

## Operating and setting instructions Tool for mechanical roughening

Original version of instructions

Version: 11/2017



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## CONTENT

1	About these instructions	3
1.1	Read the operating instructions	3
1.2	Explanation of general icons	3
1.3	Representation of requirements and operating instructions	4
1.3.1	Requirements	4
1.3.2	Operating instructions in fixed order	4
2	Identification of tool	4
2.1	Tool identification	4
2.2	Manufacturer's data	4
3	Tool description, Technical data	5
3.1	Proper use	5
3.2	Improper use	5
3.3	Technical data	5
4	Basic safety instructions	5
5	Functional description and setting of tool	6
5.1	Preliminary remarks on safety	6
5.2	Name of single components	6
5.3	Functional description of plate for mechanical roughening	8
5.4	Setting of tool for mechanical roughening	9
5.5	Balancing of tool for mechanical roughening	13
5.6	Mounting new plate for mechanical roughening	14



## 1 About these instructions

### 1.1 Read the operation instructions

Use and handling of the tool as well as its operation described below do not come naturally and are explained in the respective technical documentation.

The instructions help you to use the tool as intended, properly, effectively and safely.

Thus, read the following chapters thoroughly. If necessary, keep looking up facts that are essential for operation and handling.

Request new operating instructions if parts have been lost or damaged.

Always keep the instructions in a safe and accessible place close to the tool for future reference.



#### **Important information in enclosed document „General safety instructions“**

The safety instructions needed to use the tool properly can be found in the short version of the „General safety instructions“.

Read and strictly observe the instructions in these document.

#### **Remaining risks**

These documents give information and warn you of remaining risks for which the risk reduction by design and protective measures takes no or no complete effect.

### 1.2 Explanation of general icons

Icon	Explanation
	<b>Important information</b> This icon shows important extra information.
	<b>Information zur Maschinendokumentation</b> This icon shows that parts of the documentation need to be given special or extra attention, as for example supplier's instructions etc.

Tab. 1: General icons



## 1.3 Representation of requirements and operating instructions

### 1.3.1 Requirements

If certain requirements are mandatory in order to carry out a certain action on the tool, they are indicated and represented in the text with a checkbox.

Example Requirement

...

The thread is coated with holder lubricant.

### 1.3.2 Operating instructions in fixed order

For many actions taken on the tool it is absolutely mandatory to carry out the working steps in a fixed order.

These steps are given work instructions and have consecutive numbers. In addition, the operating instructions provide intermediate and final results. Intermediate results represent processes which are not run by the user and are marked by an arrowhead ▶. Final results indicate the end of the action and are marked with a checkmark ✓.

The order of the working steps needs to be absolutely maintained and operating instructions must be observed under all conditions.

Example Operating instructions in fixed order

1. Switch on machine at main switch
  - ▶ The control system of the machine boots
2. Start the software
  - ▶ The software starts and the following screen appears:
  - ✓ Machine and software are ready for use

## 2 Identification of tool

### 2.1 Tool identification

Tool name: Tool for mechanical roughening

Artikelnummer / SAP no.: See chapter 3.3 Technical data

Year of construction: 2017

### 2.2 Herstellerangaben

#### Main headquarters

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## 3 Tool description, Technical data

### 3.1 Proper use

Tool for mechanical roughening are intended for use on CNC-controlled machines or machining stations with HSK or SK tool holders. Coolant lubricant emulsions or minimal lubrication is provided to be used as cooling agent for internal cooling. The tools must only be operated if the machines are in perfect condition.

An optical measuring or adjusting device must be available as tools with PCD or CBN cutting edges can only be measured optically. Tools for mechanical roughening are only suitable for fine machining (cutting depth radial < 0.25 mm).

### 3.2 Improper use

Tools for mechanical roughening are not suitable for use on manual tool machines.

No internal cooling or the use of compressed air is not permissible.

Tools for mechanical roughening must not be measured mechanically (e.g. by using a calliper).

Tools for mechanical roughening are not suitable for machining with radial cutting depths > 0.25 mm. If the tool is used differently as described in chapter 3.1 „Proper use“, the tool’s function cannot be guaranteed. No liability is assumed for any damages caused to the tool, machine or work piece.

### 3.3 Technical data

Article no.	Code no.	Designation	Diameter range
7490	1.000	Balance compensation	all
7489	1.000	Case sz. 09	all
7488	1.000	Holder for roughening tool	all
7487	68.063	Tool head HSK-63	Ø68 to Ø88
	68.100	Tool head HSK-100	Ø68 to Ø88
	84.063	Tool head HSK-63	Ø84 to Ø104
	84.100	Tool head HSK-100	Ø84 to Ø104
7491	68.063	Complete tool HSK-63	Ø68 to Ø88
	68.100	Complete tool HSK-100	Ø68 to Ø88
	84.063	Complete tool HSK-63	Ø84 to Ø104
	84.100	Complete tool HSK-100	Ø84 to Ø104

Tab. 2: Technical data

#### Emission values



#### Important information

The tool itself does not cause any emissions. But the machine on which the tool runs does. Therefore, it is mandatory to observe the machine operating instructions!

## 4 Basic safety instructions



#### Important information in document „General safety instructions“

The safety instructions needed for using the tool properly can be found in document „General safety instructions“. These can be viewed or downloaded via the QR code or the link in the short version of the general safety instructions that come with the tool.

If no access to the Internet is guaranteed or the General safety instructions are needed also in paper form, please do not hesitate to contact your partner at Gühring.



Gühring will, of course, send you the document in paper form.

Read and strictly observe the instructions in document „General safety instructions“ and its short version.

## 5 Functional description and setting of tool

### 5.1 Preliminary remarks on safety



#### Important information for your safety

It lies in your responsibility!

In any case the safety instructions in document „General safety instructions“ and the local safety regulations must be observed and followed.

### 5.2 Name of single components

To ensure a clear definition and name of the single components they are named according to the following illustrations.

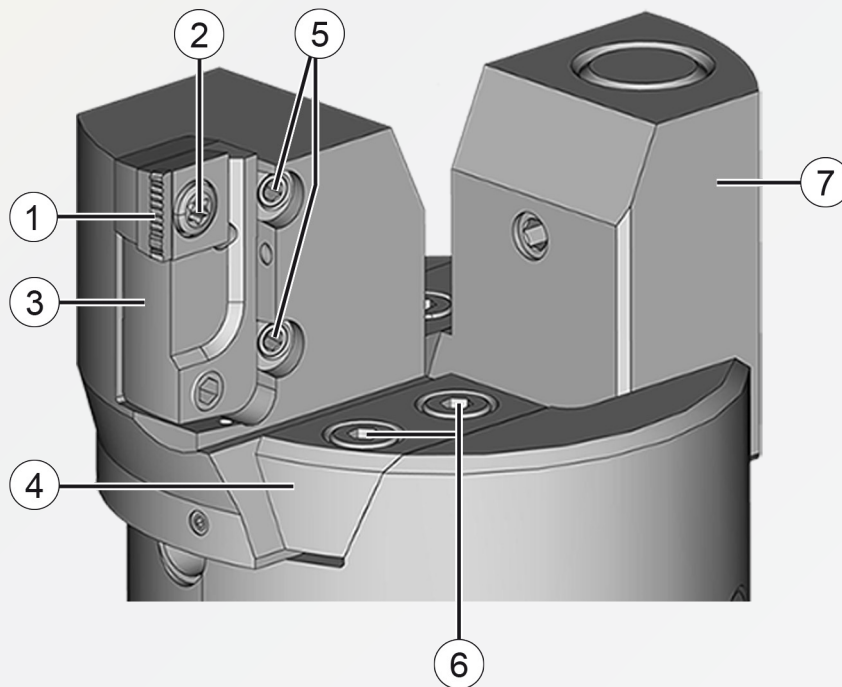


Fig. 1: Front view Tool for mechanical roughening

1	Plate for mechanical roughening	2	Clamping screw plate for mechanical roughening	3	Short clamping holder
4	Clamping strip	5	Threaded key adjustment	6	Cylinder head screw
7	Balance compensation				

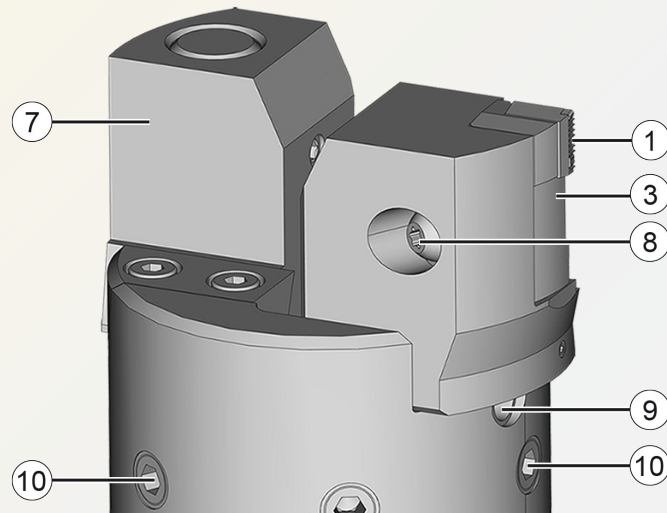


Fig. 2: Back view Tool for mechanical roughening

1	Plate for mechanical roughening	3	Short clamping holder	7	Balance compensation
8	Clamping screw of short clamping holder	9	Adjusting screw	10	Balancing screws

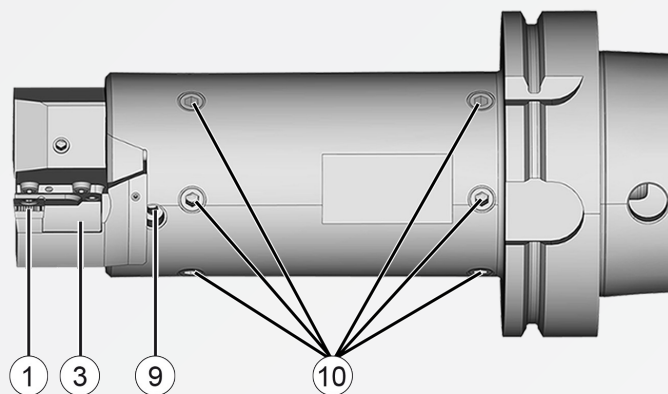


Fig. 3: Side view Tool for mechanical roughening

1	Plate for mechanical roughening	3	Short clamping holder	9	Adjusting screw
10	Balancing screws				

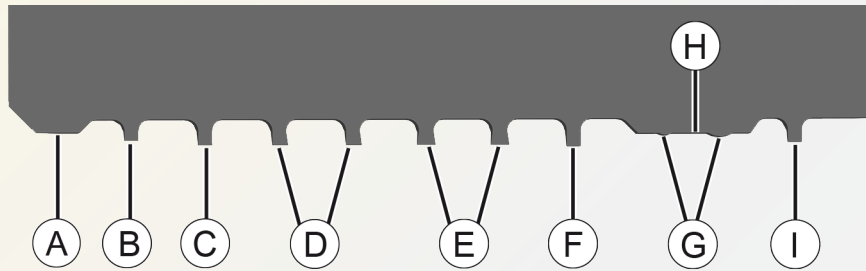


Fig. 4: Detailed view for plate for mechanical roughening

A	Safety tooth (tooth 0)	B	Pre-machining tooth (tooth 1)	C	Pre-machining tooth (tooth 2)
D	Profile teeth (teeth 3+4)	E	Profile teeth (teeth 5+6)	F	Roughening tooth (tooth 7)
G	Shifter 1 and 2	H	Measured distance	I	Cleaning tooth (Tooth 8)

### 5.3 Functional description of plate for mechanical roughening

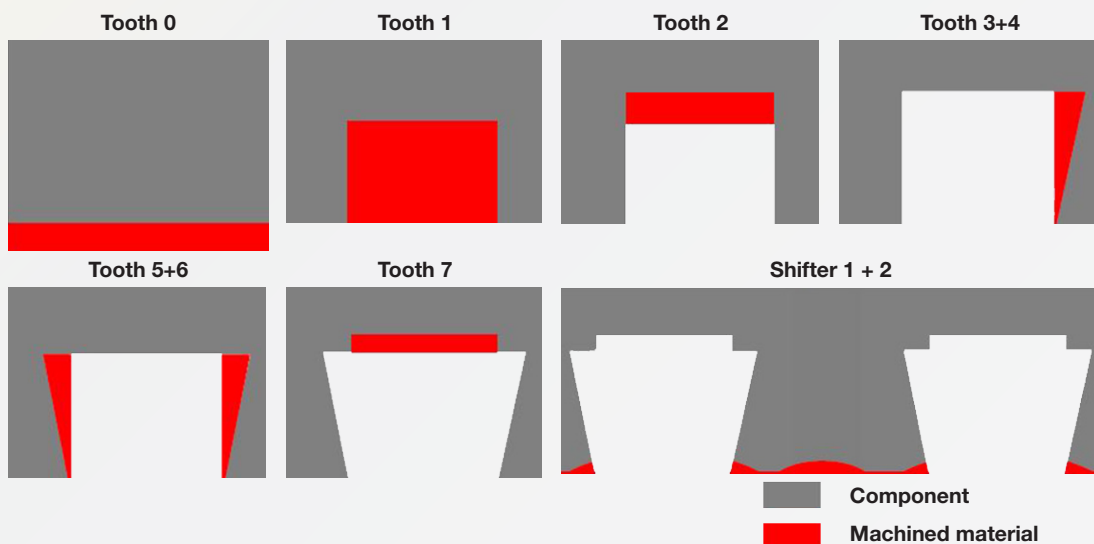


Fig. 5: Machining of component divided into single teeth

#### **Safety tooth (tooth 0):**

By means of this tooth the diameter of the cylinder bore surface is pre-machined. We recommend a radial infeed of 0.1 - 0.15 mm.

#### **Pre-machining teeth (Teeth 1 and 2):**

In this machining step the contours are roughly profiled.

#### **Profile teeth (Teeth 3, 4, 5, and 6):**

In order to make a homogenous swallow-tailed profile it is essential that these teeth are on one level. Teeth 3, 4, 5 and 6 add to the machining of the final contour.

#### **Roughening tooth (tooth 7):**

An additional recess on the swallow-tailed recess contour is done.



**Shifter 1 and 2:**

The shifters have a cutting and pushing function. The edges are rounded and the surface at the finished diameter is enlarged for ply adhesion (sharp-edged). In addition, the undercut of the swallowtailed profile is enlarged (pushing) by the shifter.

**Measured distance:**

The distance between the two shifters serves as the checkpoint for setting the required machining diameter. This distance generates the final diameter of the cylinder bore surface.

**Cleaning tooth (Tooth 8):**

As the name indicates, all chips that are in the swallow-tailed contour are removed by the final tooth.

**Secondary teeth (tooth 0 to tooth 5):**

The teeth have no impact on the final profile, but they only serve for pre-machining and increase the process safety.

**Primary teeth (tooth 5 to tooth 8):**

The primary teeth generate the final profile. In case of teeth outbreaks the end of tool life has been reached.

## 5.4 Setting of tool for mechanical roughening

**Requirements**

- Optical measuring device\*
- SW 2 Allen key
- SW 3 Allen key
- Torque screwdriver (T15)
- Torque wrench with hexagon socket wrench (SW 3)
- Torque socket wrench (T15)
- Drawing of tool (submitted by customer)

\* If requested, Gühring provides an optical measuring device for your intended use.

To set the tool for mechanical roughening, proceed as follows:



1. Clamp the tool into the optical measuring device.
2. Turn the two adjusting screws (5) completely to the left to set the threaded key adjustment completely inwards. Use an SW 2 Allen key.
3. Loosen the clamping screw of the short clamping holder (8) by approx. half a turn. Use a torque screwdriver (T15).
4. Press the short clamping holder (3) inwards with your fingers and slightly tighten the clamping screw of the short clamping holder (8) by means of a torque screwdriver.

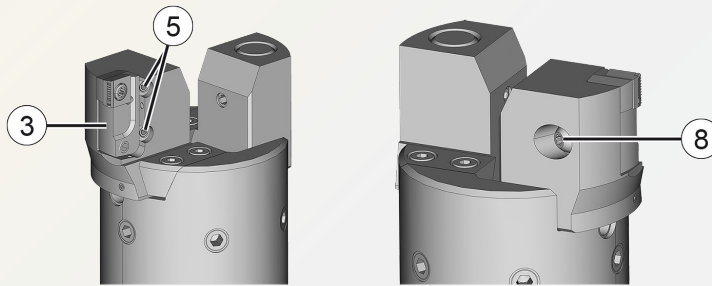


Fig. 6: Adjusting screws of threaded key adjustment, short clamping holder and clamping screw of short clamping holder

5. Loosen the two cheese-head screws (6) at the clamping strip (4) by approx. half a turn. Set the diameter at the measuring distance (see figure 4) via the adjusting screw (9) to 0.05 mm before the setting dimension (in diameter) using an SW 3 Allen key. By turning the adjusting screw (9) to the right, the diameter size can be reduced, and by turning to the left it is increased.

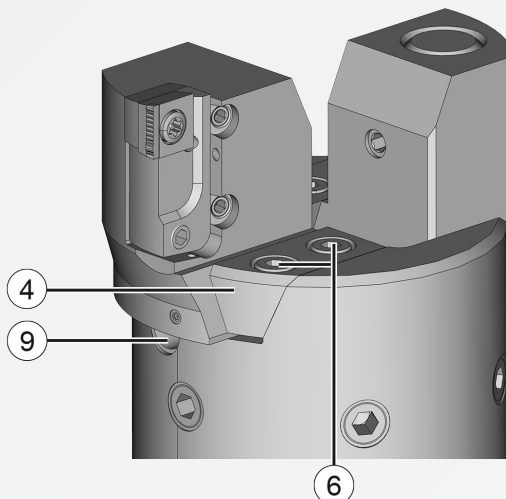


Fig. 7: Cylinder head screw, clamping strip and adjusting screw

6. Tighten the two cheese-head screws (6) at the clamping strip (4) gradually and alternately until torque of 3 Nm is reached. Use a torque wrench with a hexagon socket wrench (SW 3). Please make sure that the diameter set in step 5 is changed the least possible.



7. Tighten the clamping screw of the short clamping holder (8) with a torque of 3.45 Nm.  
Use a torque wrench with a torque socket wrench (T15).

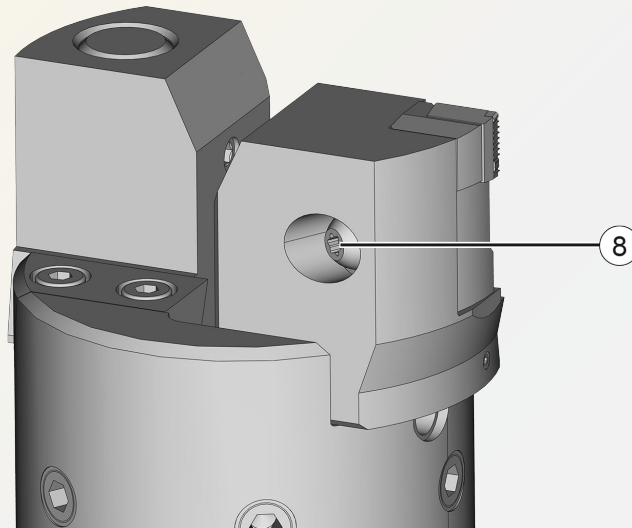


Fig. 8: Tighten clamping screw of short clamping holder with torque

8. Set the profile teeth (teeth 3-6, see figure 4) to one level by means of the two adjusting screws of the threaded key adjustment (5). The teeth 5, 4 and 3 must deviate from tooth 6 by max. 5  $\mu\text{m}$ .  
Turn the adjusting screw (5) located on the side of the teeth which need to be set to the outside, to the right by means of an SW 2 Allen key. The threaded key adjustment has an adjusting way of 0.1 mm in diameter.  
▶ If this dimension is exceeded, steps 2 to 4 need to be repeated. Steps 5 to 7 can be skipped in this case.



- Loosen the two cheese-head screws (6) at the clamping strip (4) by approx. half a turn.  
Set the diameter at the measuring distance (see figure 4) via the adjusting screw (9) to the setting dimension.



### Important information

By turning the adjusting screw (9) to the right the diameter is reduced, and by turning it to the left it is increased.

The final adjustment needs to be done clockwise due to the centrifugal force impact on the tool.

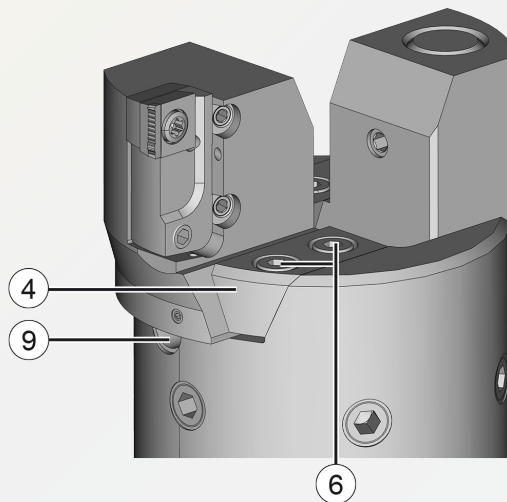


Fig. 9: Set diameter at measuring distance to adjustment dimension

- Tighten the two cheese-head screws (6) at the clamping strip (4) gradually and alternately until a torque of 3 Nm is reached. Please make sure that the diameter set in step 9 is changed the least possible. Use a torque wrench with a hexagon socket wrench (SW 3).
  - Check the setting diameter at the measuring distance. Measure the diameter at the measuring distance and compare the result to the pre-settings on the customer drawing.
    - ▶ If the setting diameter exceeds the tolerance (see customer drawing) go to step 9 of chapter 5.4 „Setting of tool for mechanical roughening“ and repeat the following steps.
  - Check the profile teeth on their straightness. To do so, measure the deviations of the height from tooth 6 to teeth 5, 4 and 3. Teeth 5, 4 and 3 must not deviate more than 5  $\mu\text{m}$  from tooth 6 (see figure 4)
    - ▶ If the profile teeth are not straight (deviation of one profile tooth > 5  $\mu\text{m}$  to tooth 6) go to step 8 of chapter 5.4 „Setting tool for mechanical roughening“ and repeat the following steps.
  - Check the side clearance from tooth 7 to tooth 6. The roughening tooth (tooth 7) must be 20  $\mu\text{m} \pm 5 \mu\text{m}$  above tooth 6 (see figure 4).
- ✓ The tool for mechanical roughening has been set.



## 5.5 Balancing tool for mechanical roughening

1. Use the balancing screws (19) to balance the tool to the standard balance quality values G6.3 / 10,000 U/min. Other balance quality values are available on request.  
Balancing surfaces or bores must only be attached, if the standard balance quality values of G6.3 / 10,000 U/min cannot be reached by means of the balancing screws (1) or the balancing compensation (7).

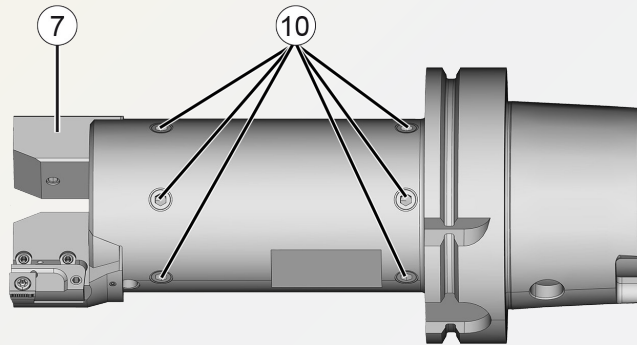


Fig. 10: Balancing screws and balancing compensation



### Important information

If balancing surfaces or bores are attached, steps 11 to 13 from chapter 5.4 „Setting of tool for mechanical roughening“ need to be repeated.

- ✓ The tool for mechanical roughening has been balanced and is ready for operation.



## 5.6 Mounting new plate for mechanical roughening

### Requirements

- ☑ New plate for mechanical roughening
- ☑ Torque screwdriver (T15)
- ☑ Torque wrench with torque 15 socket wrench (T15)

The plate for mechanical roughening has already been mounted.

The following steps are only necessary, if a new cutting edge is supposed to be mounted.

1. Loosen the clamping screw (2) of the plate for mechanical roughening by means of a torque screwdriver (T15) and turn it out completely.

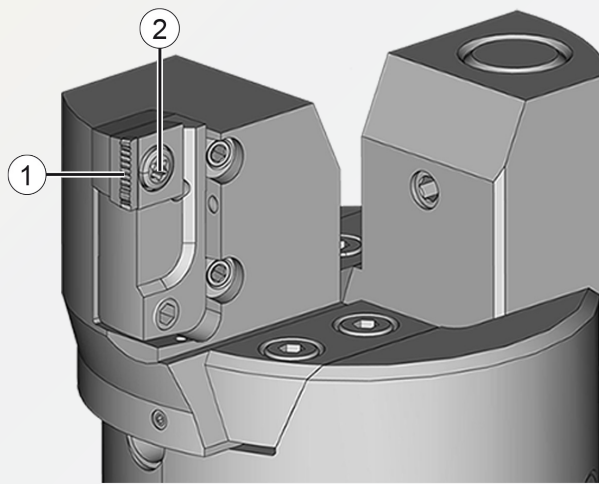


Fig. 11: Loosen clamping screw at plate for mechanical roughening

2. Replace the old plate by a new one and dispose the old one in an environmentally sound manner.
  3. Tighten the new plate for mechanical roughening at the clamping screw (2) with a torque of 3,45 Nm. Use a torque wrench with a torque socket wrench (T15).
- ✓ Cutting edge has been mounted.

**Go to chapter 5.4 „Setting of tool for mechanical roughening“ und follow the instructions in this and the following chapter 5.5 „Balancing of the tool for mechanical roughening“.**  
**The tool is then ready for operation again.**