BURNISHING TOOL GW510

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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 roughness tips 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.

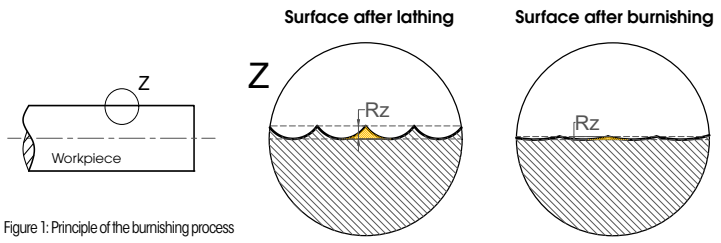

Figure 1: Principle of the burnishing process

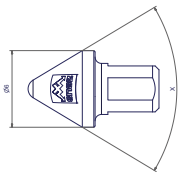

Figure 2: Diamond tip

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°)

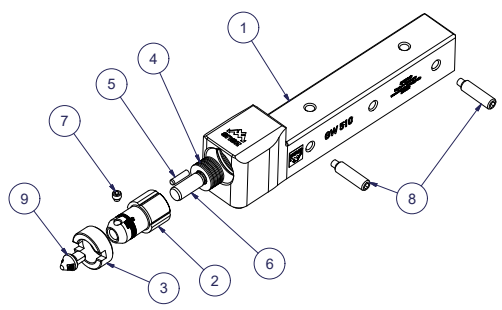

Figure 3: Exploded diagram of CNC-lathe version GW510-16U

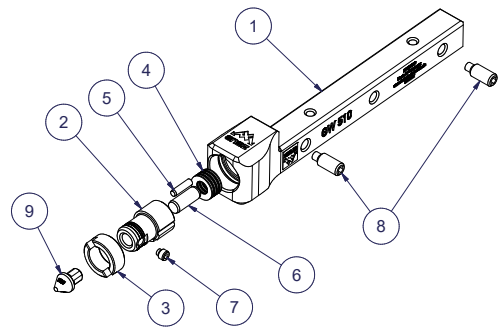

Figure 4: Exploded diagram of Swiss-type lathe version GW510-10U

This tool can be used on all machine versions.

TOOL SETTING

2. Tool setting

1. Clamping position of tool
Clamp the tool at an angle of 90° to the workpiece (Fig. 5). The centre height is the top edge of the shank. If simple contours have to be processed the entire tool can be displaced ±10° in the tool holder with the threaded pin in the shank (Fig. 3 and Fig. 4, Pos. 8).

2. Diamond tip assembly
To assemble or change the diamond tip, the threaded pin must be released first (Fig. 6, Pos. 7). Then the tip (Fig. 6, 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.

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 threated pin (Fig. 6, Pos. 7), remove the diamond tip, rotate it 90° and insert again. Then tighten the threated pin.
In addition the guide axis can also be turned once.
For this purpose, the adjusting screw (Fig. 7, Pos. 3) must be completely unscrewed with the accompanying key (Art. no.: 22BHR0335). Then the guide axis (Fig. 7, Pos. 2) and diamond tip can be removed, rotated 45° (from the notch marked red to the notch marked blue) and inserted again. Ensure that the notch of the guide axis is guided through the upper cylinder pin (Fig. 7, Pos. 5) 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!

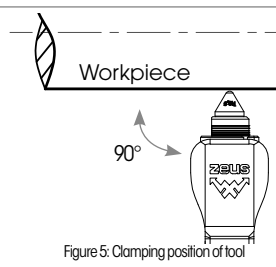

Figure 5: Clamping position of tool

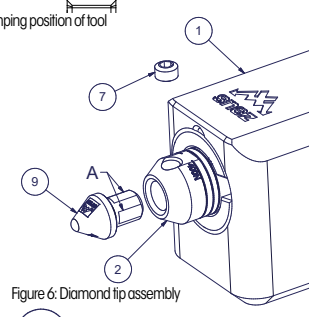

Figure 6: Diamond tip assembly

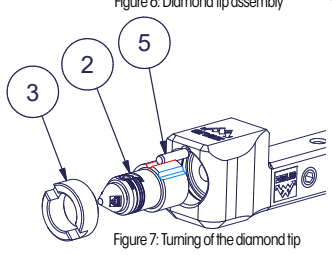

Figure 7: Turning of the diamond tip

4. Changing the spring package
The spring package can be changed depending on process requirements (Fig. 9, Pos. 4). For this purpose, the adjusting screw (Fig. 9, Pos. 3) must be loosened completely and the guide axis (Fig. 9, Pos. 2) and diamond tip must be removed. Then the cylinder pin (Fig. 9, Pos. 6) and the plate spring package (Fig. 9, Pos. 4) can be removed.
To install the spring package, push the cylinder pin into the guide axis and thread the spring package on it (see Fig. 9). Then push the complete package, consisting of guide axis, cylinder pin and plate springs, into the base holder. Ensure that the notch of the guide axis is guided through the upper cylinder pin (Fig. 9, Pos. 5) in the base holder. Then reassemble the adjusting screw and tighten the guide axis.
Note: The standard spring package is built in a series and can cause deviations in the spring force with a different arrangement (Fig. 8). In case of applications above 400 N, additional spring packages are available on request.

Figure 8: Spring package arrangement

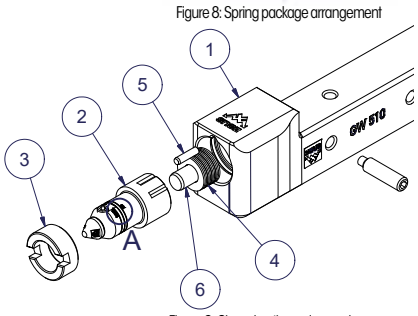

Figure 9: Changing the spring package

5. Spring pressure
When delivered the tool is set to the so-called zero position. when delivered (scale at 0N), (Fig. 10). This means that there is no pre-tension on the spring package in this position and thus no spring force acts on the diamond tip (see Fig. 12).
The sping force is applied via the infeed in the machine (see chapter 3, reference 3). Guide values for the spring force for different materials can be found in figure 11.

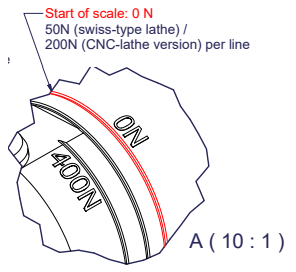

Figure 10: Adjustment of the spring pressure

Machining of high-strength materials
When machining materials with a hardness above 50 HRC or a tensile strength of more then 1000 N/mm², the application of a preload force by means of an adjusting screw is an option.
For a detailed description of this method. please contact our technical sale team.

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 preparation is done, the tool can approach and scratch on the workpiece (see Fig. 11).
The maximum immersion depth should only be a few hundredths. Afterwards, it can be continued with application of the spring force.

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 (see Fig. 12).
A guideline value of the applied force during the process can be seen on the scale of the guide axis.
Note: - The approach must take place on the workpiece and not in front of it!
- scale: 50N (swiss-tape lathe)/ 200N (CNC-lathe version) per line
- The maximum stroke of the tip must not exceed 1.8 – 2 mm (from the zero line).
To reach a smooth result, the dwell-time of the tool during infeed should be between 3 and 10 revolutions of the workpiece and not more.
After applying the spring force the tracing of the contour can begin.
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.

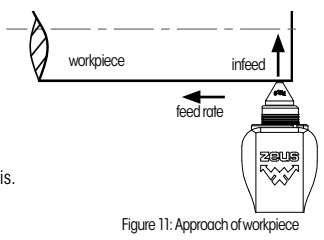

Figure 11: Approach of workpiece

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.

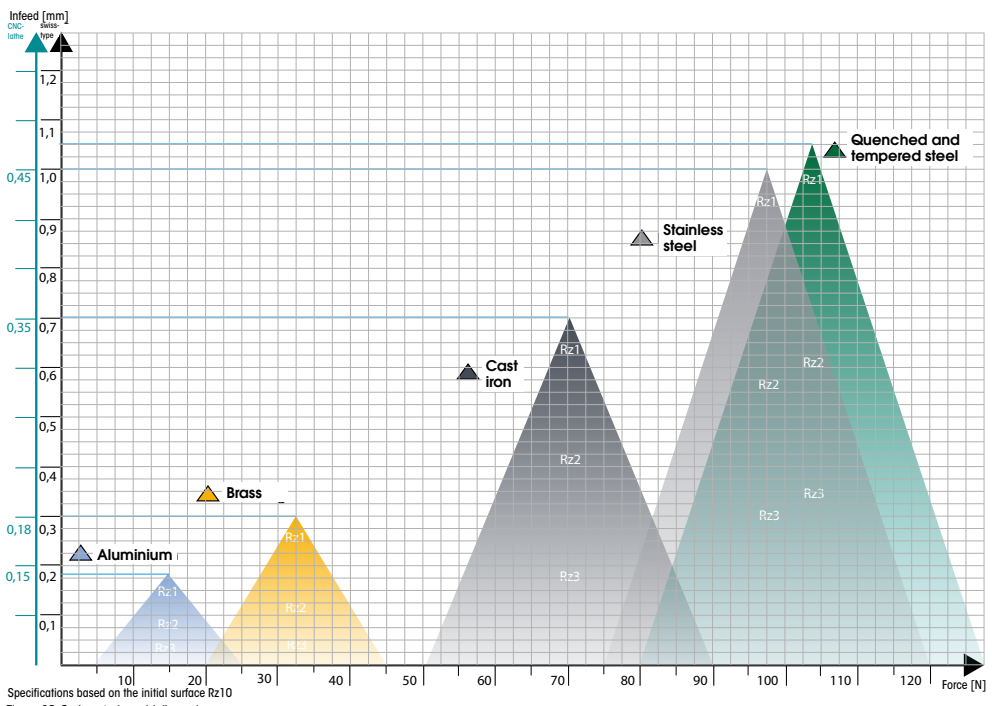

Figure 12: Spring stroke guideline values

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 (see Fig. 12, decreasing area in increasing force direction).
The optimal setting must be determined in the process.

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.
A light incline of the tool in the tool holder of approx. 1° – 2° (tool spindle direction) is recommended for a consistent material flow during the machining.

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	– Adjust pre-turning surface – Observe spring stroke according to Figure 12 – Observe cutting data according to chapter 3, reference 3 – Change the diamond tip or turn the guide axis (see chapter 2, reference 2 or reference 3)
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) – Readjustment of the spring pressure (see chapter 2, reference 5) – 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	– Constant preparation process – Change of the diamond tip or turning of the guide axis
Discolouration of the surface during the infeed	– Dwell time to long	– Increase of the feed rate

Table 1: Troubleshooting

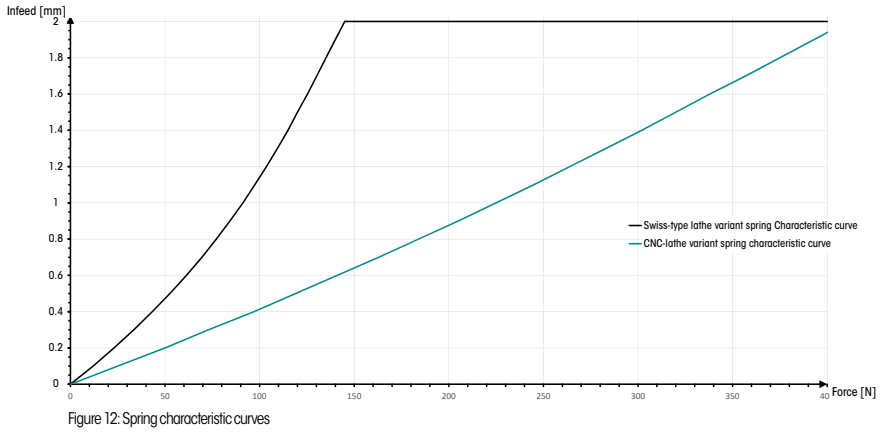

Figure 12: Spring characteristic curves

Art. no.: 09PRO0099/08/2019

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