



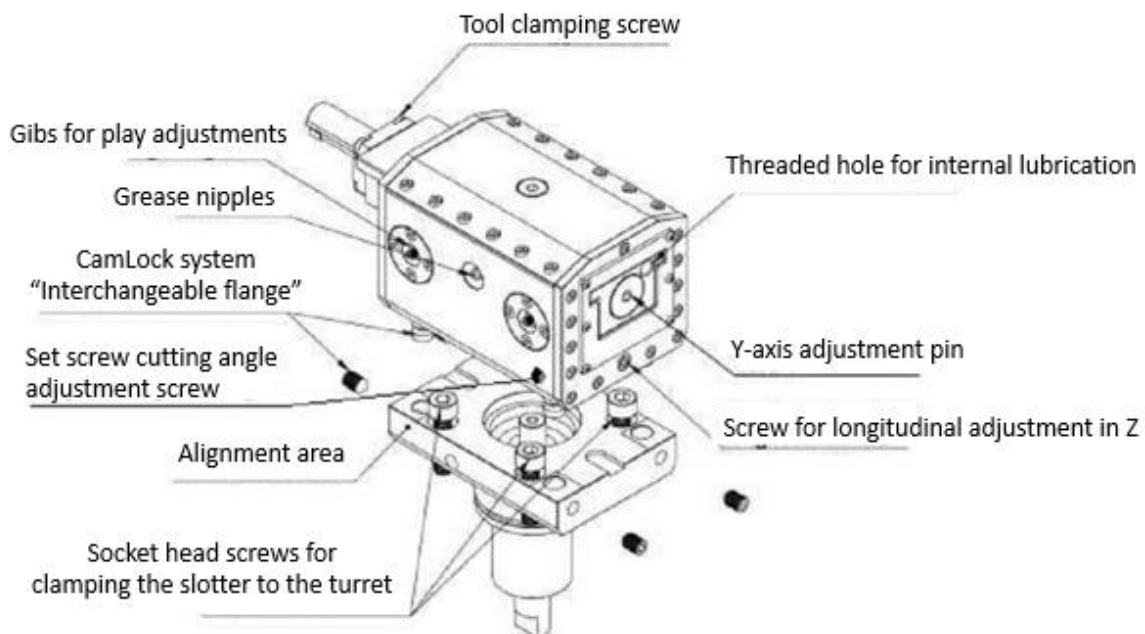
BROACHING UNIT MANUAL



Instruction manual for ALGRA's Broaching Unit

General characteristics

- All ALGRA's broaching units are delivered greased, tested, and ready for use.
- Ratio of 1:1
- Fixed strokes of 25 mm - 35 mm - 50 mm - 65 mm
- Possibility to machine both internal and external profiles with the same slotter by reversing the rotation M of the motorized device and properly rotating the tool in the machining direction.



• **Gibs for play adjustments**

After a prolonged use of the broaching unit, it is necessary to eliminate the potential plays.

In order to do so, unscrew the hexagonal nut with the elbow wrench provided by us, screw the central grub screw until it contacts the slide (the gib must be drawn close to the slide and not tightened/fastened), finally tighten again the hexagonal nut.

Carry out this procedure on all the four gibs of the broaching unit.

- **Y-axis adjustment pin**

For all machines without Y-axis

Correction of the symmetrical error between the hole and the machining operation currently being carried out.

Loosen the tool clamping screw, then turn the Y-axis adjustment pin clockwise or counterclockwise.

In this way it is possible to change the position of the tool along the Y-axis.

The adjustment range of $\pm 0,5$ mm is enough to correct the symmetrical errors on lathes that do not have a Y-axis.

- **Screw for longitudinal cutting angle adjustment**

Possibility to correct any conical errors due to mechanical bending.

Unscrew/Loosen the set screw.

By turning clockwise or counterclockwise the cutting angle can be changed by about $\pm 3^\circ$.

After the adjustment has been completed, screw the set screw.

This range is enough to correct any conical errors.

- **Grease nipples**

The two grease nipples that are built into the external structure of the broaching units are necessary for periodical maintenance.

We recommend greasing the slotter every 10 hours of continuous use of the device (effective use)

Recommended grease: Persian Poligrease EP1.

(See page 6)

- **Hole for internal lubrication**

The tools have holes allowing the passage of coolant.

We recommend using internal lubrication rather than the external one, as the first one directs the lubricant to the cutting area.

- **Alignment area**

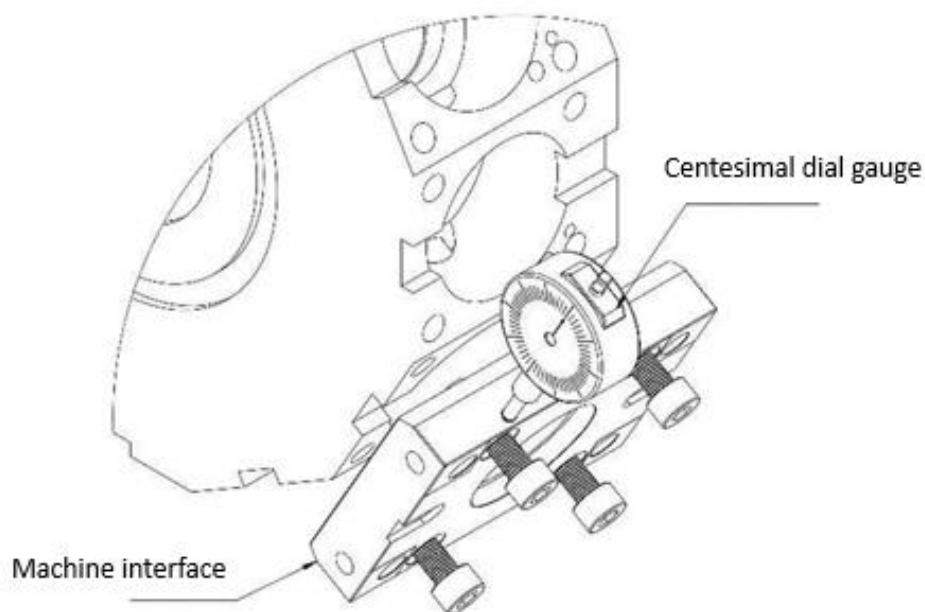
Plane to be used for controlling position and alignment by means of a dial gauge.

- **Bolts for clamping the slotter to the tool turret on the lathe**

Bolts that allow the broaching unit to be clamped to the tool turret on the lathe.

USE AND INSTALLATION

Figure 1

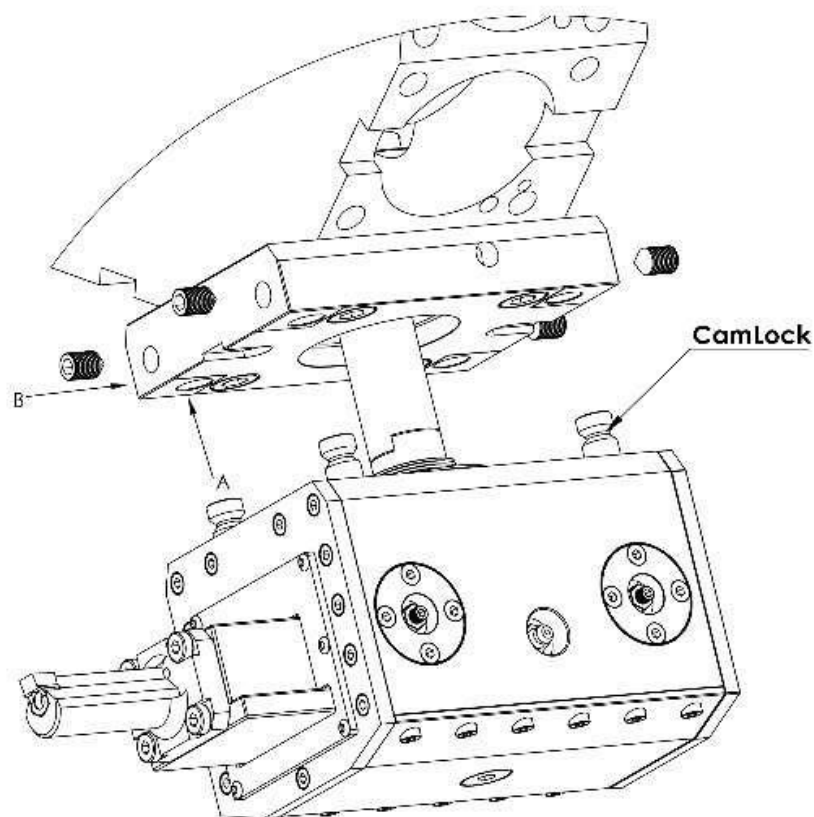


Mount the flange on the lathe.

Slightly loosen the clamping bolts in the turret and use a dial gauge to align the slotter, referring to the perimeter plane of the flange.

After having carried out the alignment with respect to the turret, tighten the clamping bolts in the turret (Figure 1).

Figure 2



After having aligned the flange in the turret by using the CamLock system, the broaching unit can be easily mounted and perfectly aligned with the turret. Insert the CamLock pins into the flange seats, tighten the M10 grub screws provided by us onto the CamLock pins.

Lastly, carry out the tool setup through pre-set on insert tip, thus detecting the Z- and Y-axis position.

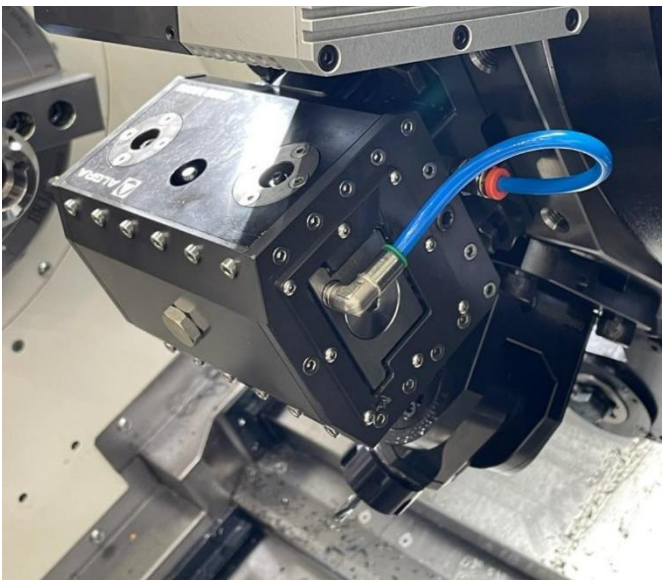
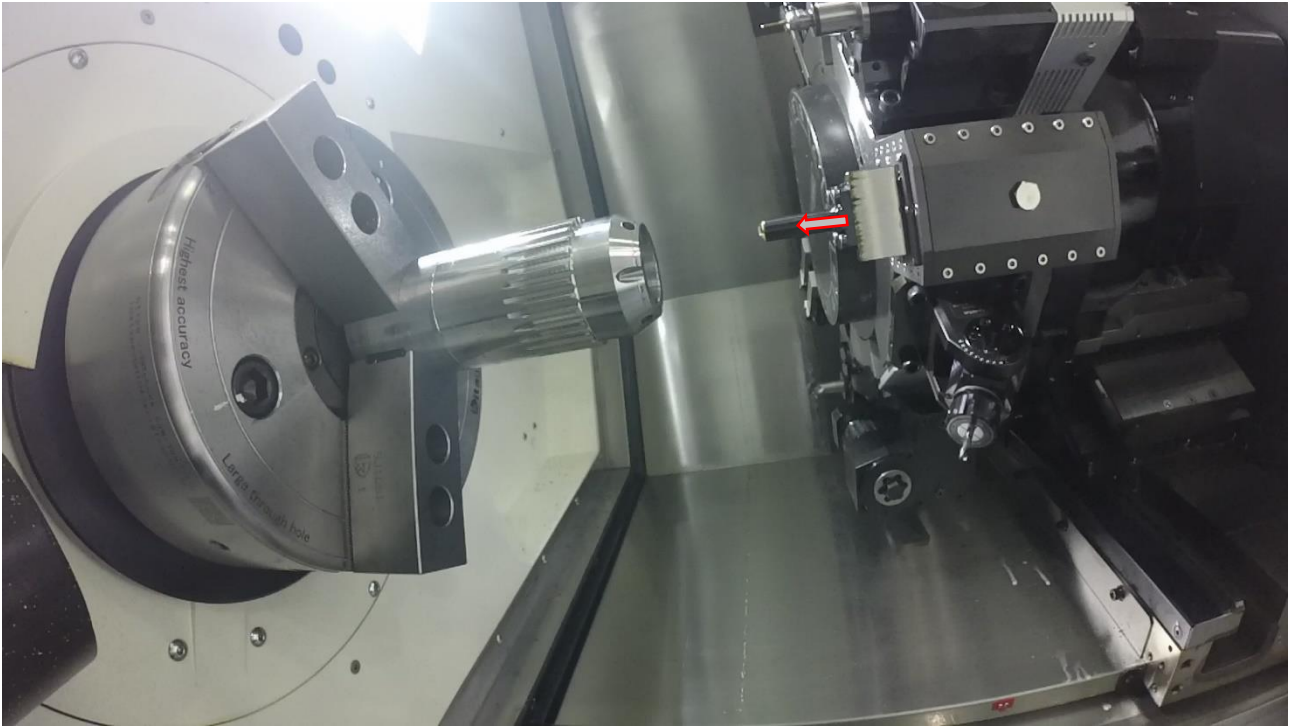
Pre-set X-axis = with slide in backward position.

Pre-set Z-axis = with slide in forward position.

Installation into the turret

For correct installation into the machine, make sure that the motorized device is mounted with the slide completely outward towards the spindle in order that, after machining, the slotter always remains in the same position, thus avoiding back collisions. (See image)

Possibility of reversed parking position (with slide in backward position) according to the needs and the inner dimensions of the machine.



Example of installation of the internal coolant feed tube, which is necessary if the applied insert holders have holes for internal cooling.

CAUTION: Adjust the length of the tube so that it does not interfere with the maximum back stroke of the slide.

MAINTENANCE

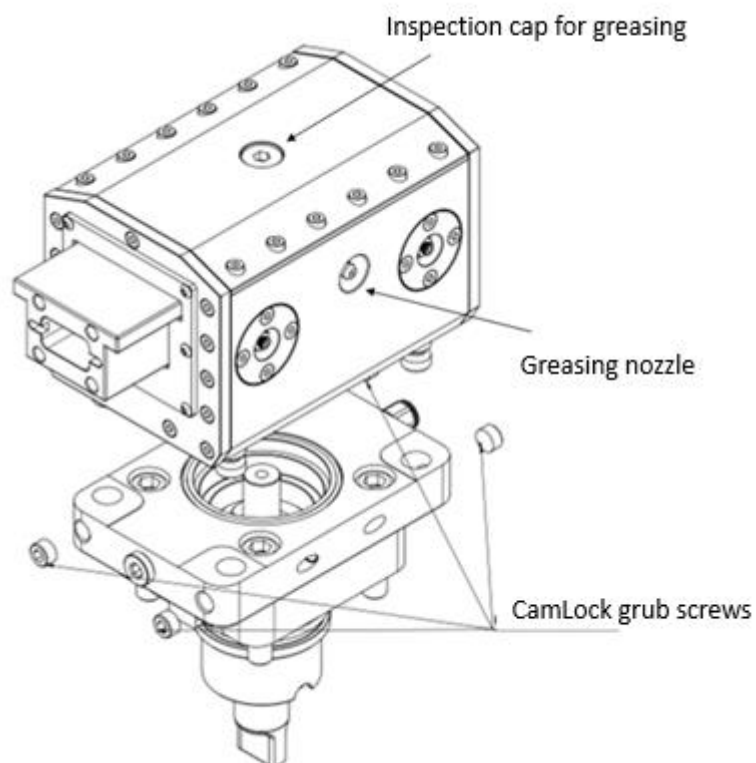
After a long period of use (about 1000 hours/1 year) the broaching unit must be maintained, replacing the parts subject to wear, such as bearings, gaskets, etc.

How to grease the slotter

In case of long-term shutdown of the broaching unit (2 months), we recommend greasing it before starting the machining process

1. Unscrew/Remove the screw and the inspection cap on the lid
2. Insert the grease from the special lateral nozzles on both sides until the new grease is visible in the inspection hole on the lid
3. Close well the inspection hole with the proper cap

Broaching unit installation/removal/replacement



This operation is required in case of flange/machine change.

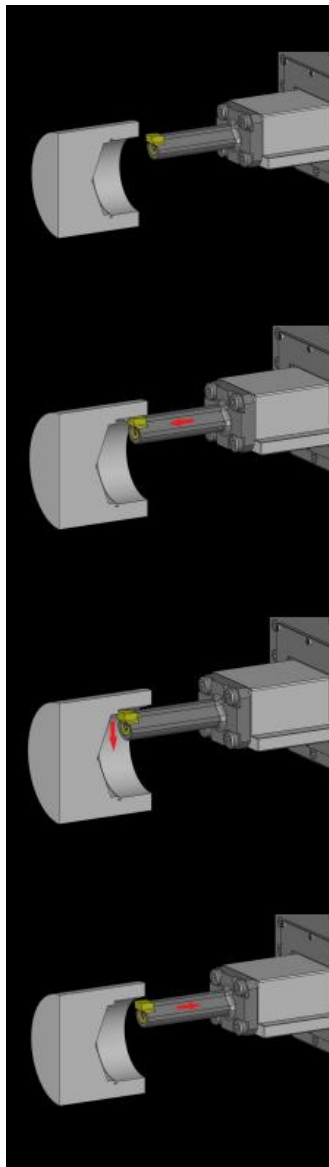
INTERNAL/EXTERNAL MACHINING

This broaching unit can perform internal or external machining.

The slotter automatically detaches the tool during the return phase.

According to the type of machining (internal or external) and to the orientation of the insert holder ($\pm 180^\circ$), the instrument must be fixed by orienting the insert to the cutting direction and paying attention to its correct detachment.

***Place the dial gauge on the slide/tool to make sure that the detachment takes place correctly with respect to machining. The machine command M03-M04 reverse the detachment direction.**



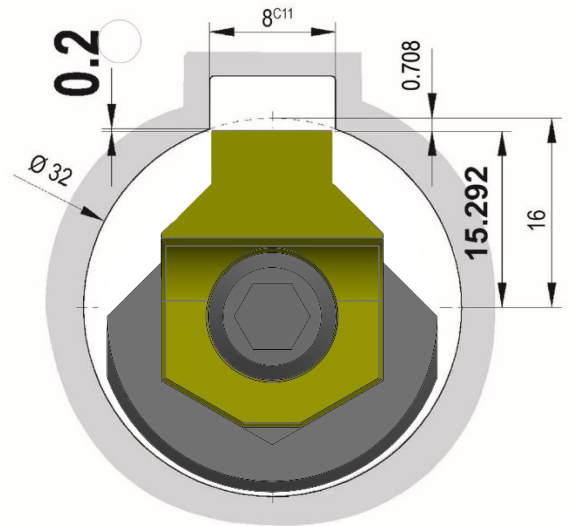
Calculation of tangential arc machining start

Example of machining operation:

Hole diameter 32 mm

Slotting width 8 mm:

Considering an entry radius of 16 mm and a safety distance of 0.2 mm from the insert edge, the tool must be placed in a starting position 15.292 mm far from the hole center in order to avoid collision at machining start.



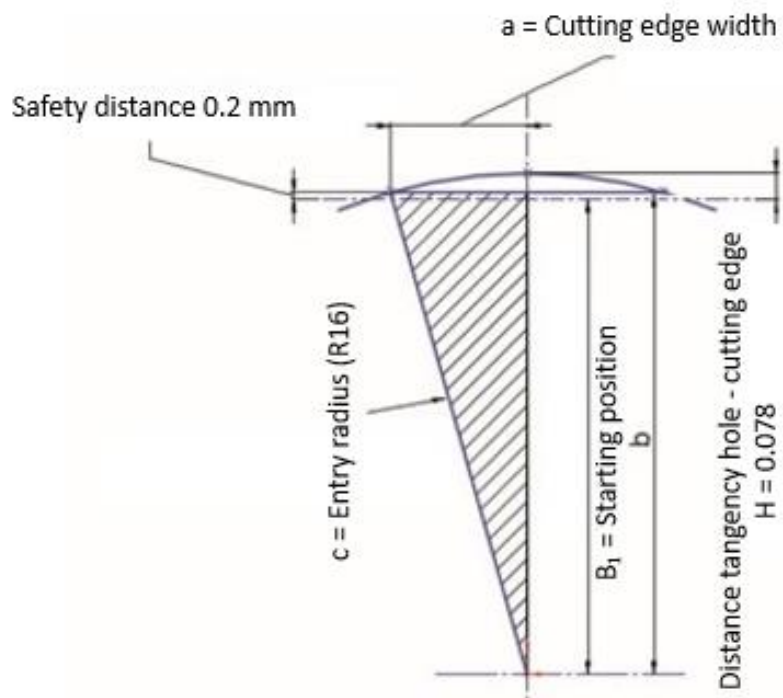
Calculation of starting position b_1 :

$$c^2 = a^2 + b^2 \quad b^2 = c^2 - a^2 \quad b = \sqrt{c^2 - a^2} = \sqrt{16^2 - 4^2} = 15,491933$$

$$b_1 = b - \text{Safety distance}$$

$$b_1 = 15,492 - 0,2 = 15,292 \text{ mm}$$

→ equivalent to a starting diameter of Ø30.584mm



Cutting parameters

Cutting data of the materials to be machined, max. cutting width and related cutting depth per pass for inserts made of HM/WIDIA							
MATERIAL		Stroke 25 mm cutting width	Stroke 35 mm cutting width	Stroke 50 mm cutting width	Stroke 65 mm cutting width	Cutting speed	Cutting depth per pass
P1	Non-alloy steel						
	C > 0,25% annealed	ae/mm 8	ae/mm 12	ae/mm 12	ae/mm 12	Vc 63 m/min	ap/mm 0,04/0,06
	HB 125, Rm 428 N/mm ²						
P2	Non-alloy steel						
	C > 0,55% annealed	ae/mm 8	ae/mm 12	ae/mm 12	ae/mm 12	Vc 57 m/min	ap/mm 0,03/0,05
	HB 190, Rm 639 N/mm ²						
P3	Low-alloy steel						
	Tempered	ae/mm 8	ae/mm 12	ae/mm 12	ae/mm 10	Vc 48 m/min	ap/mm 0,03/0,05
	HB 300, Rm 1013 N/mm ²						
K	Cast iron	ae/mm 8	ae/mm 12	ae/mm 12	ae/mm 12	Vc 53 m/min	ap/mm 0,03/0,05
N	Non-ferrous materials	ae/mm 8	ae/mm 12	ae/mm 12	ae/mm 12	Vc 72 m/min	ap/mm 0,05/0,09
M	Stainless steel						
	HB 200, Rm 675 N/mm ²	ae/mm 8	ae/mm 12	ae/mm 12	ae/mm 10	Vc 48 m/min	ap/mm 0,03/0,05
NB: We recommend using inserts made of HM/WIDIA in stable machining processes							

Cutting data of the materials to be machined, max. cutting width and related cutting depth per pass for inserts made of HSS							
MATERIALE		Stroke 25 mm cutting width	Stroke 35 mm cutting width	Stroke 50 mm cutting width	Stroke 65 mm cutting width	Cutting speed	Cutting depth per pass
P1	Non-alloy steel						
	C > 0,25% annealed	ae/mm 8	ae/mm 12	ae/mm 12	ae/mm 12	Vc 33 m/min	ap/mm 0,04/0,07
	HB 125, Rm 428 N/mm ²						
P2	Non-alloy steel						
	C > 0,55% annealed	ae/mm 8	ae/mm 12	ae/mm 12	ae/mm 12	Vc 30 m/min	ap/mm 0,03/0,05
	HB 190, Rm 639 N/mm ²						
P3	Low-alloy steel						
	Tempered	ae/mm 8	ae/mm 12	ae/mm 12	ae/mm 10	Vc 25 m/min	ap/mm 0,02/0,04
	HB 300, Rm 1013 N/mm ²						
K	Cast iron	ae/mm 8	ae/mm 12	ae/mm 12	ae/mm 12	Vc 28 m/min	ap/mm 0,02/0,04
N	Non-ferrous materials	ae/mm 8	ae/mm 12	ae/mm 12	ae/mm 12	Vc 38 m/min	ap/mm 0,06/0,15
M	Stainless steel						
	HB 200, Rm 675 N/mm ²	ae/mm 8	ae/mm 12	ae/mm 12	ae/mm 10	Vc 25 m/min	ap/mm 0,02/0,04

$$n = \frac{V_c * 1000}{L * 2} \quad \text{RPM}$$

L = Slotter stroke

$$F = n * A_p \quad \text{mm/min}$$

EXAMPLE OF PROGRAMMING

Example of slotting on lathe NLX2500

N27..... (SLOTING First line subprogram - keyway seat)

G0 T606 (Call up tool)

X26 Z50

M45 (Turn on C-axis)

G98 (Feed in mm/min)

G28H0

G0C-30

M68 (Brake clamp)

G97 S500 M13

G0Z3

G0Z-18

G1X35F15

G0X26

G0Z50

M5 (Spindle stop)

M69 (Brake unclamp)

G0G53X0 (Move away from the workpiece)

G53Z-35

Example:

- Execution of standard keyway seat on Ø32mm hole
- Keyway width 8 mm, tolerance C11
- Cutting depth per pass 0.03 mm



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