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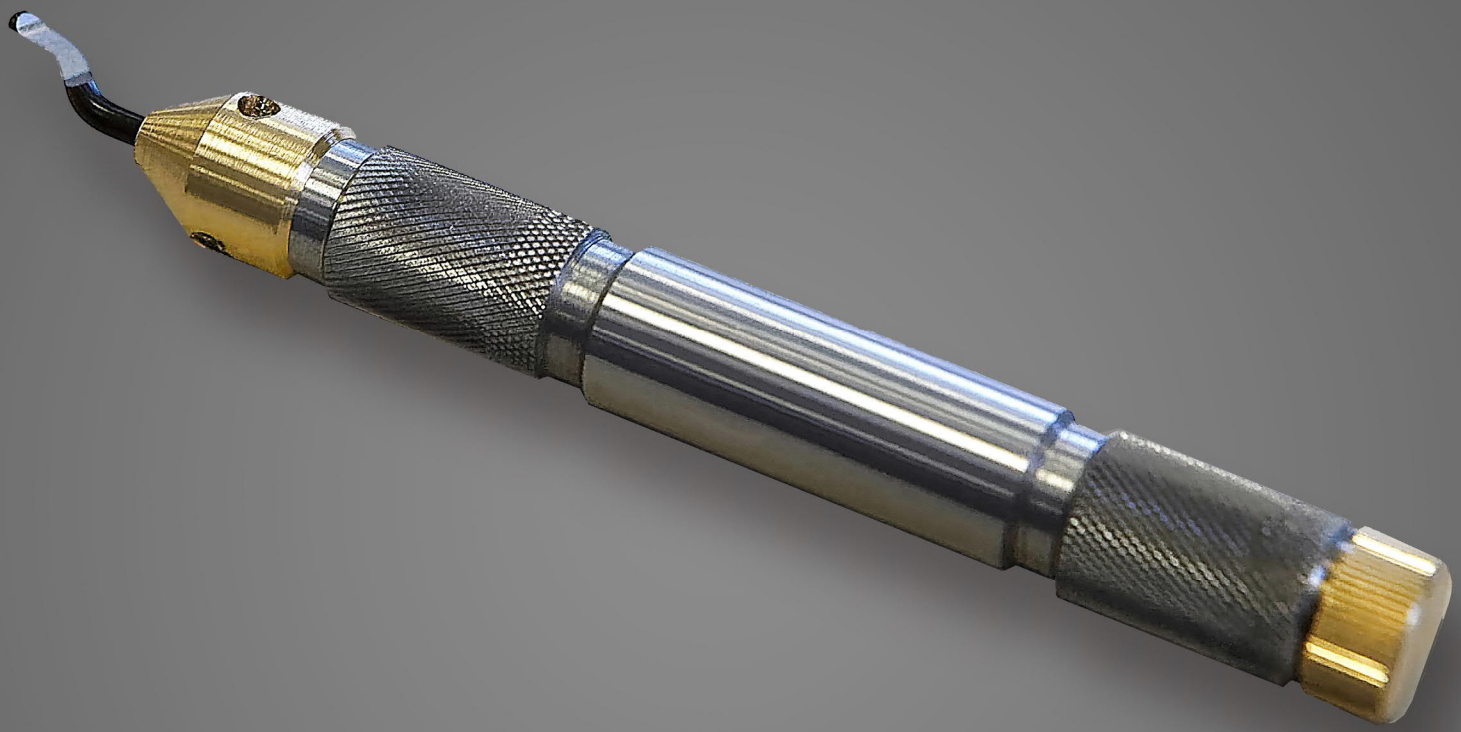

Manual deburring tool

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Manual deburring tool

Sturdy and practical: The rugged manual deburring tool is a professional tool for daily use in production. It uses commercially available blades and has a screw-on compartment in its shaft for storing replacement blades or alternative types of blades.

All of the information required for production, set of drawings, tool data, machining plan and NC programs are given below.

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Table of contents

1. Safety note

Using machinery always entails wide-ranging hazards. The statutory and operational safety regulations must therefore also be observed at all times when manufacturing the
manual deburring tool.

2. Preliminary remark

The following description is intended for operators of CNC machines who have experience with or knowledge of the SINUMERIK CNC. All the technology data listed here correspond to the machines, tools, materials,
machining plans, and drawings used in the manufacture of the sample. For remanufacturing purposes,
they only serve as an example, on account of the diverse conditions prevailing in other workshops. Trouble-free machining should nevertheless be possible in most cases.

The program was generated and tested on a CNC turning machine with a tailstock. The machine was equipped with a SINUMERIK 840D sl with the user interface ShopTurn V 07.05. As a rule, the program can easily be adapted to other SINUMERIK versions, e.g. other SINUMERIK Operate SW versions. Simulations and any necessary changes, such as zero point adjustments, should always be carried out.

All CAD drawings, programs, and manufacturing descriptions for the workpieces can be downloaded free of charge at **www.siemens.com/cnc4you**.

We offer you the following files and formats:
ShopTurn NC programs, PDF drawings, 3D data

3. Workpiece blanks/parts list

- Brass CuZn39Pb3-zh, round material Ø 20 mm, total length approx. 160 mm. Two parts are produced from the blank, the clamping range is taken into consideration in the material requirements.
- Steel 11SMnPb30+ C, round material Ø 20 mm, length approx. 120 mm (protruding length 85 mm)
- Purchased parts:
  - Deburring blades
  - Grub screw: set screw with hexagon socket and flat point, DIN M4x12

    For the sample part we have used deburring blades from the Hoffmann Group, order number 838510S10

4. Turning machine and machining plans

CNC turning machine:

- DMG CTX300 Alpha
- SINUMERIK 840D sl with ShopTurn 07.05

ShopTurn machining plans:

- HANDENTGRATER_GRIFF_L.MPF
- HANDENTGRATER_GRIFF_R.MPF
- KOPFTEIL.MPF
- RAENDELSCHRAUBE.MPF

5. Tools used

A number of turning, drilling and knurling tools must be changed during the machining of the three parts. (See also Excel file Werkzeuge_Handentgrater.xlsx, which accompanies the NC programs).

Please note: When equipping the tool turret, ensure there is sufficient clearance a) for the powered tools and b) sufficient space between the adjacent tools and the clamping jaws! Individual axial bore holes penetrate deep into the clamping area, which means that nearby tools of equal length would collide with the clamping jaws.

5.1 Initial equipment of tools for turning machine (RAENDELSCHRAUBE.MPF, KOPFTEIL.MPF brass)

Tool/short name	Description
SDM	Roughing turning chisel for outside with one roughing disk Roughing tool (lead angle 93°, plate angle 35°)
SLDM_L	Turning chisel for outside with one finishing disk Finishing tool (lead angle 107°, plate angle 35°)
GEWINDESTAHL_1.75	Threading tool with cutting insert pitch 1.75
NCAN	NC spot drill radial
Bohrer3.2_ax	Drill radial, 3.2 mm radius, powered tool
Bohrer3.2_rad	Drill axial, 3.2 mm radius
GEWINDEBOHRER_M4	Tap radial, M4, powered tool
Zent	Center drill A2.5x6.3 DIN333
Raendel_1	Knurling wheel, single, straight teeth
STECHER	Cutting tool
GEWINDESTAHL_1.5	Threading tool with cutting insert pitch 1.5

5.2 Turning machine tools, equipment for manufacturing the handle (steel)

Tool/short name	Description
SDM	Roughing turning chisel for outside with one roughing disk Roughing tool (lead angle 93°, plate angle 35°)
SLDM_L	Turning chisel for outside with one finishing disk Finishing tool (lead angle 107°, plate angle 35°)
NCA_15	Cutting inserts NC spot drill, drill hole diameter 15
Gewindebohrer_M10	Tap radial, M4
Zent	Center drill A2.5x6.3 DIN333
Raendel_2	Knurling wheel, double, opposing angled teeth
STECHER	Cutting tool

6. Turning individual parts

The manual deburring tool is comprised of three turned parts:

- the head (brass),
- the handle part (steel) with drilled-out storage compartment
- and the knurled screw (brass) for closing the storage compartment.

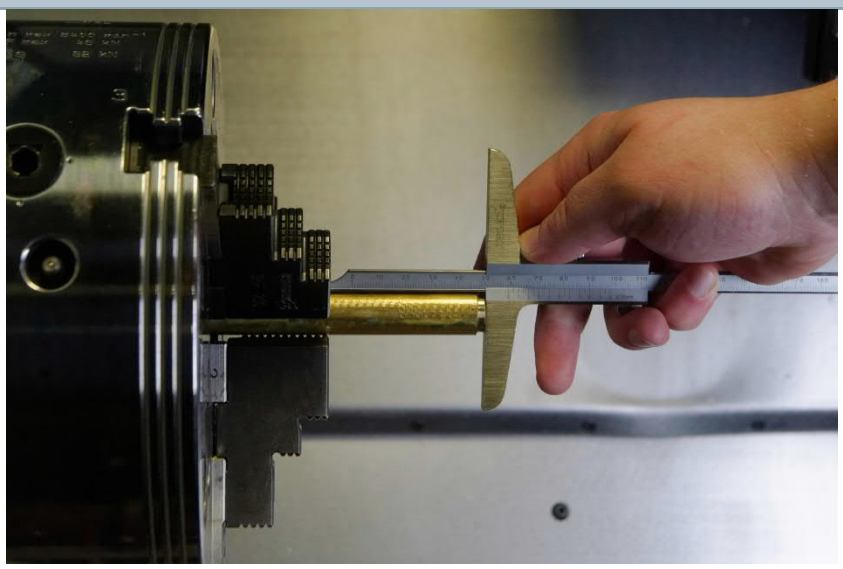
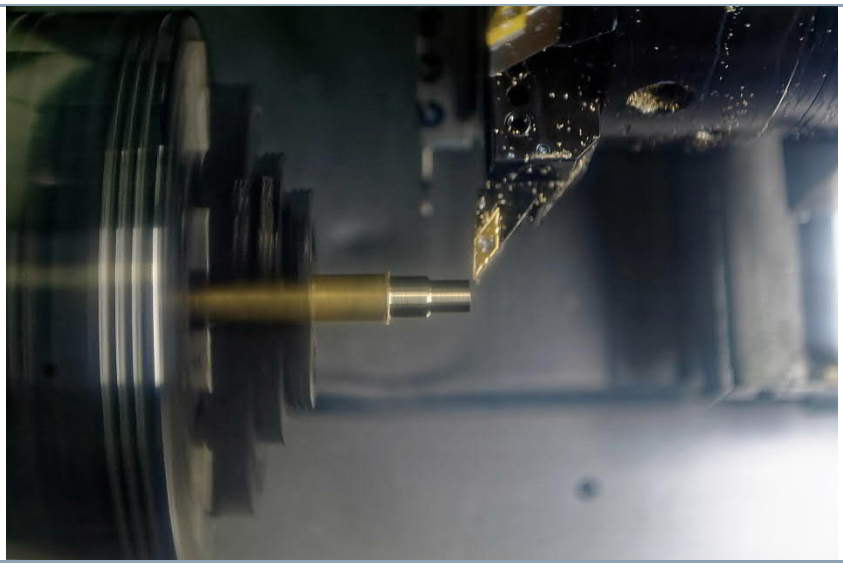
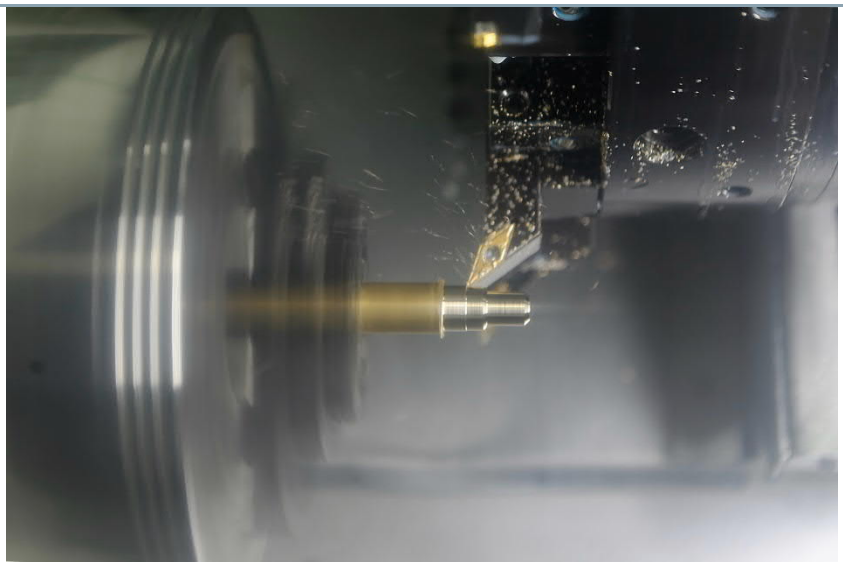
All three turned parts are processed using ShopTurn machining plans, with the left and right side of the handle part being machined in separate clamps.

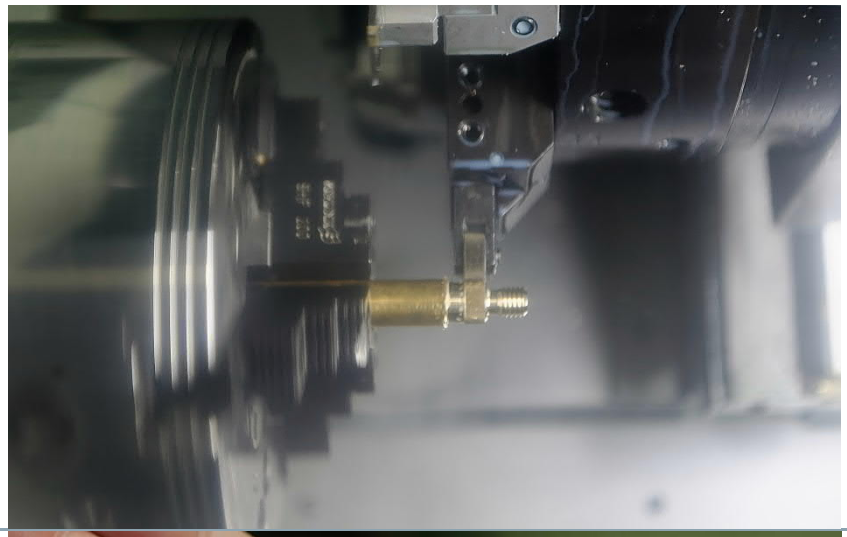
6.1 Overview of the work steps

Work steps at the turning machine

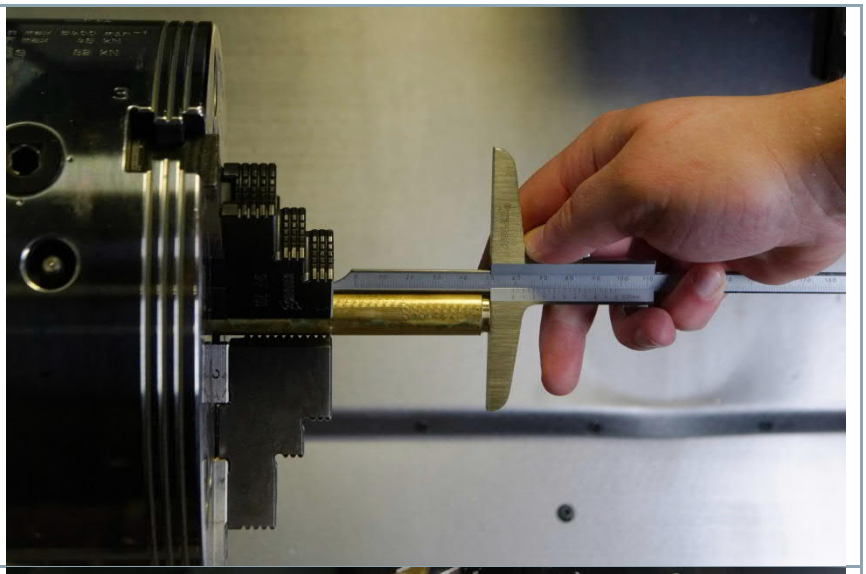
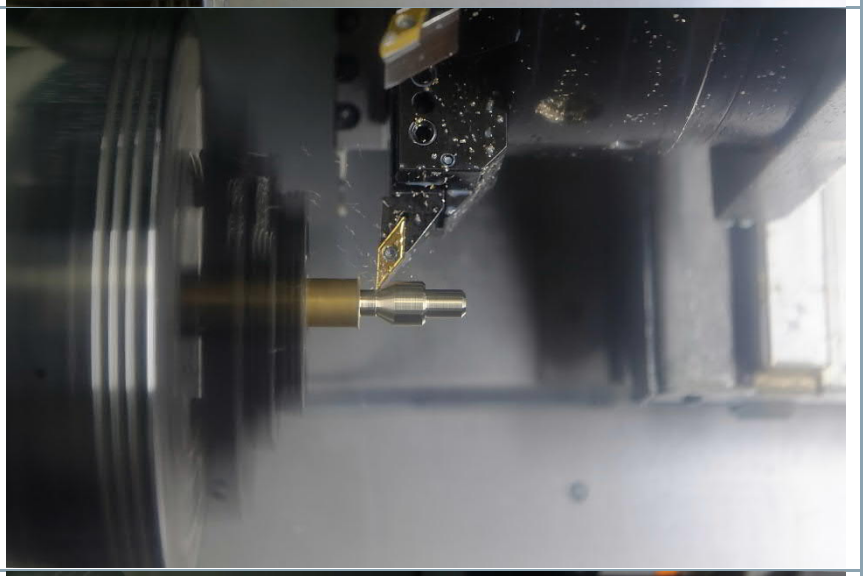
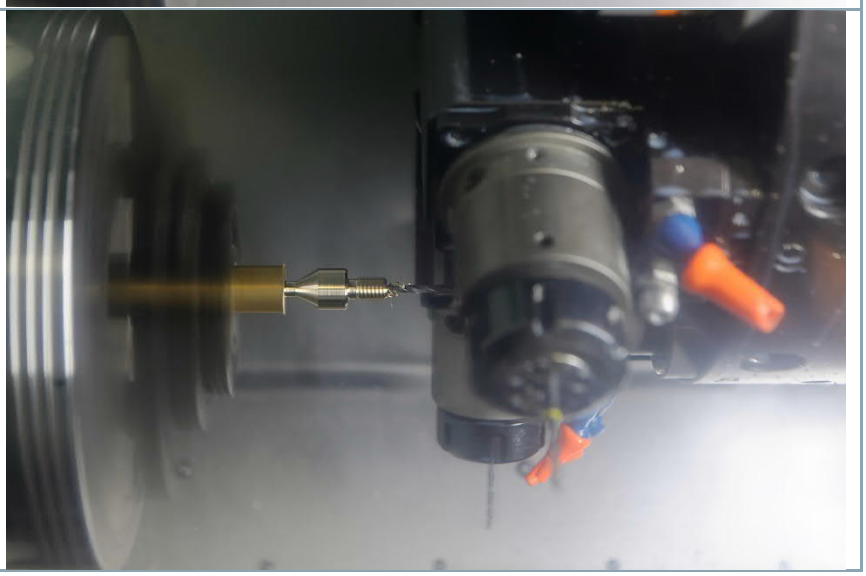
1. Approach the reference point of the machine.
2. Read-in the machining plan: RAENDELSCHRAUBE.MPF.
3. Reading-in of the tool list WKZ_LISTE_TMZ.
4. Measure the tools and enter them in the tool list (if need be, see Excel file).
5. Insert the tools in the magazine.
6. Clamp first workpiece, observe a protruding length of 59 mm.
7. Set tool zero point by scraping.
8. Check programmed work offsets in the part program and, if necessary, adapt to the machine situation
9. Perform simulation.
10. Start production, process machining plan.
11. Turn head, tapping off.
12. Remove the workpiece
13. Process steps 1 to 12 for the next part program KOPFTEIL.MPF
14. Set up the tailstock
15. Load the tools for machining the handle
16. Execute steps 1 to 11 for part program "HANDENTGRATER_GRIFF_L.MPF", with a protruding length of 85 mm and fed tailstock tip
17. Retract tailstock, remove tip, remove part
18. Install the soft clamping jaws and bore them for a diameter of 18 mm
19. Execute steps 1 to 12 for part program "HANDENTGRATER_GRIFF_R.MPF. To do this, clamp the pre-machined handle with the side already machined and a protruding length of 40 mm into the soft clamping jaws.

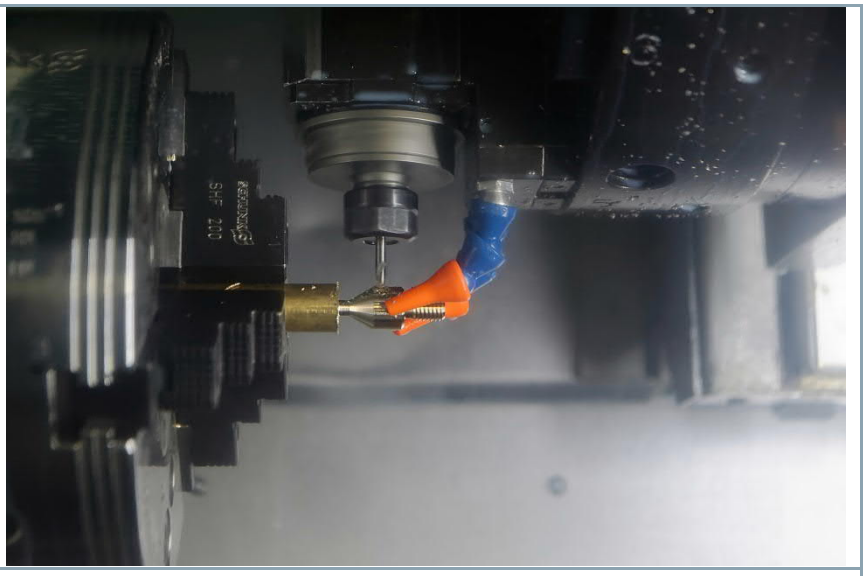
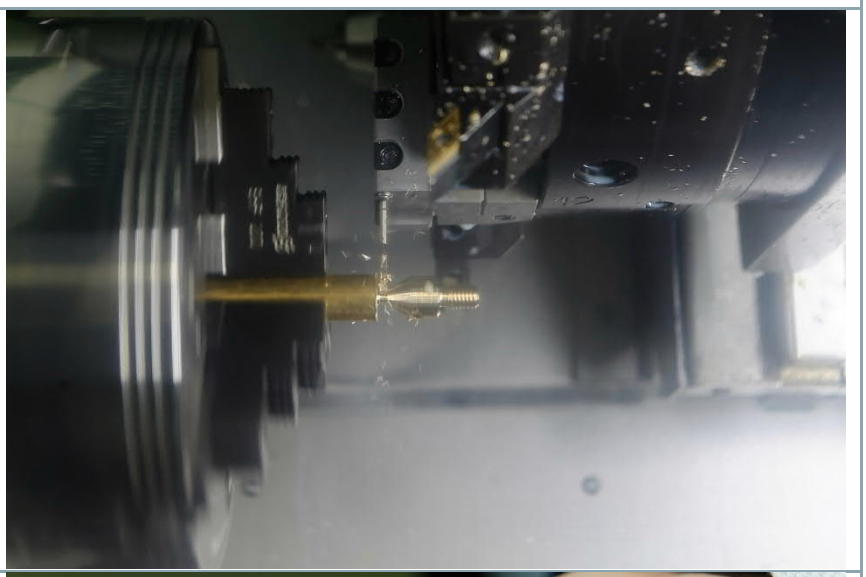
6.2 Process ShopTurn machining plan "RAENDELSCHRAUBE.MPF"

Machining step	Image
Clamp in the brass blank, protruding length 59 mm	
Roughing the contour	
Finishing the contour and male thread	

Simple knurling	
Finished knurled screw with remnant of tapping off, knock it out and smooth it manually.	

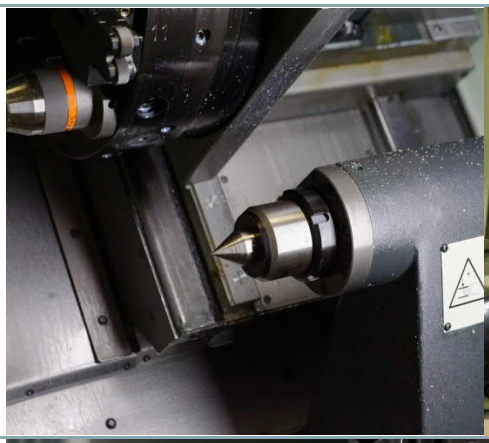
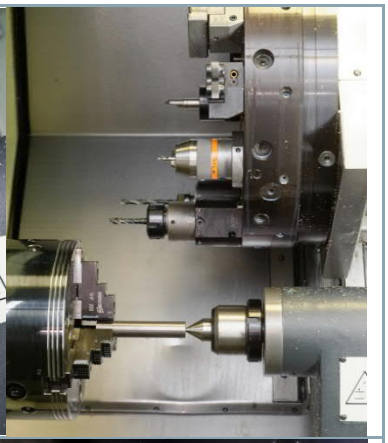
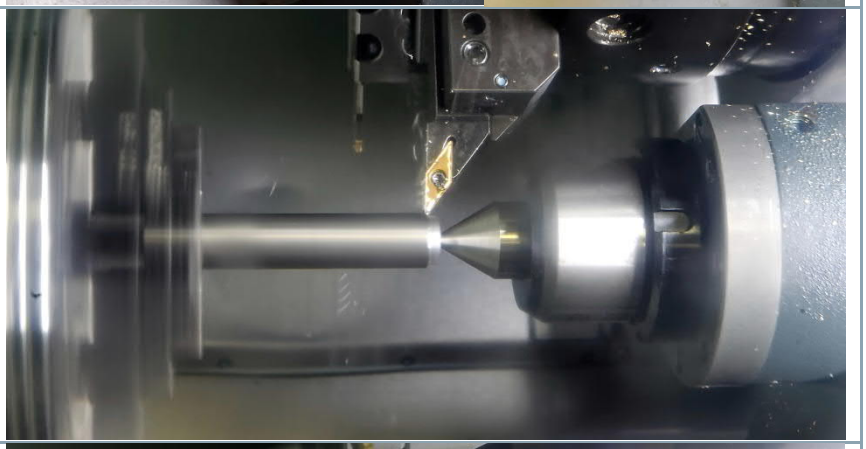
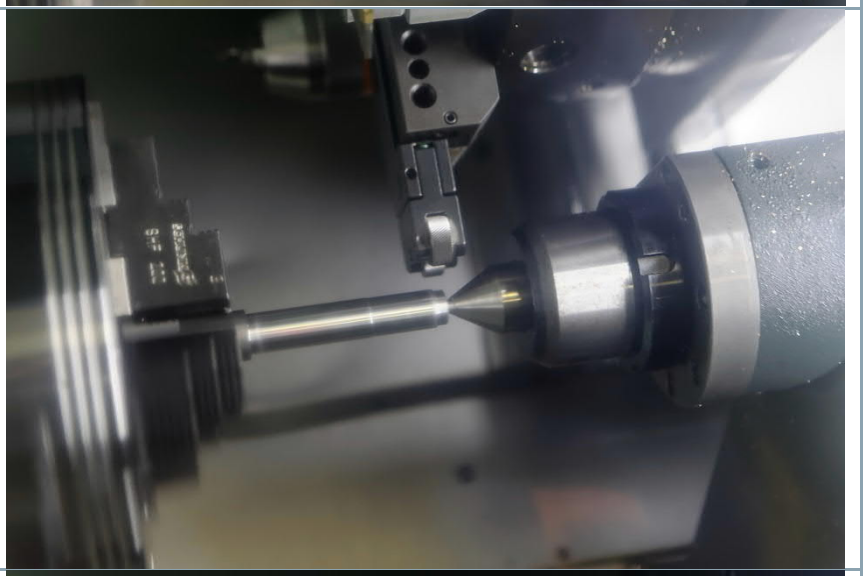
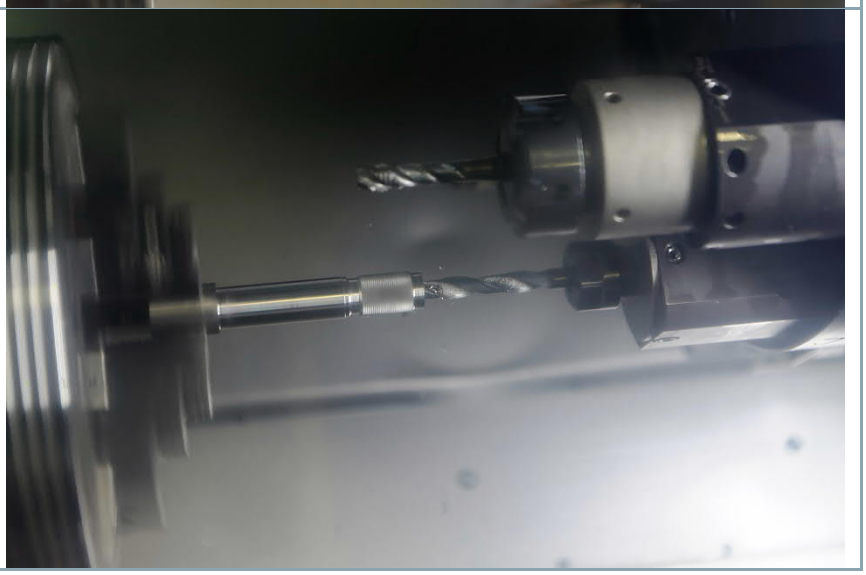
6.2 Executing ShopTurn machining plan "KOPFTEIL.MPF"

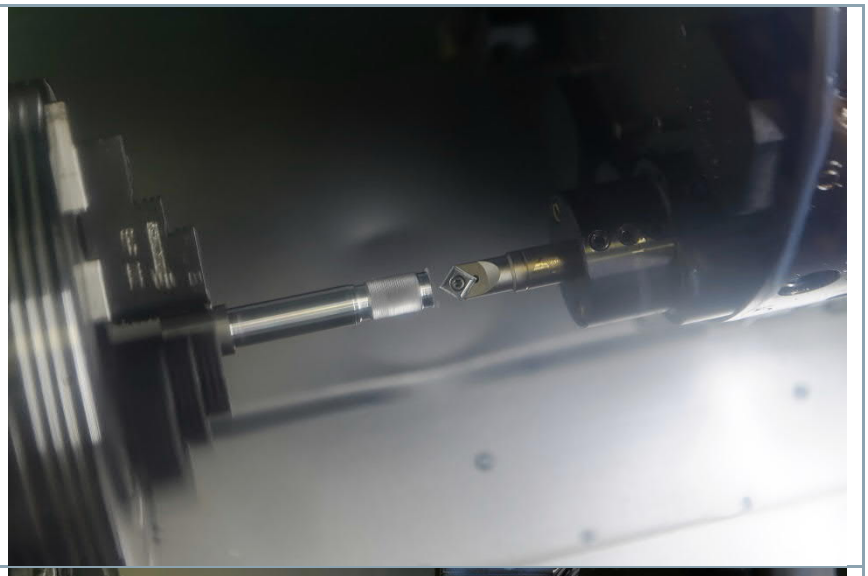
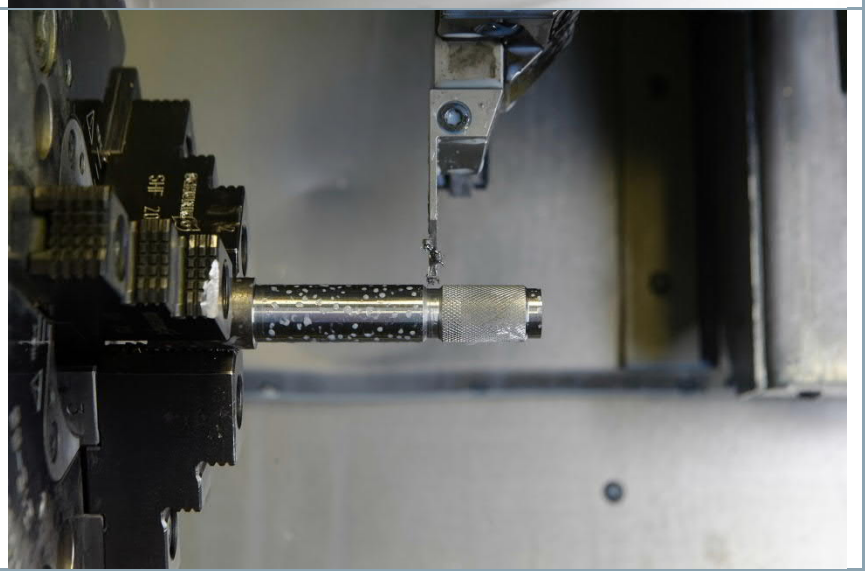
Load ShopTurn machining plan KOPFTEIL.MPF, clamp the blank, once again with 59 mm protruding length.	
Rough and finish the contour, cut the male thread	
Set the drill hole for accommodating blade in the head area	

Drill hole and thread for the grub screw/set screw	
Tapping off the head area	
Completed, turned head area. Please note: The opening on the front side and the drill hole for the knurled screw must be manually deburred.	

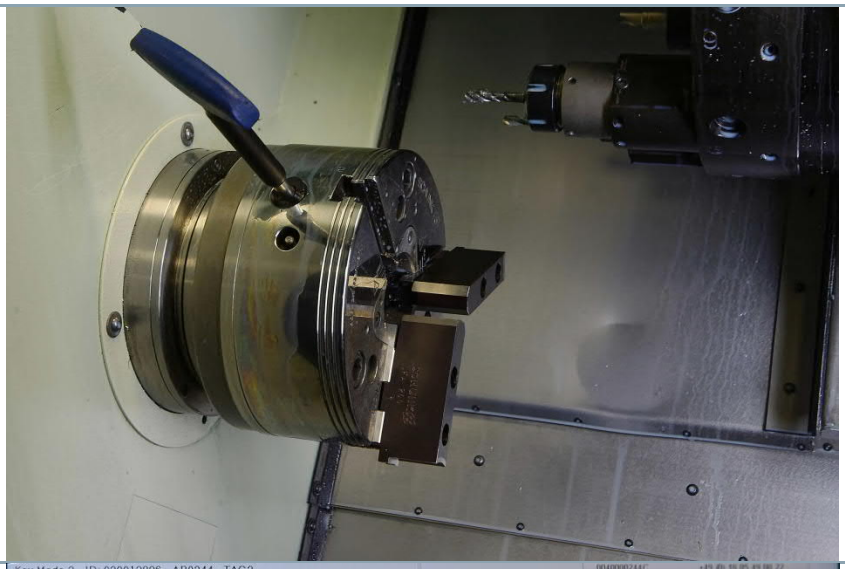
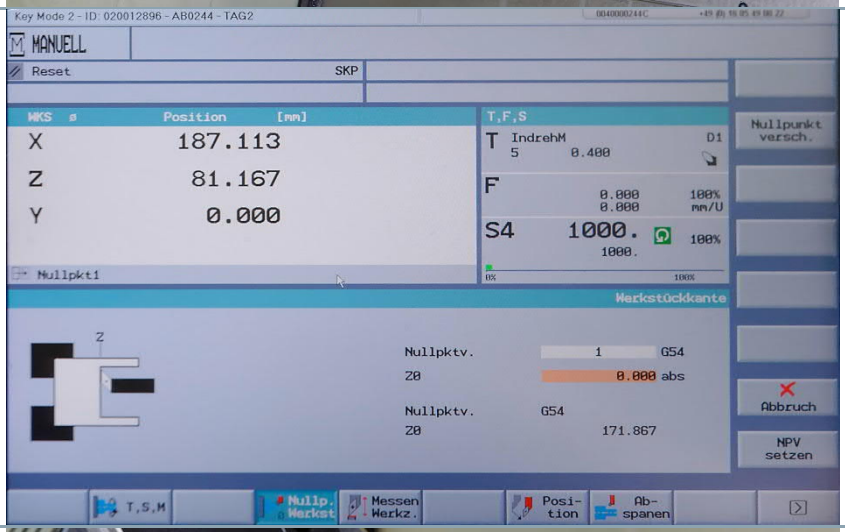
6.2 Executing the ShopTurn machining plan "HANDENTGRATER_GRIFF_L.MPF"

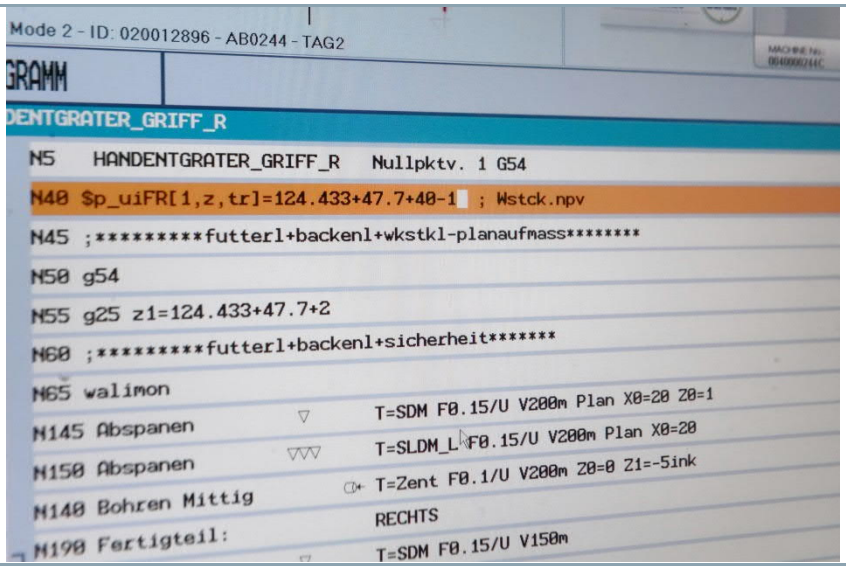
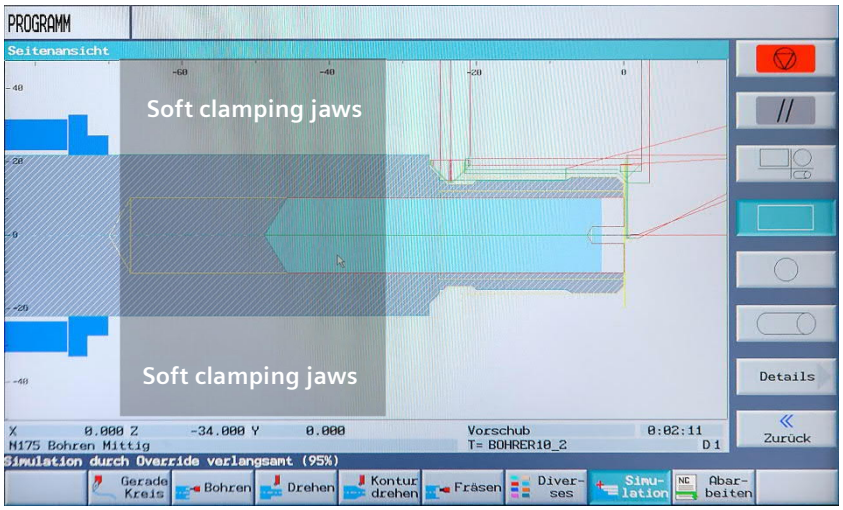
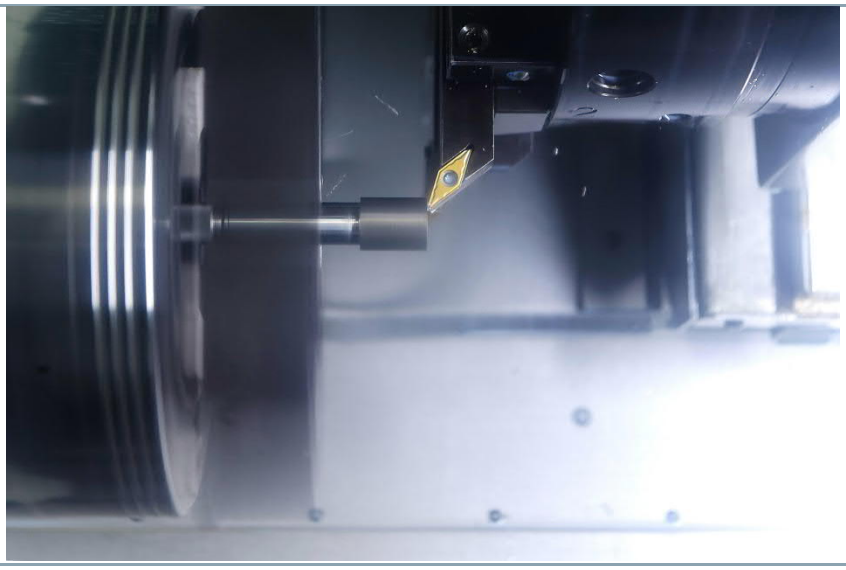
Preparing the tailstock: air-cleaning the machine, ...	
... loading the tools for machining the handle (see Section 5.2)	
... and inserting the tailstock tip.	

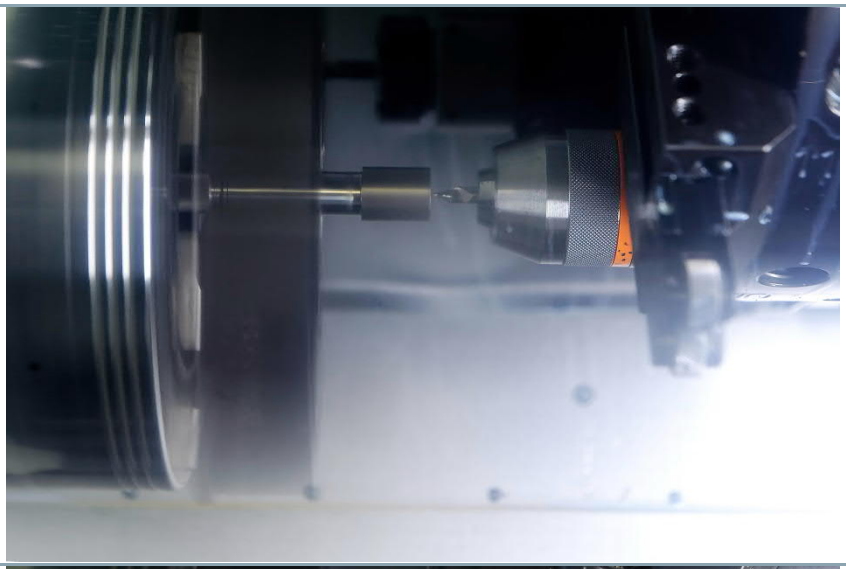
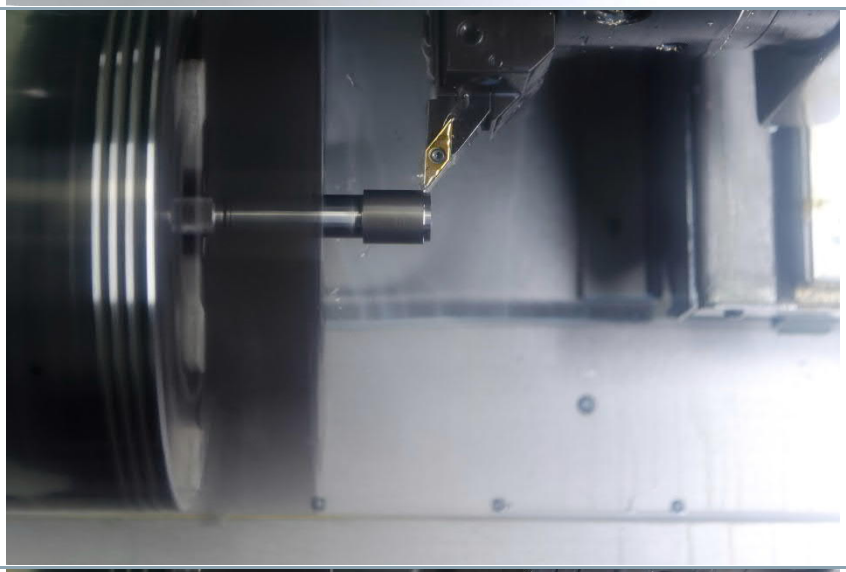
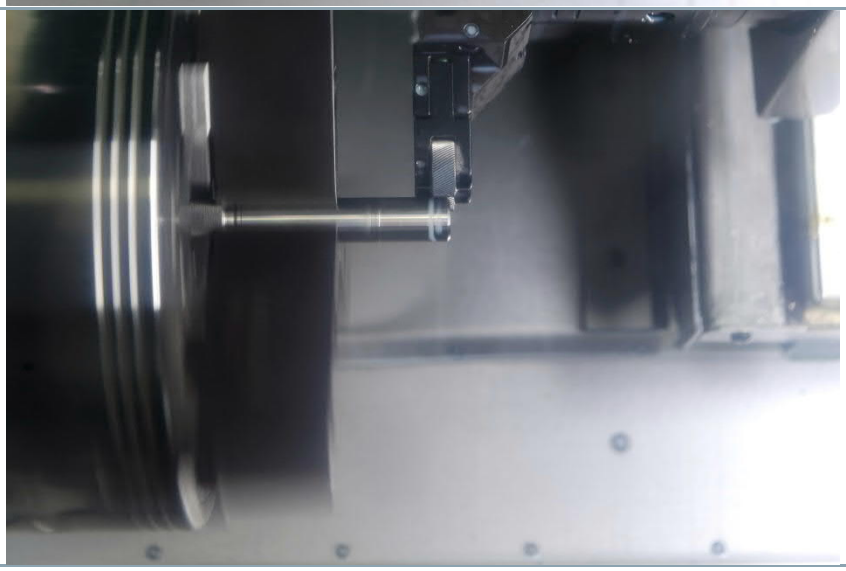
Please note: When the tailstock is used in narrow machines, the tool turret must be retracted to the reference point to prevent collisions when the tailstock is fed.	 
Load ShopTurn machining plan HANDENTGRATER_GRIFF_L.MPF, rough to target diameter ...	
... and first cross-knurling (supported by tailstock tip)	
After program-controlled retraction of the tailstock, axial drilling	

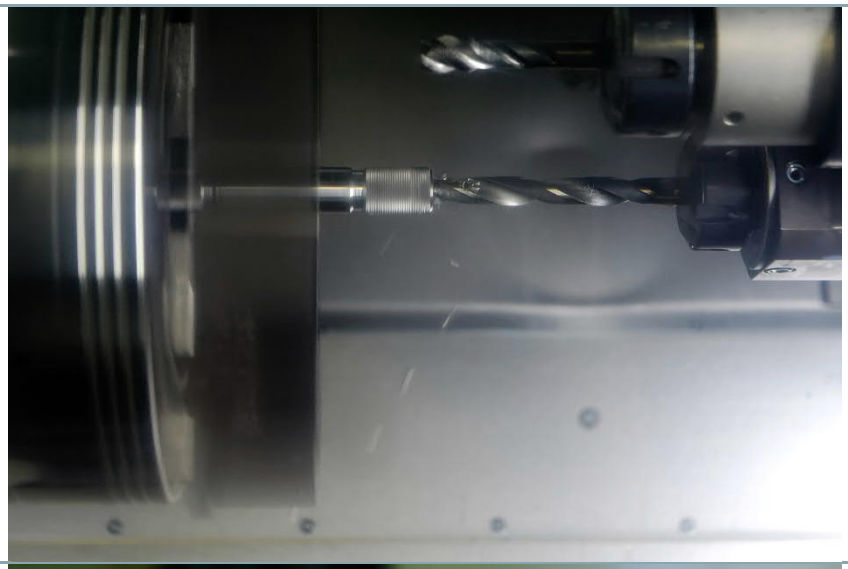
Cutting of female thread and deburring	
Continued machining of handle contour	

6.2 Executing ShopTurn machining plan "HANDENTGRATER_GRIFF_R.MPF"

Remove workpiece, mount soft clamping jaws, and insert boring tool for boring soft clamping jaws into tool turret.	
Bore soft clamping jaws in MANUAL mode to a diameter of 16 mm. The knurled section of the manual deburring tool handle is a few 10ths of a mm thinner, which means the soft clamping jaws clamp the center of the handle.	
Bored soft clamping jaws	

Load ShopTurn machining plan HANDENTGRATER_GRIFF_R.MPF. Set protruding length in the part program: The protruding length specified in the program must be adjusted to the height of the soft clamping jaws used. The protruding length in the part program is the next to last number in the first line of the program N40: The protruding length for this machine and the soft clamping jaws used here is 40 mm – 1 mm planar allowance.	
Caution, risk of breakage: Ensure that the tools in the tool turret leave enough room to the left and right of the 12 mm drill for the soft clamping jaws, because the 12 mm drill in the following part program penetrates deeply into the area of the soft clamping jaws in the workpiece. Adjacent tools that protrude too far could collide with the clamping jaws.	
Start the program: roughing and face turning of the right side of the handle, ...	

... spot-drilling, ...	
Contour stock removal	
... cross-knurling, right side of the handle	

Drilling of the storage compartment for the blades (12 mm) and thread-cutting for the knurled screw	
Finished manual deburring tool handle	

7. Assembly

Finished parts of the manual deburring tool and purchased parts (blades, grub screw). The finished parts are slightly oiled and wiped dry; the head and knurled screw are screwed into the handle. The shaft of the blade is inserted into the head and secured using the grub screw to prevent it from falling out.	
Completely assembled. The drill hole for the grub screw is designed such that the blade rotates freely about its axis during deburring.	
Storage of replacement blades	

8. Information on the Internet

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Information on the machine tools/tools used

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