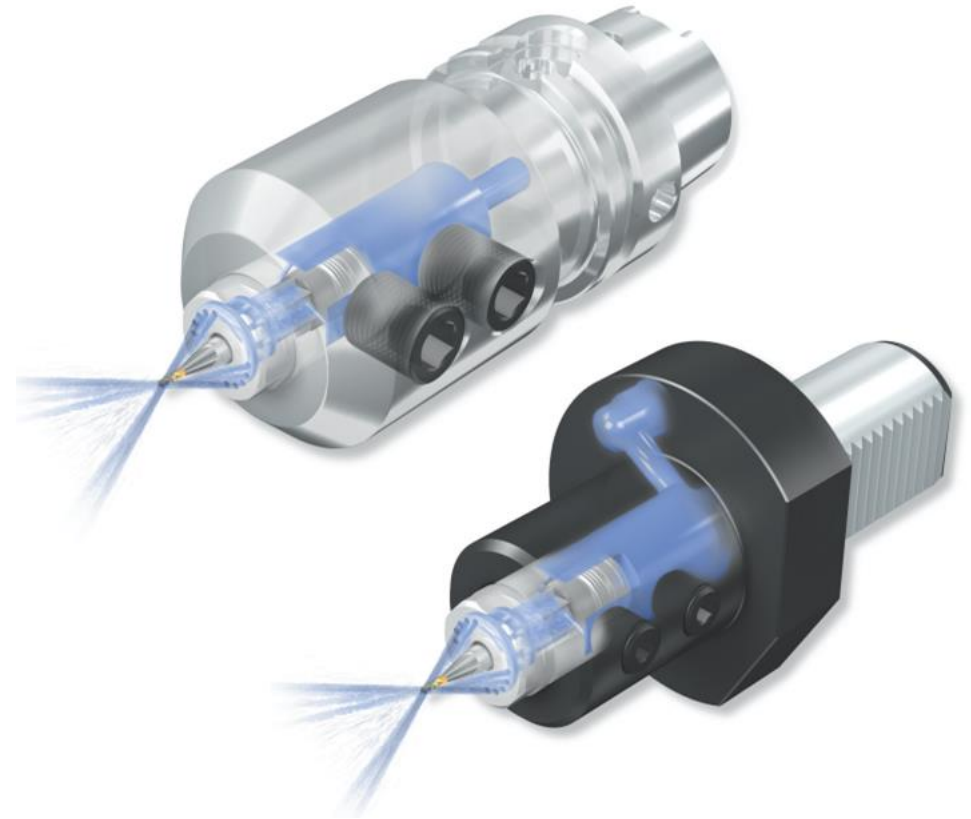
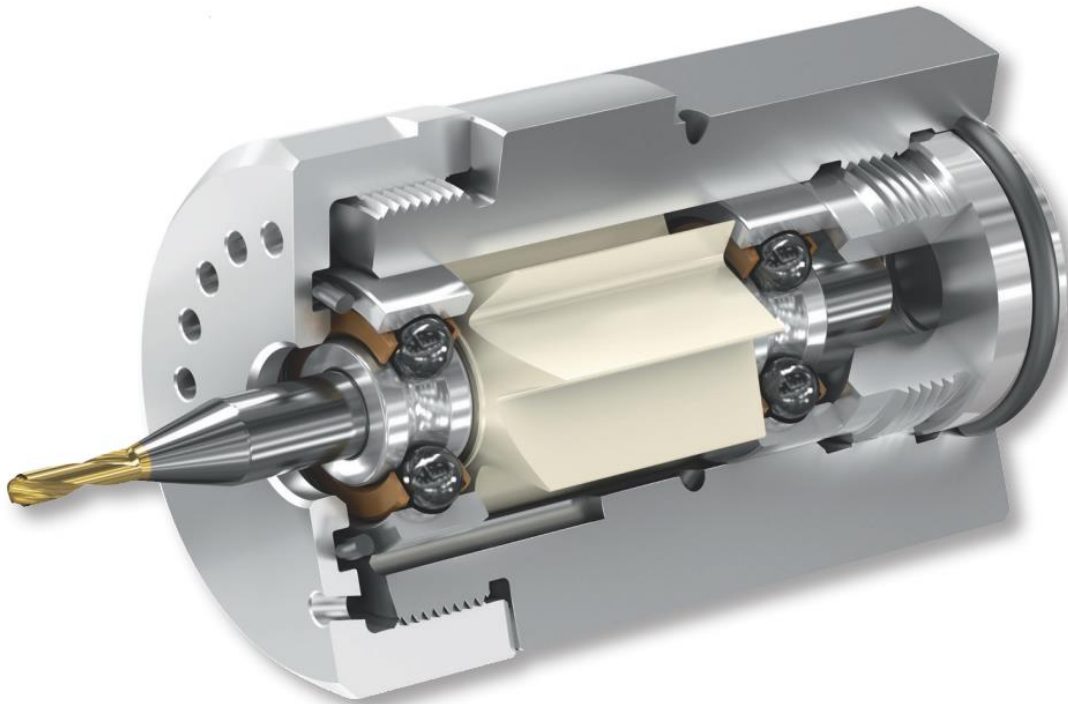
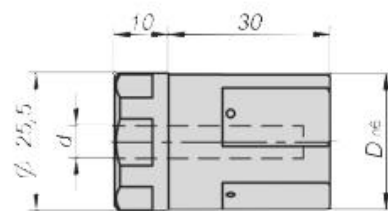


# CoolSpeed<sup>®</sup> mini

**WTO**  
*Higher Productivity*

Affordable evolutionary high rotation speeds up to 75,000 RPM!





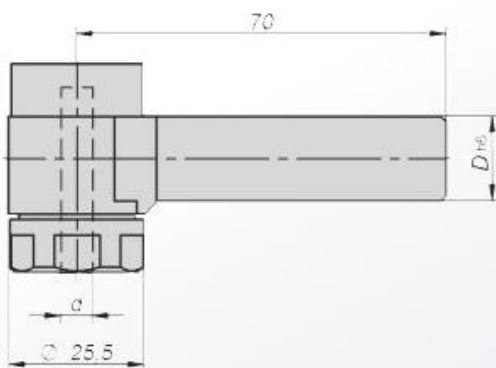
**CoolSpeed mini**

D = Ø25 mm 700100025  
D = Ø1" 700100 1000



**CoolSpeed mini Air**

D = Ø25 mm 700200025  
D = Ø1" 7002001000



**CoolSpeed mini 90**

D = Ø16 mm 700500016  
D = Ø5/8" 7005000625



**CoolSpeed mini Air 90**

D = Ø12 mm 700600012  
D = Ø1/2" 7006000500

**CoolSpeed mini spindles are driven by through-coolant or oil.**

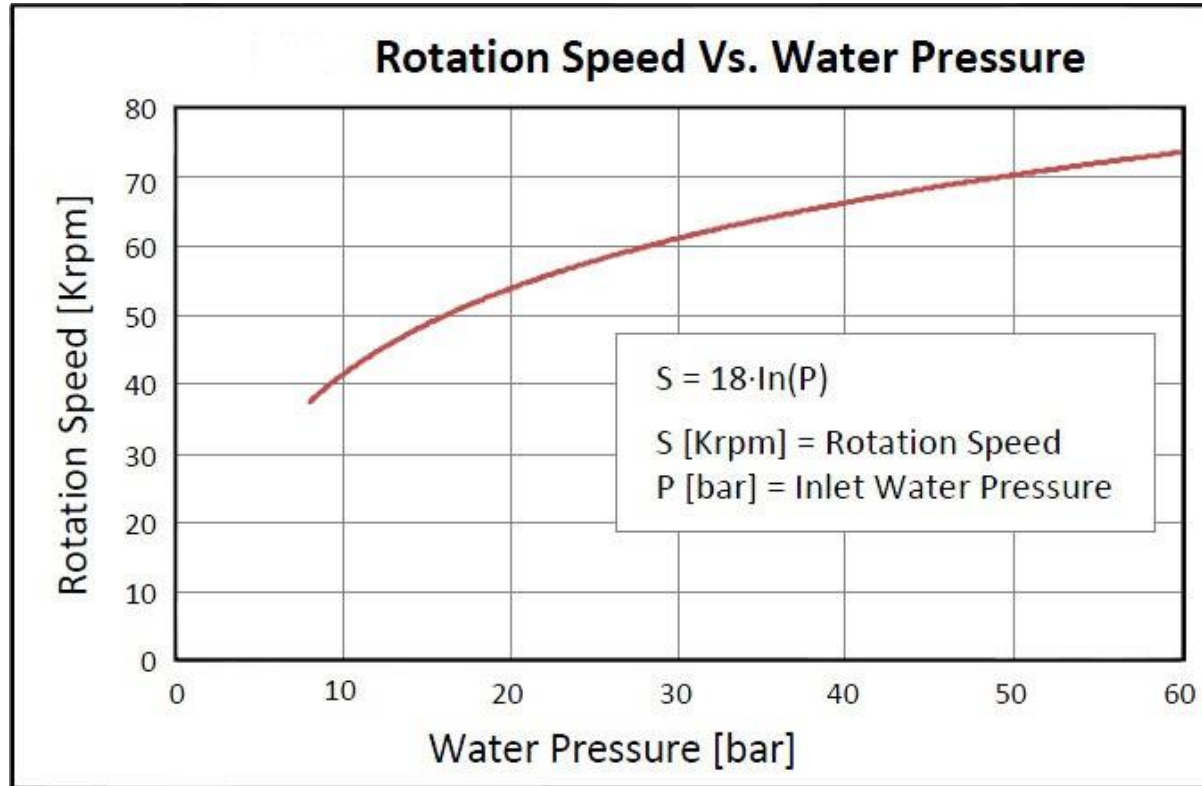
**They provide for very high rotation speeds while maintaining perfect run-out values.**

CoolSpeed mini is designed to machine the workpiece top surface and perform milling, drilling, chamfering and engraving. It requires no machine adaptations, it fits into standard – sealed – tool holders, and several CoolSpeed mini units may be applied into the machine magazine during the machine set-up.

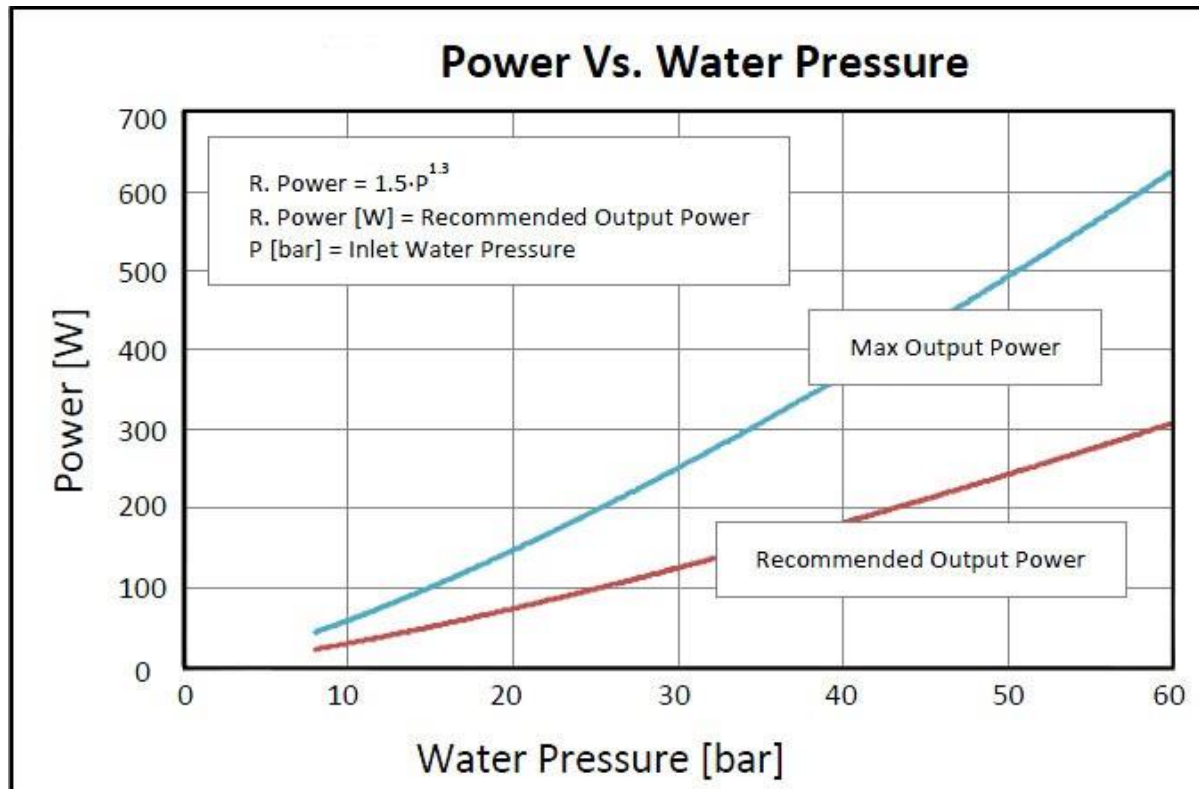
The CoolSpeed mini spindles provide for significant cost reductions, including:

- Longer tool life
- Shorter machining times
- Longer main spindle life
- Freeing machine to perform other tasks



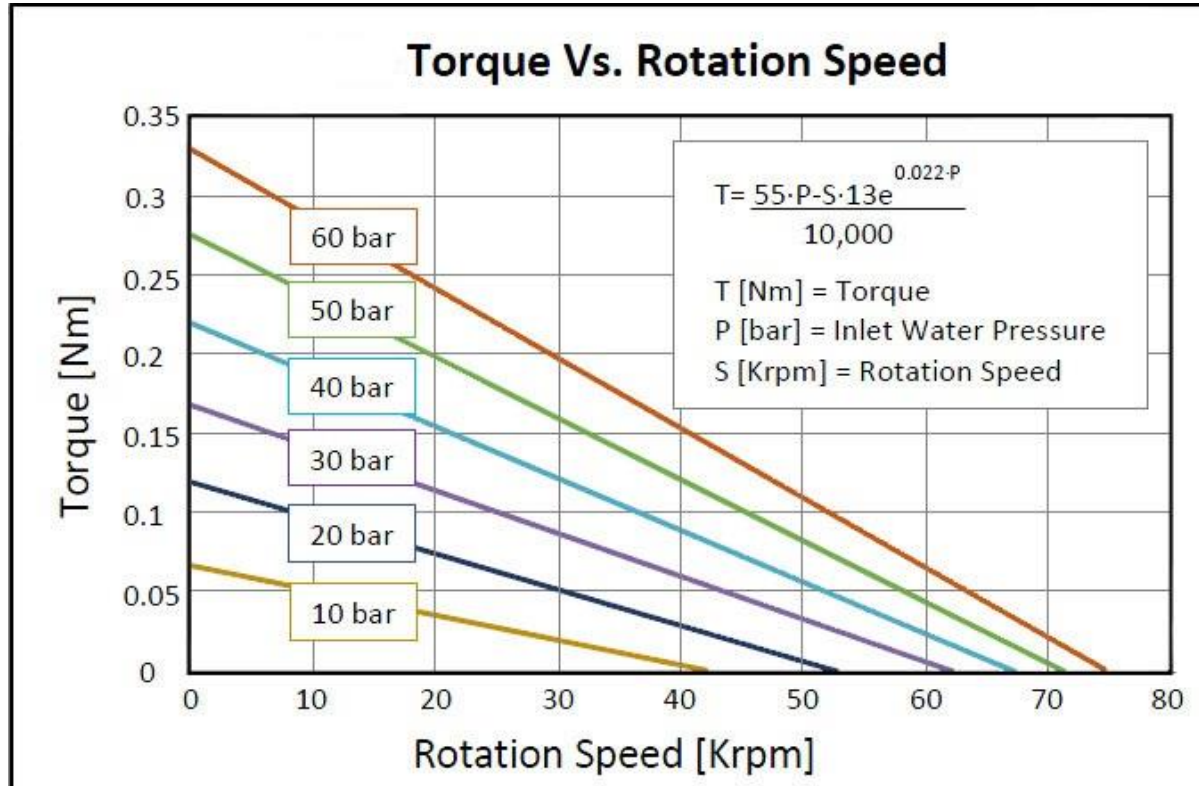


- This chart illustrates the logarithmic nature of the rotation speeds measured at different pressure levels.
- The formula displayed within the chart can be used to calculate the rotation speed at any pressure level.
- The curve and equation relate to average values. The actual results lie within a small variance from the curve.
- The labeled “Water Pressure” may refer to any liquids with similar viscosity as water (i.e. all types of emulsion/cooling liquid).
- The rotation speed levels shown here are the no-load speeds (i.e. no torque acting upon the shaft).

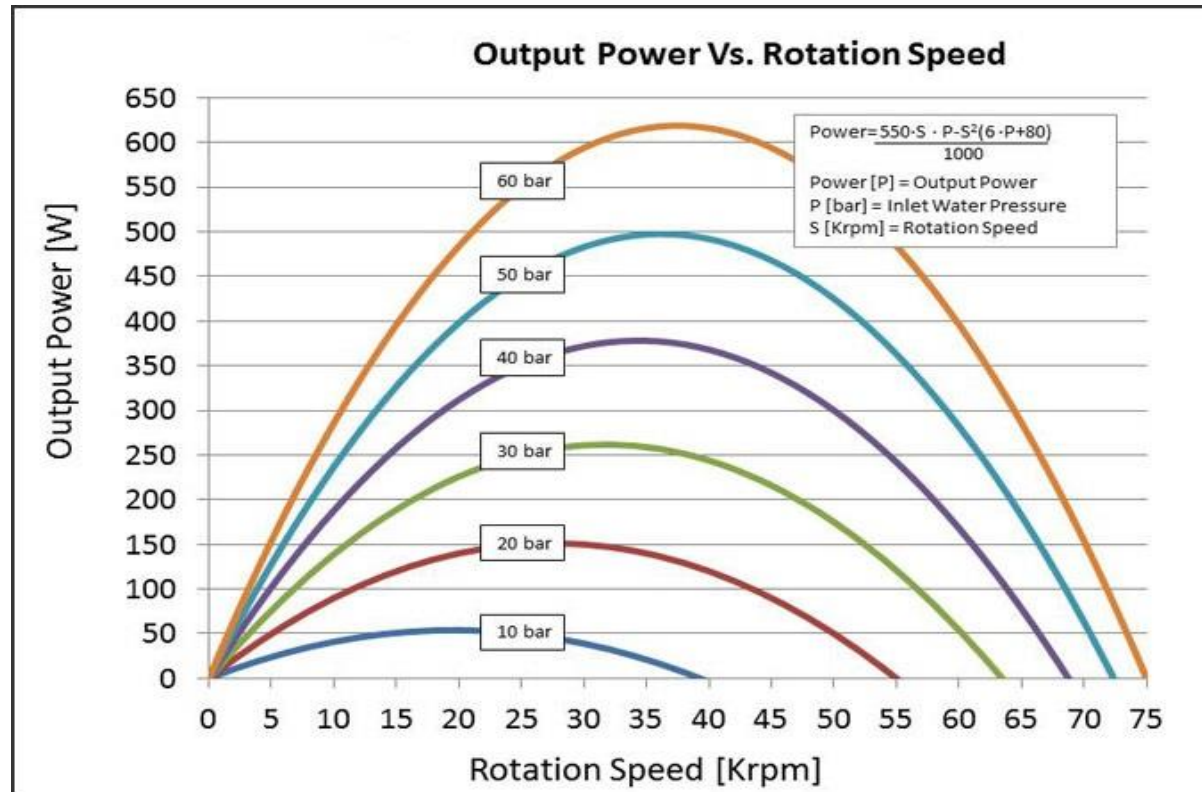


- This chart illustrates maximum and recommended output power levels measured at different pressure levels.
- The formula displayed within the chart can be used to calculate the output power at any pressure level.
- The max output power curve is meant as a reference only and should not be used for an actual job. Working near this curve will put the spindle at risk of operating failure and damages may result.
- It is suggested to locate the job's required output power close to or below the "Recommended Output Power" curve, resulting in improved speed stability.





- This chart illustrates the relationship between the torque and the actual rotation speed.
- The formula displayed within the chart can be used to calculate the torque at any rotation speed. Notice that by definition, maximum torque occurs at zero rotation speed resulting in no power. Likewise, at maximum rotation speed there is no available torque, therefore producing zero power.



- This chart illustrates the parabolic relationship between output power and rotation speed at different pressure levels. Notice that there is no power available at zero and at maximum rotation speeds.
- This chart illustrates that any external load will cause a reduction in speed; the more power demanded, the greater the speed reduction. To the right of the peak lies the working area of the spindle, the peak being its limit. The spindle will stop rotating should the power exceed “Max Power”.

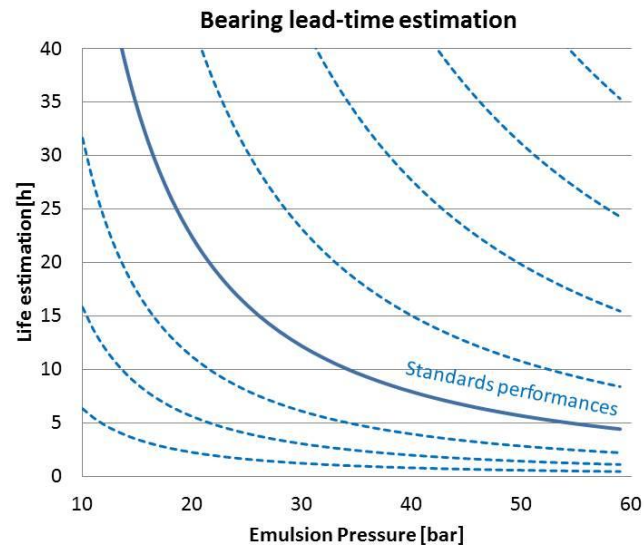
## Replacement Kit

The replacement kit includes 2 bearings and 1 turbine.  
It is replaced with each new tool (drill or mill).

There are unique replacement kits for tool shanks:

- 3 mm, 4 mm, 6 mm
- 1/8" , 3/16", 1/4"

\* Tool is not included.



### Set (2 bearings, 1 turbine)

Ø3 mm	709112003
Ø4 mm	709112004
Ø6 mm	709112006
Ø1/8"	7091130125
Ø3/16"	7091130187
Ø1/4"	7091130250



## Assembly Device

**The Assembly Devices are used to assemble the bearings and turbine onto the tool shank.**

Each diameter is unique and includes a precise ring inside.

There are separate assembly devices for tool shanks:

- 3 mm, 4 mm, 6 mm
- 1/8" , 3/16", 1/4"

\* Do not attempt to use alternative devices as you will damage the bearings and the CoolSpeed mini will not perform.



### Assembly device

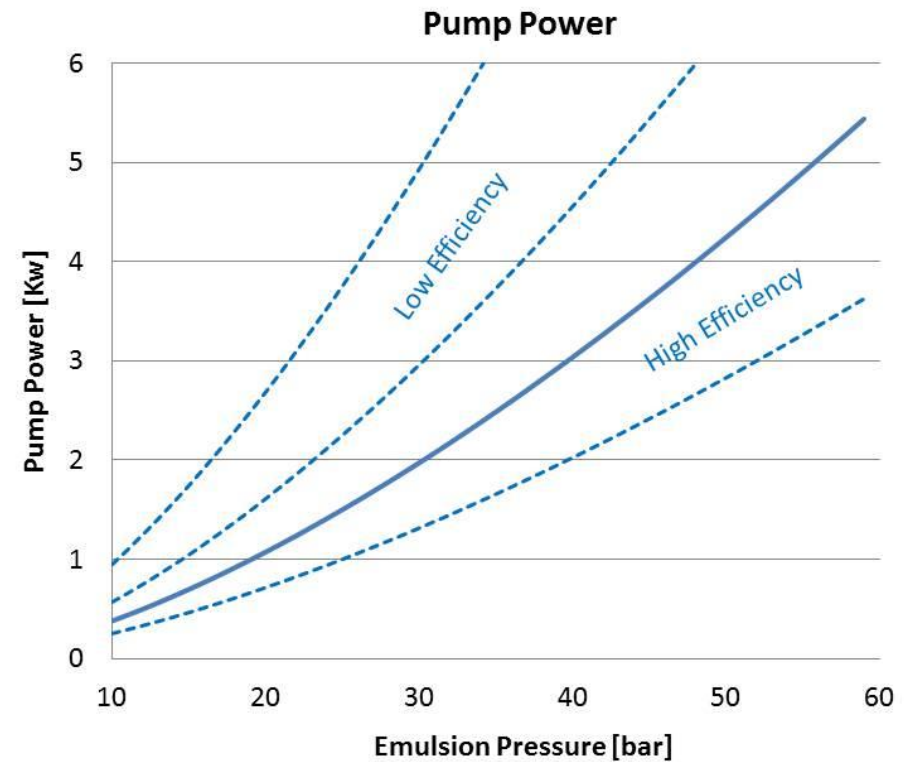
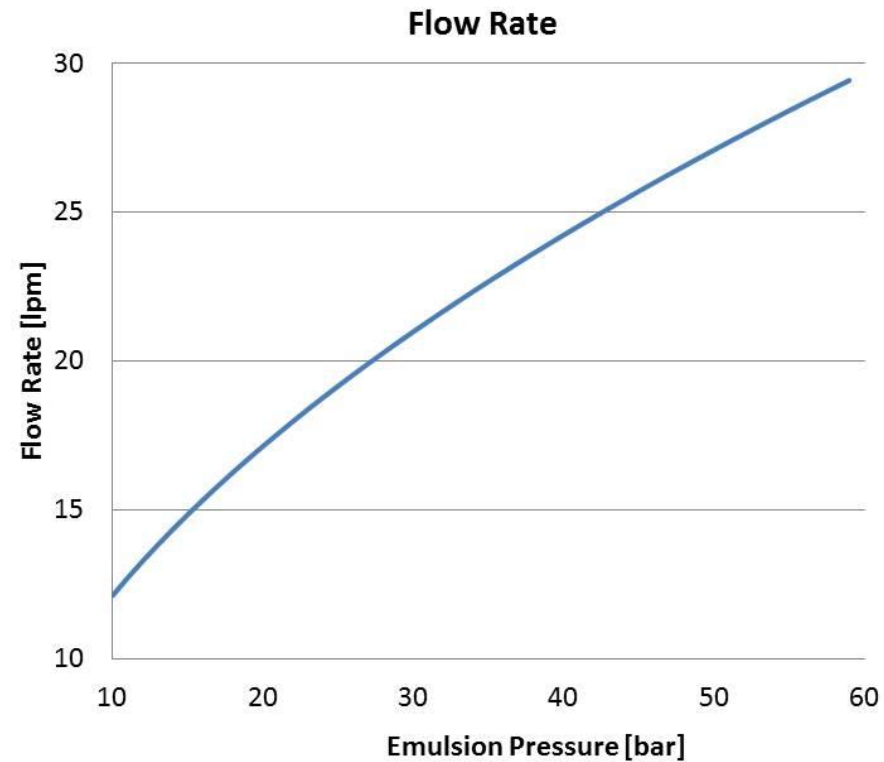
Ø3 mm	709212003
Ø4 mm	709212004
Ø6 mm	709212006
Ø1/8"	7092130125
Ø3/16"	7092130187
Ø1/4"	7092130250

## Pressure Device and Gauge

- The pressure device is used to measure the through coolant pressure at the main spindle end.
- This value is critical as it is used to calculate the CoolSpeed mini rotation speeds.
- The device fits into standard – sealed – tool holders, with ID 25 mm / 1 ”.
- The gauge is a standard pressure gauge; ¼ BSP thread, 60 bar, rear screw.



## Pump requirements



## Emulsion Types

Cutting fluid (Emulsion) is a type of coolant and lubricant designed specifically for metal working processes. There are various kinds of cutting fluids. They may be made from petroleum distillates, plant oil, water and air, or other raw ingredients. Most metalworking and machining processes can benefit from the use of cutting fluid, depending on work-piece material. Common exceptions to this are cast iron and brass, which are machined dry.

There are generally three types of liquids:

- Mineral emulsion
- Semi-Synthetic emulsion
- Synthetic emulsion

Semi-synthetic and synthetic cutting fluids represent attempts to combine the best properties of oil with the best properties of water by suspending emulsified oil in a water base. These properties include: rust inhibition, tolerance of a wide range of water hardness, ability to work with many metals, resist thermal breakdown, and environmental safety. Water is a good conductor of heat but has drawbacks as a cutting fluid. It boils easily, promotes rusting of machine parts, and does not lubricate well. Therefore, other ingredients are necessary to create an optimal cutting fluid.

**The CoolSpeed mini may use each type of emulsion to drive the turbine.**

**For calculating turbine rotation speed, we assume 95% water (viscosity and density).**





**CoolSpeed mini Air spindles are driven by mist lubricated air.**

**They provide for very high rotation speeds while maintaining perfect run-out values.**

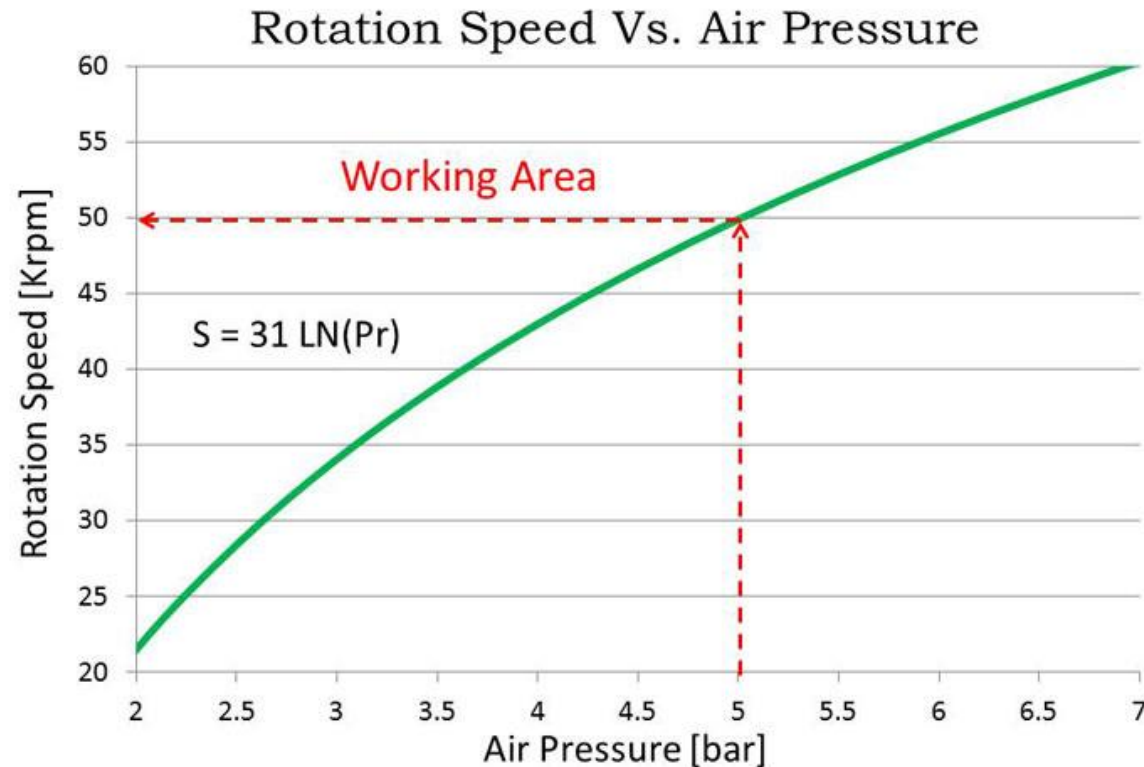
CoolSpeed mini Air is designed to machine the workpiece top surface and perform milling, drilling, chamfering and engraving. For those machines equipped with through main spindle mist, CoolSpeed mini Air requires no machine adaptations, it fits into standard – sealed – tool holders, and several CoolSpeed mini Air units may be applied into the machine magazine during the machine set-up.

For all other machines, an air hose may be adopted externally via a dedicated tool holder.

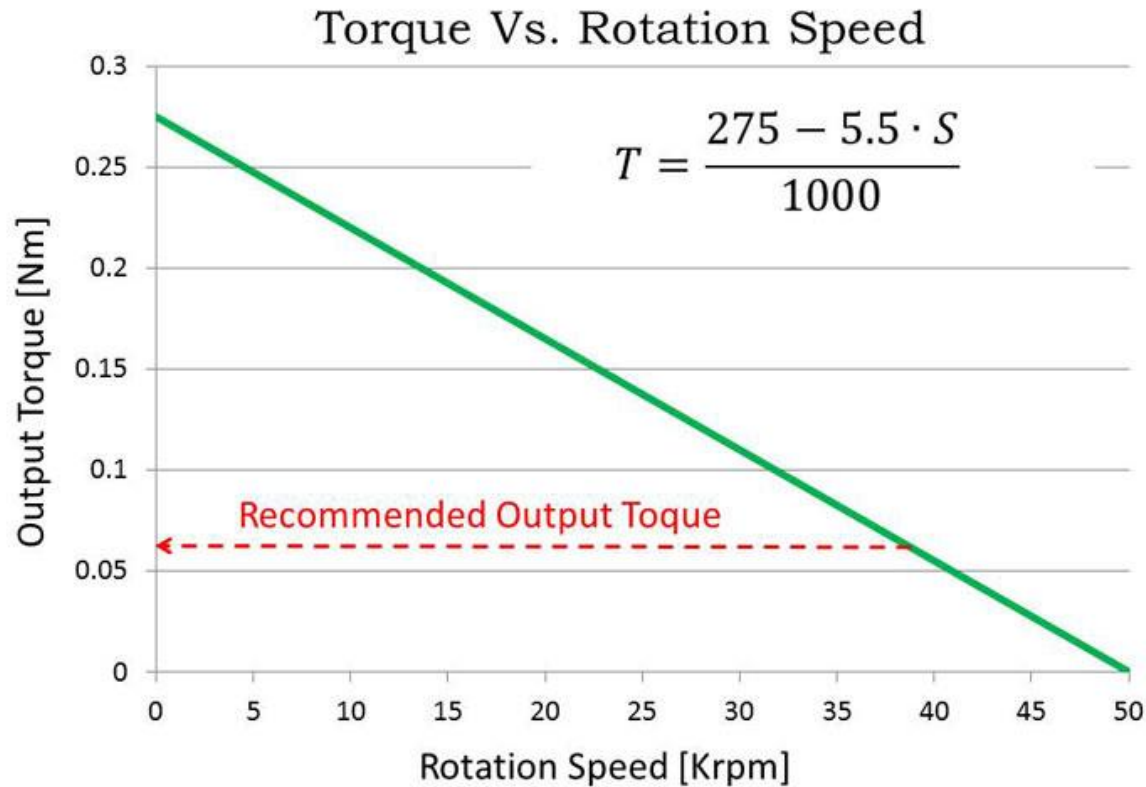
The CoolSpeed mini Air spindles provide for significant cost reductions, including:

- Longer tool life
- Shorter machining times
- Longer main spindle life
- Freeing machine to perform other tasks

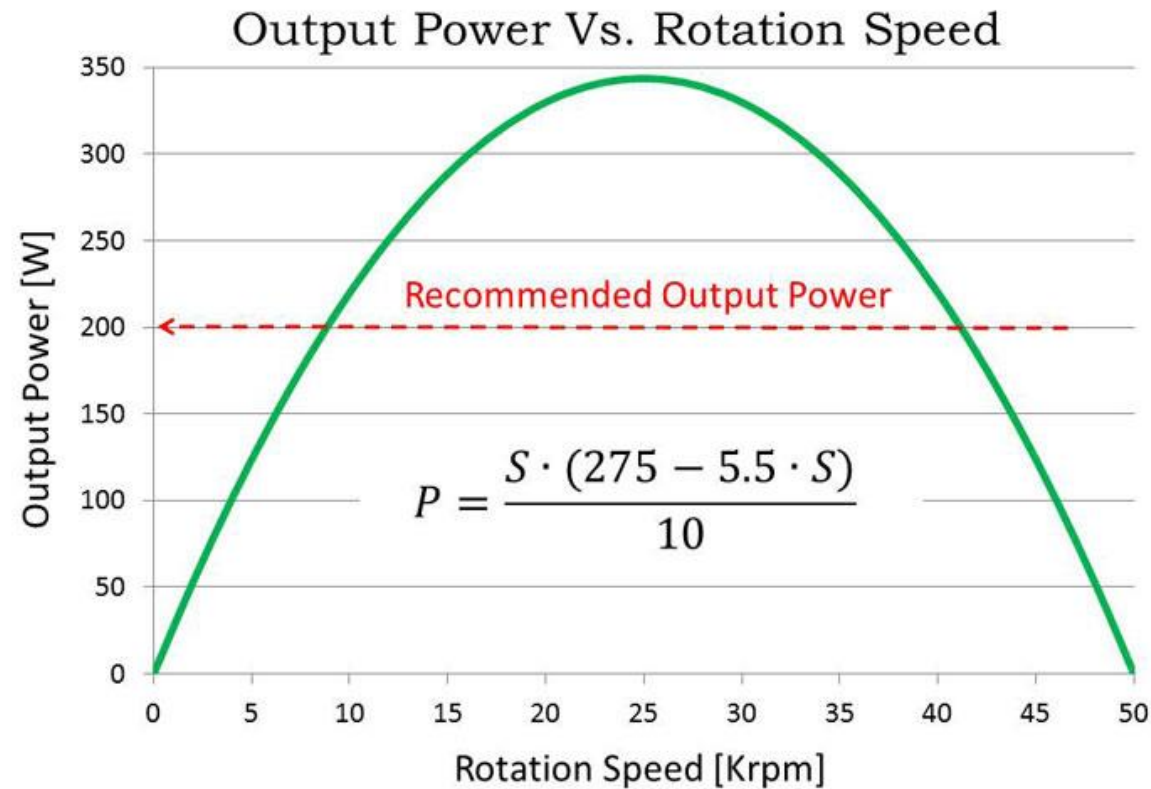




- This chart illustrates the logarithmic nature of the rotation speeds measured at different pressure levels.
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- The curve is relates to average values. The actual results lie within a small variance from the curve.
- The rotation speed levels shown here are the no-load speeds (i.e. no torque acting upon the shaft).



- This chart illustrates the relationship between the torque and the actual rotation speed.
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- This chart illustrates that any external load will cause a reduction in speed; the more power demanded, the greater the speed reduction. To the right of the peak lies the working area of the spindle, the peak being its limit. The CoolSpeed mini Air will stop rotating should the power exceed “Max Power”.

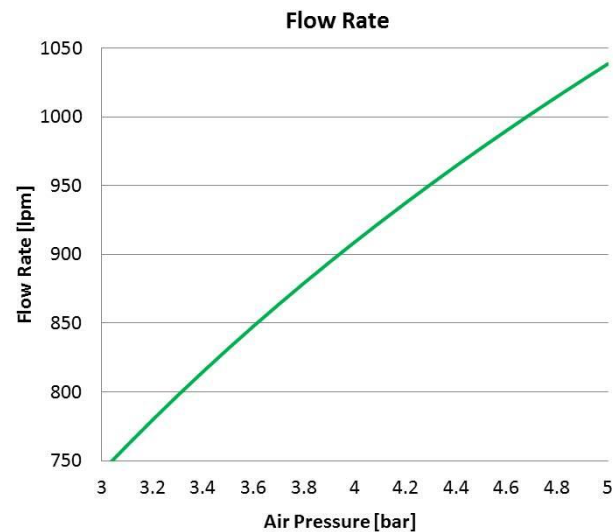
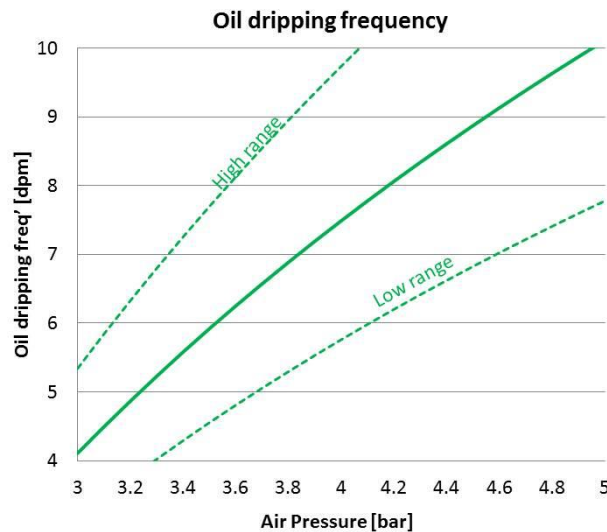
## Air Filter – Regulator – Lubricator Unit

The CoolSpeed mini Air models are driven by air mist.

For those machines that do not supply mist through the main spindle, an external 'air filter – regulator – lubricator' unit is required.

You may find affordable units at your local supplier.

You should connect the unit nearby the machine, and use suitable 6 mm or 8 mm rubber hoses with pneumatic fittings.





## Air Lubrication Oil

Oil Lubrication will affect the following:

- Bearing noise level
- rotation speed
- bearings life
- output power and torque
- Temperature elevation in bearings

**For CoolSpeed mini applications, where high rotation speeds and relative low torques are involved, oil mist is the preferred option.**

Oil is the basic lubricant for the CoolSpeed mini ball bearings.

The most suitable oils are the synthetic oils, as:

- Silicone polymers (Silicone products are useful over a much wider temperature range but do not have great load carrying ability. It has become customary in the miniature bearing industry.)
- Oil including fluorinated additive
- Esters (The esters are the most widely used synthetic lubricants. They do not have the film strength capacity of a petroleum product, but do have a wide temperature range and are oxidation resistant.)

***The best choice for CoolSpeed mini Air lubrication oil is the low viscosity (VG 10 to VG22) Synthetic oils.***

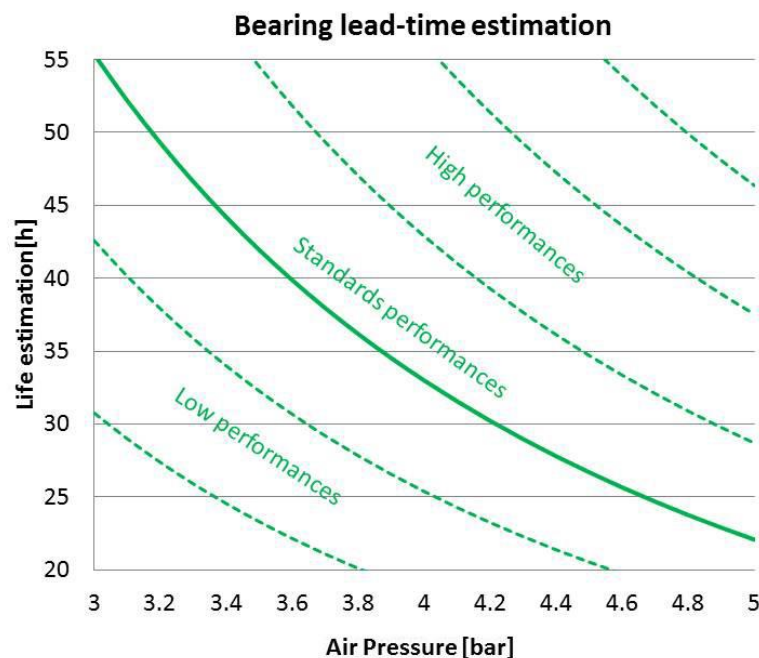
## Replacement Kit

The replacement kit includes 2 bearings and 1 turbine.  
It is replaced with each new tool (drill or mill).

There are unique replacement kits for tool shanks:

- 3 mm, 4 mm, 6 mm
- 1/8" , 3/16", 1/4"

\* Tool is not included.



### Set (2 bearings, 1 turbine)

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## Assembly Device

**The Assembly Devices are used to assemble the bearings and turbine onto the tool shank.**

Each diameter is unique and includes a precise ring inside.

There are separate assembly devices for tool shanks:

- 3 mm, 4 mm, 6 mm
- 1/8" , 3/16", 1/4"

\* Do not attempt to use alternative devices as you will damage the bearings and the CoolSpeed min Air will not perform.



Assembly device

Ø3 mm	709212003
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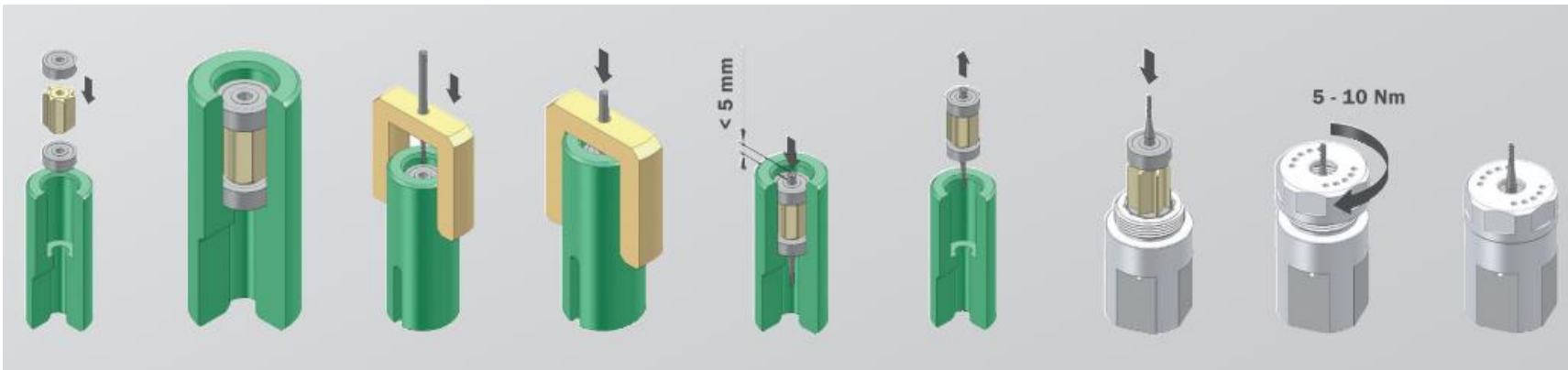
# Assembly inside the Tool Holder

- Before assembling the CoolSpeed mini inside the tool holder, make sure that the CoolSpeed mini is fully assembled, including rear cover and front cover (Tool Assembly is not mandatory).
- The front cover helps to define the CoolSpeed mini position in relation to the tool holder.
- Before assembly, clean the tool holder internal and external diameter. Pay attention to corrosion marks upon the Tool Holder, and CoolSpeed mini. Remove any corrosion marks.
- Before assembly, pay attention to the CoolSpeed mini Jet's. Assure they are all clean and open. Clean the Jet's with a small needle if necessary (1.4 mm – 0.055 in)
- In case of CoolSpeed mini Air, pay attention to the external O-Ring seal. Change the O-Ring if necessary.
- Use moderated torque to close the CoolSpeed mini inside the Tool Holder. The Torque should be according to the Tool Holder manufacture. In case of Low torque, the CoolSpeed mini might disconnect from the Tool Holder due to the high pressure. Therefore it is extremely important (safety issues) to apply the minimum require torque.
- Extensive Torque (Radial force) upon the CoolSpeed mini might cause radial distortion of the CoolSpeed mini housing. Therefore, it is important to apply clamping force according Tool Holder recommendations as function of hydraulic pressure.
- In order to avoid damage to the machine or human injuries, it is mandatory to apply the pressure (emulsion, oil and air) right after the CoolSpeed mini assembly (inside the Tool Holder) while the CoolSpeed mini is blocked by the machine horizontal table. In case of wrong torque (too low) the CoolSpeed mini will get out of the Tool holder and be blocked by the horizontal table.
- In case of replacement kit change, it is not necessary to remove the CoolSpeed mini out of the Tool Holder, just open the front cover and pull out the tool.



# Tool replacement

- In order to replace a new tool, it is necessary to assembly a new replacement kit and change the tool, bearings and turbine with new set.
- In order to change the replacement kit, open the front cover and remove the used replacement kit.
- In case that the rear bearing is stacked inside the CoolSpeed mini housing, it is essential to remove the CoolSpeed mini from the tool holder and open the rear cover.
- Normally, the rear bearing may be easily removed together with the tool, turbine and front bearing.
- Push carefully the new replacement kit inside the CoolSpeed mini, and close the front cover.
- Before Front cover assembly, pay attention to the O-Ring inside the cover. Make sure that the seal in the designated slot.
- Do not use extensive force (Torque) to close the front cover. No Hammer or extensive tube is necessary.
- After front cover closing, rotate the cutting tool with your hand, make sure it turns freely. If not open and check.



# General safety instructions



- Do not touch the cutting tool during rotation, and do not attempt to stop the tool rotation.
- Do not change replacement kits while the tool holder is clamped in the main spindle.
- Do not attempt to operate the CoolSpeed mini while the machine door is open.
- Follow machine instructions at all times (specifically while operating the CoolSpeed mini).
- Only authorized CoolSpeed mini operators are authorized to operate the CoolSpeed mini.
- Do not place your hand or other organs in front of the CoolSpeed mini while in operation.
- Before daily operation, inspect CoolSpeed mini parts status and perfection.
- Avoid inhalation of the emulsion, oil or air during operation. Use a face mask while operation the CoolSpeed mini.
- Follow general safety instructions while operating the CoolSpeed mini – use protecting glasses, work shoos and gloves.
- Avoid loose long hair.
- Avoid long necklaces and other jewelry.
- Use common sense at al times.

# Safety Instructions



## for tool assembly:

- The operator must use the WTO assembly device. Never use a device not supplied from WTO.
- The tool assembly includes the cutting bit. Be aware of the cutting edge.
- Beware while press fit assembling of the bearing and turbine.
- Assure not to drop the tool assembly while removing it from the assembly device.
- Do not re-use the turbines or bearings.
- Do not remove the turbine and bearings from a cutting bit.

# Safety Instructions

**during assembly procedure of the CoolSpeed mini inside the tool holder.**

- Clean internal diameter of the tool holder and external diameter of CoolSpeed mini before assembling.
- Use a sealed tool holding system.
- Use cylindrical collets only, like hydraulic chuck or ER systems.
- Use moderate force while closing the collet, in order to extend CoolSpeed mini life.
- Closing Torque for ER 40 collet should be 175 [Nm] or higher. The axial force upon the CoolSpeed mini due to 40 bar is 2,000 [N].
- During initial run (implementation of emulsion pressure) place the tool holder with CoolSpeed mini near the machine table in order to avoid safety issues.  
In case the CoolSpeed mini is not properly locked, there may be axial movement between CoolSpeed mini and tool holder, but no damage will be present.

# Maintenance



- Clean CoolSpeed mini parts after each use.
- Apply maintenance oil to the CoolSpeed mini parts before storing.
- Clean machine filters every day.
- Remove corrosion marks from stainless steel CoolSpeed mini parts.
- A used tool assembly in good condition should be clean and oiled before storing. Do not attempt to disassemble the turbine or bearings from cutting tool.



# Routine Hourly Inspections



- Coolant (emulsion or oil) temperature.
- Emulsion or oil dust in machine surroundings.
- Tool status.
- Cutting surface quality.
- Change in the noise level.
- Static run out of new tool (outside the machine).
- Radial and Axial tool edge position (set point).
- Sufficient emulsion or oil flow rate from CoolSpeed mini exhaust.

# Routine Daily Inspections



- Check machine filters.
- Check machine's pump pressure near the pump using machine integrated pressure gauge.
- Check pressure at tool holder (main spindle end) using the WTO Pressure Device.
- Check media status – clean filter, oil percentage and coolant temperature.
- When using CoolSpeed mini Air, check the lubricating oil level.
- When using CoolSpeed mini Air, check air pressure in the supply line.
- When using CoolSpeed mini , check coolant level in the tank. Fill as required.
- Inspect CoolSpeed mini parts for cracks, fractures or distortions.
- Inspect CoolSpeed mini parts for corrosion marks, and remove if needed.
- Check machine general safety conditions.
- Inspect tool holder condition.

# Estimating life-time of tool and bearings



In order to improve cutting performances and surfaces quality, pay attention to the following:

- Small cutting depth – In order to reduce cutting forces.
- Moderate cutting wide – cutting force reduction.
- Optimal feed rate – too low will cause wrong cutting performance, and lead to decreasing in tool lead-time.
- Low emulsion temperature – high temp' decrees bearing life
- Clean emulsion – polluted emulsion may cause bearings crash.
- Correct assembly procedure – wrong assembly (high axial forces) cause damage to the bearing races leading to reduction in lead time.
- Bearing maintenance – After initial use of the bearings assembly, it is recommended to wash the tool assembly (clean water) and spray maintenance oil before storing.
- CoolSpeed mini clamping torque – during CoolSpeed mini assembly inside the tool holder, it is recommended to close the CoolSpeed mini inside with moderated torque in order to avoid radial distortion of CoolSpeed mini housing leading to bearing lead-time reduction.
- Tool tolerance – It is recommended to use tight tolerance tools (h5, h6) not higher (h7). High tolerance may cause dynamic run-out of the tool which lead to low surface quality and lead-time reduction.
- Tool choice – Use the right tool (material, coating cutting edge angle...).
- Front Cover tighten – The front cover is part of the axial pre-load system. In case that the front cover is not fully closed, the tool will exhibit radial and axial vibrations.

# Questions and Answers

- **Is it possible to drill using the CoolSpeed mini?**

Yes, the CoolSpeed mini may perform drilling application on various materials. The friction clamping between the turbine and tool shank is strong enough to overcome to axial forces during drilling.

- **What is the maximum drill size that may be used with the CoolSpeed mini?**

For soft materials, we recommend drills up to 5 mm.

For hard materials, we recommend drills up to 3 mm.

The feed rate in drilling applications is extremely important, and should be optimized according to machine and tool parameters.

- **What will happen if the drill size is too big?**

In case the drill size or the feed rate are too big, the CoolSpeed mini may be under-powered. As a result, the tool core will penetrate inside the turbine, the tool rotation will stop and the tool cutting edge will brake.

- **Is it possible to re-use the turbine or bearings when replacing the cutting tool?**

Certainly not. If attempting to re-use turbines, the tolerance from tool shank OD to turbine ID will not be sufficient and the CoolSpeed mini will not perform leading to tool break. If attempting to re-use the bearings, the CoolSpeed mini run-out will not be sufficient leading to poor surface finish and tool break.

# Questions and Answers

- **Is the CoolSpeed mini damaged during a crash?**

No. Normally, the CoolSpeed mini is not affected by a crush. The tool and bearings will be damaged, so replacing to a new tool with new bearings and turbine will completely solve the problem.

- **How do I know the CoolSpeed mini rotation speeds?**

The CoolSpeed mini rotation speed is a function of the through-coolant (or oil) pressure. To measure the through-coolant (or oil) pressure place the WTO Pressure Device into the sealed tool holder and place into the main spindle. Turn on the machine through-coolant (or oil) pressure and read the gage. Now look at the CoolSpeed mini speed table and learn the rotation speed.

- **How do I know the CoolSpeed mini Air rotation speeds?**

The CoolSpeed mini Air operates under 5 – 7 [bar] of air pressure (mist), providing 55,000 rpm.

- **Is the rotating speed calculation precise?**

The CoolSpeed mini rotation speed is a function of a few parameters, as pressure, viscosity and bearing's friction. The calculation delivers an estimation of the no load speed. During cutting procedure, the rotating speed will be reduced according to the cutting load. Therefore, it essential to promote optimization (few trials) in order to define the optimal cut depths and feed rates for the specific application.

# Questions and Answers



- **Why does the tool not rotate freely after assembly of a new CoolSpeed mini?**  
Most likely this is due to the tool shank touching the CoolSpeed mini rear cover. Disassemble the Tool Assembly from the CoolSpeed mini, place it back into the Assembly Device, and press the tool further through the turbine and bearings. There should be no more than 5 mm tool shank remaining from the rear bearing.
- **Can I place the CoolSpeed mini into the machine magazine during machine set up?**  
Sure you can. As the CoolSpeed mini fits into standard sealed tool holders, you may place several CoolSpeed minis into the machine magazine during machine set up.
- **Can I store the CoolSpeed mini and re-use tomorrow?**  
Yes. Remove the CoolSpeed mini from the tool holder, wash through with running water, spray with WD-40, and place in a safe place. Assure the tool is not damaged.
- **Through coolant pressure seems to decrease. What should I do?**  
A decrease in through coolant pressure is most likely a result of the machine's filters condition. It is recommended to clean wash the filters at the start of each day. A decrease in through coolant pressure will severely affect the CoolSpeed minis performance.





## Tool Assembly Procedure



\* Same tool assembly suitable for all CoolSpeed mini models

## Step #1

Insert the first bearing inside the assembly device,  
direction does not matter.

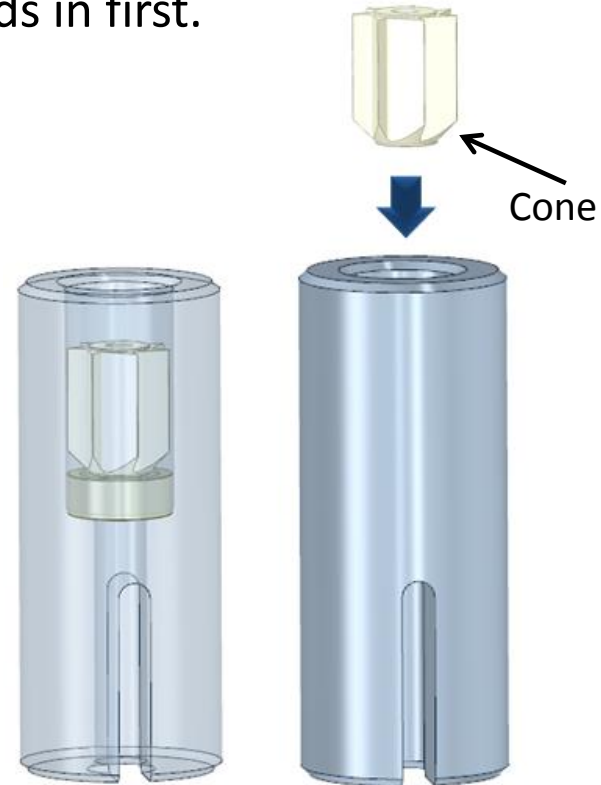
Use the right assembly device per tool shank diameter.



## Step #2

Insert the turbine inside the assembly device.

Pay attention to the turbine direction; the big cone heads in first.



## Step #3

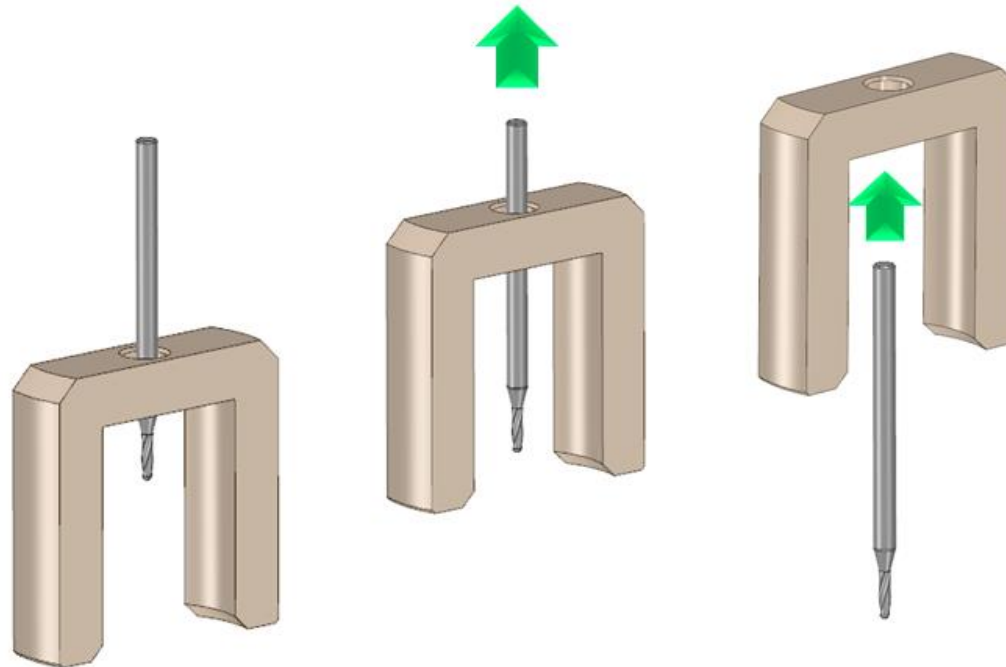
Insert the second bearing inside the assembly device.  
The bearing direction does not matter.



## Step #4

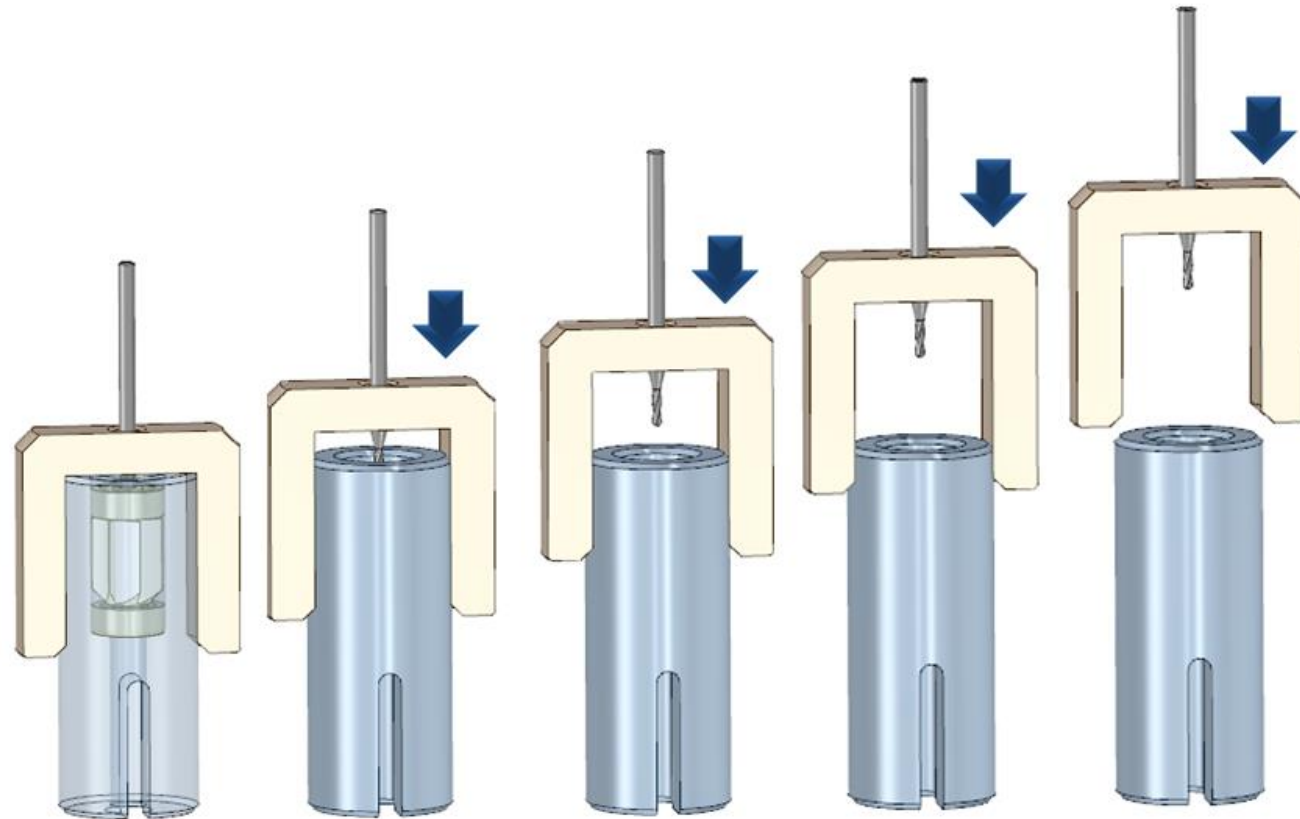
Insert the tool inside the bridge.

Use the right bridge per tool shank diameter (3, 4 or 6 mm).



## Step #5

Place the bridge with tool over the device, so the tool tip is placed in through the top bearing.

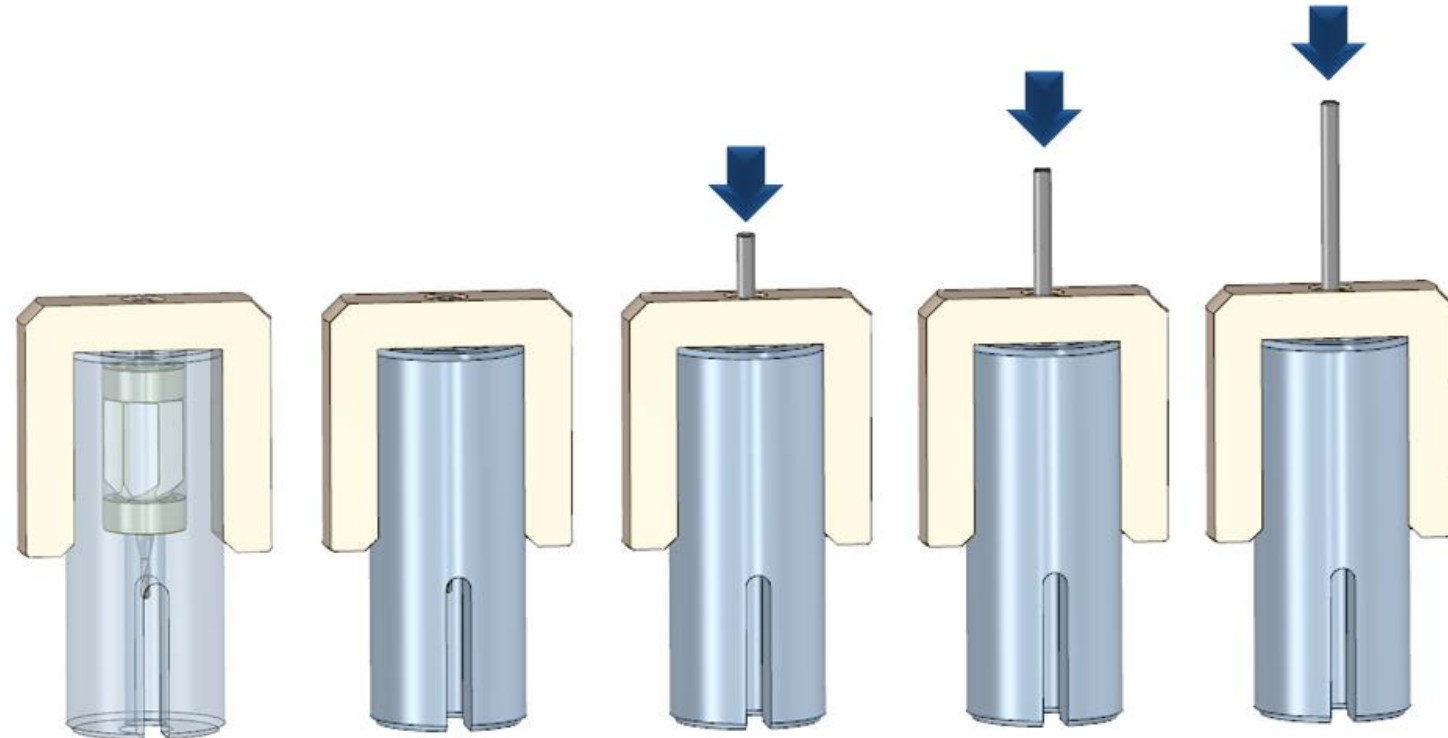


# CoolSpeed<sup>®</sup> mini

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## Step #6

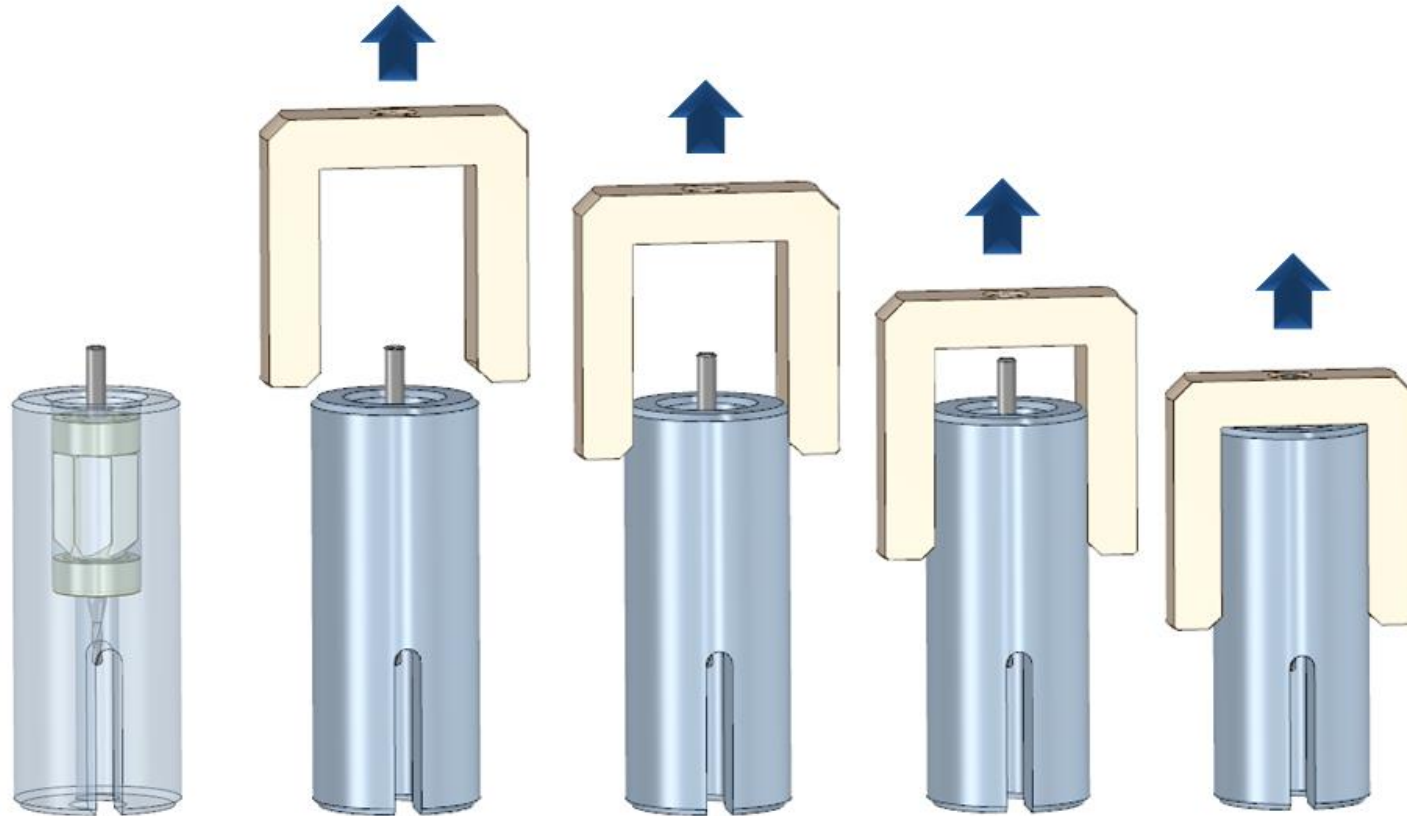
Push the tool into the device and through the bearings and turbine with a press or vise.





## Step #7

Pull the bridge up and away from the assembly device.



# CoolSpeed<sup>®</sup> mini

## Step #8

Press the tool further into the device, leaving 5 mm maximum with a press or a vise.

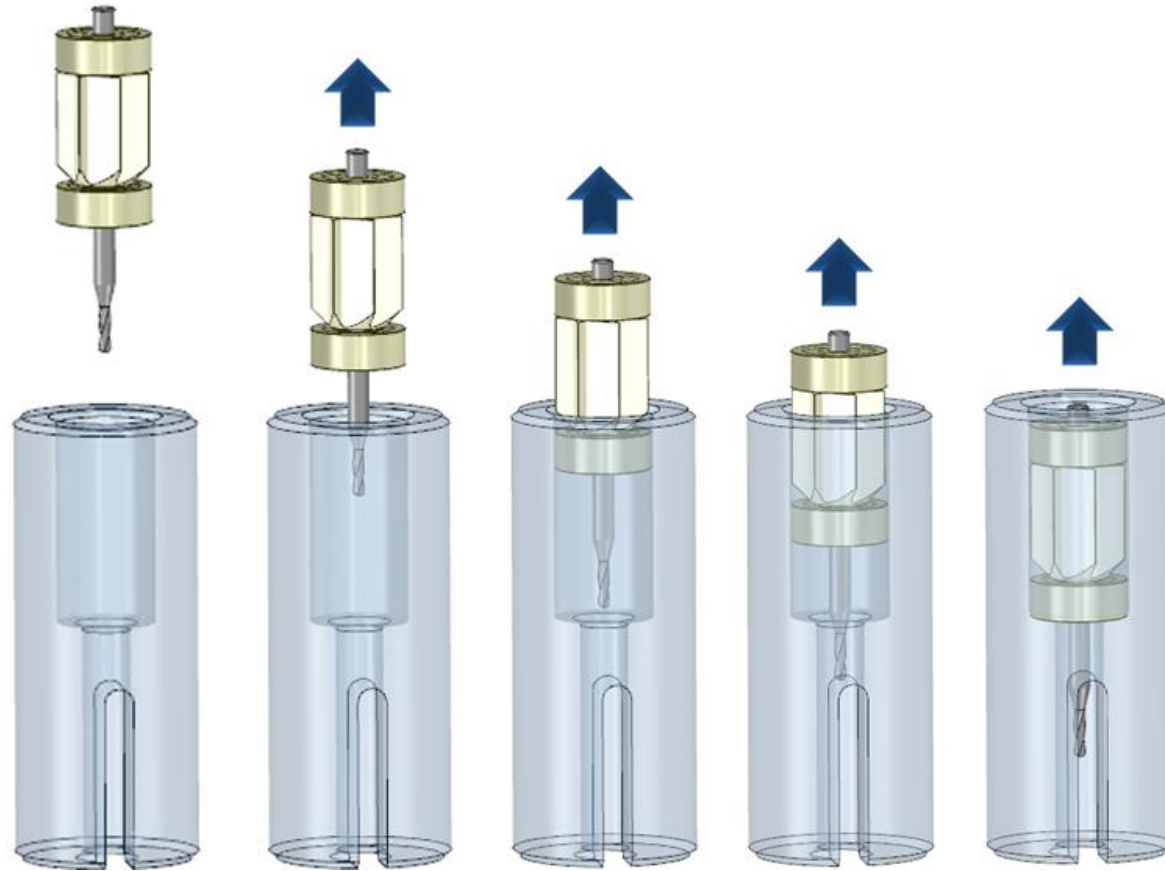


**WTO**  
*Higher Productivity*



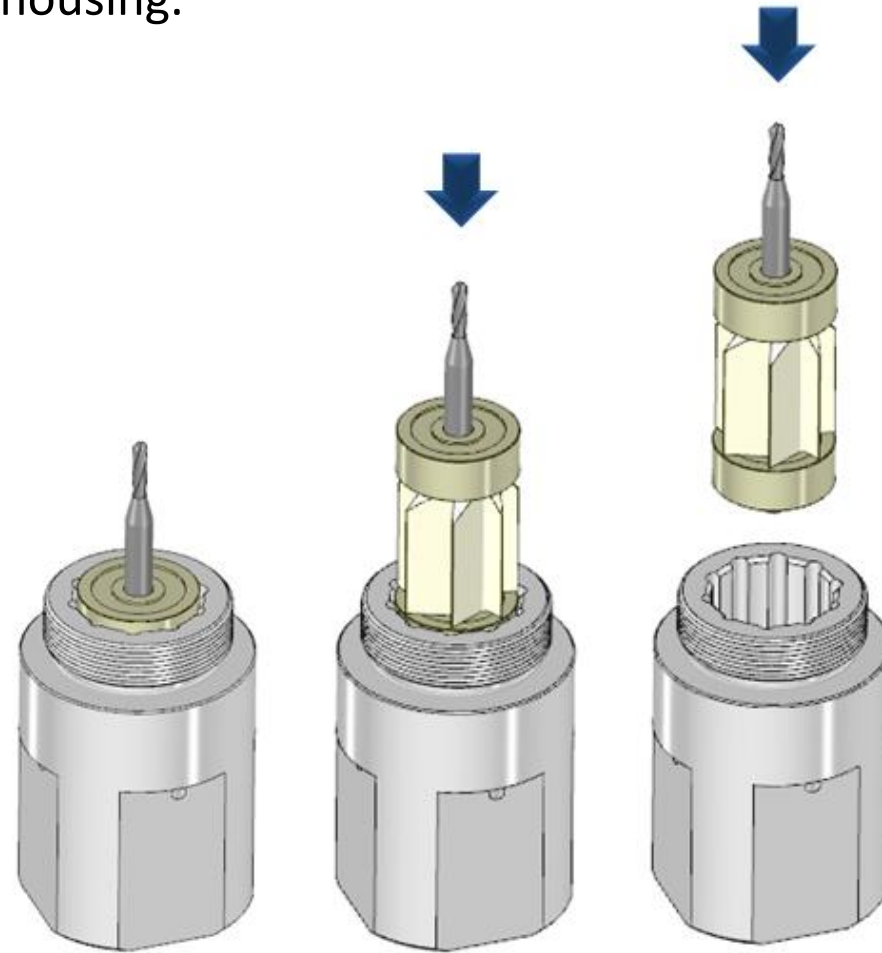
Step #9:

Carefully pull the tool assembly out of the device.



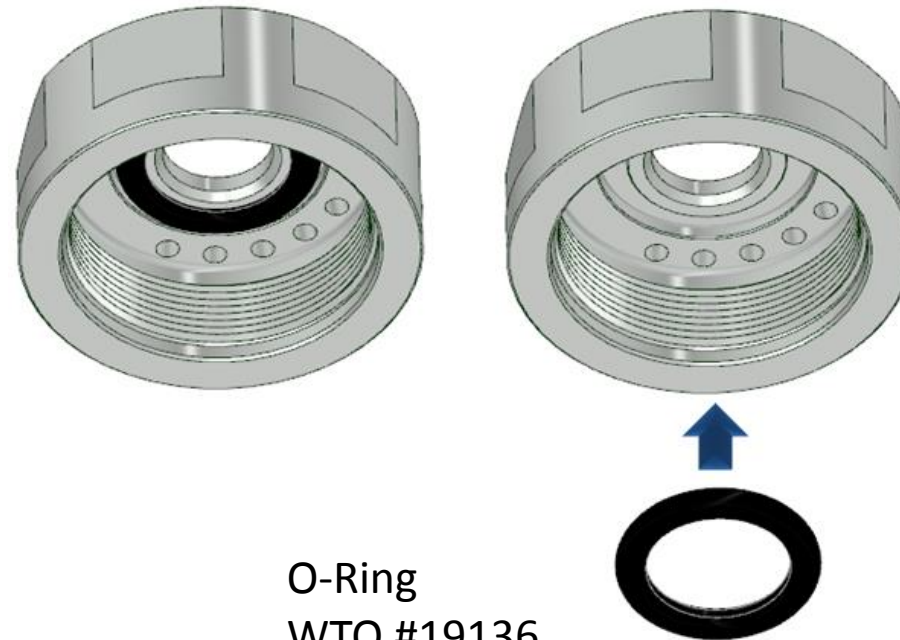
## Step #10

Insert the tool assembly inside the CoolSpeed mini housing.



## Step #11

Check that the O-Ring is inside the front cover.



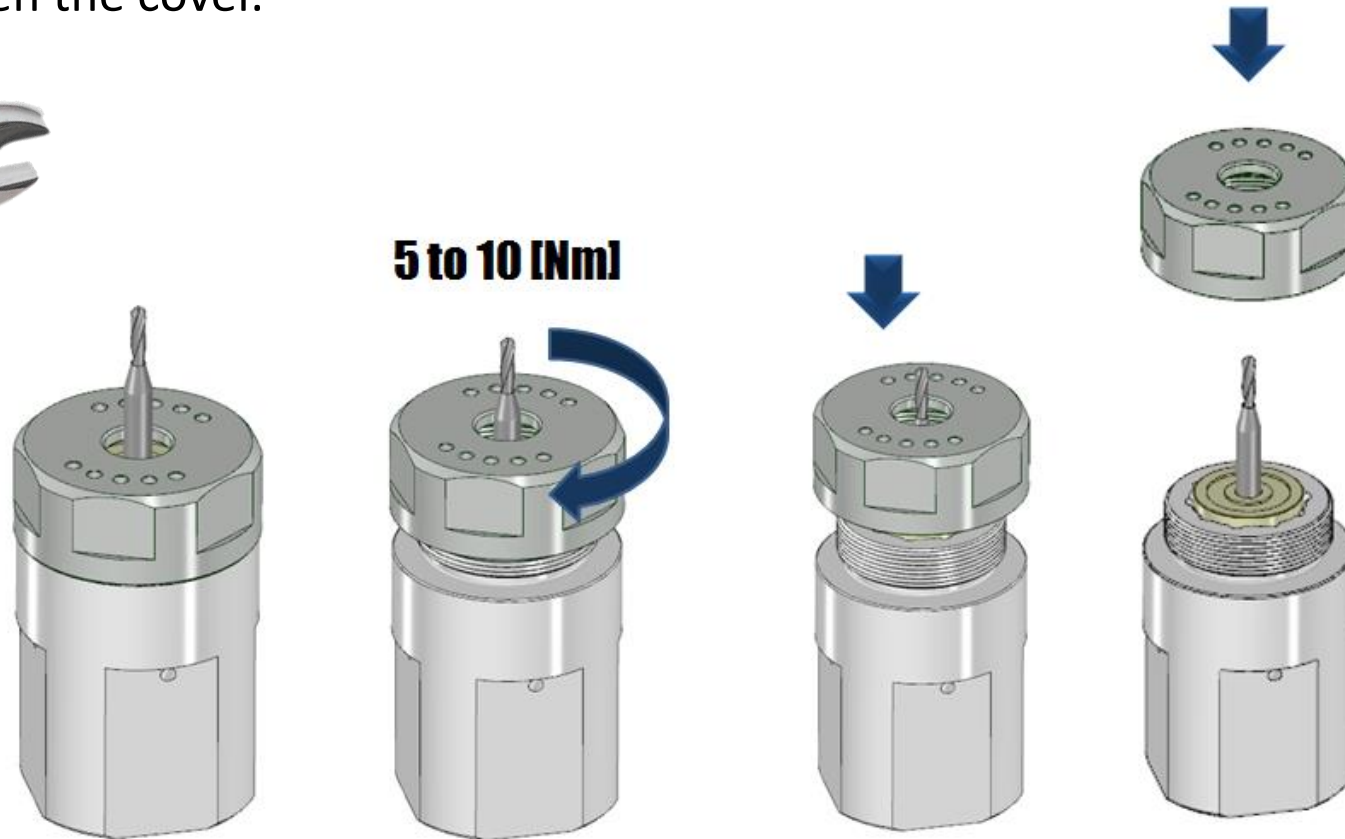
O-Ring  
WTO #19136  
Ø10,00 x 2,00  
NBR 70

## Step #12

Insert the front cover over the tool and screw it onto the CoolSpeed mini housing.  
Use a 24 mm wrench to tighten the cover.



24 mm wrench



# CoolSpeed<sup>®</sup> mini

## Step #13:

Place the CoolSpeed mini into the tool holder.  
The CoolSpeed mini front cover limits the axial position.  
Use a sealed tool holder for 25 mm / 1" tools.

**WTO**  
*Higher Productivity*



Step #14:

Tighten tool holder after placing CoolSpeed mini in place.

Torque according manufacture instructions.

The CoolSpeed mini is ready.





## Complete Tool Assembly

