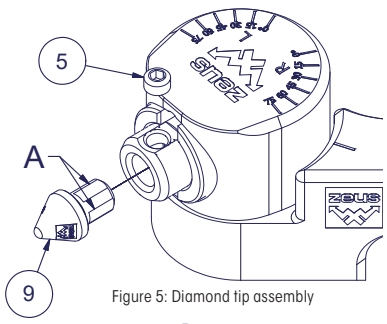

Figure 5: Diamond tip assembly

3. Turning of the diamond tip
If signs of wear appear on the diamond tip, the complete guide axis can be turned up to four times in order to enable further use of the tip. Therefore loosen the threaded pin (Fig. 5, Pos. 10), remove the diamond tip, rotate it 90° and insert again. Then tighten the threaded pin.

In addition the guide axis (Fig. 8, Pos. 3) can also be turned once.
For this purpose, the Locking screw (Fig. 6, Pos. 4) must be completely unscrewed with the accompanying key (Art. no.: 22BHR0335). In this case, rotation of the guide axis is desired. Then the guide axis and diamond tip can be removed, rotated 45° (from the notch marked red to the notch marked blue) (e.g. Fig. 8) and inserted again. Ensure that the notch of the guide axis is guided through the upper cylinder pin (Fig. 8, Pos. 11) in the base holder.

Then the adjusting screw can be screwed into the base holder again and the system can be clamped. If both options are combined, the diamond tip can be used up to eight times.
Note:
-Turning of the diamond tip is possible up to three times!
-Turning of the guide axis is possible once!

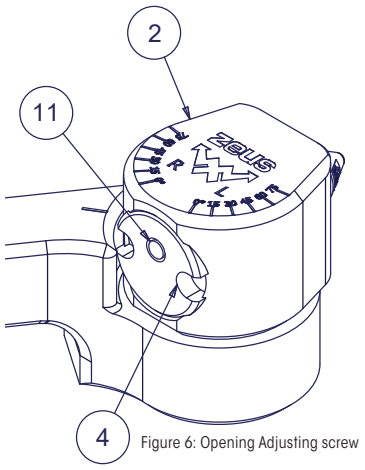

Figure 6: Opening Adjusting screw

4. Replace the spring assambly
In order to replace the spring assembly in case if wear, please loosen the adjusting screw (Fig. 6, item 4) first. Then the guide axis (Fig. 8, item 3) and the spring assembly (Fig. 8, item 8) can be removed.
When reassembling, make sure that the spring assembly is threaded onto the attachment of the guide axis.
Note: The standard set-up of spring assambly is in pictures on Figure7.
Finally return the guide axis back into basic holder and screw the adjusing screw as far as it willgo and the system tensioned.

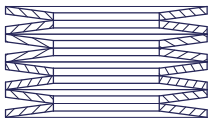

Figure 7: Spring assembly

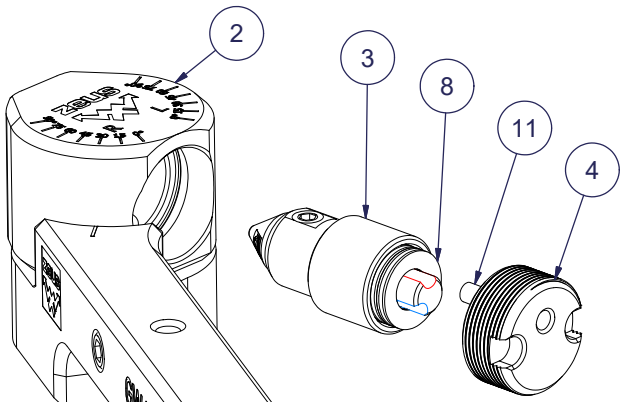

Figure 8: Turning of the guide axis

5. Tool head adjustment
With this tool type, the tool head can be pivoted ±90° (Fig. 9). Then contours of convex and concave geometries can also be machined. To adjust the head, first loosen the hexagon screw (Fig. 3 + Fig. 4, item 7). Then the head can be swiveled in the desired direction using the engraved scale. Once the desired position of the head has been achieved, retighten the hexagon socket screw.

Note: Only unscrew the hexagon screw until it is possible to turn the tip holder.

Note: A slight incline of the tool head (approx. 10–20°towards the tool spindle) is recommended for a consistent material flow during machining of cylindrical components. With deviating contours, the tool head setting must be adjusted

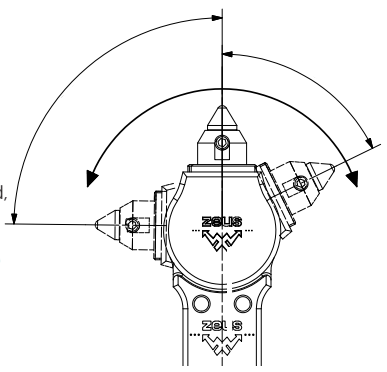

Figure 9: Tool head adjustment

6. Spring pressure
The spring force is applied via the infeed in the machine (see Chapter 3, Reference 3). Guide values for the machining parameters of different materials can be rechecked in Figure 12.
Please do not change the delivered set-up of spring assembly for standard burnishing applications.

USE

3. Use

1. Necessary preparation
The workpiece must have an even roughness profile with a pre-turn surface of Rz10 (Ra1.0) to Rz20 (Ra2.0).
Tolerance fluctuations during preparation on the workpiece should be minimised.
Note: – The finer the pre-turn surface of the workpiece, the finer the burnished surface will be.
– The concentricity of the workpiece must be max. 0.03 mm.

2. Approaching the workpiece
After the preliminary work has been carried out, the tool can be approached and scratched on the workpiece (see Fig. 10). The infeed takes place in a diagonal direction (depending on the inclination of the tool head) and may only be a few hundredths. The next step is to apply the spring force.

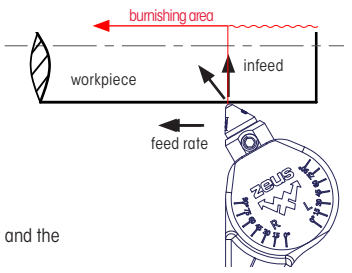

Figure 10: Approach of workpiece

3. Application of spring force with infeed in the machining direction
The infeed corresponds to the applied spring stroke and is based on the desired target surface quality and the material to be machined (e.g. Table. 1).

Note: - The approach must take place on the workpiece and not in front of it! (e.g. Fig. 10)
- The maximum stroke of the tip must not exceed 1.8–2 mm.

Please use the infeed value of the table (mm) for the setting in x-direction and the Feed rate f (mm/rev) for moving in z-direction (Figure 10). The values can vary depending on different materials.
The recommende dwell time for a clean burnishing result maximum 3-10 revolutions of the workpiece.
Note:
– These specifications are guideline values based on an initial surface of Rz10 (Ra1).
– The optimal setting must be determined in the process.
– For contour transitions, ensure a steady contact pressure of the diamond tip (Fig. 11).

Figure 11: steady contact pressure

4. Cutting data
The cutting data of the burnishing process should be based on the finishing of the turning with which the workpiece was prepared. The radius of the diamond-tip should be larger than the radius of the turning inserts.

4. Manufacturer's recommendations

Continuous cooling by means of emulsion or oil is recommended.
Replace the diamond tip after the appropriate number of cycles, after considerable wear or in case of deviating process parameters, and/or after turning the guide axis three times. Machining of interrupted cuts must be avoided.
Values in Table 1 refer to an initial surface of Rz5 - Rz10

Material	Cutting speed vc [m/min]	Feed rate f [mm/U]	Infeed ap [mm]
Quenched and tempered steel	100 - 130	0,02 - 0,1	0,01 - 0,08
Stainless steel	100 -130	0,02 - 0,06	0,01 - 0,1
Cast iron	80 - 120	0,05 - 0,1	0,05 - 0,2
Free cutting steel	110 - 140	0,02 - 0,06	0,006 - 0,04
Brass	100 - 130	0,02 - 0,06	0,005 - 0,02
Aluminium	120 - 140	0,03 -0 ,1	0,005 - 0,02

Table 1: Guide values for the machining paramters

Note: These specifications are guideline values!
Deviations of up to 20% can arise due to tolerances of individual materials. If the spring stroke is too high in case of infeed , high pressures can be achieved. However, this can result in a rlower surface quality.
The optimal setting must be determined in the process.

IMPORTANT

5. Troubleshooting

Problem:	Reason / Cause:	Solution:
Desired target surface is not achieved	– Pre-turning surface too rough – Incorrectly adjusted spring stroke – Incorrectly used cutting data – Wear of the diamond tip – Occurring vibrations	– Adjust pre-turning surface – Observe s guide valuesaccording to Table 1 – Observe cutting data according to chapter 4, Table 1 – Change the diamond tip or turn the guide axis (see chapter 2, reference 2 or reference 3) –Check correct mounting / fixing of the components
Spring stroke is not provided	– Adhesion of the spring package – Tool not in use for an extended period – Signs of wear on the spring package – Corrosion	– Removal and installation of the spring package (see chapter 2, reference 4) – Removal and installation of the spring package (see chapter 2, reference 4) – Change the plate spring package (see chapter 2, reference 4) – Use of VA plate springs (available on request)
Burnishing result not reproducible	– Fluctuations in preparatory work – Wear of the diamond tip – Temperature fluctuations	– Constant preparation process – Change of the diamond tip or turning of the guide axis – Ensure constant temperatures in the process
Discoloration of the surface during delivery	– Too long dwell time of the tip on one spot	– Increase of the feed rate

Table 2: Troubleshooting

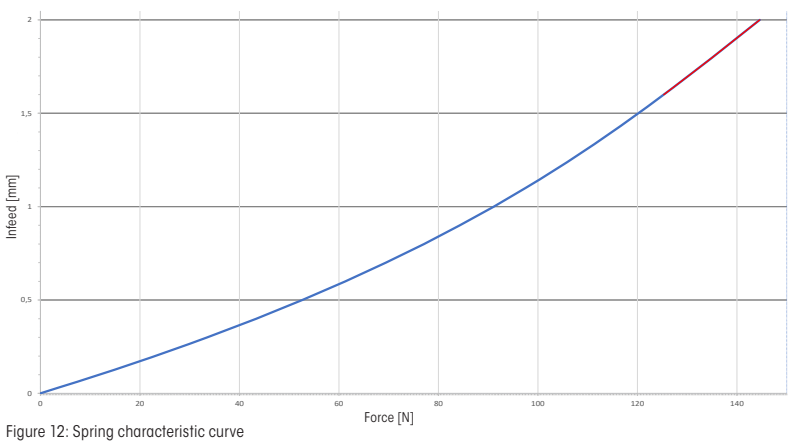

Figure 12: Spring characteristic curve

Art.-no.: 09PRO0121/07/2021

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