

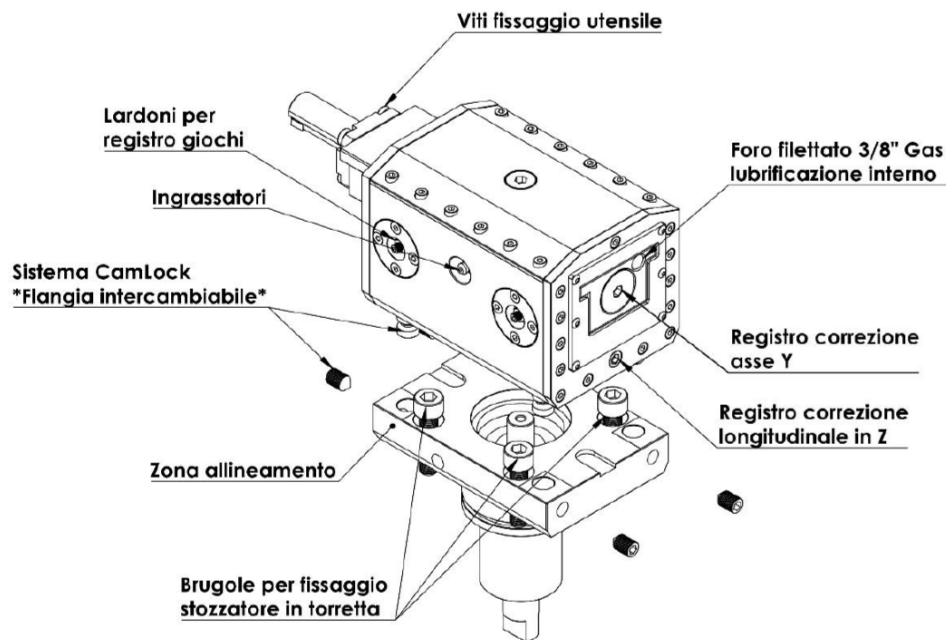


# Operation Manual of Mongtec Broaching Unit

## Mongtec broaching unit operation manual

### General features

- All broaching units are delivered greased, tested and ready for use.
- Ratio 1:1
- 35mm – 50mm – 65mm fixed strokes
- Possibility of processing internal and external profiles with a single slotter by reversing the M rotation of the broaching unit and correctly turning the tools in the working direction



### Gibs for clearance adjustment

After a prolonged use of the broaching unit, possible clearance should be eliminated. Do this by unscrewing the hexagonal nut with the provided pipe wrench, tighten the central grub screw until it is flush with the slide (the gib must be neared to the slide and not tightened) and then screw the hexagonal nut back on. Repeat the operation on all four gibs of the slotter.

### Y-axis adjustment pin

For all machines without Y axis Symmetric error correction between the hole and the piece currently being processed. After loosening the tool clamping screws, turn the Y-axis adjustment pin clockwise or anti-clockwise. This allows to change the position of the tool along the Y axis. The adjustment range is  $\pm 0.5\text{mm}$ , sufficient to correct the symmetric errors on lathes without Y axis.

### Longitudinal cutting angle adjustment screw

Possibility to correct any conical errors due to mechanical bending. By turning it clockwise or anticlockwise the cutting angle can be changed by about  $\pm 3^\circ$ . This range is sufficient to correct any conical errors.

#### ◆ Grease nipples

The two grease nipples built into the external structure of the motorised slotter are necessary for periodic maintenance.

We recommend greasing the slotter after using the tool for about 10 continuous hours (actual use) ease: Persian Poligrease EP1.

#### ◆ GAS 3/8" threaded hole for internal lubrication

All of the tools feature holes for the supply of coolant.

We suggest internal lubrication rather than external, this allows the lubricant to be directed to the cutting area.

#### ◆ Alignment area

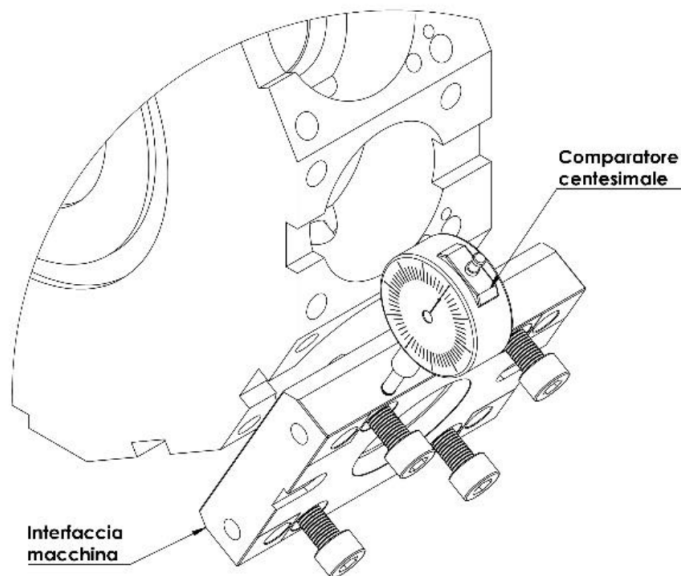
Surface to be used for the comparator position and alignment control.

#### ◆ Bolts clamping the slotter to the tool turret on the lathe

Bolts that fasten the slotter to the tool turret on the lathe.

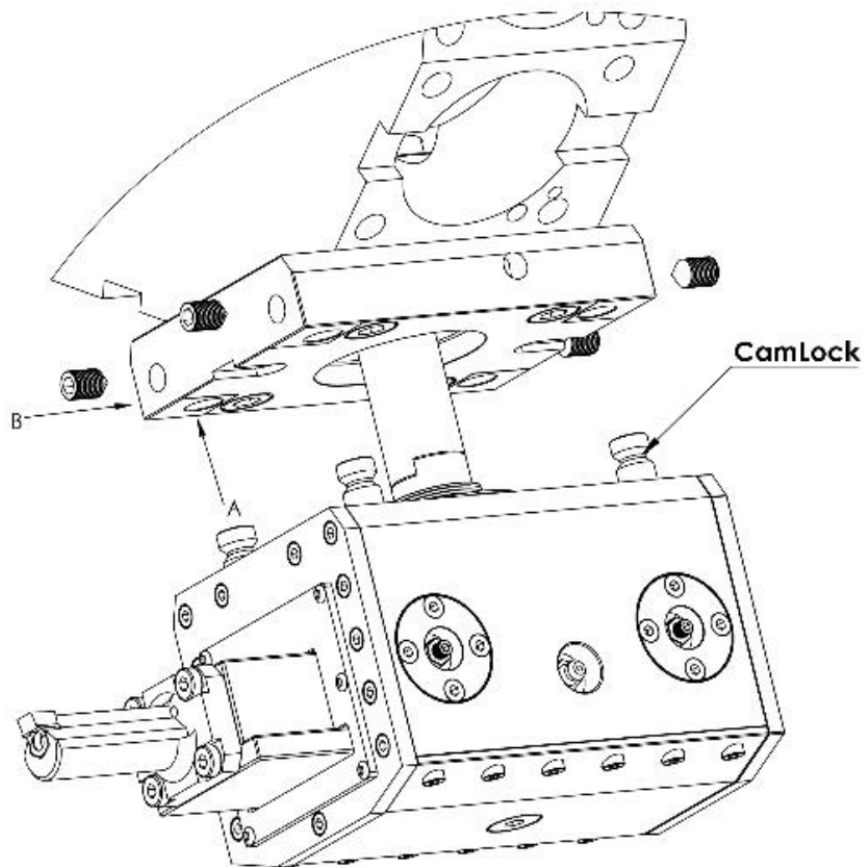
USE AND ASSEMBLY

**Figure 1**



Assemble the flange on the lathe. Slightly loosen the turret clamping bolts and align the slotter using a comparator, referring to the perimeter surface of the flange. Once aligned with respect to the turret, tighten the turret clamping bolts (Figure1).

**Figure 2**



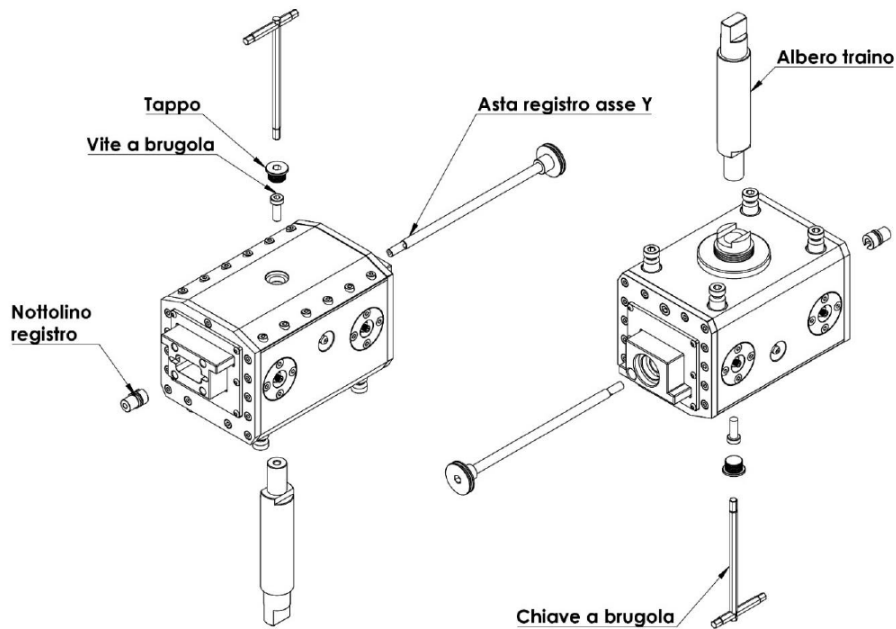
Once aligned the flange in turret, through the CamLock system, the broaching unit can be easily assembled and perfectly aligned with the turret. Insert the CamLock pins in the flange seats, tighten the provided M10 grub screws on the CamLock pins.

Lastly, perform setting and tool scanning by means of insert tip pre-set, detecting the Z axis and X axis position.

## **MAINTENANCE**

After a long period of use (about 1,000 hours/1 year), maintenance will need to be performed on the broaching unit, replacing the parts subject to wear such as bearings, gaskets, etc.

## Drive shaft Assembly/Removal/Replacement

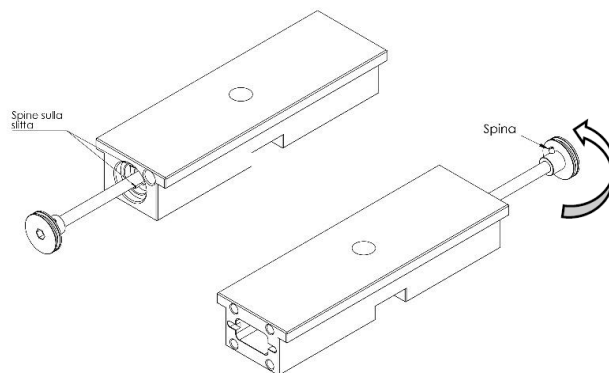


To correctly use the broaching unit, the rotary motion drive shaft must be properly fixed to the motorised device by means of an Allen screw.

Procedure for flange/machine change Observe the following steps:

- Tool disassembly
- Removal of adjustment snib fixed by M3 screw
- Y adjustment rod removal from the back
- Cap removal from cover - Allen screw removal with key
- Shaft extraction from cam

Caution: when assembling the Y-axis adjustment rod, make sure that the pin on the rod is positioned facing the greater stroke between the two pins on the slide.



## INTERNAL/EXTERNAL PROCESSING

This broaching unit can perform internal or external processing.

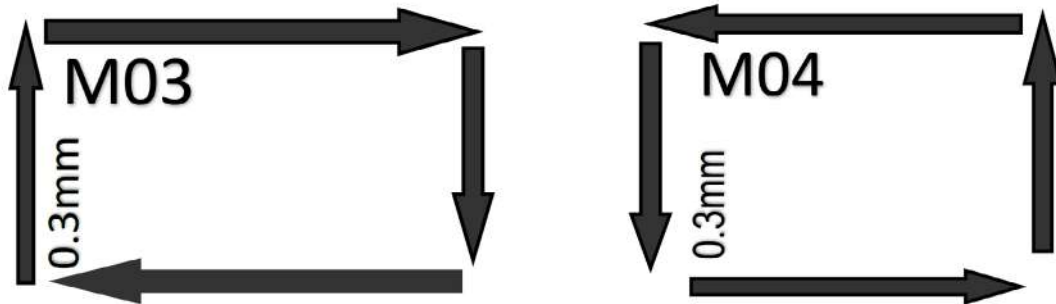
Simply reverse the motorised rotation direction as follows:

control M04 = internal processing

control M03 = external processing.

Depending on whether internal or external processing is to be done, the tool must be fixed with the insert following the cutting direction, paying attention to the correct removal.

**NOTE:** Directions may be different depends on different machine models. Before first use, please check the direction of your M03 and M04



## Processing start Tangent Arc Calculation

Before starting processing, always consider the tangent arc distance to avoid chipping or breaking the insert



## EXAMPLES OF PROCESSING WITH A Mongtec broaching unit

### External profile processing

This short video shows an external processing: making a DIN 5482 module 2.5 Z=30 external grooved profile.

The processed material is alloy steel with 35 HRC hardness.

The processing time of a single housing is 4 seconds, while the total time for processing an entire toothed profile is about two minutes.

Given the extreme rigidity of the tool, processing is very simple and with an excellent degree of finish.

This programme is available for all CNC lathes on the market.



video



### Internal processing

This short video shows an internal processing: making eight keyways for an 8 mm thick key.

The processed material is alloy steel with 35 HRC hardness.

The processing time of the single key is 6 seconds, while the total time for processing the 8 keyways is about 50 seconds.

Given the extreme rigidity of the tool, processing is very simple and with an excellent degree of finish.

In order to correctly and efficiently use this tool, This programme is available for all CNC lathes on the market.



video



## CUTTING PARAMETERS

### SYSTEM CUTTING PARAMETERS

Suggested cutting parameters

|                 | Cutting speed<br>(mm/min.) | Increment (mm)<br>recommended | Increment (mm) min | Increment (mm) max |
|-----------------|----------------------------|-------------------------------|--------------------|--------------------|
| Aluminium       | 10000                      | 0,2                           | 0,1                | 0,25               |
| Soft steel      | 8000                       | 0,11                          | 0,06               | 0,15               |
| Cast iron       | 6000                       | 0,13                          | 0,06               | 0,2                |
| Common steel    | 6000                       | 0,08                          | 0,04               | 0,12               |
| Hardened steel  | 5000                       | 0,06                          | 0,03               | 0,08               |
| Stainless steel | 5000                       | 0,06                          | 0,03               | 0,08               |
| Plastic         | 10000                      | 0,25                          | 0,2                | 0,3                |
| Bronze-Brass    | 7000                       | 0,1                           | 0,05               | 0,15               |

Nb: For insert sizes with width  $\geq 18$ mm we recommend machining in two steps: roughing and finishing.

## BROACHING UNIT CUTTING PARAMETERS

To ensure a long service life of the insert and an excellent processing finish, it is advisable to follow the suggested parameters (see parameters table).

### Maximum thickness achievable on various materials and cutting parameters

|                 | 35 mm stroke | 50 mm stroke | 65 mm stroke | Cutting speed | Increment      |
|-----------------|--------------|--------------|--------------|---------------|----------------|
| Aluminium       | 14mm         | 14mm         | 14mm         | 38 m/min.     | 0,06 / 0,15 mm |
| Soft steel      | 12mm         | 12mm         | 12mm         | 33 m/min.     | 0,04 / 0,07 mm |
| Cast iron       | 12mm         | 12mm         | 10mm         | 28 m/min.     | 0,04 / 0,07 mm |
| Common steel    | 12mm         | 12mm         | 10mm         | 30 m/min.     | 0,03 / 0,05 mm |
| Hardened steel  | 10mm         | 10mm         | 10mm         | 25 m/min.     | 0,02 / 0,04 mm |
| Stainless steel | 10mm         | 10mm         | 10mm         | 25 m/min.     | 0,02 / 0,04 mm |
| Plastic         | 14mm         | 14mm         | 14mm         | 40 m/min.     | 0,07 / 0,15 mm |
| Bronze-Brass    | 12mm         | 10mm         | 10mm         | 30 m/min.     | 0,03 / 0,06 mm |



## **ST- programming example**

CAUTION: consider tangent arc at the start of processing, under the lathing diameter

Programming example: Ø25mm with 3.3mm depth on the radius and useful length of the 25mm profile.

Consider processing common steel with 0.03mm increment and 30 metres/min.

G0 X23,5 Z10 (Rapid tool approach)

M34 S400 (motorised activation) [S calculated as  $S/(2 \times \text{stroke}) = 30000/(35 \times 2)$ ]

G1 Z-26 (useful section depth + 1mm  $\rightarrow 25 \times 1 = 26$ )

X31.6 F12 (consider diameter depth, not radial! E.g.: on diameter  $25 + 3.3 + 3.3 = 31.6\text{mm}$ )

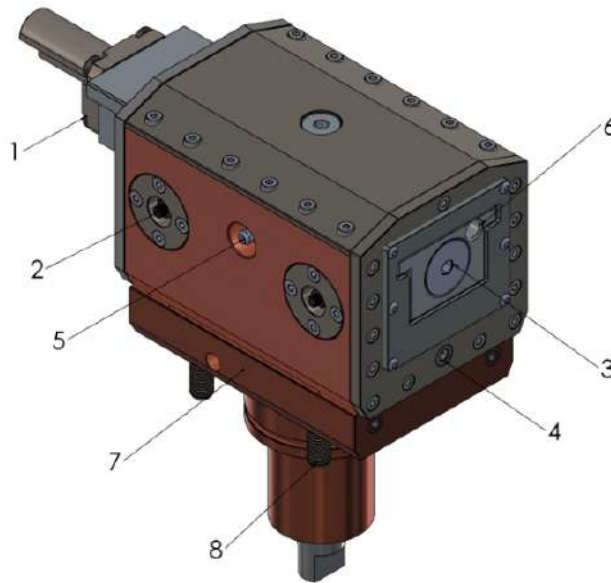
(F12 calculated as  $0.03\text{mm increment} \times F = 0.03 \times 400$ )

X23,5 F500 (centre hole disengagement)

G0 Z150 (tool out)

## USE AND MAINTENANCE

### broaching unit



#### 1. Tool clamping screws

The tool clamping screws must be slightly unscrewed before correcting any symmetry errors. Before resuming the work, make sure you have tightened the tool clamping screws again.

#### 2. Adjustable gib screws

After using the broaching unit for a long time, it will be necessary to eliminate the potential play created in the tool.

Do this by unscrewing the hexagonal nut, tightening the centre screw and then screwing the hexagonal nut back on. Repeat this operation on all four gibs of the slotter.

#### 3. Y-axis adjustment pin

This is used to correct any symmetry errors between the hole and the piece currently being processed.

After unscrewing the tool clamping screws 1, turn the Y-axis adjustment pin either clockwise or anticlockwise. This will allow you to move the tool along the Y-axis. The adjustment range is  $\pm 0.5$ , which is extensive enough to correct all of the symmetry errors on lathes without a Y-axis.

#### 4. Cutting angle adjustment screw

This screw is used to correct any conical errors due to mechanical bending.

By turning it clockwise or anticlockwise the cutting angle can be changed by about  $\pm 3^\circ$ . This range is sufficient enough to correct any conical errors.

#### 5. Grease nipples

These two grease nipples are built into the external structure of the broaching unit and are used to grease after about 10 hours of use, meaning the effective operating time of the tool (see example of calculation for greasing).

#### 6. Threaded hole for internal 3/8" gas supply

All of the tools feature holes for the supply of coolant. The internal supply is recommended more than the external supply and allows the lubricant to be directed to the cutting area.

## **7. Alignment area**

This is the area to be used for the comparator control.

## **8. Bolts clamping the slotter to the tool turret on the lathe**

These are bolts that fasten the slotter to the tool turret on the lathe.

## **FIRST USE**

Mount the broaching unit onto the lathe. Slightly loosen the 8 clamping bolts and align the broaching unit using a comparator. The latter is to be placed on alignment area 7. When the slotter is perfectly aligned, tighten the 8 clamping bolts and operate the broaching unit at 150 movements per minute for about 10 minutes. Grease the moving slide with common oil for guides. This will soften the gaskets and break in the broaching unit before use.

**NOTE:** Directions may be different depends on different machine models. Before first use, please check the direction of your M03 and M04

## **GREASING**

To preserve the mechanics, we recommend greasing the broaching unit every 10 hours of use, meaning actual use (see example of calculation for greasing).

Preferably use Persian Poligrease EP 1.

Proceed as follows in order to introduce the right amount of grease:

### **Loosen the cap on the motorised coverW;**

Start introducing the greasing using the special grease nipples;

Stop the introduction of grease when it comes out from the hole;

Tighten the cap back on and start using the tool again.

Example of calculation for greasing

If 2 minutes are required to produce one piece and 10 seconds are needed to make just the keyway for a feather key, grease after about 3600 pieces.

## **MAINTENANCE**

After a long period of use (about 1,000 hours), maintenance will need to be performed on the broaching unit, replacing the parts subject to wear such as bearings, gaskets, etc.

## **INTERNAL/EXTERNAL PROCESSING**

This broaching unit can perform internal or external processing.

Simply reverse the motorised rotation direction as follows:

control M03 = internal processing

control M04 = external processing.

Depending on whether internal or external processing is to be done, the tool must be fixed with the insert following the cutting direction.

## **DETACHMENT DURING THE RETURN PHASE**

During the return phase, the tool detaches from the processed surface by 0.25 mm.

This movement is essential to preserve the integrity of the insert.



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