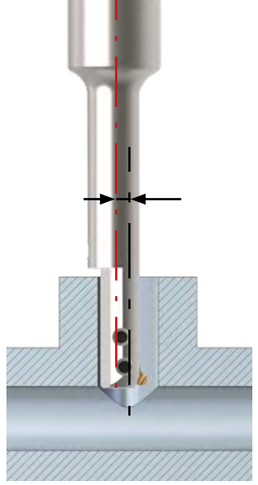
OPERATING PRINCIPLE

Tool function: COFA-X works the same way as the COFA tool system. The difference is the pre-tensioned spring and the relieved front of the tool body. The relief is necessary in order to move the blade, which can only move in one direction due to the pretension, eccentrically into the bore. Eccentricity, in turn, requires the capabilities of a CNC machine.

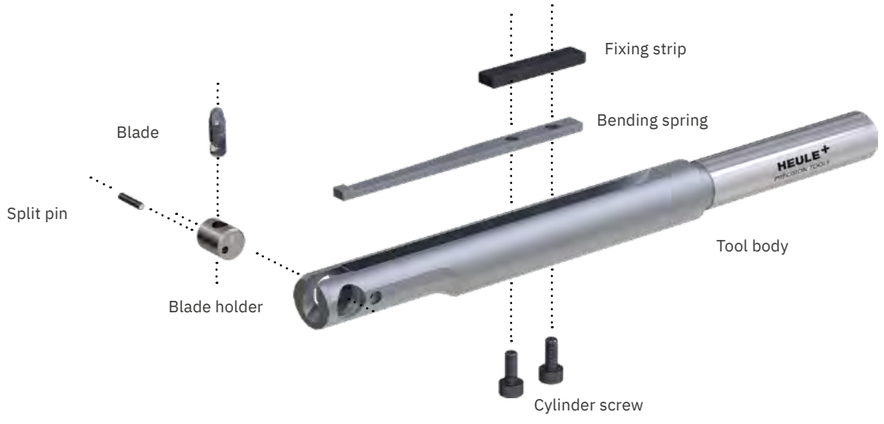
Blade function: The blades are designed either for forward or reverse machining only and are always pre-tensioned by the spring. The spring returns the blade to its neutral position. The blade position varies according to the machining direction.



Neutral position of blade for machining in reverse

Neutral position of blade for forward machining

TOOL DESIGN



COFA-X CUTTING DATA

	Description	Tensile strength RM (MPa)	Hardness (HB)	Hardn. (HRC)	Spring	Cutting speed (VC)	Working feed (FZ)
P0	Low-carbon steel, long-chipping, C <0.25%	<530	<125	–	S	20–30	0.05–0.15
P1	Low-carbon steel, short-chipping, C <0.25%	<530	<125	–	S	20–30	0.05–0.15
P2	Steel with carbon content C >0.25%	>530	<220	<25	S	20–30	0.05–0.15
P3	Alloy steel and tool steel, C >0.25%	600–850	<330	<35	S	20–30	0.05–0.15
P4	Alloy steel and tool steel, C >0.25%	850–1400	340–450	35–48	Z	10–20	0.05–0.1
P5	Ferritic, martensitic and stainless PH steel	600–900	<330	<35	Z	10–20	0.05–0.1
P6	High-strength ferritic, martensitic and PH stainless steel	900–1350	350–450	35–48	Z1	10–20	0.05–0.1
M1	Austenitic stainless steel	<600	130–200	–	Z1	20–30	0.05–0.15
M2	High-strength austenitic stainless steel	600–800	150–230	<25	Z1	10–20	0.05–0.1
M3	Duplex stainless steel	<800	135–275	<30	Z1	10–20	0.05–0.1
K1	Cast iron	125–500	120–290	<32	S	20–30	0.05–0.15
K2	Ductile cast iron with up to medium strength	<600	130–260	<28	S	20–30	0.05–0.15
K3	High-strength cast iron and bainitic cast iron	>600	180–350	<43	S	20–30	0.05–0.15
N1	Wrought aluminium alloys	–	–	–	H	20–40	0.1–0.2
N2	Aluminium alloys with low Si content	–	–	–	H	20–40	0.1–0.2
N3	Aluminium alloys with high Si content	–	–	–	H	20–40	0.1–0.2
N4	Copper, brass and zinc base	–	–	–	H	20–40	0.1–0.2
S1	Iron-based heat-resistant alloys	500–1200	160–260	25–48	Z1	10–20	0.05–0.1
S2	Cobalt-based heat-resistant alloys	1000–1450	250–450	25–48	Z1	10–20	0.05–0.1
S3	Nickel-based heat-resistant alloys	600–1700	160–450	<48	Z1	10–20	0.05–0.1
S4	Titanium and titanium alloys	900–1600	300–400	33–48	Z1	10–20	0.05–0.1

The cutting data listed are guidelines! They depend on the amount of the unevenness of the bore edges (e.g. high slope > low cutting value).
For materials that are difficult to machine or uneven bore edges, we recommend applying cutting speeds that are at the lower end of the range.

Operating instructions

> Blade change
> Spring change

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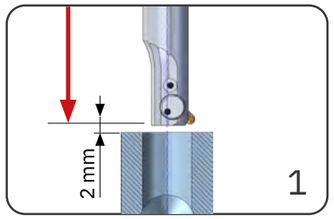
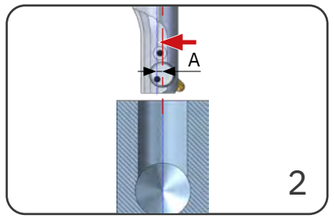
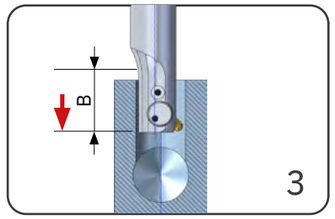
COFA-X PROCESS STEPS



- Spindle stop
- Approach by rapidly traversing with offset 0 spindle orientation[2] (=M19).



- Offset value **A** (value depends on the tool, see customer drawing)



- Rapid feed to max. **B** (value depends on the tool, see customer drawing)

Example

```
M5
G0 X0 Y0 M19
G0 Z+27.0[1]
```

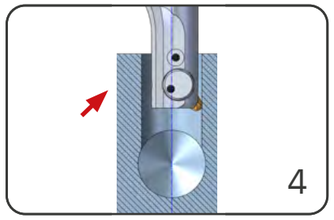
```
G0 Y+1.12
```

```
G0 Z+10.0[3]
```

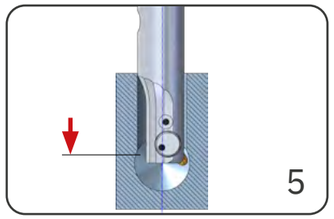
[1] 27.0=50.0/2+2.0

[2] Spindle orientation: The position of the cutting edge must be aligned in advance so that it can be moved in the offset direction.

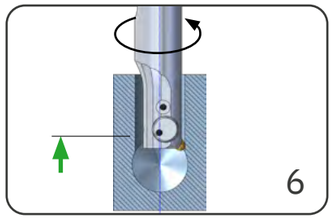
[3] 10.0=50.0/2-15.0(=B)



- Offset value 0 (centre of bore axis, bore edge is lightly touched)



- Rapid feed to the starting position



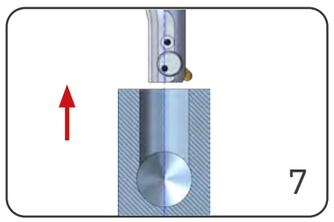
- Spindle rotation anti-clockwise
- External coolant on
- Working feed

```
G1 Y+0.0 Z+11.12
```

```
G0 Z+0.0
```

```
S800 M4
M8
G1 Z+7.0[3] F80
```

[4] 7.0=5.0+2.0

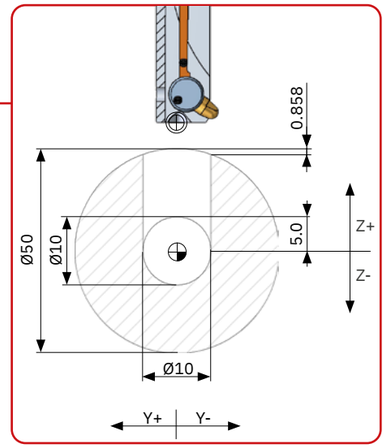


- Spindle stop!
- Rapid feed out of the workpiece

```
M5
G0 Z+27.0
```

Important:
COFA-X works in the **anti-clockwise direction**, meaning the spindle must be programmed to rotate anti-clockwise.

APPLICATION AND PROGRAMMING EXAMPLE



Application data

Material:	St50-1 (P3)
Bore Ø:	Ø10.0 mm
Workpiece:	Ø50.0 mm
Machining:	rear bore edge only

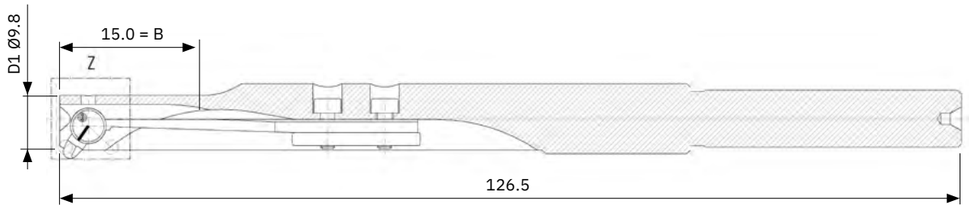
Tool and blade selection

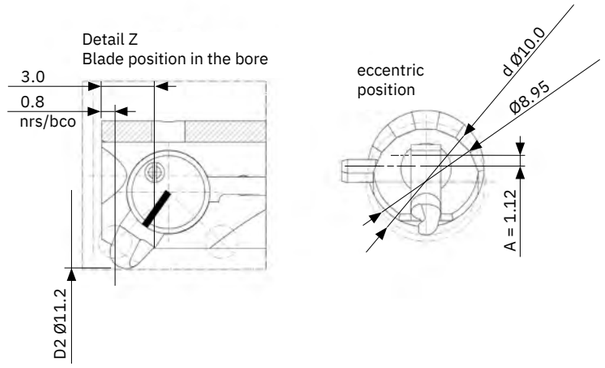
Tool:	COFA-X
Blade:	backward cutting only left-hand cutting

Cutting data

Cutting speed V_c:	20–30 m/min.
Tool working feed:	0.05–0.15 mm/rev

TOOL FOR APPLICATION EXAMPLE





Attention!
Each COFA-X is application-specific, i.e. specifically designed for the individual deburring task. When programming, do not use the values from the programming/tool example above, but use the values from your own tool drawing.

COFA-X