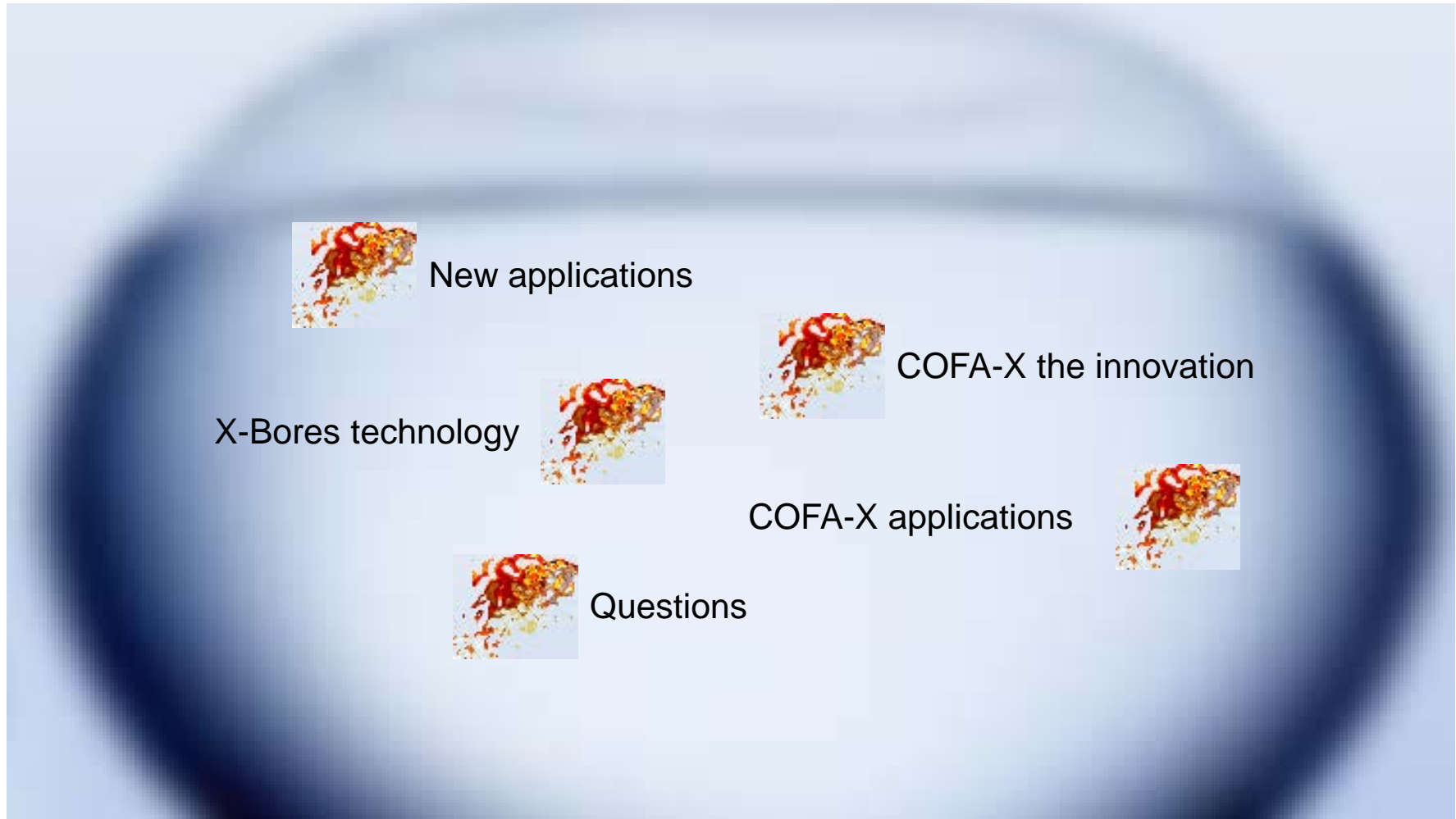


# Welcome

## **X-Bores-Technology** The key to completely new applications.

*René Kehl, Key Account Manger, HEULE Werkzeug AG*





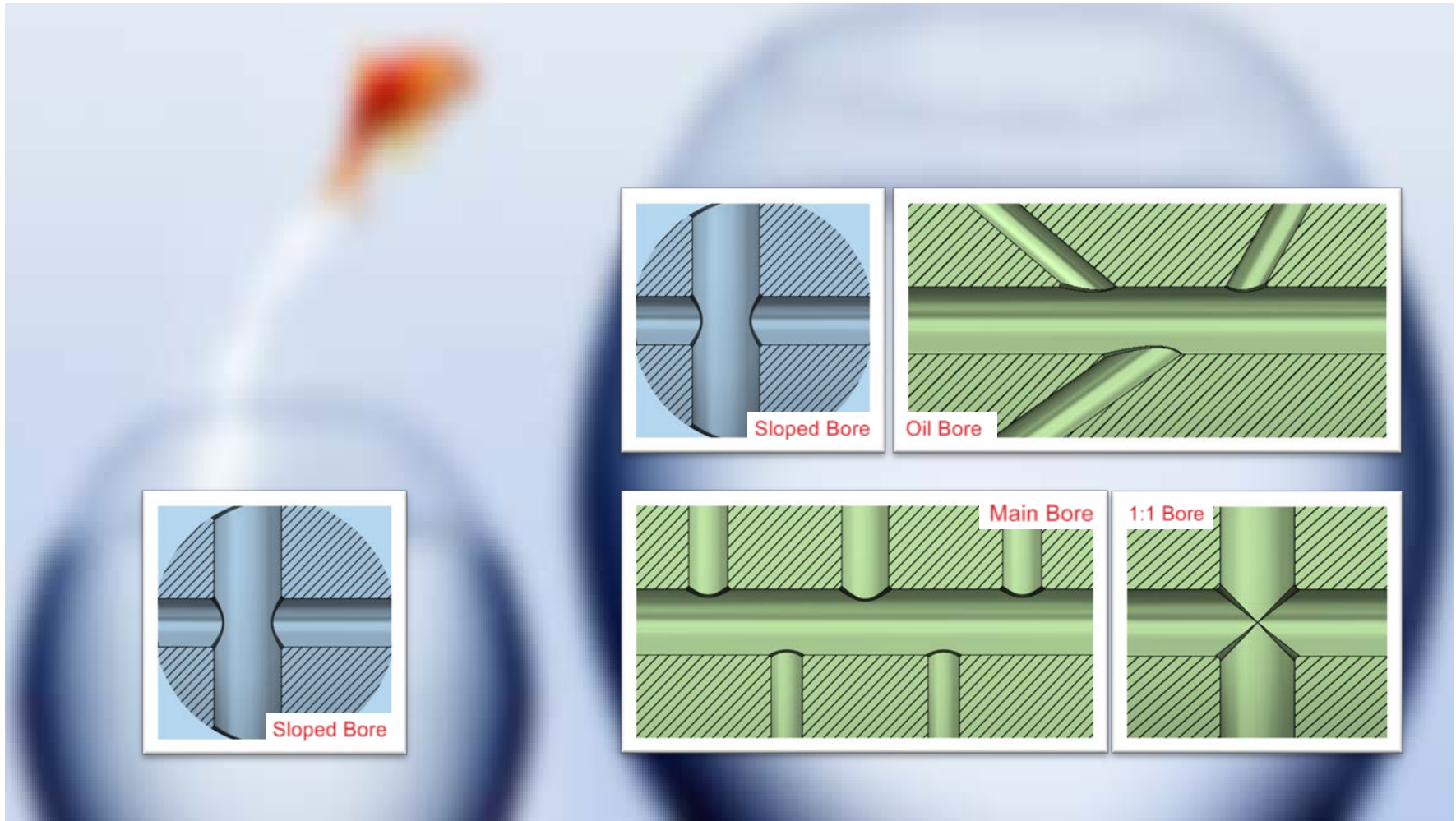
# Strength of HEULE Werkzeug AG



Innovative  
High value  
Familiar  
Solid  
Global

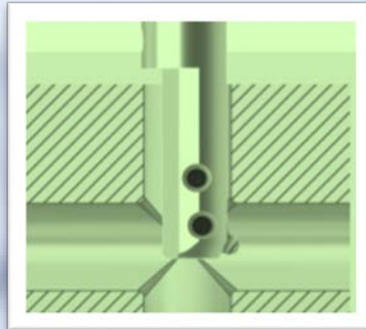
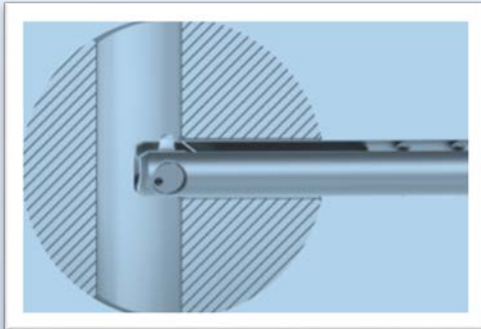
# Possibility of completely new applications

## X-Bores technology



# Tool families

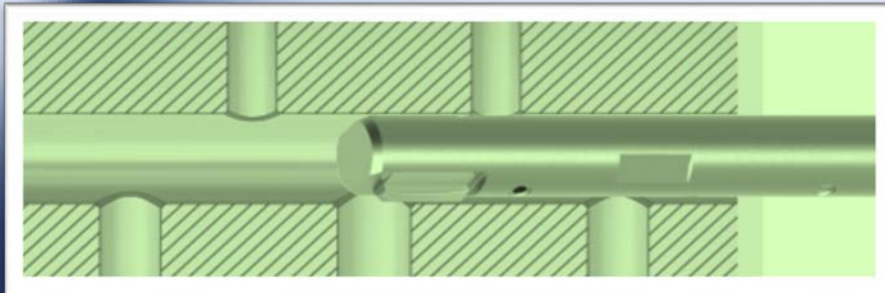
## X-Bores technology



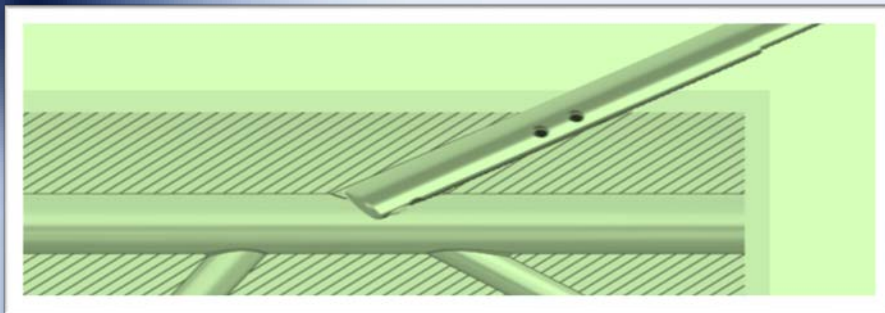
**COFA**



**COFA-X**

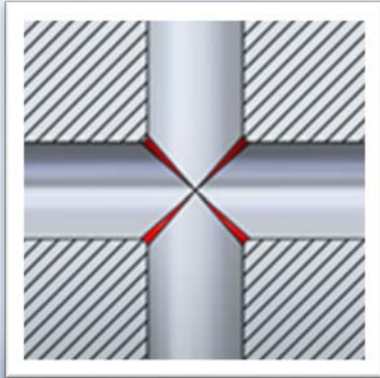


**SNAP-X**

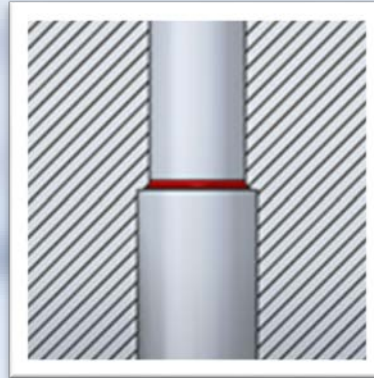


**CBD (Cross Bore Deburring)**

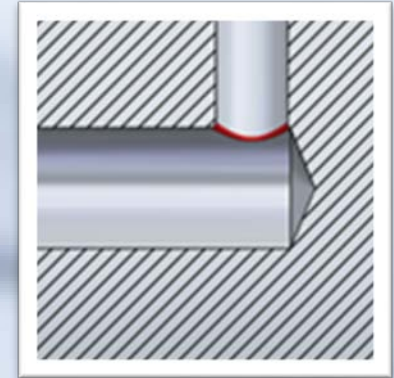
# Applications with COFA-X X-Bores technology



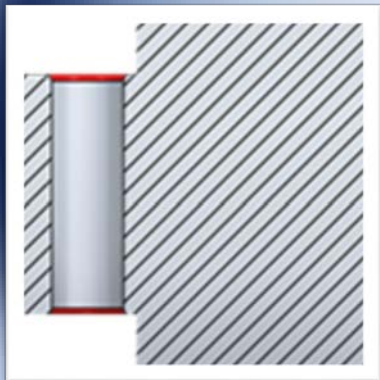
Ratio 1:1



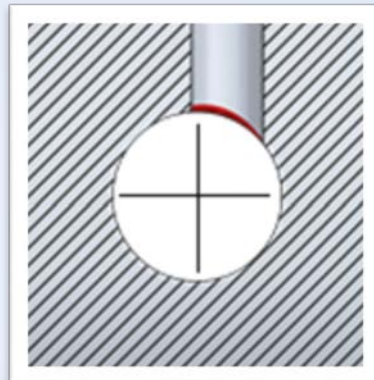
Merge into another



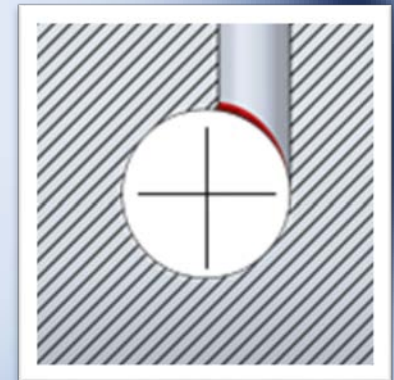
Interfering edges



Interfering edges



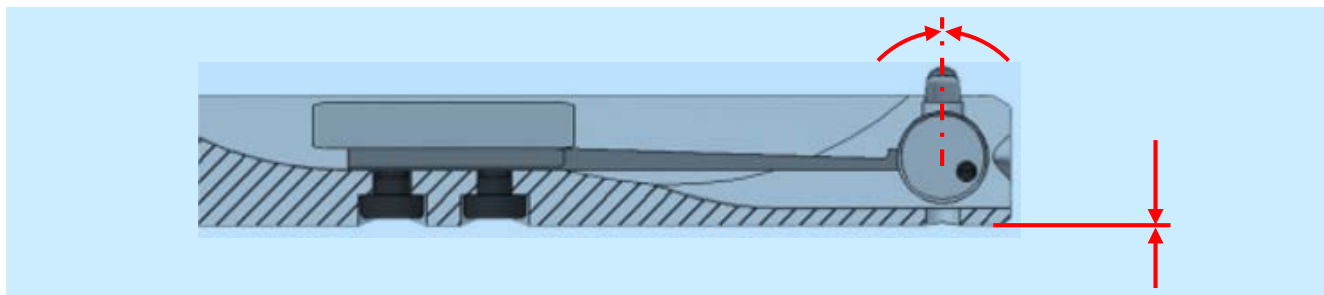
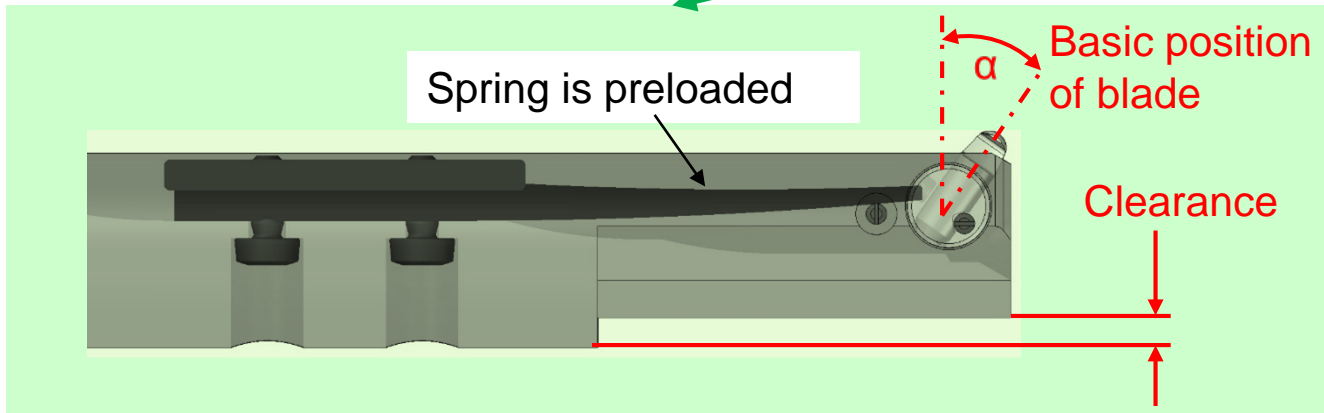
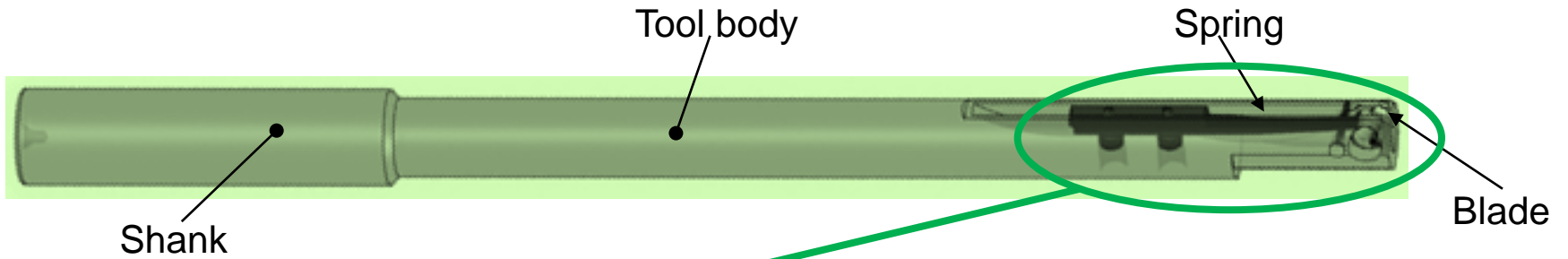
Small center axis offset



Big center axis offset

# Tool design

## Deburring tool COFA-X

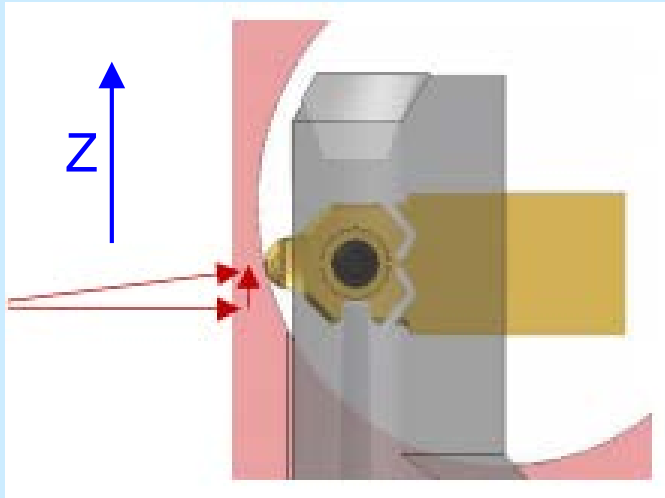


Compared with COFA

# Reliability due to blade kinematics

## Deburring tool COFA-X

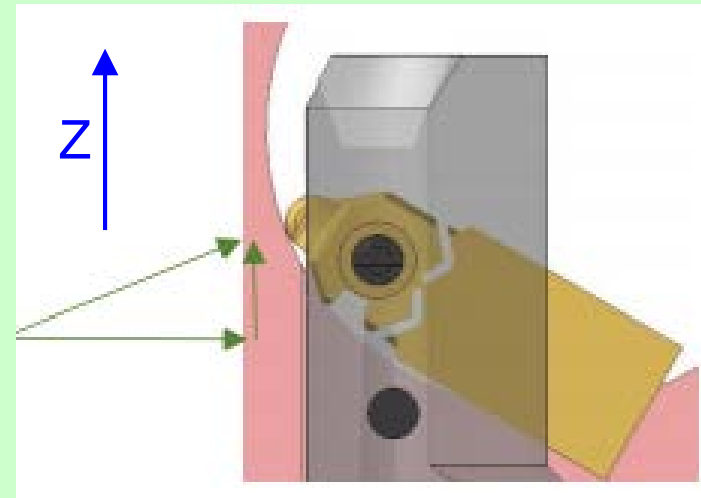
### Basic position of COFA blade



The force vector in the Z direction is too little to rotate the blade into tool body.

Most of the force goes radially into the blade → **blade breakage !**

### Basic position of **COFA-X** blade



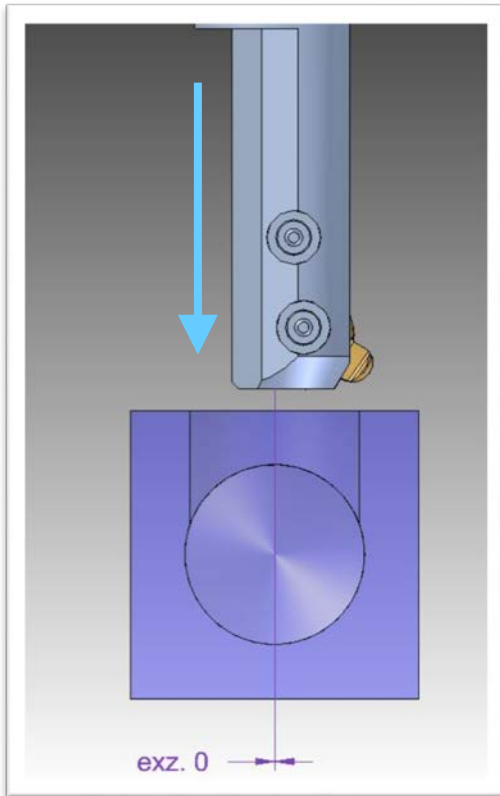
The force vector in the Z direction has enough power to rotate the blade into tool body.

The blade deburrs and rotates into the tool body. → **no blade breakage !**

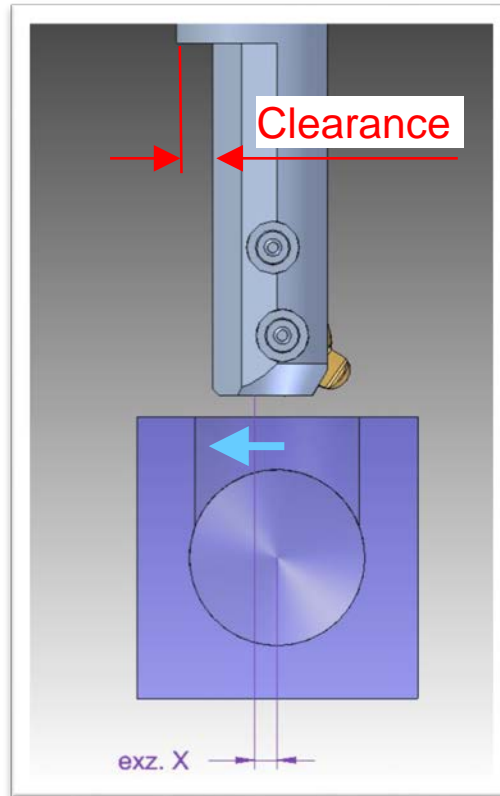


# Program flow «move into workpiece»

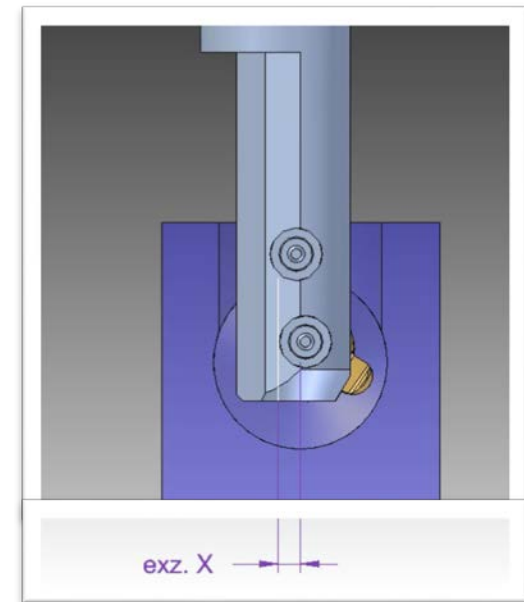
## Deburring tool COFA-X



- With spindle stopp
- Spindle oriented approach
- Offset 0



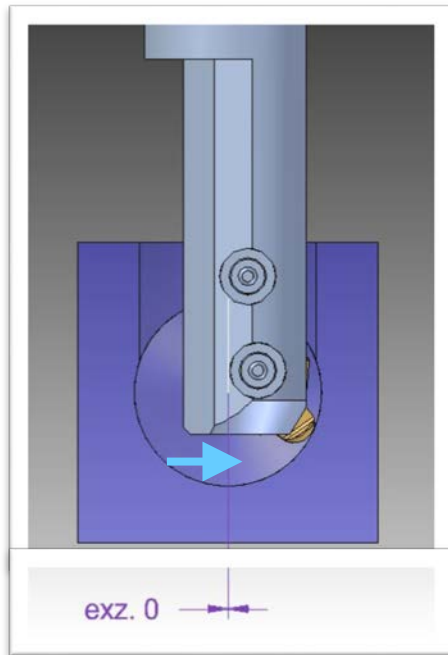
- Offset (outside center)



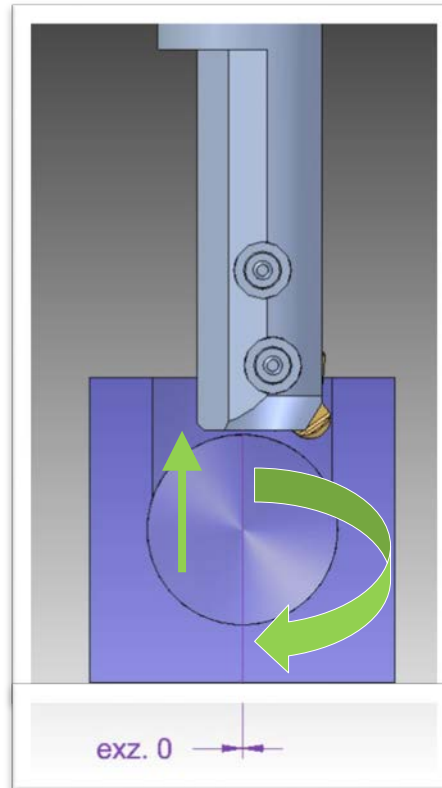
- Move inside the bore (the blade is behind the bore edge)

# Program flow «deburring and move out»

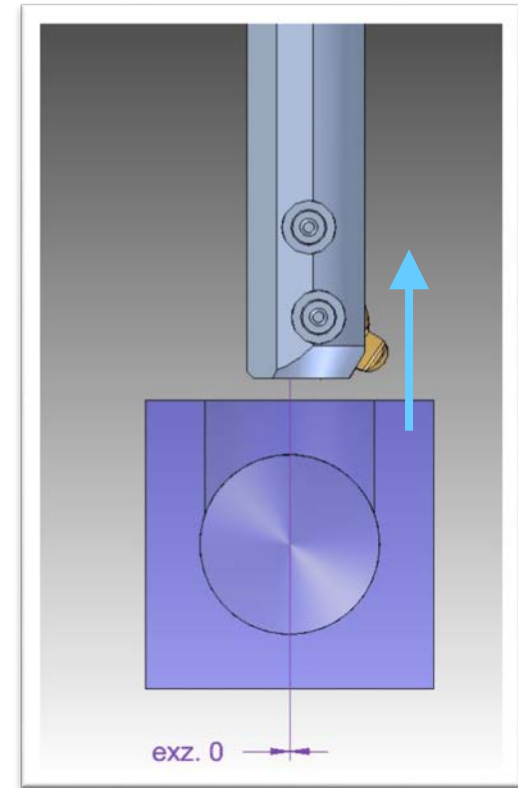
## Deburring tool COFA-X



- Back to offset 0 (blade is pushed forward)



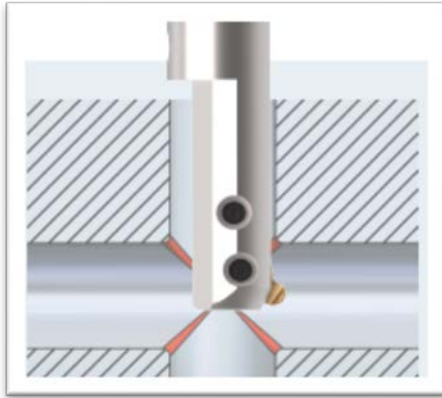
- Spindle on
- Deburring backwards (working feed)



- Move outside the workpiece

# Limitations of the application

## Deburring tool COFA-X



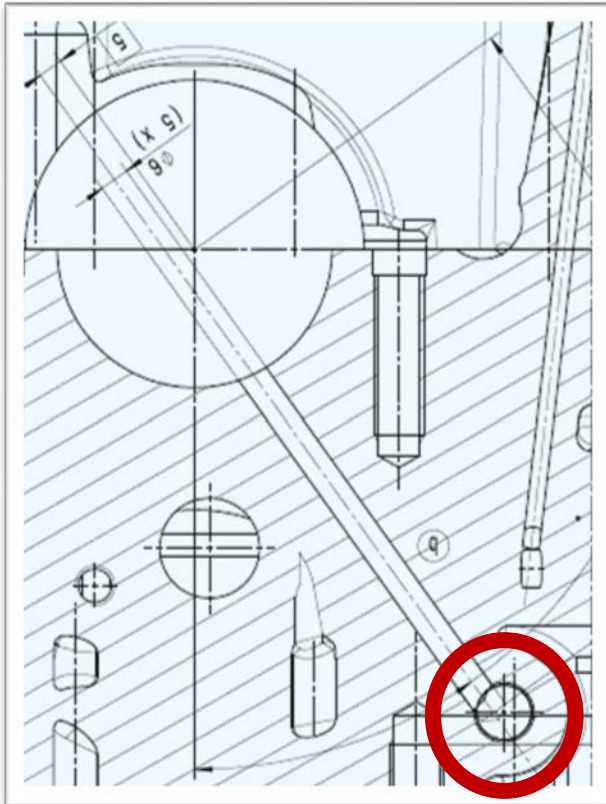
- Starts with bore diameter 4.0 mm
- Special blade with free angle of 30° and additional steering elements
- Deburring only backwards or only forwards, not combined as with COFA
- Maximum working length depends on bore diameter and whether one or two-part tool



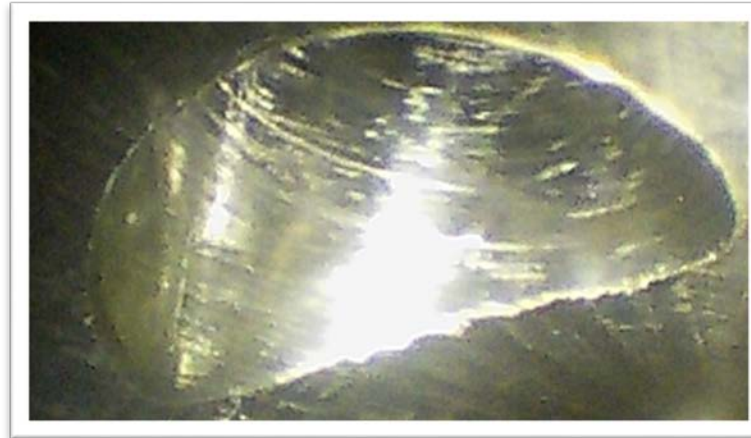
- **NO interrupted cutting surface → blade breaks !!**

# Application: Crankshaft housing

## Deburring tool COFA-X



- Drill  $\varnothing$  6.0 mm
- Main bore  $\varnothing$  11.0 mm
- Axis offset 1.8 mm



Drilled

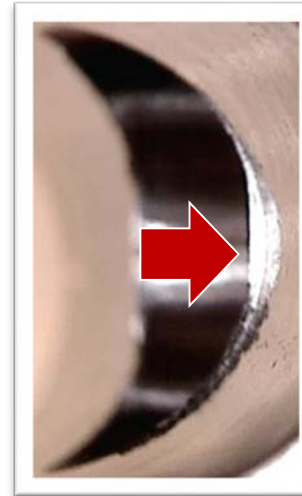
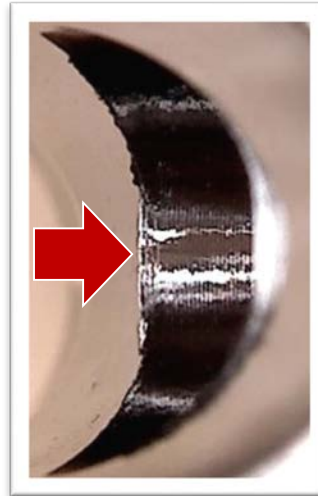
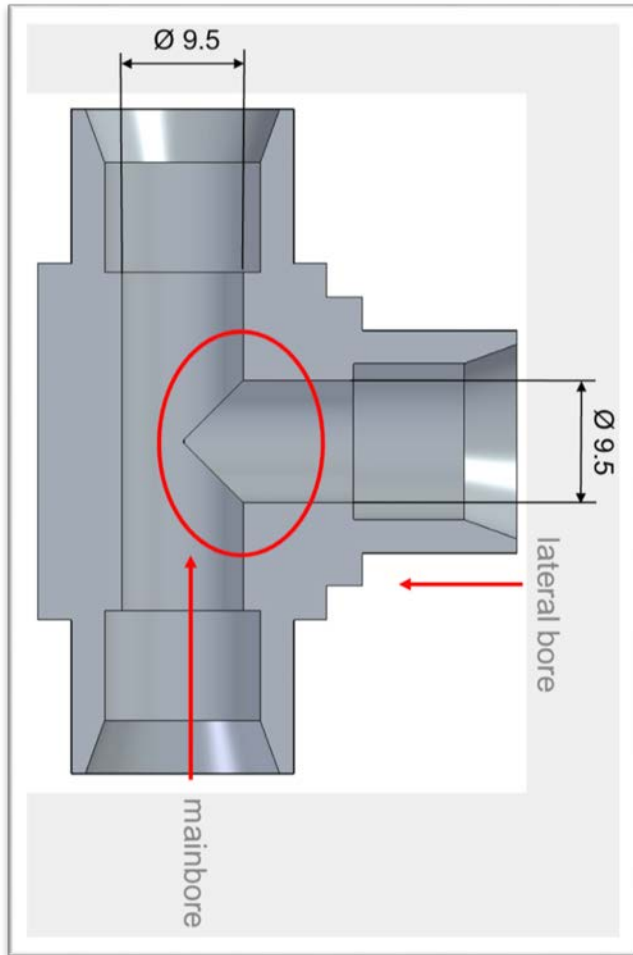


Deburred

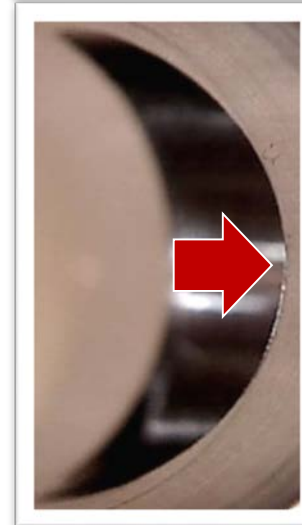
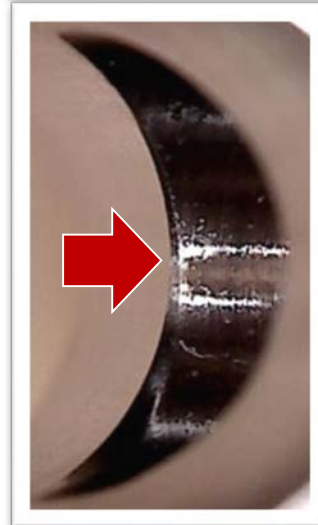
S1000 [rev./min]  
f 0.05 mm/rev.

# Application: Hydraulic fittings

## Deburring tool COFA-X



Drilled

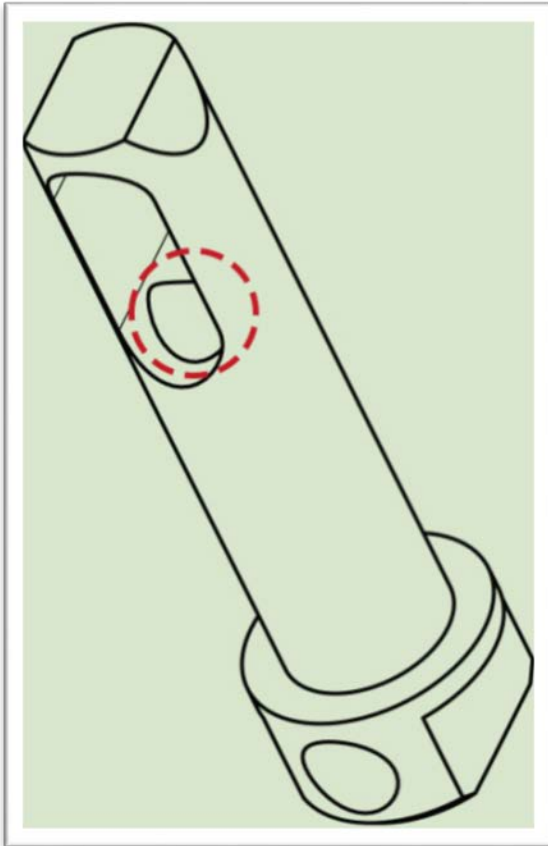


Deburred

S300 [rev./min]  
f 0.05 mm/rev.

# Application: Springbolt

## Deburring tool COFA-X



- Bore  $\varnothing 4.0$
- Slot width 4.1 mm
- Material 1.4301



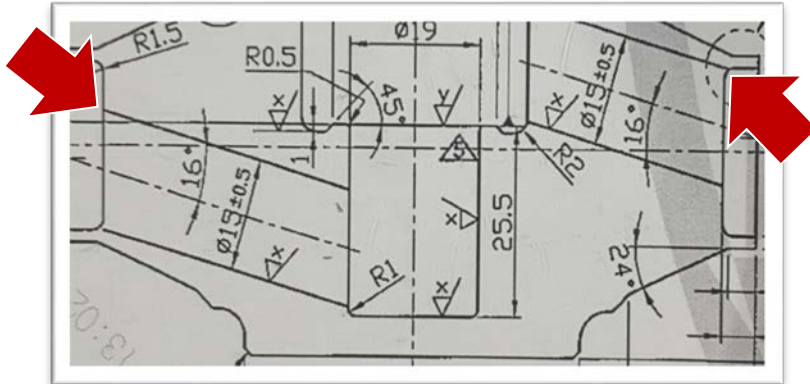
### Deburred

S800 [rev./min]  
f 0.03 mm/rev.

Life time of  
blade:  
9500 bores

# Application: Fittings-valve

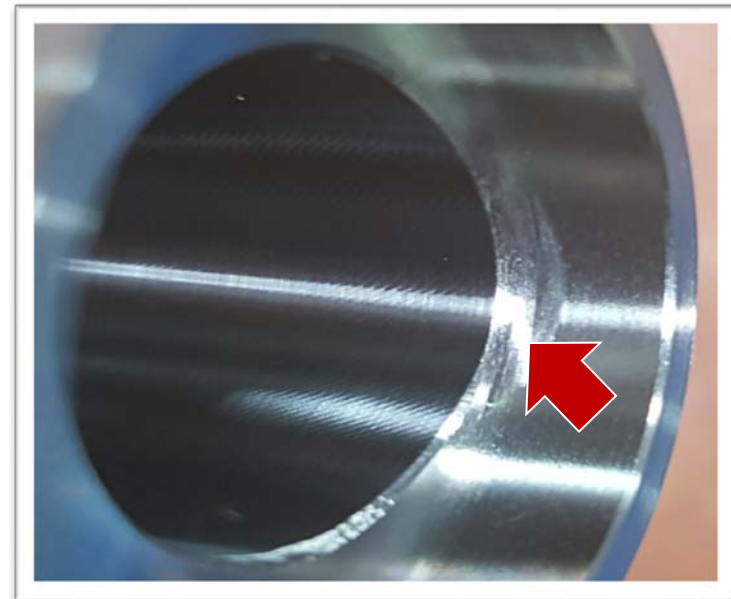
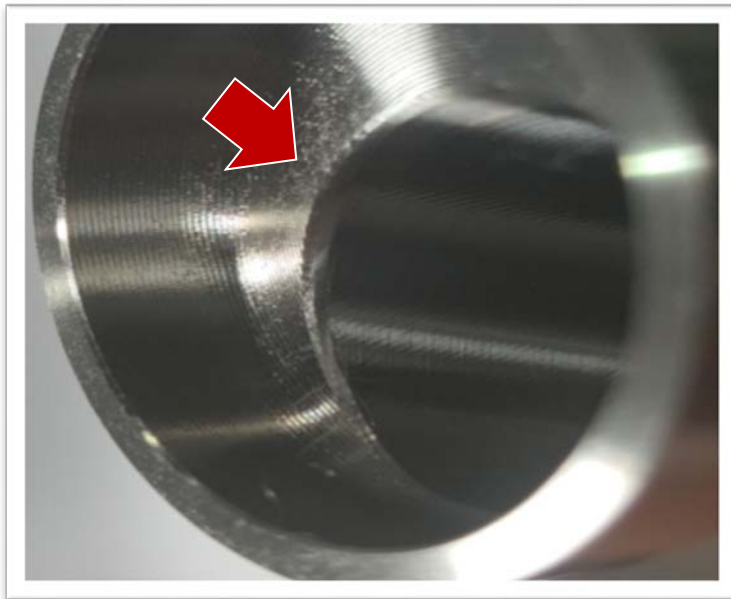
## Deburring tool COFA-X



- Bore  $\phi 15.0$
- Material SS316

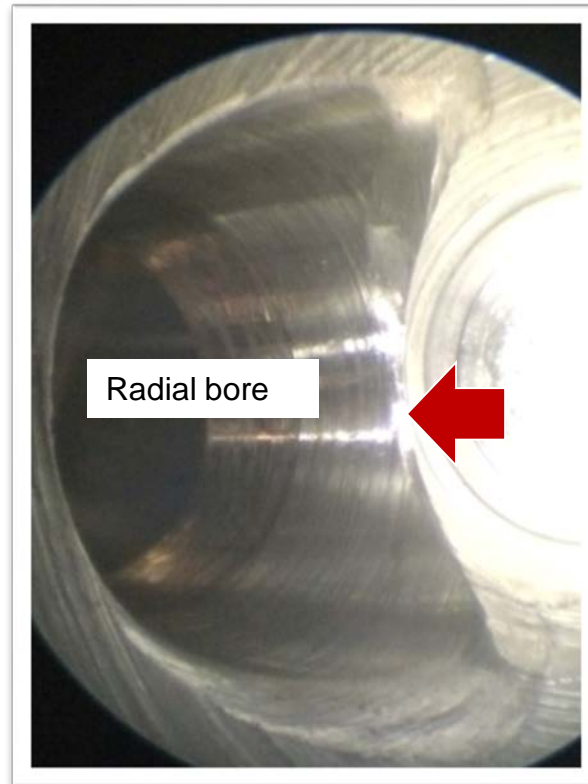
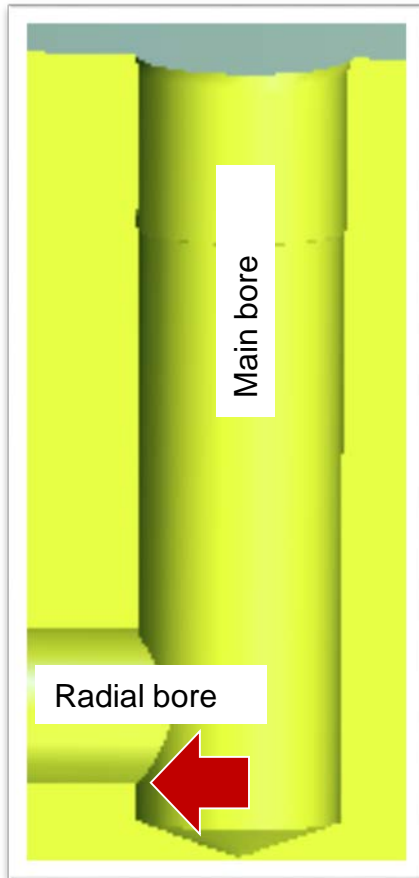
### Deburred

S200 [rev./min], f 0.13 mm/rev.



# Application: Pump housing

## Deburring tool COFA-X

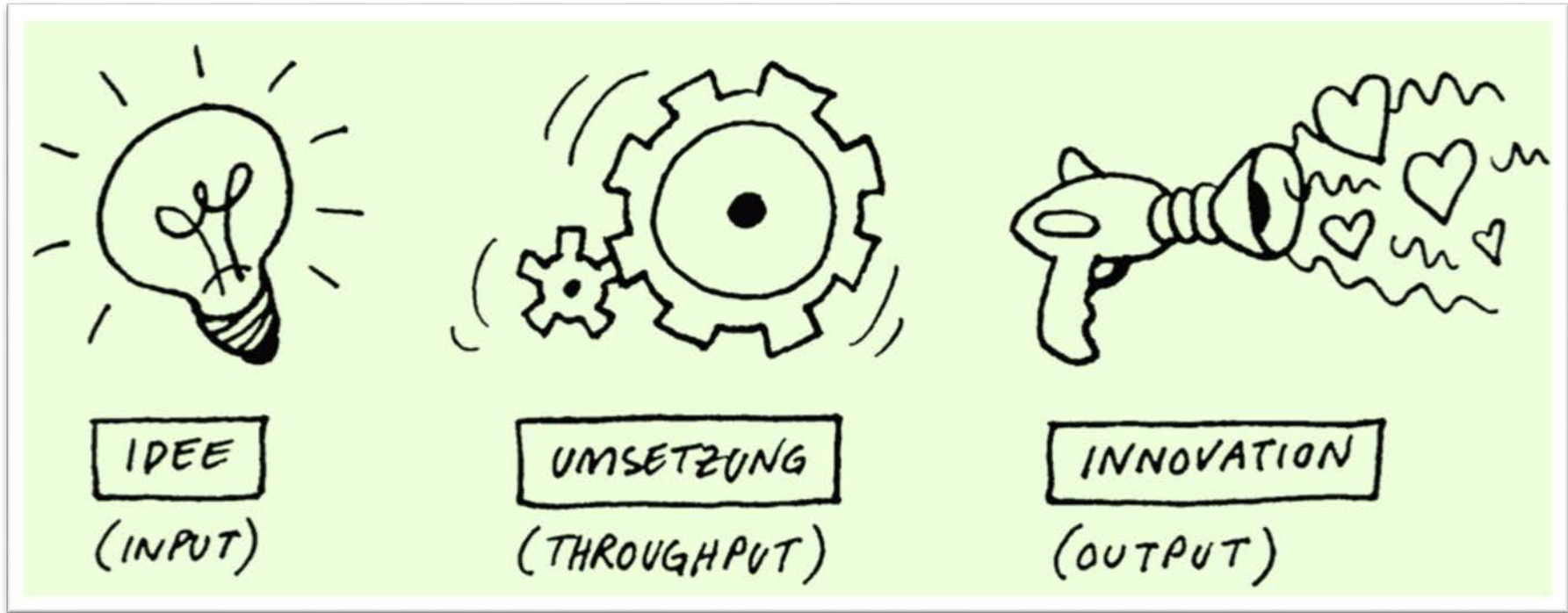


Deburred  
S300 [rev./min], F30 mm/Min.

- Radial bore  $\varnothing 4.7$
- Main bore  $\varnothing 5.0$
- Material X17CrNi16



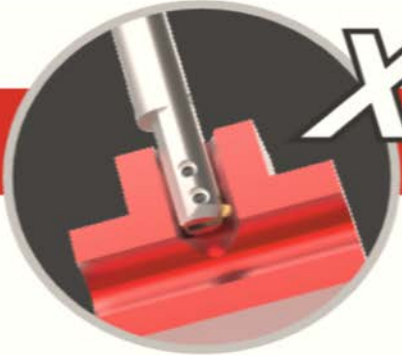




Each inquiry is checked in terms of technical feasibility and R&D capacity.

Thank you for your attention

# Do You have any Questions ?



**Probleme beim Entgraten?**  
*Deburring problems?*

**Die Lösung.**  
*The Solution.*

**X BORES**

Meet us in Hall1 / Booth 602