KEMPF
SONDERWERKZEUGE IN PRÄZISION

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All prices on request

#burrfree

DEBURRING TOOLS

176 pages with innovative solutions
for burrfree processing

With six extra pages for burr-minimal drilling
without caps - with the KEMPF ExBurrDrill

INCLUSIVE
ExBurrDrill

www.kempf.tools/deburringtools

PRODUCT GROUP: Deburring Tools

P25BURRFREE1

KEMPF SPECIAL TOOLS FOR ALMOST ANY APPLICATION

QUALITY TOOLS
MADE IN GERMANY

Burr-minimal machining processes increase the process reliability of the deburring tools used afterwards. Therefore, we consider your machining process from A to Z and offer you special tool solutions for almost any application.

QUESTIONS ABOUT DEBURRING?

Our team of deburring specialists is always there for you.
If you have product-specific questions or questions about an application, our professionals from the office staff are your first choice. We will also be happy to put you in touch with the responsible field service for your request on site.

OUR TEAM OF DEBURRING SPECIALISTS

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www.kempf.tools/xing

BENEFIT FROM OUR SERVICES!

Look for these symbols on the corresponding tools. In this way, you will know immediately which tools are available in intermediate sizes or in special designs and which tools can be resharpened without any problems.

KEMPF RESHARPENING SERVICE

Old does not mean bad! That's why used tools don't have to be thrown away right away. We take care of the complete reconditioning, even of the patented tool geometries. This ensures the original functionality after reconditioning.

KEMPF SPECIAL CONSTRUCTION SERVICE

You can't find the right tool specifically for your application? Then make use of our possibilities to offer solutions even for the most untypical special cases. Whether intermediate sizes or fully new special tool designs - we at KEMPF can certainly help you.

Issues with burrs?

We got solutions.

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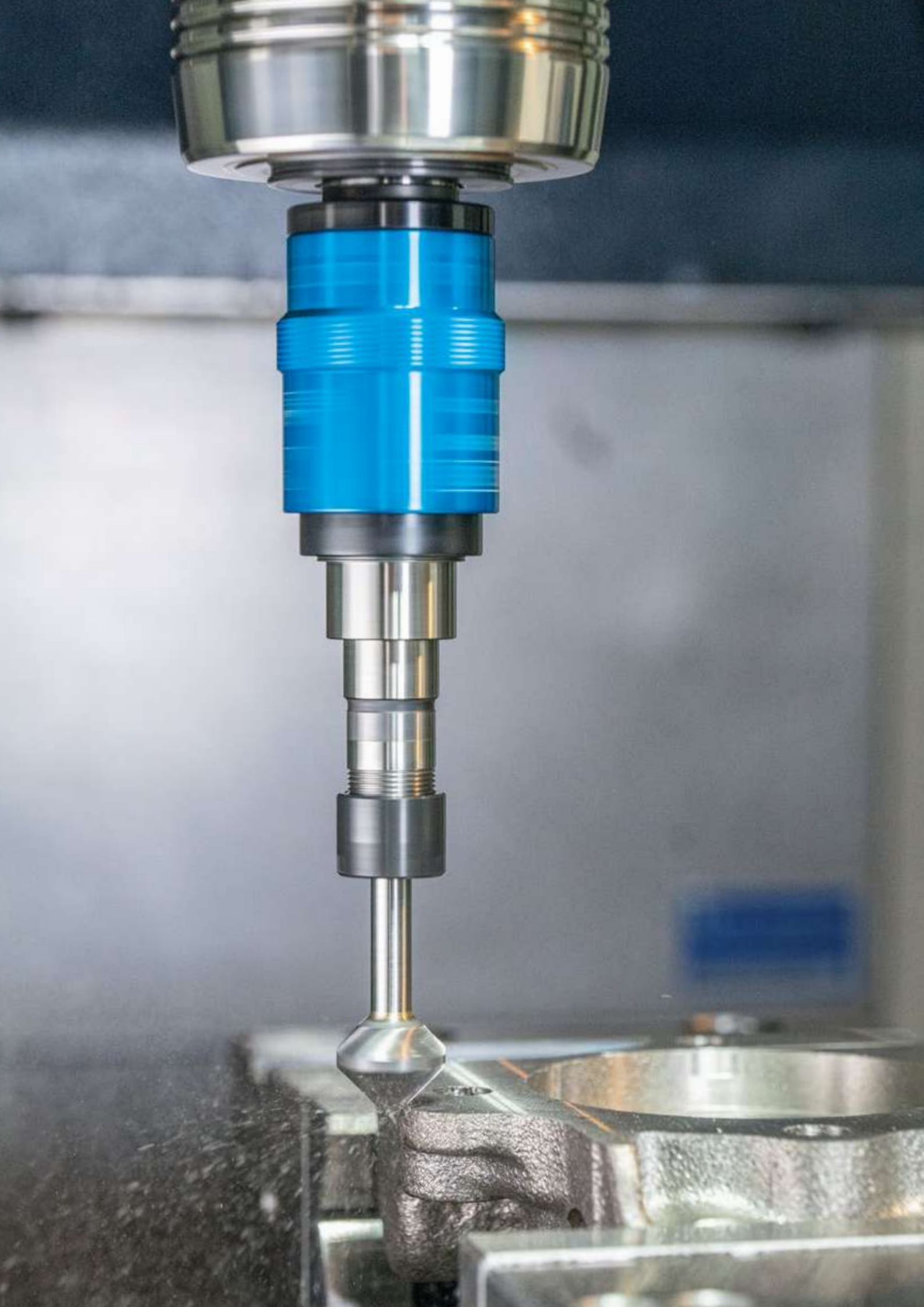
A CONTOUR-CONTROLLED DEBURRING TOOLS

B FORCE-CONTROLLED DEBURRING TOOLS

C CERAMIC FIBER DEBURRING TOOLS

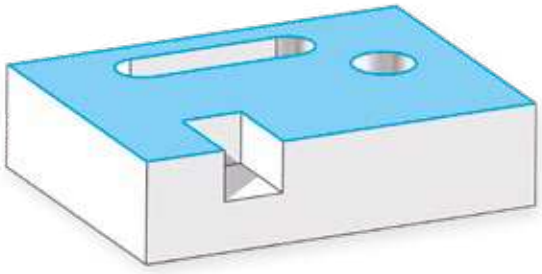
D HANDHELD DEBURRING TOOLS



TOOL SELECTION BY DEBURRING APPLICATION

Selection guide for machining:

DEBURRING OF SURFACES & EDGES



		ChamferMill	ChamferMill DualCut	Chamfering Cutter	Back-Burr Cutter & Path
					
		page 58	from page 59	from page 48	from page 34
Tool properties	Tool type	Solid carbide milling cutter	Solid carbide forward and backward milling cutter	Solid carbide milling cutter with V-shaped cutting edge for chamfering without secondary burr	Deburring system consisting of ball cutter and NC data set; Processing the Contour through NC data set
	Contour machining through	NC data set	NC data set	NC data set	NC data set
	Cutting material	Solid carbide (coated)	Solid carbide (coated)	Solid carbide (coated)	Solid carbide (coated)
	Adjustability of the deburring intensity	■■■■■■■■■	■■■■■■■■■	■■■■■■■■■	■■■■■■■■■
Contour to be machined	Undefined contours (e.g. cast/forged parts)				
	Hole-Ø front (mm)	0.25 - ∞	0.16 - ∞	2 - ∞	0.65 - ∞
	Hole-Ø back (mm)		0.25 - ∞		0.9 - ∞
	Inclined hole entry	○	○	○	●
	15° chamfer (30° countersink)				
	30° chamfer (60° countersink)	●	●		○
	41° chamfer (82° countersink)				○
	45° chamfer (90° countersink)	●	●	●	○
	50° chamfer (100° countersink)				○
	60° chamfer (120° countersink)				○
Burr condition	Machinable burr root thickness	large	large	large	large
Programming/Machine Requirement		3 axes	3 axes	3 axes	3 axes
Machining speed		■■■■■■■□□	■■■■■■■□□	■■■■■■■□□	■■■■■■■□□

● = suitable ○ = conditionally suitable

Indexable Chamfer Milling Cutter	KEMPF ibex	Ceramic Fiber Brush	Ceramic Fiber Wheel Brush	Ellipti-Bur	Micro Limit Countersinking
					
from page 64	from page 70	from page 130	from page 148	from page 82	from page 79
Forward and backward indexable milling cutter with inserts	KEMPF ibex Deburring Tool Holder and ibex Carbide Chamfer Milling Cutter	Ceramic Fiber Brush Surface	Ceramic Fiber Wheel Brush	Spring loaded countersinking tool	Countersinking tool
NC data set	Spring loaded tool holder	Grinding the surface	Grinding the surface	Spring loaded blade	Defined sinking
Carbide (coated)	Carbide	Al_2O_3 Advanced ceramics	Al_2O_3 Advanced ceramics	HSS	HSS
■■■■■■■■■	■■■■■■■□□□	■■■□□□□□□□	■■■□□□□□□□	■■■■■□□□□□	■■■■■■■■■□
	●	●	●		●
2.1 - ∞	0.3 - ∞	0 - ∞		3.96 - 25.4	3.18 - 22.22
11.1 - ∞	10.1 - ∞				
○	●	●		●	
●					
					●
					●
●	●				●
					●
●					●
large	large	small	small	large	large
3 axes	2 axes	2 axes	2 axes	1 axis	1 axis
■■■■■□□□□□	■■■■■■■■■■	■■■■■□□□□□	■■■■■□□□□□	■■■□□□□□□□	■■□□□□□□□□

Selection guide for machining:

BACKWARD DEBURRING OF HOLE EXITS

		Burraway	Micro Burraway	E-Z-Burr	Burr-Off
					
		from page 84	from page 96	from page 98	from page 100
Tool properties	Tool type	Universal tooling system with spring loaded cutting edge	Micro tooling system with resilient cutting edge	Tooling system with resilient cutting edge	HSS tool with resilient cutting edge
	Contour machining through	Spring loaded blade	Elastic/flexible blade	Elastic/flexible blade	Elastic/flexible cutting edge
	Cutting material	HSS/coated HSS/ carbide	HSS	HSS/carbide	HSS
	Adjustability of the deburring intensity	■■■■□□□□□	■■■□□□□□□	■■■■□□□□□	■■□□□□□□□
Contour to be machined	Hole-Ø (mm)	2 - 52	1 - 2.34	2.38 - 52	1.57 - 14.3
	Inclined hole exit 	o	o	o	o
	Required tool overflow 	■■■■■□□□□	■■■■■□□□□	■■■■■□□□□	■■■□□□□□□
	Max. Overhang length / Depth of hole 	>7xD	6xD	>5xD	>12xD
Burr condition	Machinable burr root thickness	large	small	large	large
Programming/Machine Requirement		1 axis	1 axis	1 axis	1 axis
Machining speed		■■■■□□□□□	■■■■□□□□□	■■■■□□□□□	■■■■□□□□□

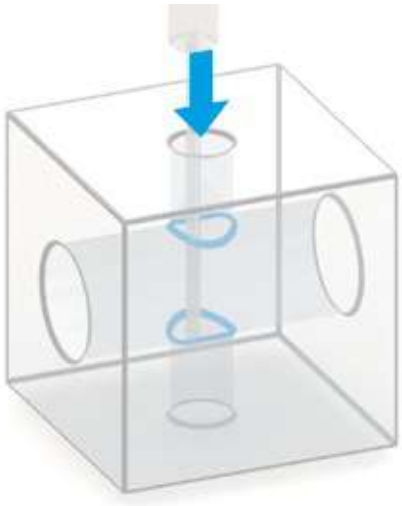
● = suitable o = conditionally suitable

GMO Deburring Tool	Back-Burr Cutter & Path	HSD Deburring tool	ChamferMill DualCut	Indexable Chamfer Milling Cutter	Flipcut	RevCut
						
from page 104	from page 34	from page 124	from page 59	from page 64	from page 114	from page 56
Tooling system with spring loaded cutting edge	Deburring system consisting of ball nose cutter and NC data set; contour tracing by NC data set	Individually manufactured tooling system with pressure-activated cutting edges	Forward and backward deburring cutter; contour traversing by NC data record	Indexable forward and backward milling cutter	Tool system with deburring/chamfering edge activated by changing the rotational direction	Reverse chamfering tool with eccentric cutting edge
Spring loaded blade	NC data set	inner coolant or Elastomer cutting edge	NC data set	NC data set	Change of direction of rotation	NC data set
Solid carbide	Solid carbide (coated)	HSS	Solid carbide (coated)	Carbide (coated)	Carbide	Solid carbide
0.8 - 18.0	0.9 - ∞	2.9 - ∞	0.25 - ∞	11.1 - ∞	7 - 34	1.0 - ∞
○	●	●	○	○	○	●
>5xD	>15xD	∞	~3.5xD	>3xD	~6xD	<5xD
large	large	medium	large	large	large	large
1 axis	3 axes; Specially adapted NC data set	1 axis	3 axes	3 axes	1 axis rotary change of direction	2 axes & cutting edge orientation

Selection guide for machining:

DEBURRING OF CROSS HOLES

MACHINING THROUGH THE CROSS HOLE



		Burraway	Micro Burraway	E-Z-Burr
				
		from page 84	from page 96	from page 98
Tool properties	Tool type	Universal, Tooling system with spring loaded cutting edge	Micro tooling system with spring loaded cutting edge	Tooling system with resilient cutting edge
	Contour machining through	Spring loaded blade	Elastic/flexible blade	Elastic/flexible blade
	Cutting material	HSS/coated HSS/ carbide	HSS	HSS/carbide
	Adjustability of the deburring intensity	▮▮▮▮▯▯▯▯▯	▮▮▮▯▯▯▯▯▯	▮▮▮▮▮▯▯▯▯
Contour to be machined	Cross hole-Ø (mm)	2.0 - 52.0	1.0 - 2.34	2.38 - 52.0
	Bore ratio 1:3 (Ø cross hole to Ø main hole) 	●	●	●
	Bore ratio 1:2 (Ø cross hole to Ø main hole) 			○
	Bore ratio 1:1 (Ø cross hole to Ø main hole) 			
	Inclined cross hole 	○	○	○
	Axle offset cross hole 			
	Required tool overflow 	▮▮▮▮▮▮▮▯▯	▮▮▮▮▮▮▮▯▯	▮▮▮▮▮▮▮▯▯
	Max. Overhang length / Depth of hole 	>7xD	6xD	>5xD
Burr condition	Burr located in main hole	●	●	●
	Burr located in cross hole	●	●	●
Programming/Machine Requirement		1 axis	1 axis	1 axis
Machining speed		▮▮▮▮▯▯▯▯▯	▮▮▮▮▮▯▯▯▯	▮▮▮▮▮▯▯▯▯

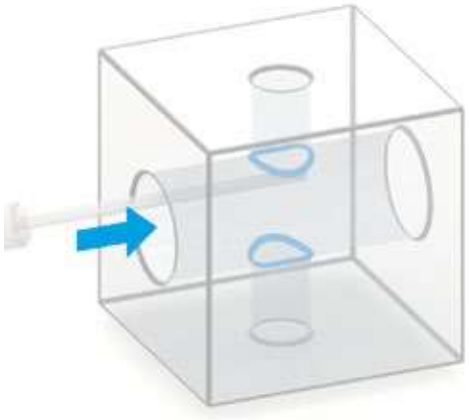
● = suitable ○ = conditionally suitable

Burr-Off	GMO Deburring Tool	Back-Burr Cutter & Path	HSD Deburring Tool	Ceramic Fiber Stone	RevCut
					
from page 100	from page 104	from page 34	from page 124	from page 158	from page 56
HSS tool with resilient cutting edge	Tooling system with spring loaded cutting edge	Deburring system, consisting of ball nose cutter and NC data set	Individually manufactured tooling system with pressure activated cutting edges	Ceramic fiber stone with flexible shaft	Reverse chamfering tool with eccentric cutting edge
Elastic/flexible cutting edge	Spring loaded blade	NC data set	Inner coolant/Elastomer-steered cutting edge	NC data set	NC data set
HSS	Solid carbide	Solid carbide (coated)	HSS	Al_2O_3 Advanced ceramics	Solid carbide
1.57 - 14.3	0.8 - 18.0	0.9 - ∞	2.9 - ∞	≥ 3.1	1.0 - ∞
●	●	●	●	○	○
	●	●	●	○	○
		●	●	○	
○	○	●	○	○	
	○	●	●	○	
>12xD	<5xD	<15xD	∞	12xD - 40xD	<5xD
●	●	●		●	●
●	●	●	●	●	●
1 axis	1 axis	3 axes - specially adjusted NC data set	1 axis, change of direction of rotation	3 axes	2 axes & cutting edge orientation

Selection guide for machining:

DEBURRING OF CROSS HOLES

MACHINING THROUGH THE MAIN HOLE

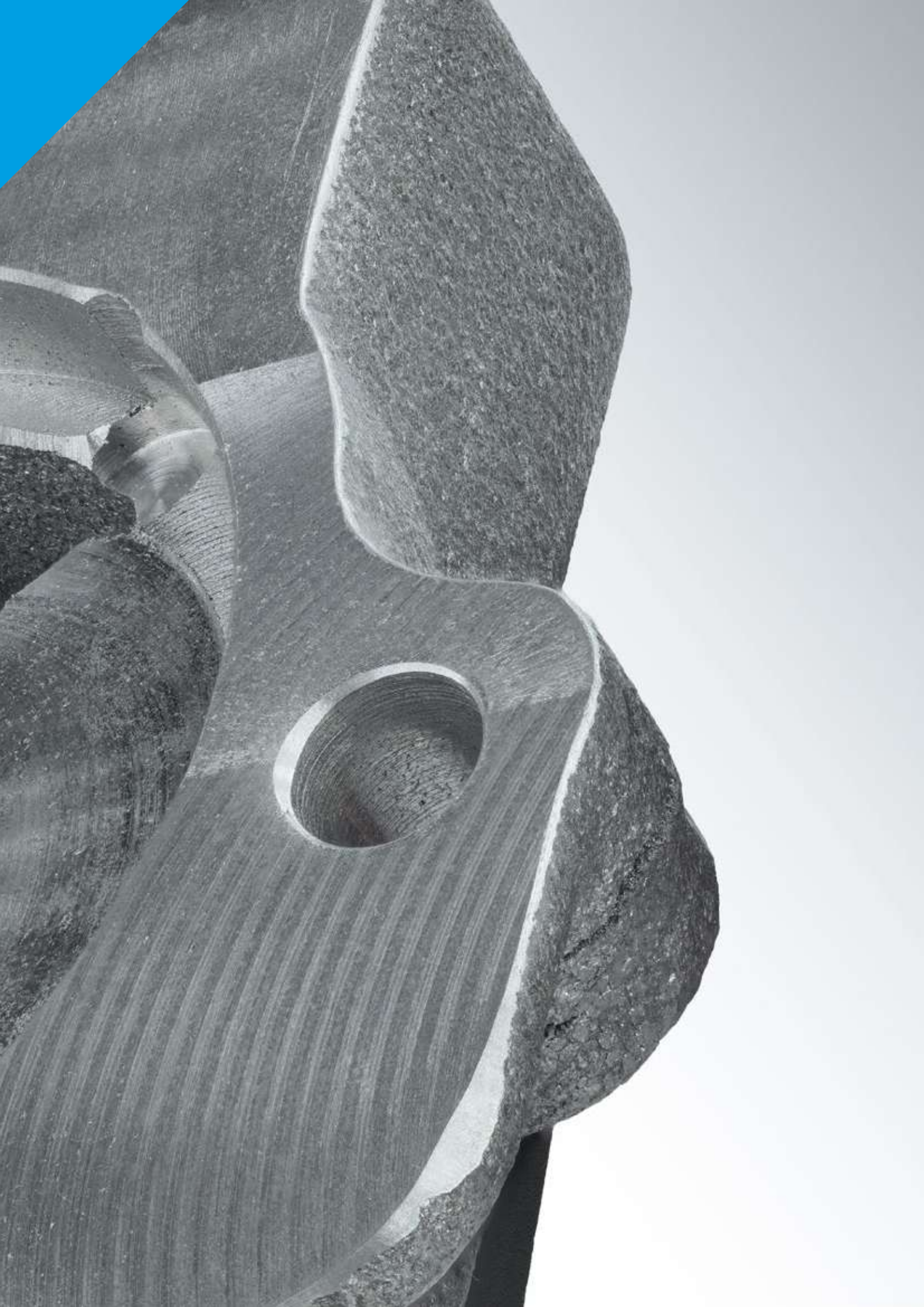


		Ceramic Fiber Cross-Hole Brush	HSD Deburring tools
			
		from page 150	from page 124
Tool properties	Tool type	Ceramic fiber brush	Individually manufactured tooling system with pressure activated cutting edges
	Contour machining through	Ceramic fibers spread by centrifugal force	Inner coolant/Elastomer-steered cutting edge
	Cutting material	Al_2O_3 Advanced ceramics	HSS
	Adjustability of the deburring intensity		
Contour to be machined	min. Ø main hole (mm)	1.9	2.9
	min. Ø cross hole (mm)	0	1.0
	Bore ratio 3:1 (Ø cross hole to Ø main hole) 	●	●
	Bore ratio 2:1 (Ø cross hole to Ø main hole) 	●	●
	Bore ratio 1:1 (Ø cross hole to Ø main hole) 		●
	Inclined cross hole 	●	●
	Axle offset cross hole 	●	●
	Max. Overhang length / Depth of hole 		
Burr condition	Burr located in main hole	●	●
	Burr located in cross hole		○
Programming/Machine Requirement		1 axis	1 axis, change of direction of rotation
Machining speed			

● = suitable ○ = conditionally suitable

Ceramic Fiber Stone	Back-Burr Cutter & Path	Ceramic Fiber Wheel Brush		
				
from page 158	from page 34	from page 148		
Ceramic fiber stone with flexible shaft	Deburring system, consisting of ball nose cutter and NC data set; contour tracing by NC data set	Ceramic Fiber Wheel Brush		
Contour probing	NC data set	Grinding the surface		
Al_2O_3 Advanced ceramics	Solid Carbide (coated)	Al_2O_3 Advanced ceramics		
3.1	0.9	51		
1.0	0.7	0		
●	●	●		
●	●	●		
○	●	●		
●	●	●		
only with slight axial offset	●	●		
●	●	●		
○	●	○		
2 axes	3 axes - Special adjusted NC data set	2 axes		

#burrfree starts now.



1 THE #burrfree BASICS

WHY IS #burrfree STRAIGHT OUT OF THE MACHINE SO IMPORTANT?

With the ever more complex requirements for high-precision components with increasingly difficult workpiece contours, today's competitive advantage lies in manufacturing these components with a consistent high quality - #burrfree.
If deburring is implemented in the production process of the CNC machine, not only time is saved, but resources are also gained that were previously tied up. The use of machine deburring tools almost always leads to lower unit costs in series production and at the same time to fewer quality defects or complaints from the end customer.

WHAT IS A BURR?

In order to be able to remove a burr without leaving any residue or to be able to machine a workpiece #burrfree, it is first necessary to define what a burr actually is. According to German Standard DIN ISO 13715, workpiece edges are considered "burr-like" if their protrusion is a deviation of > 0.05 mm from the ideal geometric shape. Smaller burrs are considered sharp-edged or even #burrfree. In practice, the picture is somewhat different. Which burr heights or burr root thicknesses are still accepted on a workpiece edge depends strongly on the requirements of the component and differs from application to application.

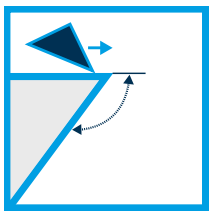
HOW MASSIVE CAN A BURR BE?

In general, the more massive the burr, the fewer deburring solutions there are. Therefore, the focus is on designing the pre-machining in a way to minimize burrs as much as possible.

Burr root thickness in mm	<0.05	0.05 - 0.1	0.1 - 0.2	0.2 - 0.5	0.5 - 1.0	1.0 -2.0	>2.0
Microfinishing	Almost all deburring solutions can be considered						
Honing							
Grinding							
Rubbing							
Milling			• Deburring tools • Manual deburrer • Grinding wheel • Finishing file				
Turning							
Fine drilling							
Drilling					• Rotary cutter • Deburring cutter • Rough grinding wheels Problem from Secondary burr formation		
Sawing							
Punching							
Forged parts							
Castings							
Welded parts							

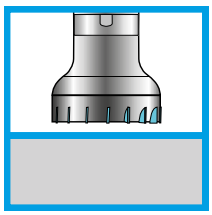
WHY IS BURR-MINIMAL MACHINING IMPORTANT?

Depending on the #burrfree requirements of the workpiece edge, a well-designed burr-minimizing machining process can possibly eliminate the need for a deburring tool afterwards. If this is successful, a very economical machining process is achieved without the use of another tool. But even if the use of a further tool remains necessary, burr-minimal pre-machining is always important, because deburring tools that follow in the machining process can then be used much more effectively and economically.



HOW DOES THE EDGE ANGLE INFLUENCE BURR FORMATION?

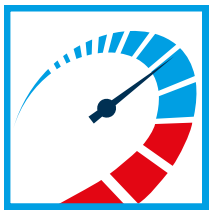
Pointed edge angles on the workpiece should also be avoided as far as possible, because the sharper the edge, the larger the burr that is generated. At chamfered edges or countersunk holes, only a minimal burr occurs from a blunt edge angle of ≤ 45° and practically no burr at 30°.



HOW DOES THE MACHINING TOOL INFLUENCE THE BURR FORMATION?

In order to be able to produce a component that is as free of burrs as possible, it is NOT only the actual deburring tools that are important. Rather, it is also important to keep an eye on the actual "preparatory work". Not only chip- and edge angles have an influence on burr formation, the tool itself plays a crucial role.

Optimized cutting tools with sharper cutting edge geometries also generally lead to less burr formation - with shorter tool life. However, in the field of machining non-ferrous metals, for example, it is possible to achieve both the goal of minimizing burrs and the goal of maximizing tool life. The use of PCD as a cutting material and an appropriate tool design make sense here.



HOW DO APPLICATION PARAMETERS INFLUENCE BURR FORMATION?

Burr minimization can also often be achieved by adjusting the machining parameters where the tool meets the workpiece edge. For example by:

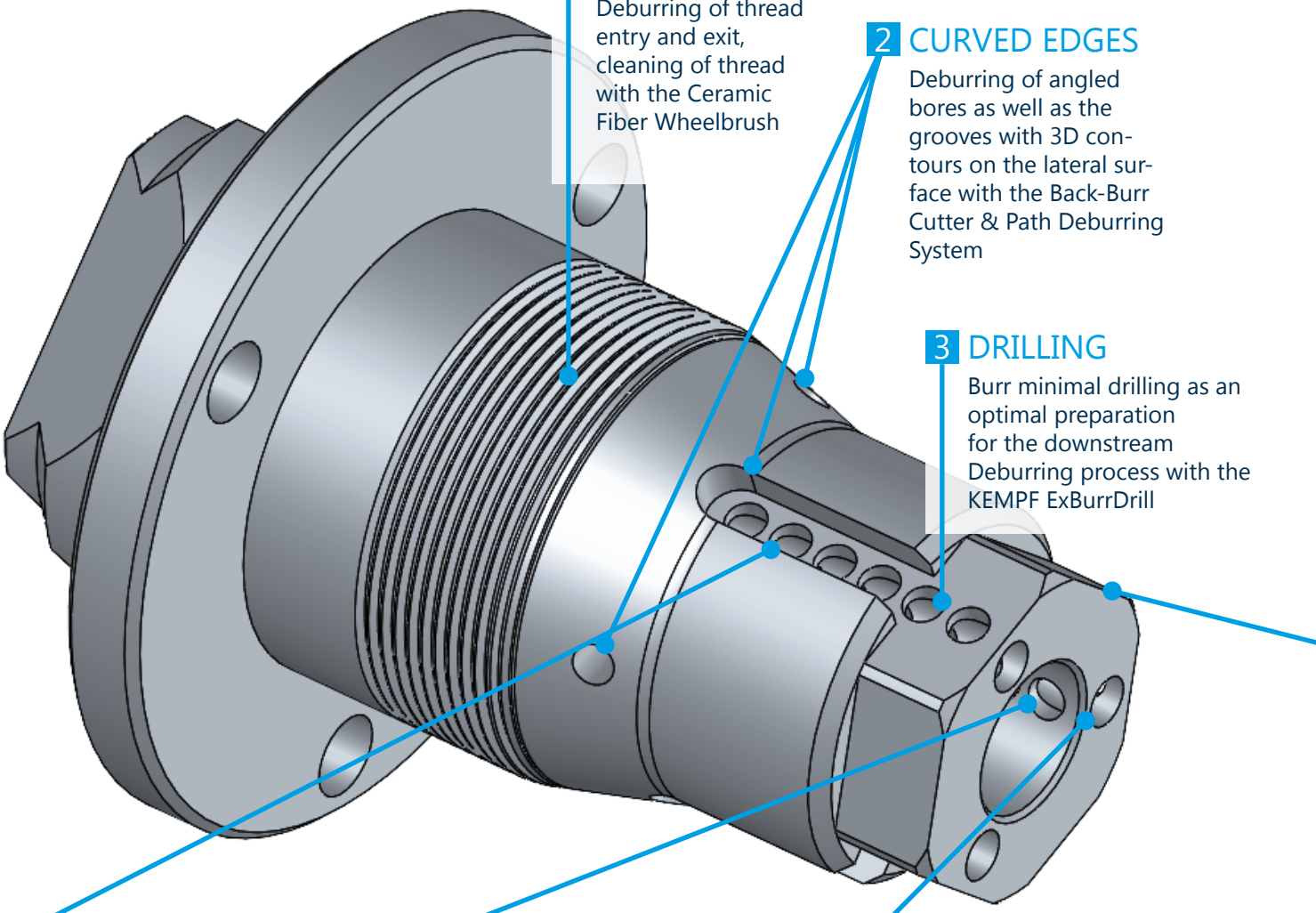
- Reduction of the depth of cut for a face milling operation
- Reduction of the feed rate at the exit of the bore hole

Alternatively, our specially developed ExBurrDrill drills (from page 24) are also suitable for burr-minimal drilling.

2

TOOL USAGE IN SAMPLE PART "BURR ENEMY NO. 1"

Overview of the different deburring tools and their areas of application



1 THREAD

Deburring of thread entry and exit, cleaning of thread with the Ceramic Fiber Wheelbrush

2 CURVED EDGES

Deburring of angled bores as well as the grooves with 3D contours on the lateral surface with the Back-Burr Cutter & Path Deburring System

3 DRILLING

Burr minimal drilling as an optimal preparation for the downstream Deburring process with the KEMPF ExBurrDrill

4 HOLE DEBURRING

Deburring of bore entries and exits in one process with the spring loaded Burraway Universal Deburring Tool

5 HOLE DEBURRING

Deburring of bore entries and exits in one process with the spring loaded GMO Deburring Tool

6 CROSS HOLE DEBURRING

Deburring of bore entries and exits in one process with the pressure medium controlled HSD Deburring Tool

1 CERAMIC FIBER WHEELBRUSH
pages 148/149

2 BACK-BURR CUTTER & PATH DEBURRING SYSTEM
pages 34-47

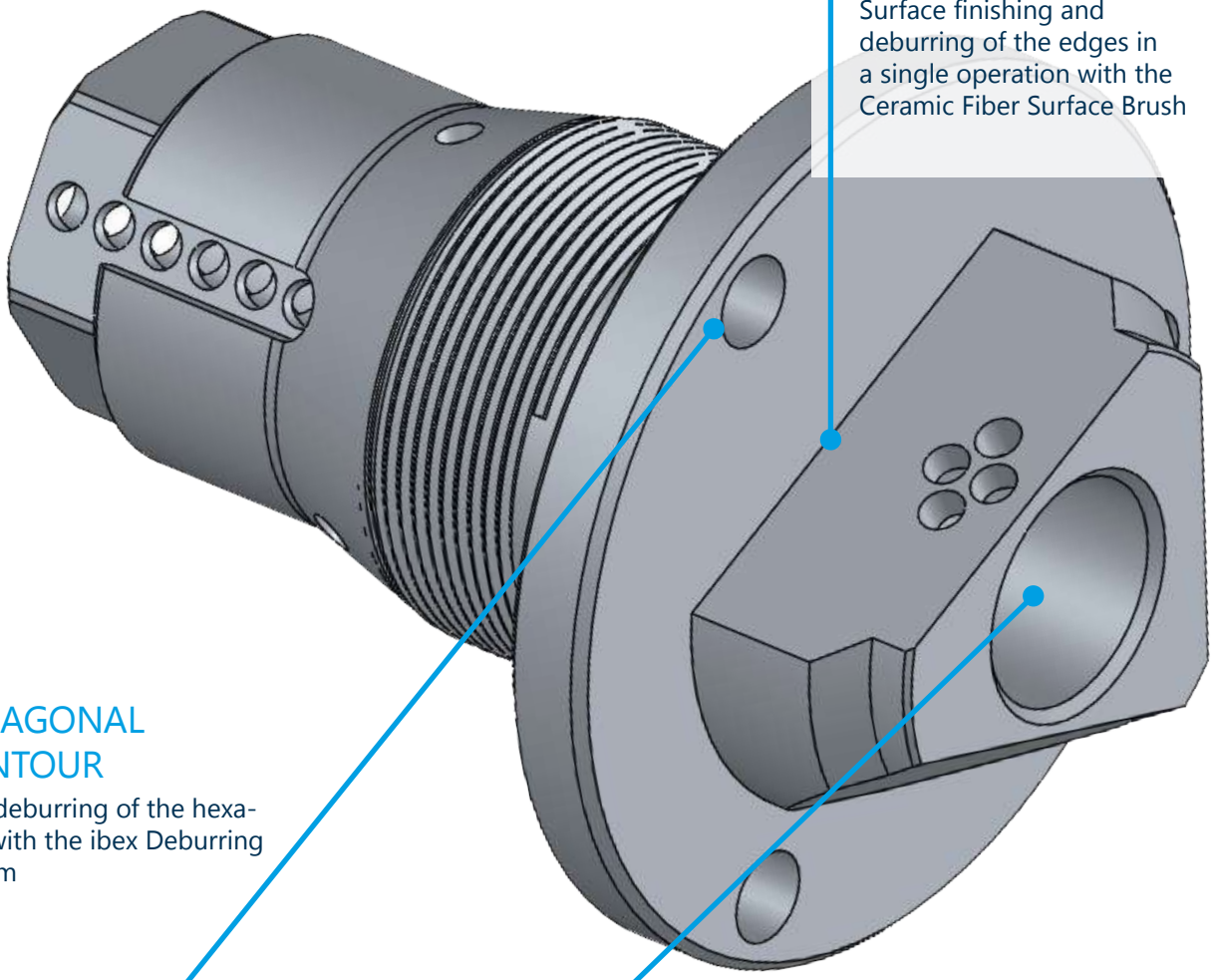
3 EXBURRDRILL
pages 24-31

4 8 BURRAWAY
pages 84-95

5 GMO DEBURRING TOOL
pages 104-113

9 INTERRUPTED SURFACE

Surface finishing and deburring of the edges in a single operation with the Ceramic Fiber Surface Brush



7 HEXAGONAL CONTOUR

Face deburring of the hexagon with the ibex Deburring System

8 HOLE DEBURRING

Deburring of bore entries and exits on plane surfaces in one process with the spring loaded Burraway Universal Deburring Tool

10 LARGE DIAMETER BORE AND CROSS HOLES

Deburring of cross hole exits in one process with the „Ceramic Fiber Cross-Hole Brush Extra Large

6
HSD "HIGH SPEED DEBURRING"
pages 124-127

7
KEMPF IBEX
pages 70-78

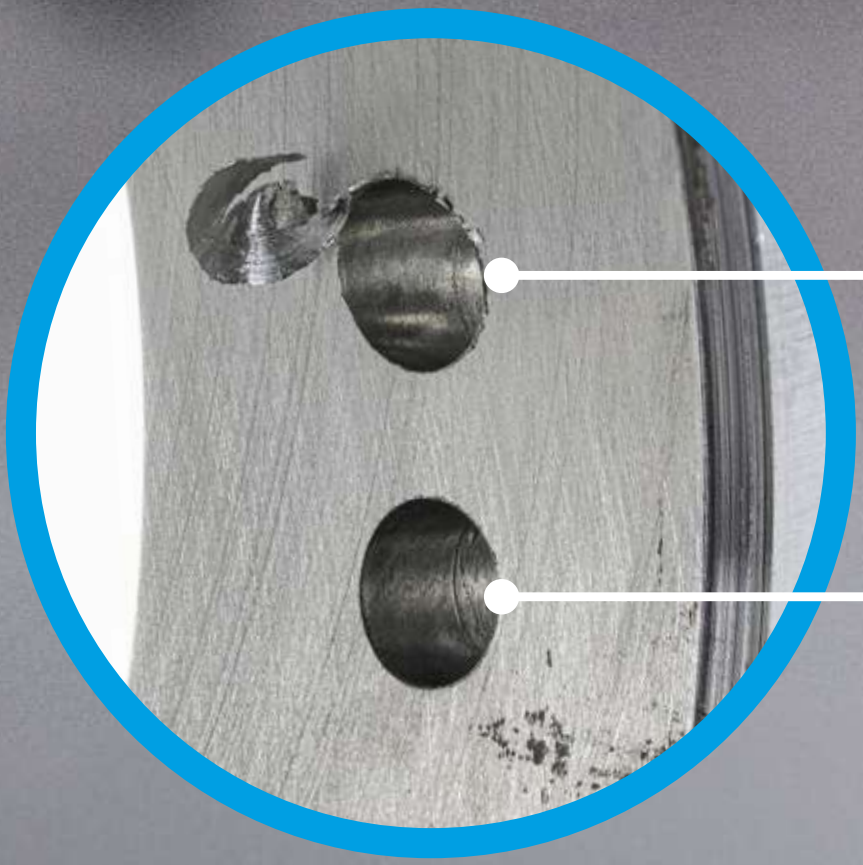
9
CERAMIC FIBER SURFACE BRUSH
pages 136-141

10
CERAMIC FIBER CROSS-HOLE BRUSH EXTRA LARGE
pages 150-155

3

ExBurrDrill

The drill that drills with such minimal burrs that it is almost #burrfree - and leaves no cap behind.



EXBURRDRILL
BURR-MINIMAL DRILLING WITHOUT A CAP

The benchmark in burr minimization - without compromising the feed rate.

FEATURES

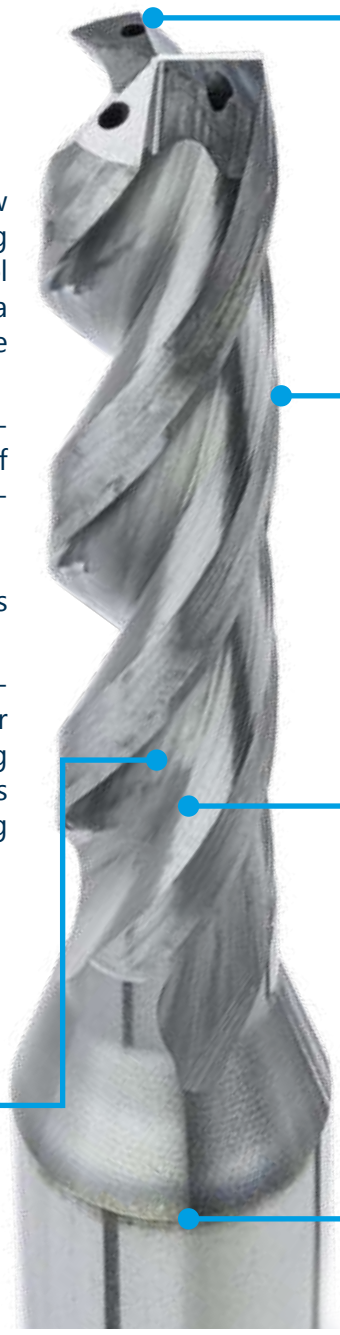
MINIMUM BURR AT MAXIMUM FEED RATE

When exit burrs need to be avoided, the new solid carbide drill for burr-minimizing drilling has clear advantages. Thanks to its special tool geometry, the formation of burrs is reduced to a minimum at the exit of the hole. The use of the new drill...

- eliminates the need for a downstream deburring process. This reduces process and, if necessary, set-up costs and reduces the machining time of the component

In the case of very high burr-free requirements for a component, downstream...

- burr machining is made possible with process reliability. The burr root of the exit burr is minimized. The downstream deburring tool can shear off the burr root with process reliability. The service life of the deburring tool is multiplied.



ANTI-BURR GEOMETRY

- Extremely low burr formation at the bore exit
- No weakening of the tool. Long tool life is achieved

ANTI-BURR SIDE GRINDING

- Specially developed side grinding in the cutting corner area
- Minimizes burr formation even at high feed rates

ANTI-BURR COATING

TiAlN multilayer coating

- Specially adapted to the process forces of the burr-minimized geometry
- Low thermal conductivity ➨ Heat shield for the hard metal substrate

SOLID CARBIDE SUBSTRATE

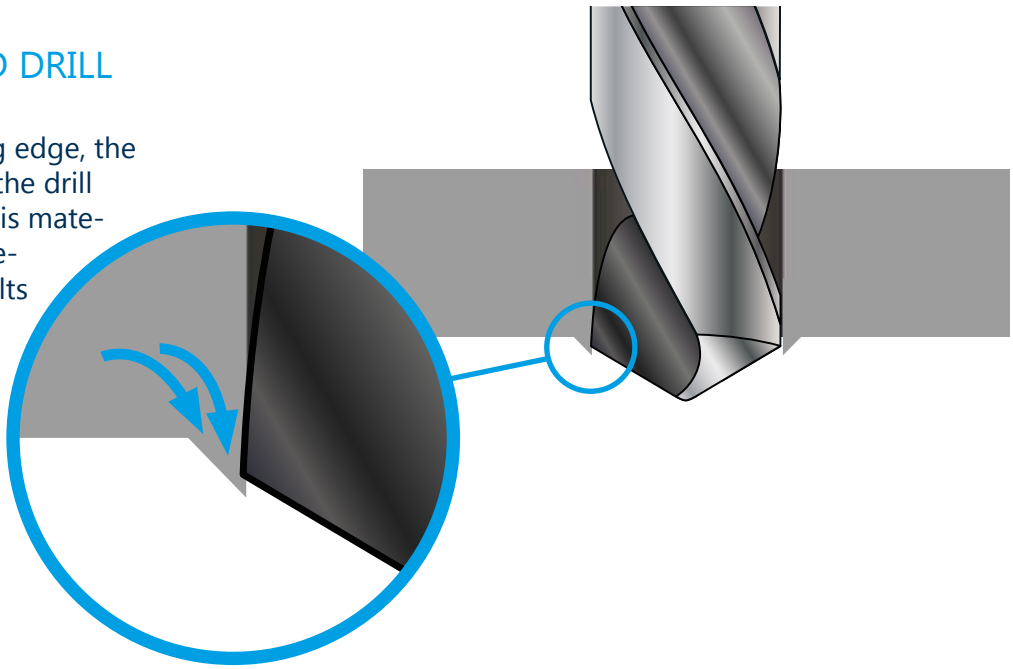
- Designed for machining through holes
- Very good properties in terms of flexural strength and toughness

SHANK DESIGN

HA, HB and HE cylindrical shank available on request at no extra charge

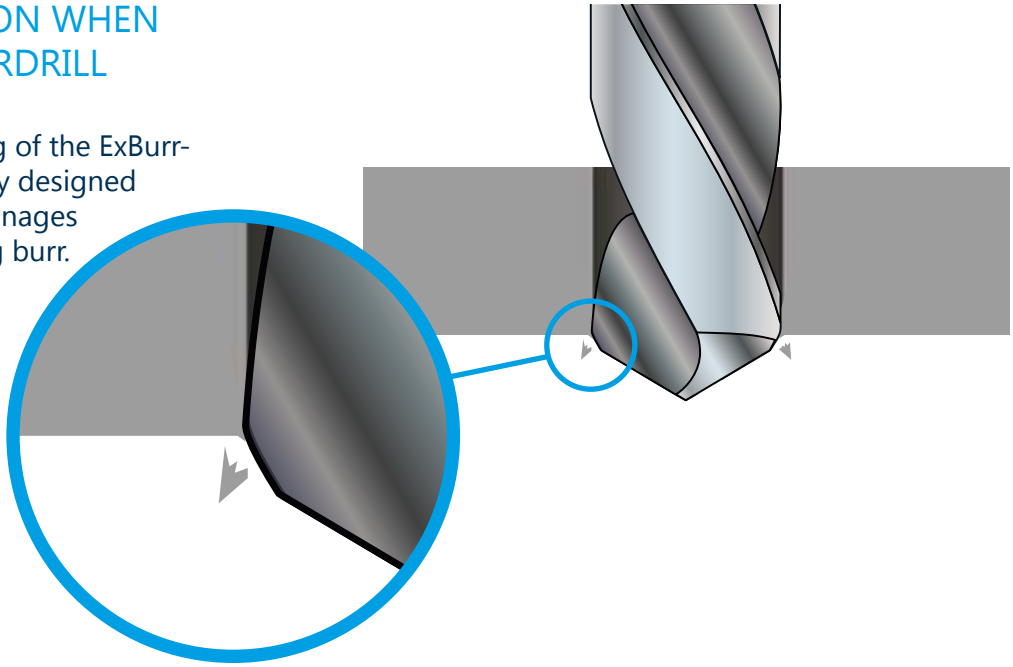
BURR FORMATION WITH A STANDARD DRILL

In the area of the cutting edge, the material is bent over as the drill exits the workpiece. If this material is not peeled off, it remains in place. This results in a burr.

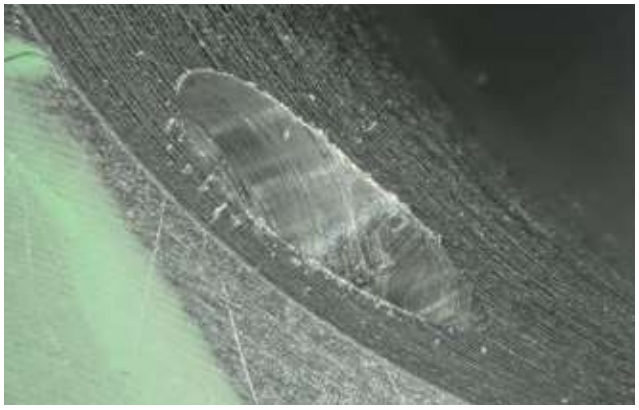


BURR MINIMIZATION WHEN USING THE EXBURRDRILL

The special side grinding of the ExBurrDrill, which is individually designed for the exit situation, manages to shear off the resulting burr. This results in a burr-minimized bore exit, which can even be described as "#burr-free" depending on the specifications. Caps can therefore also no longer occur or are also sheared off when exiting the workpiece.



Even with apparently burrfree or burr-minimized results when using standard drills, the difference lies in the detail. At 30x magnification, the performance of the ExBurrDrill (right) becomes clear.



Bore exit after using a standard drill in aluminum

Bore exit after using the ExBurrDrill in aluminum

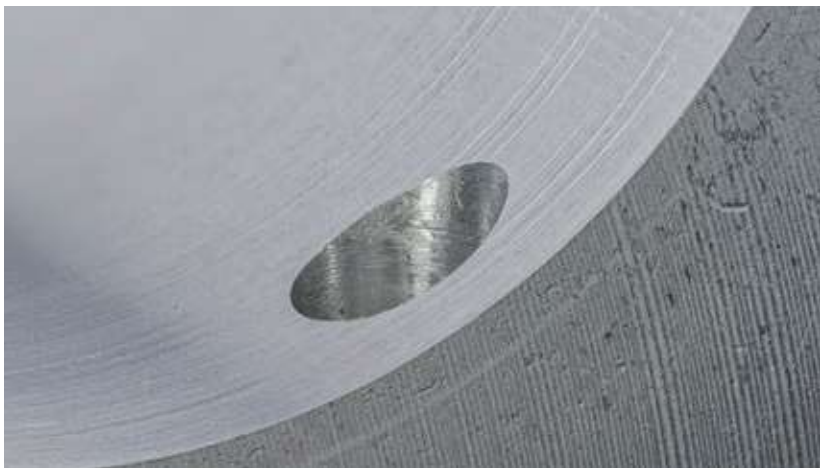
ADVANTAGES

NOT ONLY BURR-MINIMAL - BUT ALSO NO CAP

In order to manufacture as efficiently as possible, the preparatory work generally plays an important role. So why not ensure that there is as little burr as possible when drilling and that no cap needs to be removed? Whether in aluminum, cast iron, steel or stainless steel - the ExBurrDrill sets standards.

Part of a piston rod made of C70 steel. When using a standard drill (left), a relatively large burr is created on the curved surface at the exit of the Bore and a cap remains. When using the ExBurrDrill (right), only a minimal burr can be seen at the exit edge of the bore, a cap is not created.

Piston rod bearing with bore entry in C70 steel and bore exit (bearing bush) made of CuZn31Si1. On the left a standard drill was used, on the right the KEMPF ExBurrDrill. The differences are significant.



ABOVE: Off-axis bore exit into the cross bore in an aluminum component. With the ExBurrDrill, almost no burr can be measured even with this type of machining.

TOOL VIDEO LINK

VIDEO
„No more need for caps“

ORDER PROCESS FOR THE EXBURRDRILL

We manufacture the KEMPF ExBurrDrill individually for your application in order to achieve burr-minimal bore machining. The tool geometry of the ExBurrDrill is parameterized and it takes into account the engagement conditions at the bore exit on your component and the material.

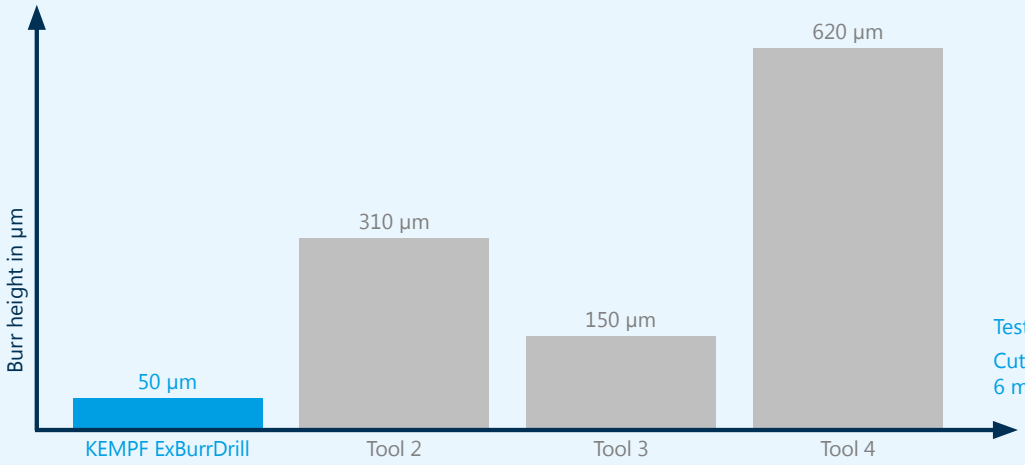
Utilize the individual tool production to combine several process steps into one drilling operation. By using an ExBurrDrill step drill, both the subsequent deburring process and a counterboring process can be omitted. This reduces tool change times as well as main times on the machine.
We will be pleased to manufacture the KEMPF ExBurrDrill for you in the diameter ranges from Ø 0.8 mm to Ø 20.0 mm.

Ø 0.8 mm

Ø 20.0 mm

BURR MINIMAL

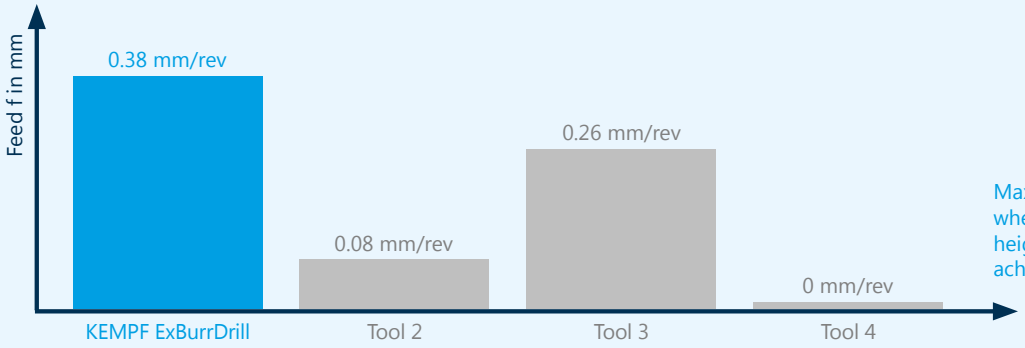
The generated burr height is minimal with the KEMPF ExBurrDrill.



Test series in 42CrMoV4
Cutting edge diameter:
6 mm

FAST

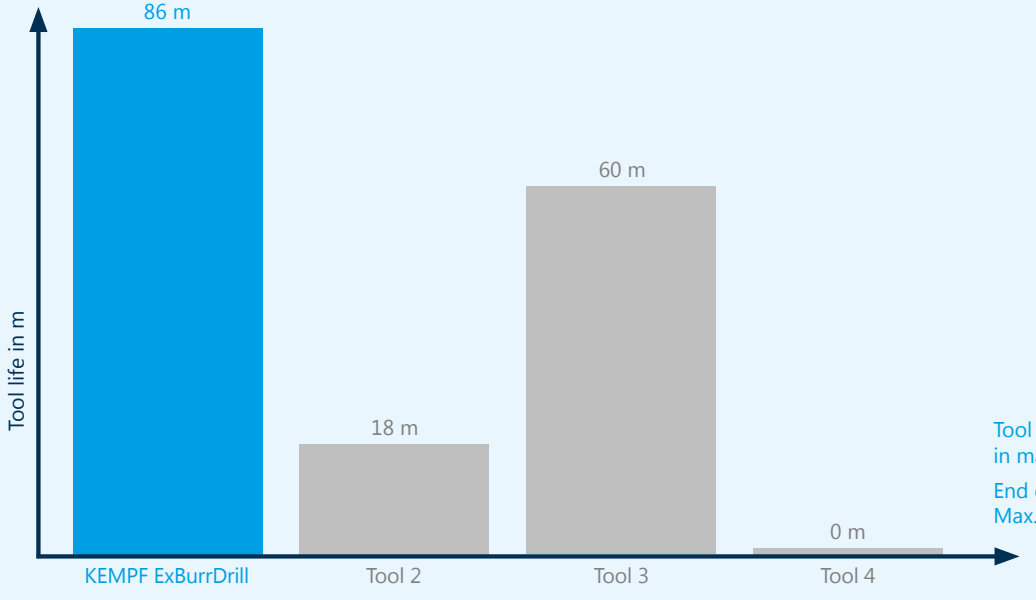
At a defined burr height, the KEMPF ExBurrDrill reaches the highest feed rates.



Max. feed rate f in mm/rev, where a required max. burr height of 100 µm can be achieved.

DURABLE

The special tool geometry of the KEMPF ExBurrDrills is not at the expense of tool life.



Tool life reached
in material 42CrMoV4

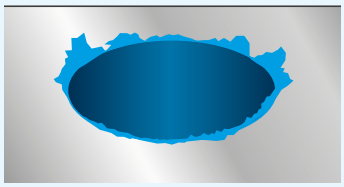
End of tool life:
Max. burr height = 200 µm.

GOOD TO KNOW

WHAT TYPES OF BURRS ARE THERE?

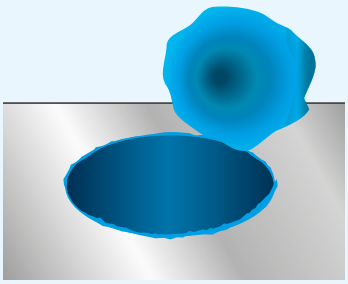
CROWN BURR OR WING BURR

- Non-constant burr height
- Makes follow-up process more difficult



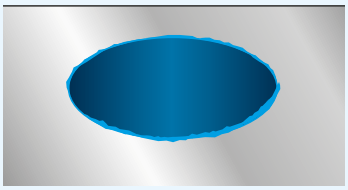
RING BURR & CAP

- Adhesive cap
- Endangers follow-up process



RING BURR

- Constant burr height
- Is therefore considered manageable



EXPERT TIP

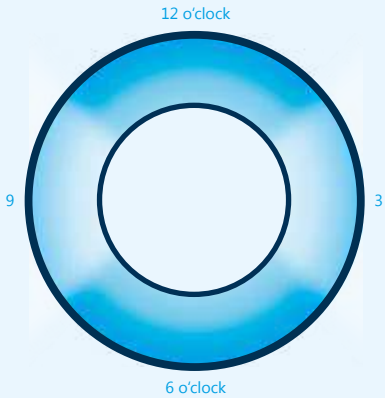
THESE INFLUENCING FACTORS ARE DECISIVE FOR BURR FORMATION IN CROSS-HOLES

CROSS-HOLE

Bore exits in cross-holes result in an elliptically curved contour. This results in constantly changing engagement conditions as the drill exits the bore.

INFLUENCING FACTOR MATERIAL ANGLE

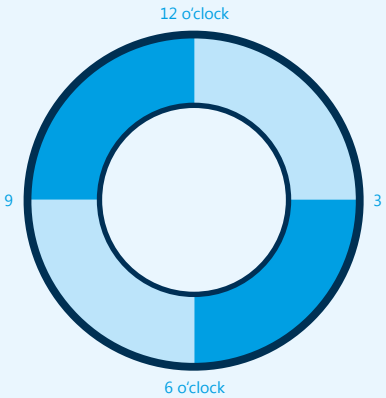
- The following applies: The more acute the edge angle, the larger the burr (see page 21, „THE #burrfree BASICS“)



- High material angle, low burr height
- Low material angle, high burr height

INFLUENCING FACTOR INTERACTION ANGLE

- The tool cutting edge leaves the material not only due to the movement in the feed direction, but also due to the rotation of the drill

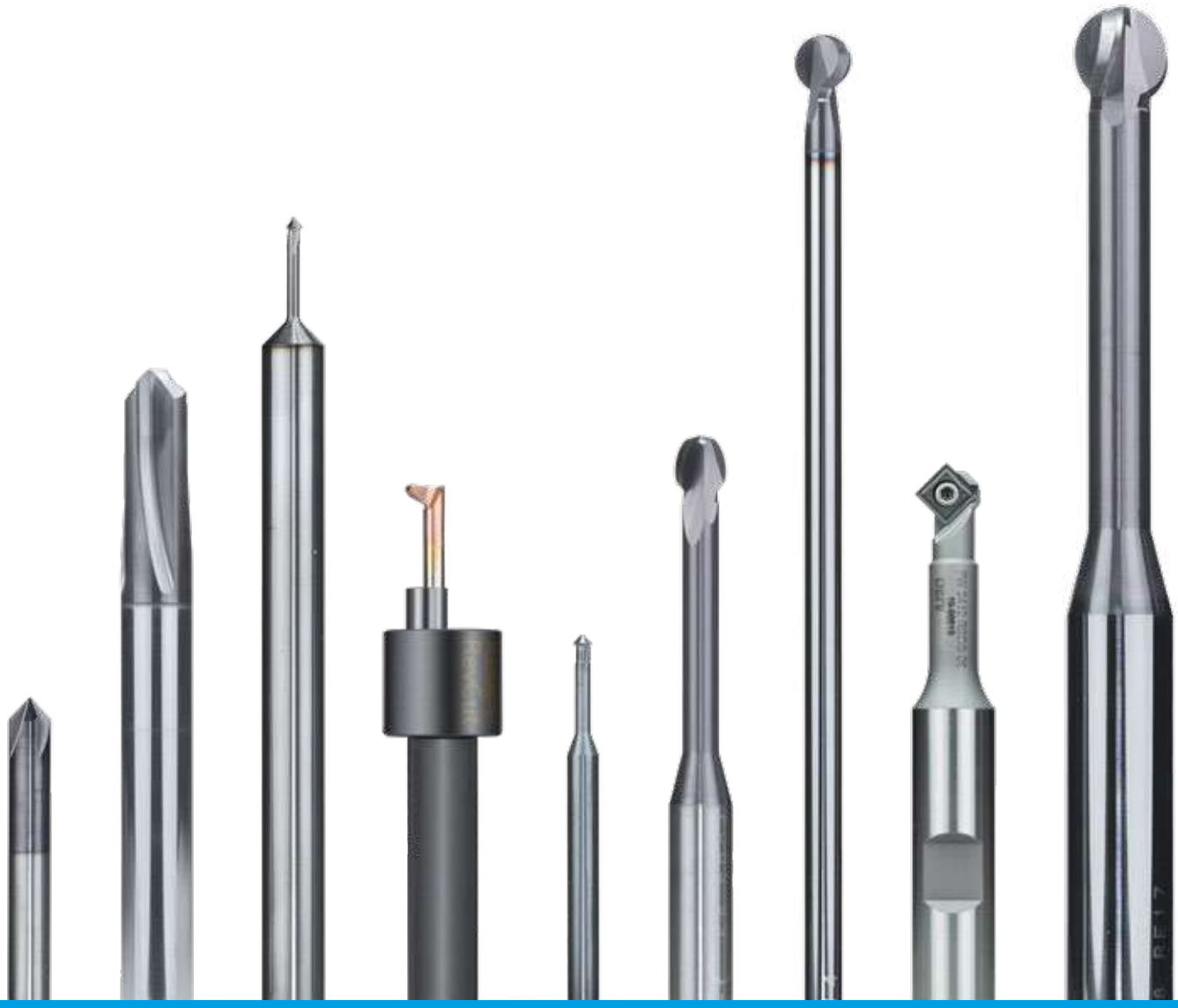


- Negative interaction angle, low burr height
- Positive interaction angle, large burr height

A CONTOUR-CONTROLLED DEBURRING TOOLS

THE CONTOUR SETS THE WAY

Deburring is performed by following the contour to be machined with the aid of an adapted NC program. A milling tool removes the burr repeatable with defined infeed and applies a chamfer. Due to the rigid path guide of the tool with NC program, the use of contour-bound tools requires workpieces with low position tolerances.



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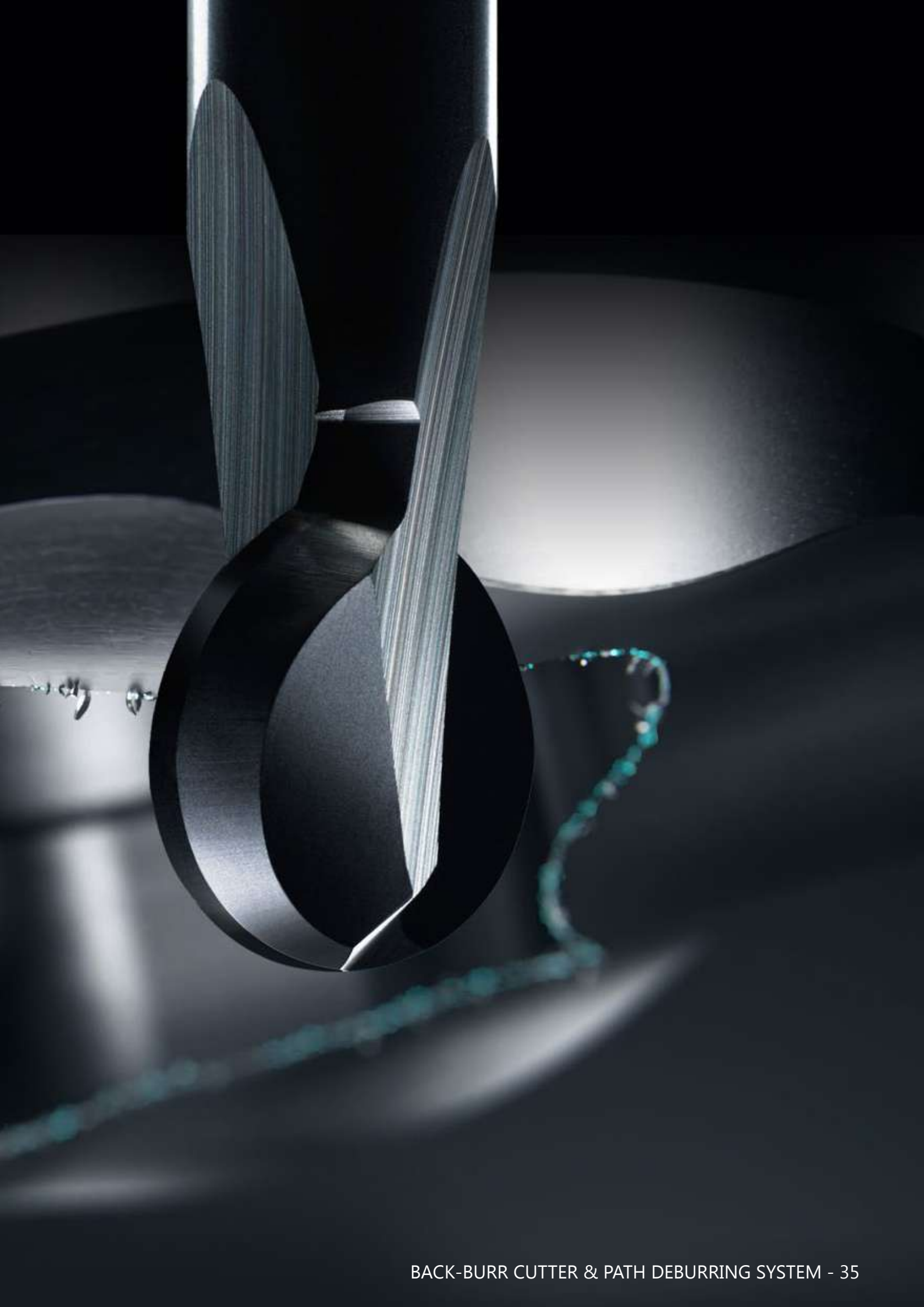
BACK-BURR CUTTER & PATH DEBURRING SYSTEM

"The only deburring system on the market that can shift the Cutter intersection point during the machining process."

BEST OF INDUSTRY AWARD NOMINEE 2019

1st PLACE OF THE TOP 15 PRODUCTS IN THE MACHINING SECTOR
PRODUKTE DES JAHRES 2018 MM

2nd PLACE OF THE TOP 15 PRODUCTS IN THE MACHINING SECTOR
Produkte des Jahres 2019 MM



BACK-BURR CUTTER & PATH DEBURRING SYSTEM

Front and back deburring of edges on 3D curved surfaces

System with ball nose cutter & individually programmed NC data set

FEATURES

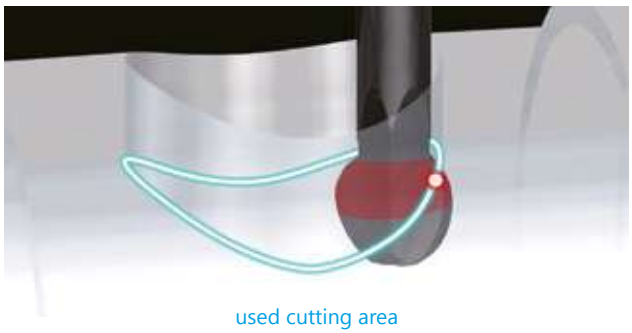
SPECIALLY DEVELOPED BALL NOSE CUTTER

- Micro-grain-carbide: sharp cutting edge, with high wear resistance
- Type A, AS-3F and B with high-temperature resistant AlTiCrN coating for a wide range of applications from aluminum to difficult-to-machine materials such as Inconel or titanium. Type A-N without coating and extra sharp - ideal for aluminum and plastic/composite machining
- Highly positive cutting edge: produces clean edges and prevents secondary burrs
- Faster machining due to the special geometry

NC DATA SET (PATH)

- Uniform chamfers due to constant material removal over the contour
- Increase of tool life by changing the cutter's intersection point while machining

before | after



used cutting area

INFO

The deburring of bores is still a great challenge, as the requirements are constantly increasing. Many components are becoming more and more complex, so that deburring operations are also becoming increasingly difficult to manage and new challenges are always arising.

For CNC deburring, basically only two types of tool solutions are offered on the market. For the most part, these are tools that perform linear movements in relation to the cross hole while rotating.

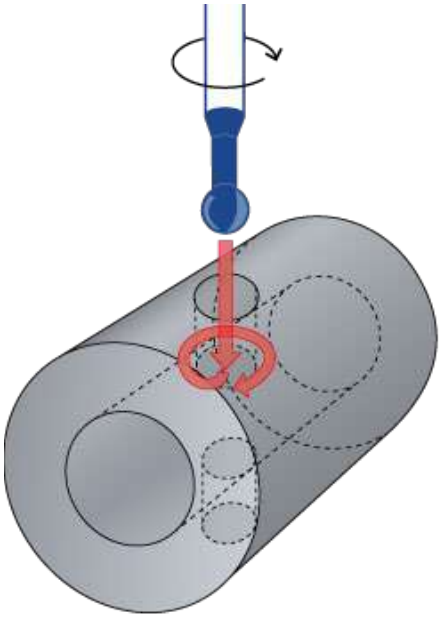
A sometimes more effective alternative is machining with a spherical cutter, which deburrs along the edge at two intersecting bores parallel to the contour.
However, even with these tools, which are far more flexible to use, difficulties arise when programming the data sets of the contour to be machined.

We have addressed precisely these problems and developed a holistic tool solution that enables high-quality CNC deburring.

ADVANTAGES

TOOL IN COMBINATION WITH NC DATA SET

The Back-Burr Cutter is an innovative deburring solution that is a synergy of a ball nose cutter and NC data set. Both components are perfectly matched and the tool is optimally utilized. Due to the individual programming of the data set, the cutter follows the contour of the component with high precision and thus removes burrs safely and without leaving any secondary burr - even on the back side of holes.



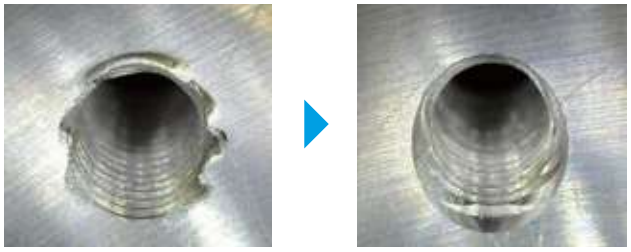
Using the coordinate points of the NC data set, a customized path is programmed for each application and the use of the tool is optimized by taking the machining points, contact points and cutter angles into account.

This system solves many previously existing problems and has already caused quite a sensation in the field of CNC deburring. Users confirm the uniform as well as precise operation and a much higher production efficiency in contrast to other tooling solutions.
Thanks to the machining program, a spherical cutter is usually sufficient to deburr various bore diameters. The data set supplies not only simple (round) bore edges, but also offers much more machining options, since orthogonal transverse bores as well as angled or interrupted bores can also be machined. The user thus usually only has to use a single tool for many machining operations, so that the machining time is reduced many times over.

In addition, the intersection point of the cutter can also be shifted during contour machining, so that the cutting edge is more evenly used on the one hand and the tool life is significantly increased on the other. Another advantage of the Back-Burr Cutter Deburring System is that very uniform deburring can be performed and a uniform chamfer width is produced.

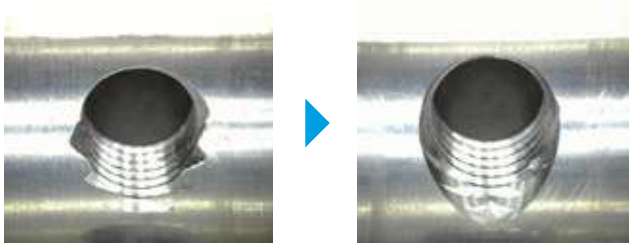
With our Back-Burr Cutter NC data sets currently on the market, thread deburring is now also possible.

Angled cross hole (aluminum)



before | after

Off-center cross hole (aluminum)



before | after

TOOL VIDEO LINK

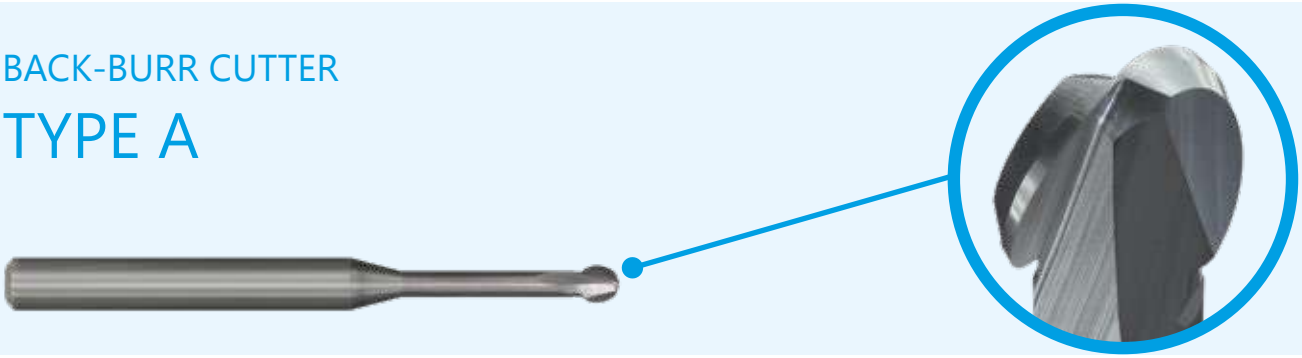
VIDEO
"Beautiful Deburring"

BACK-BURR CUTTER VARIANTS

The Back-Burr Cutter & Path Deburring System is constantly being further developed. In order to be able to use the deburring system as universally as possible, the tool itself is also subject to continuous innovation. In addition to the previous variants with continuous and stepped shank, the program has now been supplemented with two further variants, which means that 4 versions of the Back-Burr Cutter are available.

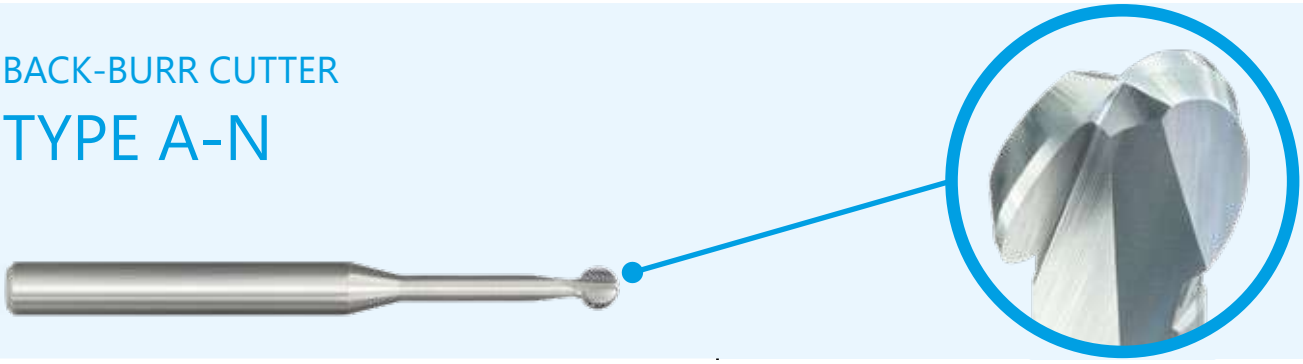
BACK-BURR CUTTER

TYPE A



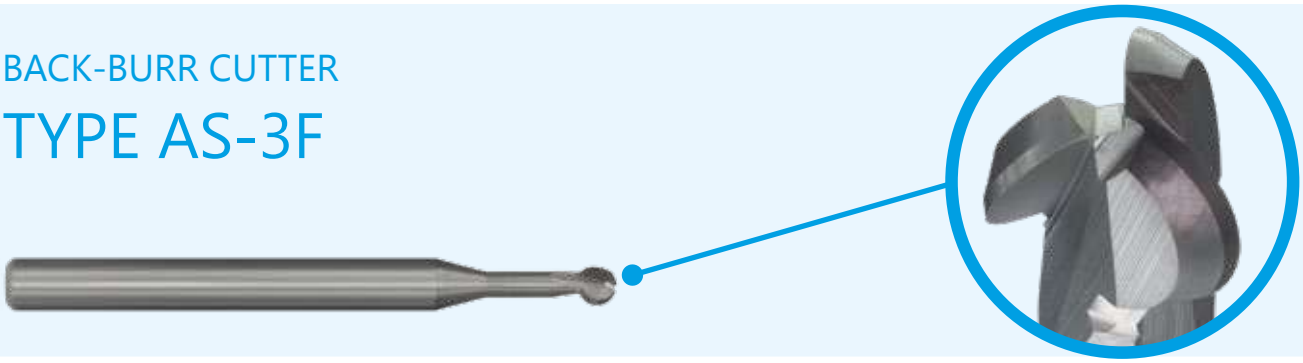
BACK-BURR CUTTER

TYPE A-N



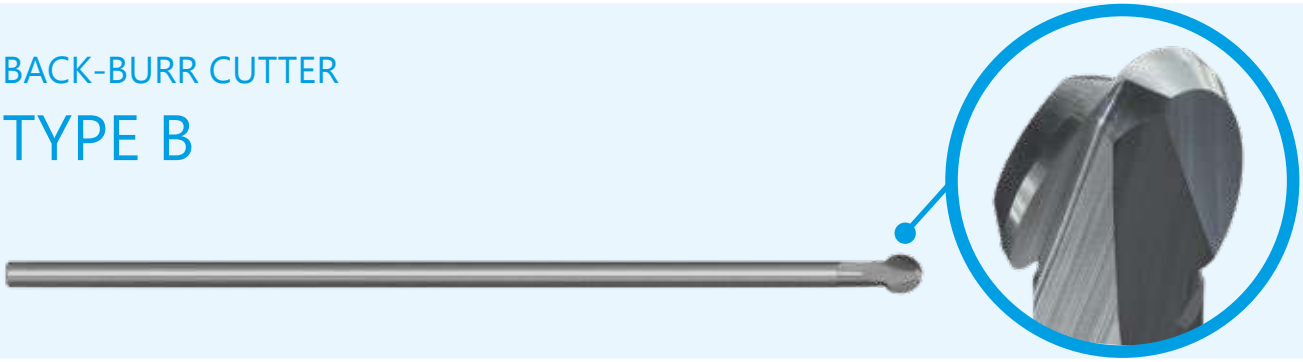
BACK-BURR CUTTER

TYPE AS-3F



BACK-BURR CUTTER

TYPE B



- Most commonly used deburring cutter with AlTiCrN coating and 2 cutting edges up to diameter 5.8 mm or 3 cutting edges for diameters 7.8 mm and 9.8 mm
- This "allround" milling cutter can be used for all materials and is also ideally suited for superalloys due to its coating
- The stepped shank provides more stability even with large overhang lengths

- Newly developed uncoated deburring cutter with a very sharp cutting edge design
- This deburring cutter convinces with an extremely sharp cutting geometry without a rounding of the cutting edge resulting from an additional coating. For this reason, this type of milling cutter is ideal for applications in non-ferrous metals and in plastics as well as in composite materials
- The stepped shank provides more stability even with large overhang lengths

- Newly developed deburring cutter with 3 cutting edges and AlTiCrN coating from diameter 0.8 mm
- This "allround" milling cutter can be used for all materials and is ideally suited for superalloys due to its coating.
- Due to the three cutting edges, an even longer tool life can be achieved even with very hard materials
- The stepped shank and an additionally shortened working length result in more stability and a higher feed rate is possible

- Standard deburring cutter with AlTiCrN coating and 2 cutting edges up to diameter 5.8 mm or 3 cutting edges for diameters 7.8 mm and 9.8 mm
- This "allround" milling cutter can be used for all materials and is also ideally suited for superalloys due to its coating
- This type has a continuous shank and is therefore particularly suitable for deburring tasks in difficult to access areas

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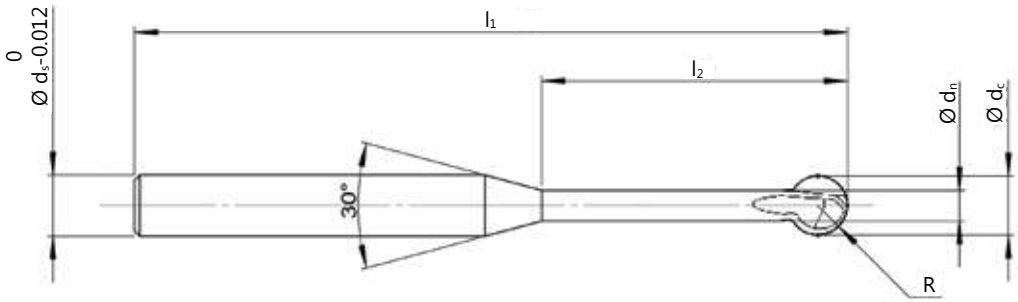
BACK-BURR CUTTER TYPE A

STANDARD - with AlTiCrN coating
STEPPED SHANK - BXC-..-A

The shank is suitable for shrink chucks and hydraulic chucks.



Material			STAIN-LESS	GG	S	H up to 58HRC	AL	CuZn	THERMO PLAST	DURO PLAST	GFK CFK	GRAPHIT
v_c (m/min)		110	110	110	50*	45	250	130	-	-	-	-
f_z (mm/Z)	Ø 0.8	0.015	0.015	0.015	0.011	0.008	0.017	0.017	-	-	-	-
	Ø 1.3	0.015	0.015	0.015	0.011	0.008	0.017	0.017	-	-	-	-
	Ø 1.8	0.015	0.015	0.015	0.011	0.008	0.017	0.017	-	-	-	-
	Ø 2.3	0.025	0.025	0.025	0.019	0.013	0.027	0.027	-	-	-	-
	Ø 2.8	0.040	0.040	0.040	0.030	0.020	0.047	0.047	-	-	-	-
	Ø 3.3	0.050	0.050	0.050	0.038	0.025	0.050	0.050	-	-	-	-
	Ø 3.8	0.065	0.065	0.065	0.049	0.033	0.073	0.073	-	-	-	-
	Ø 4.8	0.072	0.072	0.072	0.054	0.036	0.080	0.080	-	-	-	-
	Ø 5.8	0.076	0.076	0.076	0.057	0.038	0.086	0.086	-	-	-	-
	Ø 7.8	0.100	0.100	0.100	0.075	0.050	0.100	0.100	-	-	-	-
	Ø 9.8	0.100	0.100	0.100	0.075	0.050	0.100	0.100	-	-	-	-

d_c (mm)	d_n (mm)	l_1 (mm)	l_2 (mm)	d_s (mm)	Z	Coating	Item No.	EUR/Piece
0.8	0.48	60	5.0	3.0	2	AlTiCrN	BXC-08-A	
1.3	0.78	60	8.0	3.0	2	AlTiCrN	BXC-13-A	
1.8	1.1	60	10.0	3.0	2	AlTiCrN	BXC-18-A	
2.3	1.4	70	12.5	3.0	2	AlTiCrN	BXC-23-A	
2.8	1.7	70	15.0	4.0	2	AlTiCrN	BXC-28-A	
3.3	2.0	70	17.5	4.0	2	AlTiCrN	BXC-33-A	
3.8	2.4	70	20.0	4.0	2	AlTiCrN	BXC-38-A	
4.8	3.0	70	25.0	6.0	2	AlTiCrN	BXC-48-A	
5.8	3.5	70	30.0	6.0	2	AlTiCrN	BXC-58-A	
7.8	4.7	100	40.0	8.0	3	AlTiCrN	BXC-78-A	
9.8	5.9	120	50.0	10.0	3	AlTiCrN	BXC-98-A	

*PLEASE NOTE: Depending on the alloy, different cutting speeds apply.

Original size

BXC-08-A

Original size

BXC-38-A

Original size

BXC-78-A

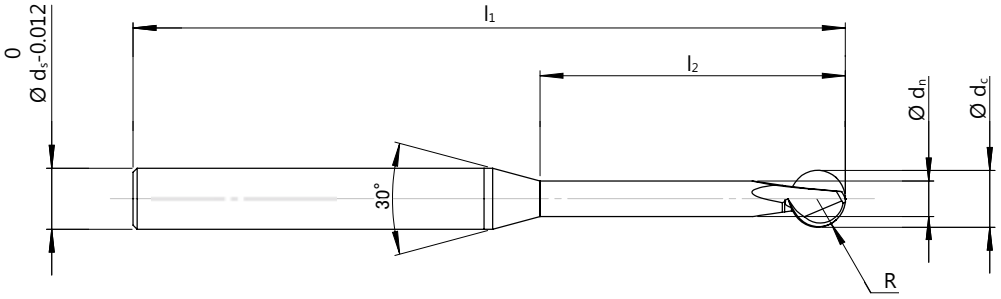
Original size

BXC-98-A

BACK-BURR CUTTER TYPE A-N

EXTRA SHARP - UNCOATED STEPPED SHANK - BXC-..-A-N

The shank is suitable for shrink chucks and hydraulic chucks.



Material			STAIN-LESS	GG	S	H up to 58HRC	AL	CuZn	THERMO PLAST	DURO PLAST	GFK CFK	GRAPHIT
v_c (m/min)		-	-	-	-	-	250	130	150	150	80*	130
f_z (mm/Z)	Ø 0.8	-	-	-	-	-	0.017	0.017	0.017	0.017	0.017	0.017
	Ø 1.3	-	-	-	-	-	0.017	0.017	0.017	0.017	0.017	0.017
	Ø 1.8	-	-	-	-	-	0.017	0.017	0.017	0.017	0.017	0.017
	Ø 2.3	-	-	-	-	-	0.027	0.027	0.027	0.027	0.027	0.027
	Ø 2.8	-	-	-	-	-	0.047	0.047	0.047	0.047	0.047	0.047
	Ø 3.3	-	-	-	-	-	0.050	0.050	0.050	0.050	0.050	0.050
	Ø 3.8	-	-	-	-	-	0.073	0.073	0.073	0.073	0.073	0.073
	Ø 4.8	-	-	-	-	-	0.080	0.080	0.080	0.080	0.080	0.080
	Ø 5.8	-	-	-	-	-	0.086	0.086	0.086	0.086	0.086	0.086
	Ø 7.8	-	-	-	-	-	0.100	0.100	0.100	0.100	0.100	0.100
	Ø 9.8	-	-	-	-	-	0.100	0.100	0.100	0.100	0.100	0.100

d_c (mm)	d_n (mm)	l_1 (mm)	l_2 (mm)	d_s (mm)	Z	Coating	Item No.	EUR/Piece
0.8	0.48	60	5.0	3.0	2	-	BXC-08-A-N	
1.3	0.78	60	8.0	3.0	2	-	BXC-13-A-N	
1.8	1.1	60	10.0	3.0	2	-	BXC-18-A-N	
2.3	1.4	70	12.5	3.0	2	-	BXC-23-A-N	
2.8	1.7	70	15.0	4.0	2	-	BXC-28-A-N	
3.3	2.0	70	17.5	4.0	2	-	BXC-33-A-N	
3.8	2.4	70	20.0	4.0	2	-	BXC-38-A-N	
4.8	3.0	70	25.0	6.0	2	-	BXC-48-A-N	
5.8	3.5	70	30.0	6.0	2	-	BXC-58-A-N	
7.8	4.7	100	40.0	8.0	3	-	BXC-78-A-N	
9.8	5.9	120	50.0	10.0	3	-	BXC-98-A-N	

*PLEASE NOTE: Depending on fiber content and fiber orientation, different cutting speeds apply.

Original size

BXC-08-A-N

Original size

BXC-38-A-N

Original size

BXC-78-A-N

Original size

BXC-98-A-N

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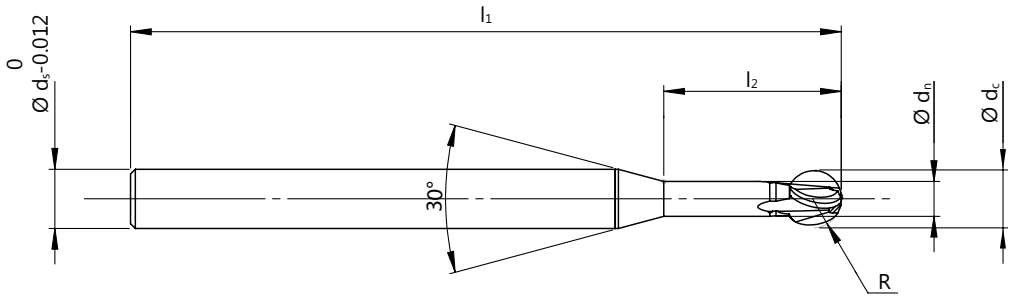
1.3

BACK-BURR CUTTER TYPE AS-3F

SHORT NECK LENGTH with 3 cutting edges & AlTiCrN coating STEPPED SHANK - BXC-..-AS-3F

The shank is suitable for shrink chucks and hydraulic chucks.

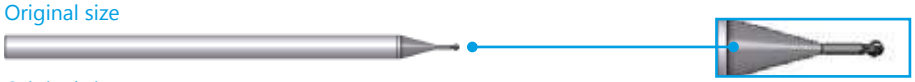


Material		STAIN-LESS	GG	S	H up to 58HRC	AL	CuZn	THERMO PLAST	DURO PLAST	GFK CFK	GRAPHIT
v_c (m/min)		110	110	110	50*	45	250	130	-	-	-	-
f_z (mm/Z)	Ø 0.8	0.018	0.018	0.018	0.014	0.009	0.020	0.020	-	-	-	-
	Ø 1.3	0.018	0.018	0.018	0.014	0.009	0.020	0.020	-	-	-	-
	Ø 1.8	0.018	0.018	0.018	0.014	0.009	0.020	0.020	-	-	-	-
	Ø 2.3	0.030	0.030	0.030	0.023	0.015	0.032	0.032	-	-	-	-
	Ø 2.8	0.048	0.048	0.048	0.036	0.024	0.056	0.056	-	-	-	-
	Ø 3.3	0.059	0.059	0.059	0.044	0.030	0.059	0.059	-	-	-	-
	Ø 3.8	0.078	0.078	0.078	0.059	0.039	0.087	0.087	-	-	-	-
	Ø 4.8	0.084	0.084	0.084	0.063	0.042	0.113	0.113	-	-	-	-
	Ø 5.8	0.090	0.090	0.090	0.068	0.045	0.116	0.116	-	-	-	-

d_c (mm)	d_n (mm)	l_1 (mm)	l_2 (mm)	d_s (mm)	Z	Coating	Item No.	EUR/Piece
0.8	0.48	60	3.0	3.0	3	AlTiCrN	BXC-08-AS-3F	
1.3	0.78	60	5.0	3.0	3	AlTiCrN	BXC-13-AS-3F	
1.8	1.1	60	6.0	3.0	3	AlTiCrN	BXC-18-AS-3F	
2.3	1.4	70	7.5	3.0	3	AlTiCrN	BXC-23-AS-3F	
2.8	1.7	70	9.0	4.0	3	AlTiCrN	BXC-28-AS-3F	
3.3	2.0	70	10.5	4.0	3	AlTiCrN	BXC-33-AS-3F	
3.8	2.4	70	12.0	4.0	3	AlTiCrN	BXC-38-AS-3F	
4.8	3.0	70	15.0	6.0	3	AlTiCrN	BXC-48-AS-3F	
5.8	3.5	70	18.0	6.0	3	AlTiCrN	BXC-58-AS-3F	

*PLEASE NOTE: Depending on the alloy, different cutting speeds apply.

Original size



BXC-08-AS-3F

Original size

BXC-23-AS-3F

Original size

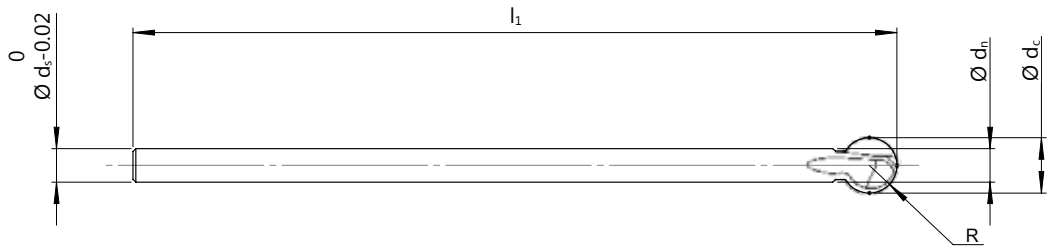
BXC-38-AS-3F

Original size

BXC-58-AS-3F

BACK-BURR CUTTER TYPE B

STANDARD - with AlTiCrN coating
CONTINUOUS SHANK - BXC-..-B



Material				STAIN-LESS	GG	S	H up to 58HRC	AL	CuZn	THERMO PLAST	DURO PLAST	GFK CFK	GRAPHIT
6xD		v_c (m/min)	55	55	55	40	-	80	60	-	-	-	-
	f_z (mm/Z)	Ø 1.8	0.025	0.025	0.025	0.019	-	0.025	0.025	-	-	-	-
		Ø 2.3	0.030	0.030	0.030	0.023	-	0.030	0.030	-	-	-	-
		Ø 2.8	0.037	0.037	0.037	0.027	-	0.037	0.037	-	-	-	-
		Ø 3.3	0.043	0.043	0.043	0.032	-	0.043	0.043	-	-	-	-
		Ø 3.8	0.050	0.050	0.050	0.038	-	0.050	0.050	-	-	-	-
		Ø 4.8	0.050	0.050	0.050	0.038	-	0.050	0.050	-	-	-	-
		Ø 5.8	0.050	0.050	0.050	0.038	-	0.050	0.050	-	-	-	-
		Ø 7.8	0.050	0.050	0.050	0.038	-	0.050	0.050	-	-	-	-
		Ø 9.8	0.052	0.052	0.052	0.039	-	0.052	0.052	-	-	-	-
10xD		v_c (m/min)	24	24	24	20	-	28	28	-	-	-	-
	f_z (mm/Z)	Ø 1.8	0.025	0.025	0.025	0.019	-	0.025	0.025	-	-	-	-
		Ø 2.3	0.031	0.031	0.031	0.023	-	0.031	0.031	-	-	-	-
		Ø 2.8	0.034	0.034	0.034	0.026	-	0.034	0.034	-	-	-	-
		Ø 3.3	0.036	0.036	0.036	0.027	-	0.036	0.036	-	-	-	-
		Ø 3.8	0.036	0.036	0.036	0.027	-	0.036	0.036	-	-	-	-
		Ø 4.8	0.038	0.038	0.038	0.029	-	0.038	0.038	-	-	-	-
		Ø 5.8	0.038	0.038	0.038	0.029	-	0.038	0.038	-	-	-	-
		v_c (m/min)	16	16	16	16		16	16				
	f_z (mm/Z)	Ø 7.8	0.040	0.040	0.040	0.030	-	0.040	0.040	-	-	-	-
		Ø 9.8	0.040	0.040	0.040	0.030	-	0.040	0.040	-	-	-	-
15xD		v_c (m/min)	15	15	15	12	-	18	18	-	-	-	-
	f_z (mm/Z)	Ø 1.8	0.025	0.025	0.025	0.019	-	0.025	0.025	-	-	-	-
		Ø 2.3	0.025	0.025	0.025	0.019	-	0.025	0.025	-	-	-	-
		Ø 2.8	0.025	0.025	0.025	0.019	-	0.025	0.025	-	-	-	-
		Ø 3.3	0.025	0.025	0.025	0.019	-	0.025	0.025	-	-	-	-
		Ø 3.8	0.025	0.025	0.025	0.019	-	0.025	0.025	-	-	-	-
		Ø 4.8	0.023	0.023	0.023	0.017	-	0.023	0.023	-	-	-	-
		Ø 5.8	0.023	0.023	0.023	0.017	-	0.023	0.023	-	-	-	-
		v_c (m/min)	6	6	6	6		6	6				
	f_z (mm/Z)	Ø 7.8	0.017	0.017	0.017	0.013	-	0.017	0.017	-	-	-	-
		Ø 9.8	0.017	0.017	0.017	0.013	-	0.017	0.017	-	-	-	-

d_c (mm)	d_n (mm)	l_1 (mm)	l_2 (mm)	d_s (mm)	Z	Coating	Item No.	EUR/Piece
1.8	1.1	50	-	1.1	2	AlTiCrN	BXC-18-B	
2.3	1.4	60	-	1.4	2	AlTiCrN	BXC-23-B	
2.8	1.7	70	-	1.7	2	AlTiCrN	BXC-28-B	
3.3	2.0	80	-	2.0	2	AlTiCrN	BXC-33-B	
3.8	2.4	85	-	2.4	2	AlTiCrN	BXC-38-B	
4.8	3.0	105	-	3.0	2	AlTiCrN	BXC-48-B	
5.8	3.5	120	-	3.5	2	AlTiCrN	BXC-58-B	
7.8	4.7	150	-	4.7	3	AlTiCrN	BXC-78-B	
9.8	5.9	180	-	5.9	3	AlTiCrN	BXC-98-B	

Original size

BXC-18-B

Original size

BXC-33-B

Original size

BXC-98-B

A
1.5

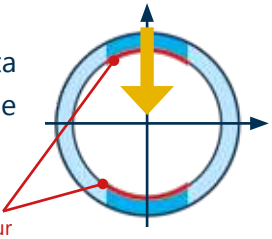
NC-DATA SET (PATH)

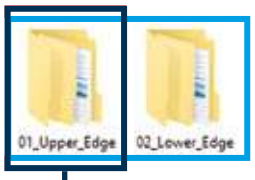
STRUCTURE DIAGRAM OF THE SUPPLIED NC DATA

If desired, an individual NC data set can be created and supplied together with the respective Back-Burr Cutter. This data is composed as follows in its scope and folder structure:

1. LEVEL

For each contour the NC data set contains a folder for the upper and lower deburring.

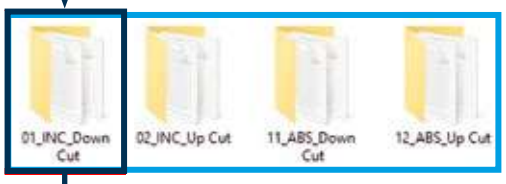




2. LEVEL

The second folder level contains the data sets for the following modes:

- Incremental mode (INC)
- Absolute mode (ABS)
- Machining in down-cut mode
- Machining in up-cut mode



3. LEVEL

Five different chamfer widths are supplied for each standard contour (see table).

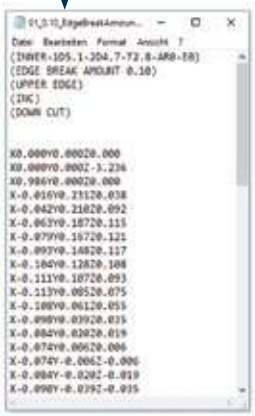
- Filename: _EdgeBreakamount_
(available in the example from 0.10 mm to 0.30 mm)

NC-PROCESSING DATA

The data set information is noted down in the header of the data set. Before using, check which one of the NC data sets contains the correct path for your specific application.

If the cutter does not touch the edge due to a too large bore diameter, try a path with a larger chamfer width.

If the chamfer becomes too large due to the small diameter of the machined bore, try a path with a smaller chamfer width.



NOTICE:
Depending on the type of borehole, other data sets are available. In this example, 20 data sets are available. (4 edges with 5 chamfer widths each)

Back-Burr Cutter with cutting edge diameter	Standard chamfer widths (mm)					Cumulative error size (mm)
	(1)	(2)	(3)	(4)	(5)	
0.8 mm	0.02	0.04	0.06	0.08	0.10	0.03
1.3 mm	0.04	0.06	0.08	0.10	0.12	0.05
1.8 mm	0.07	0.09	0.11	0.13	0.15	0.08
2.3 mm	0.07	0.09	0.11	0.13	0.15	0.09
2.8 mm	0.08	0.11	0.14	0.17	0.2	0.10
3.3 mm	0.08	0.11	0.14	0.17	0.2	0.11
3.8 mm	0.09	0.13	0.17	0.21	0.25	0.12
4.8 mm	0.1	0.15	0.2	0.25	0.3	0.15
5.8 mm	0.1	0.15	0.2	0.25	0.3	0.18
7.8 mm	0.1	0.15	0.2	0.25	0.3	0.18
9.8 mm	0.1	0.15	0.2	0.25	0.3	0.18

BACK-BURR CUTTER & PATH STARTER KIT

For each standard path, we offer you the cost-effective STARTER KIT, which is equipped with 3 Back-Burr Cutters of one size for the respective application and a USB stick with an individually created NC data set already loaded.

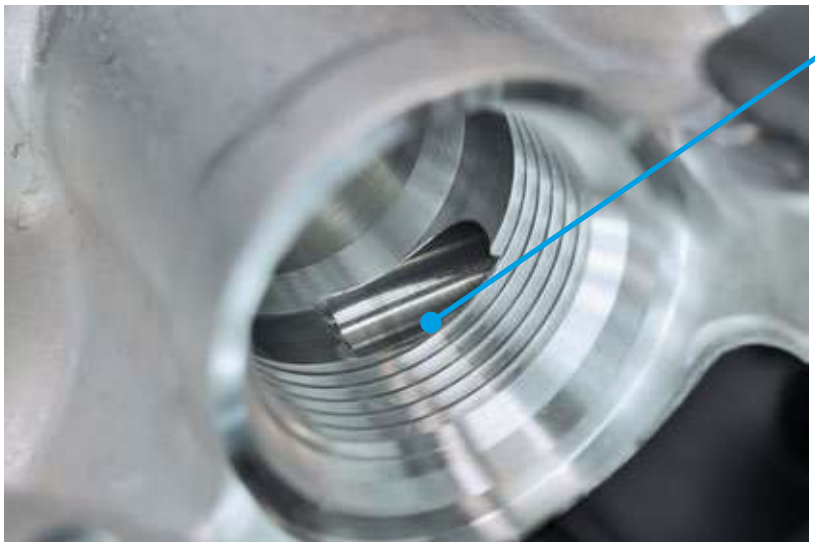
Use this set at a discounted price to get started with Back-Burr Cutter & Path Deburring.

OFFER EXAMPLES

Designation	Content	Special price Starter Kit
Starter Kit 08-A	3x BXC-08A, path, USB stick+lanyard	
Starter Kit 13-A	3x BXC-13A, path, USB stick+lanyard	
Starter Kit 18-A	3x BXC-18A, path, USB stick+lanyard	
Starter Kit 23-A	3x BXC-23A, path, USB stick+lanyard	
Starter Kit 28-A	3x BXC-28A, path, USB stick+lanyard	
Starter Kit 33-A	3x BXC-33A, path, USB stick+lanyard	
Starter Kit 38-A	3x BXC-38A, path, USB stick+lanyard	
Starter Kit 48-A	3x BXC-48A, path, USB stick+lanyard	
Starter Kit 58-A	3x BXC-58A, path, USB stick+lanyard	
Starter Kit 78-A	3x BXC-78A, path, USB stick+lanyard	
Starter Kit 98-A	3x BXC-98A, path, USB stick+lanyard	

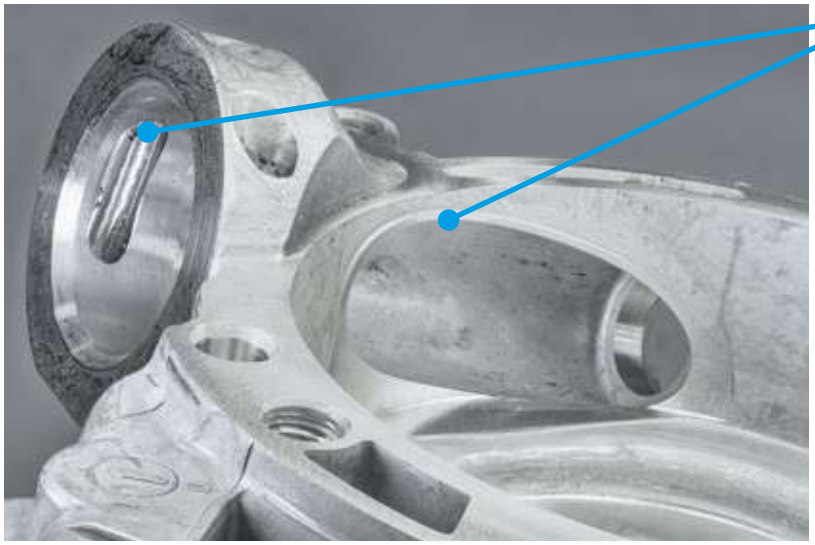
Designation	Content	Special price Starter Kit
Starter Kit 18-B	3x BXC-18B, path, USB stick+lanyard	
Starter Kit 23-B	3x BXC-23B, path, USB stick+lanyard	
Starter Kit 28-B	3x BXC-28B, path, USB stick+lanyard	
Starter Kit 33-B	3x BXC-33B, path, USB stick+lanyard	
Starter Kit 38-B	3x BXC-38B, path, USB stick+lanyard	
Starter Kit 48-B	3x BXC-48B, path, USB stick+lanyard	
Starter Kit 58-B	3x BXC-58B, path, USB stick+lanyard	
Starter Kit 78-B	3x BXC-78B, path, USB stick+lanyard	
Starter Kit 98-B	3x BXC-98B, path, USB stick+lanyard	

MACHINING EXAMPLES



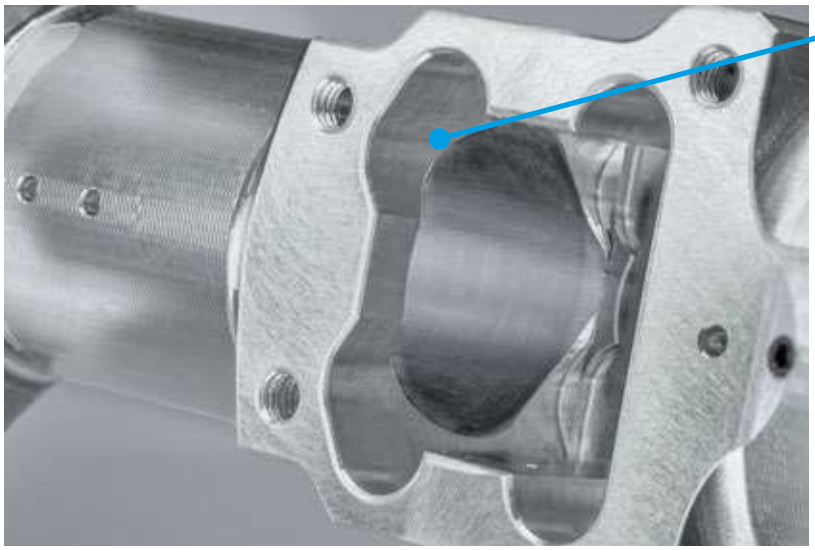
CROSS HOLE IN THREAD

For a truck oil filter housing, several defined deburring operations had to be carried out, including a difficult transverse bore in a threaded bore exit. Only the Back-Burr Cutter & Path Deburring System could deburr the curved, elliptical contour in the thread without secondary burrs in series.



DEBURRING IN LARGE SERIES

A steering gear housing made of magnesium for the automotive sector is manufactured in large series with around 200,000 parts per year and deburred both with ceramic fiber brushes and with the Back-Burr Cutter & Path Deburring System. The cross holes with different contours are machined with a single cutter, eliminating the need for long tool changes. The large contour on the right is deburred using a special path.

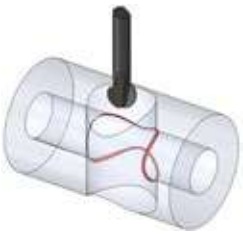


PRECISION FOR SPACE TECHNOLOGY

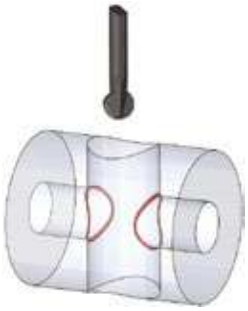
Prototypes of an optical sensor component for the aerospace sector made of titanium were deburred with the Back-Burr Cutter & Path Deburring System. Maximum precision was a prerequisite, as no burr is allowed to come loose in space. The complicated contour could only be machined with the 3.8 mm type B Back-Burr Cutter. The slim shank provides the necessary access to be able to machine the entire contour without contact to the outer surface.

FIELDS OF APPLICATION

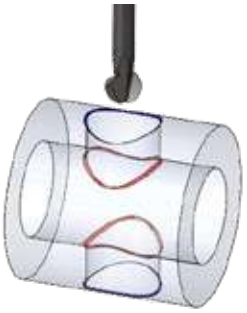
Due to the synergy of ball nose cutter and NC data set, more and more machining tasks can be handled with only one tool by continuous further development of the data sets. Among others, the following use cases can be processed: (For further use cases, please contact us.)



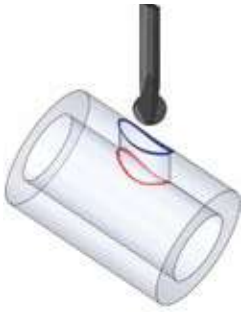
INTERRUPTED HOLE
AXIAL OFFSET
Cross hole > Main bore



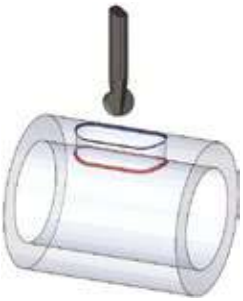
INTERRUPTED HOLE
CENTRICAL
Cross hole > Main bore



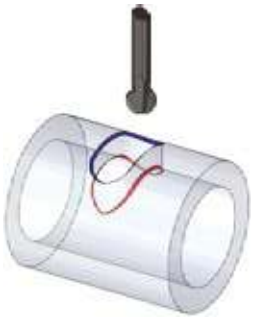
RECTANGULAR
CROSS HOLE



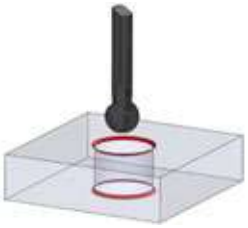
INCLINED
CROSS HOLE



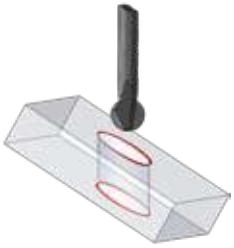
SLOTTED HOLE
AXIALLY PARALLEL



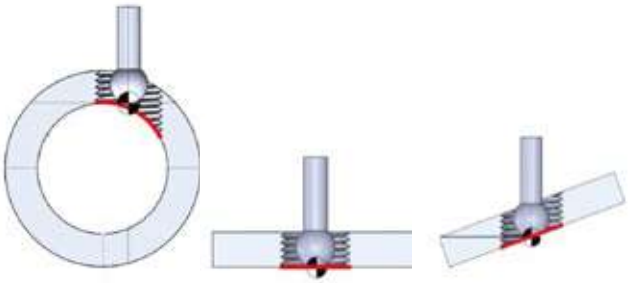
SLOTTED HOLE
TRANSVERSE TO
LENGTH SECTION



PLANE BORE



ANGLED SURFACE
BORE HOLE



THREADED BORE HOLE

APPLICATION NOTES FOR BACK-BURR CUTTER & PATH DEBURRING SYSTEM

- Use only in suitable clamping device
  (TYPE B > Mounting in high precision collets)
- Radial run-out/concentricity recommendations
  - TYPE A, TYPE A-N & TYPE AS-3F: <= 0.02 mm (for BXC-08-A < 0.01 mm)
  - TYPE B: <= 0.01 mm
- CNC machining centers must be able to machine 3 axes (X, Y, Z) simultaneously.
- The NC data set for CNC lathes/turning centers is generated with U, V, W, H. The NC data set must be able to be processed by the machine control.
- To check the axis movement, an initial programrun should be performed outside the component.
- Ensure that there is no collision with the component or clamping device.

TOOL VIDEO LINK

VIDEO
Deburring of
tapped holes

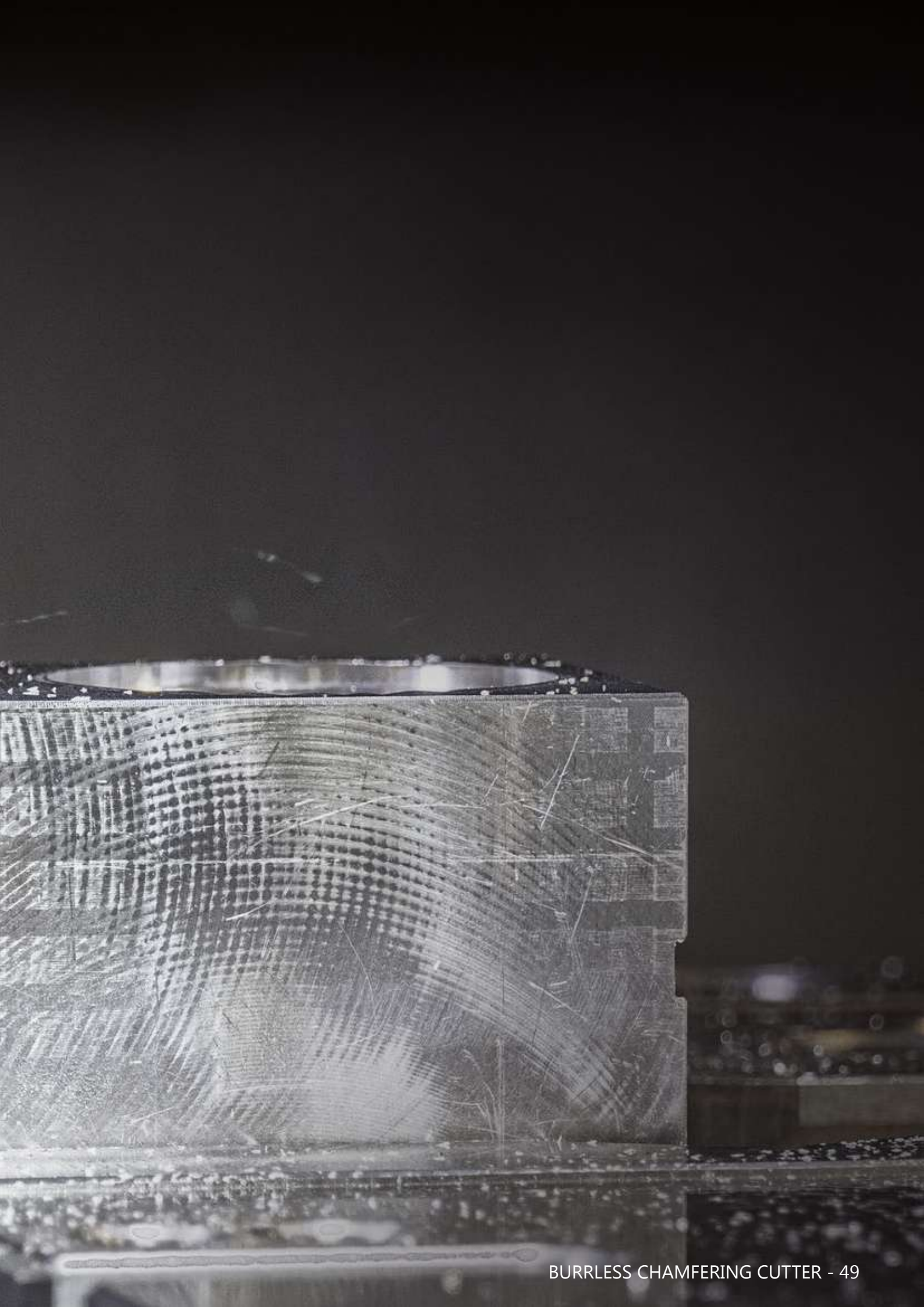
VIDEO
Deburring of curved
bore edges

A
2

BURRLESS CHAMFERING CUTTER

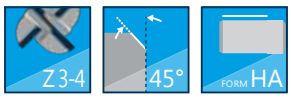
The world's first Chamfering Cutter with V-shaped blades for defined chamfering without secondary burr.

WINNER 2023
BEST OF INDUSTRY AWARD



BURRLESS CHAMFERING CUTTER

Defined chamfering without secondary burr with the world's first V-shaped cutting edge



WINNER 2023
BEST OF INDUSTRY AWARD

FEATURES

- Patented tool geometry with highly specialized V-shaped cutting edge for secondary burrfree chamfering
- Long tool life due to high-temperature resistant AlTiCrN coating (type ...-M)
- Extremely sharp cutting edge design without coating (type...-N)
- 3 or 4 cutting edges for high feed rates
- Blunt tip for more stability and higher dimensional accuracy of the tool

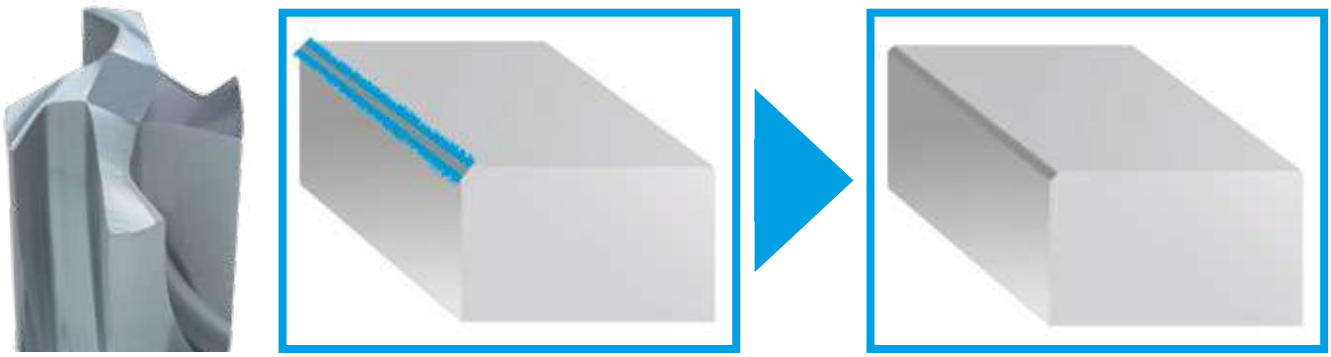
INFO

The BURRLESS CHAMFERING CUTTER with the world's first V-shaped cutting edge prevents secondary burrs:

- Subsequent deburring processes can be omitted
- Reduced labor costs due to elimination of manual rework
- Lower tool costs compared to conventional deburring cutters, as a significantly higher tool life is achieved up to the wear mark "secondary burr"

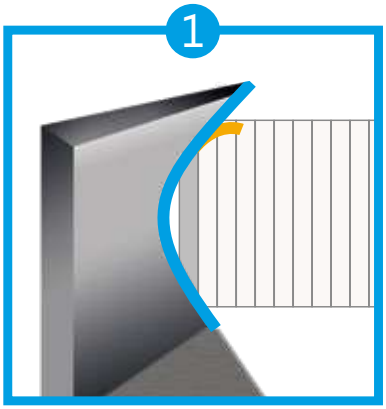
Conventional chamfer milling

Burrless Chamfering Cutter

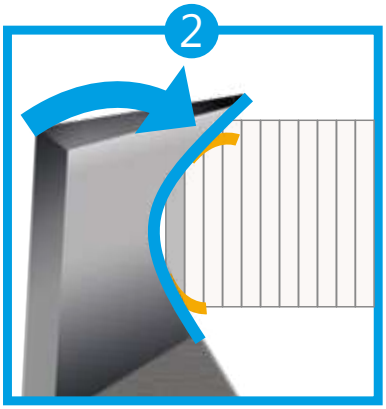


WORKING PRINCIPLE

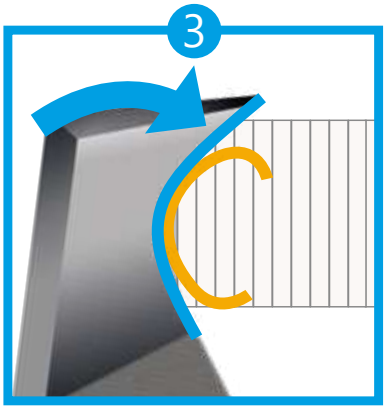
Burrs are being formed when a tool's cutting edge exits the workpiece. However, due to the patented V-shaped cutting edge of the BURRLESS CHAMFERING CUTTER, the tool cutting edge only leaves the workpiece when the material has already been sheared off the workpiece. This prevents the formation of burrs.



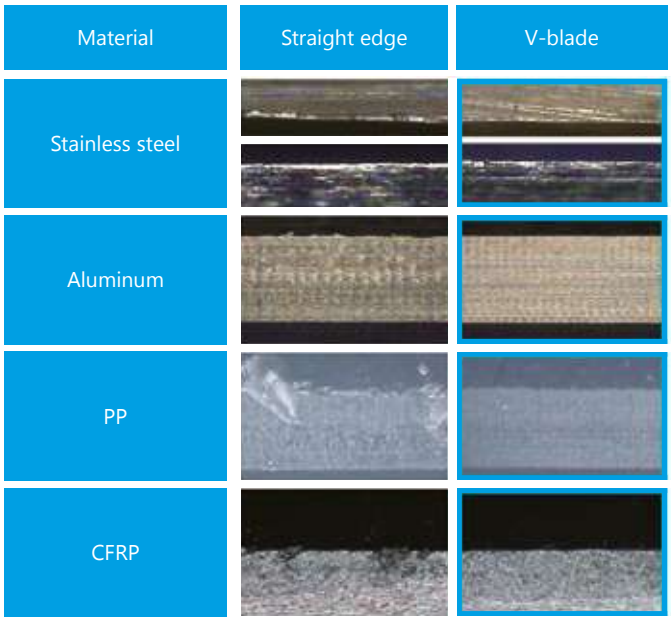
The outer area of the cutting edge shapes the chip towards the center of the chamfer.



The inner area of the cutting edge also shapes the chip towards the center of the chamfer.



Finally, the chip is sheared off from the workpiece in the center of the chamfer. Only then does the tool leave the workpiece.



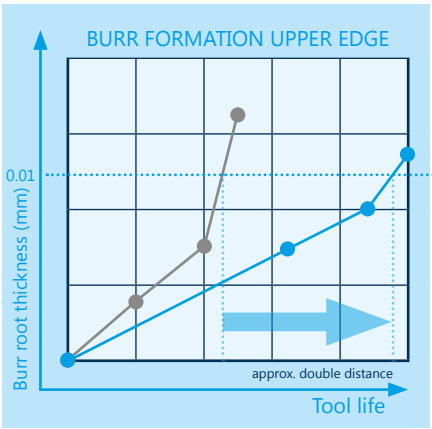
COMPARISON OF THE BURR FORMATION IN DIFFERENT MATERIALS

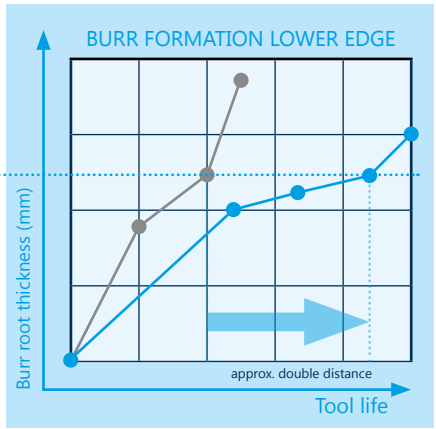
The overview (left) illustrates the differences in machining with conventional straight edge cutters compared to the BURRLESS CHAMFERING CUTTER with the patented V-shaped cutting edge. The "cuts" are cleaner and without secondary burrs.

TOOL LIFE COMPARISON

Wear criterion:
Burr root thickness = 0.01 mm

Even in terms of tool life (right), the BURRLESS CHAMFERING CUTTER clearly outperforms the competition when machining stainless steel.
The innovative tool can achieve up to twice the tool life compared to conventional milling cutters.



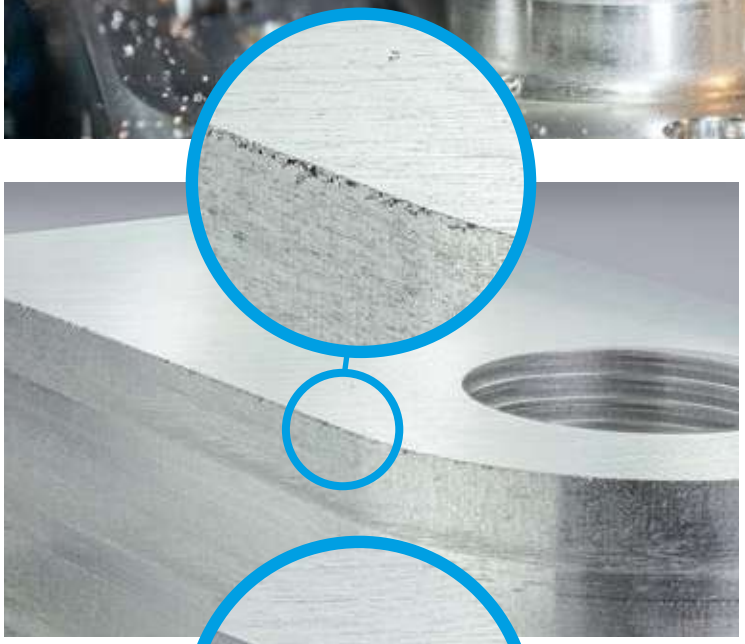


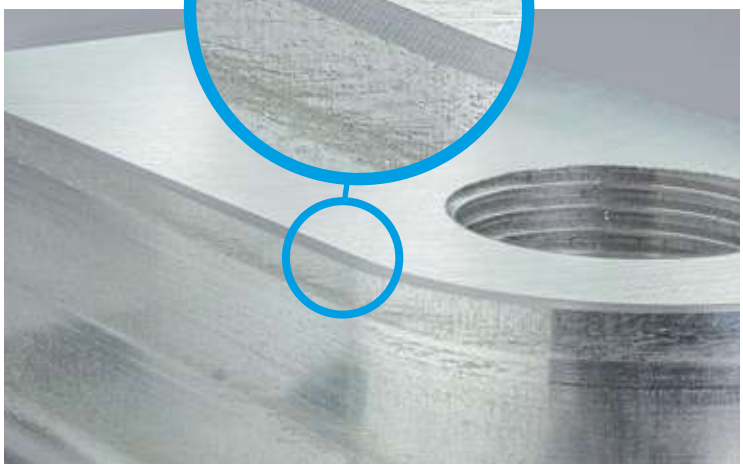
BURRLESS CHAMFERING CUTTER
Competitor product with straight cutting edges

BURRLESS CHAMFERING CUTTER
Competitor product with straight cutting edges

MACHINING EXAMPLES

After pre-milling the component with our PCD semi-standard attachable milling cutter, only a flitter burr was formed on the defined contour. This contour was subsequently deburred with the BURRLESS CHAMFERING CUTTER Type 06N. The patented cutting edges remove the burr effortlessly and a clean "edge" with a defined chamfer without secondary burr is created.

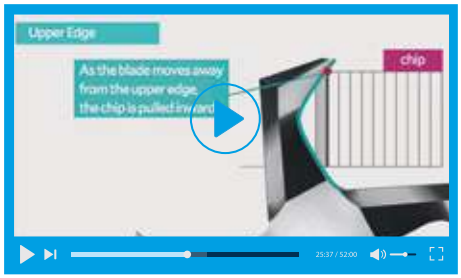




Picture above: Here you can clearly see the burr (left of the cutter) and the already deburred contour (right of the cutter).

Left: The component before deburring (top) - after face milling of the surface, flitter burr has formed on the entire contour. This is removed without secondary burrs after using the BURRLESS CHAMFERING CUTTER (bottom left image).

TOOL VIDEO LINK



VIDEO
Operation of the Burrless Chamfering Cutter

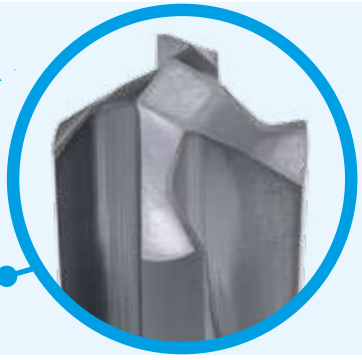
VIDEO
Deburring of an outer contour

BURRLESS CHAMFERING CUTTER-VARIANTS

In order to cover as many applications and material groups as possible, the BURRLESS CHAMFERING CUTTER is offered in coated and uncoated versions, as well as with two different cutting edge diameters.

BURRLESS CHAMFERING CUTTER TYPE 06M

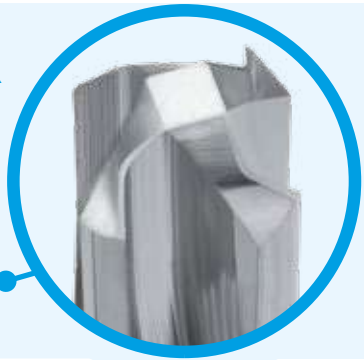
FOR CHAMFER SIZES BETWEEN 0.7 mm and 1.5 mm



- With AlTiCrN coating and 4 cutting edges
- Suitable for all materials and due to the coating also best for superalloys

BURRLESS CHAMFERING CUTTER TYPE 06N

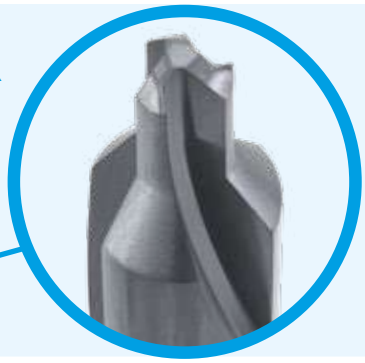
FOR CHAMFER SIZES BETWEEN 0.7 mm and 1.5 mm



- Uncoated cutter with 4 cutting edges
- Extremely sharp cutting edges without rounding. Best suited for non-ferrous metals, plastics and composites materials

BURRLESS CHAMFERING CUTTER TYPE 03M

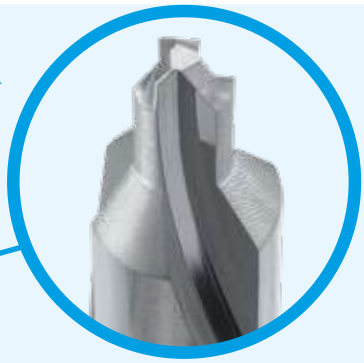
FOR CHAMFER SIZES BETWEEN 0.3 mm and 0.6 mm



- With AlTiCrN coating and 3 cutting edges
- The stepped shank leads to more stability and a higher feed rate is possible

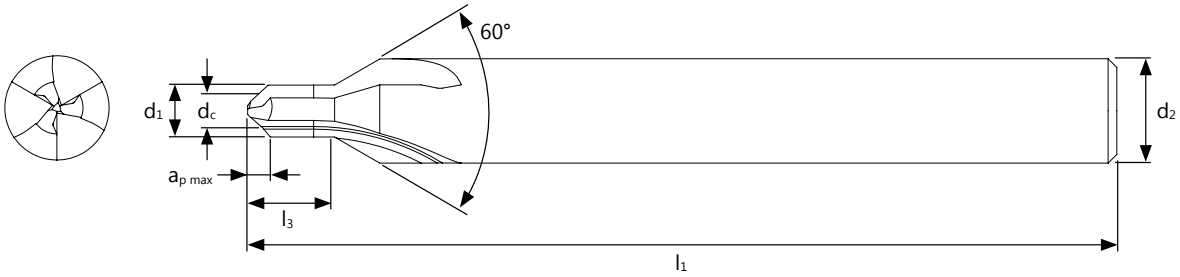
BURRLESS CHAMFERING CUTTER TYPE 03N

FOR CHAMFER SIZES BETWEEN 0.3 mm and 0.6 mm

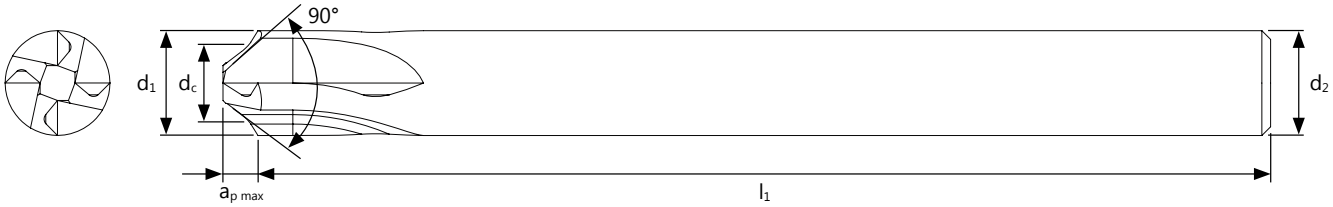


- Uncoated cutter with 3 cutting edges
- Extremely sharp cutter without rounding the cutting edge. Best suited for non-ferrous metals, plastics and composite materials
- The stepped shank leads to more stability and a higher feed rate is possible

BXCC03M (COATED) & BXCC03N (UNCOATED)
3 CUTTING EDGES



BXCC06M (COATED) & BXCC06N (UNCOATED)
4 CUTTING EDGES



TYPE M - WITH AlTiCrN COATING

Material			STAIN-LESS	GG	AL	CuZn	S Inconel	Ti	THERMO PLAST	DURO PLAST	GFK CFK	GRAPHIT
v_c (m/min)		60-100	40-80	60-100	-	-	20-30	45-60	-	-	-	-
f_z (mm/Z)	BXCC03M	0.05	0.05	0.05	-	-	0.05	0.05	-	-	-	-
	BXCC06M	0.05	0.05	0.05	-	-	0.05	0.05	-	-	-	-

d_1 (mm)	d_c (mm)	Chamfer size C (mm)	l_3 (mm)	l_1 (mm)	d_2 h6 (mm)	Z	Cutting angle	max. cutting depth $a_{p\ max}$ (mm)	Item No.	EUR/Piece
3.0	2.0	0.3 - 0.6	5.0	50.0	6	3	45°	1.0	BXCC03M	
6.0	4.0	0.7 - 1.5	-	60.0	6	4	45°	2.0	BXCC06M	

TYPE N - WITHOUT COATING

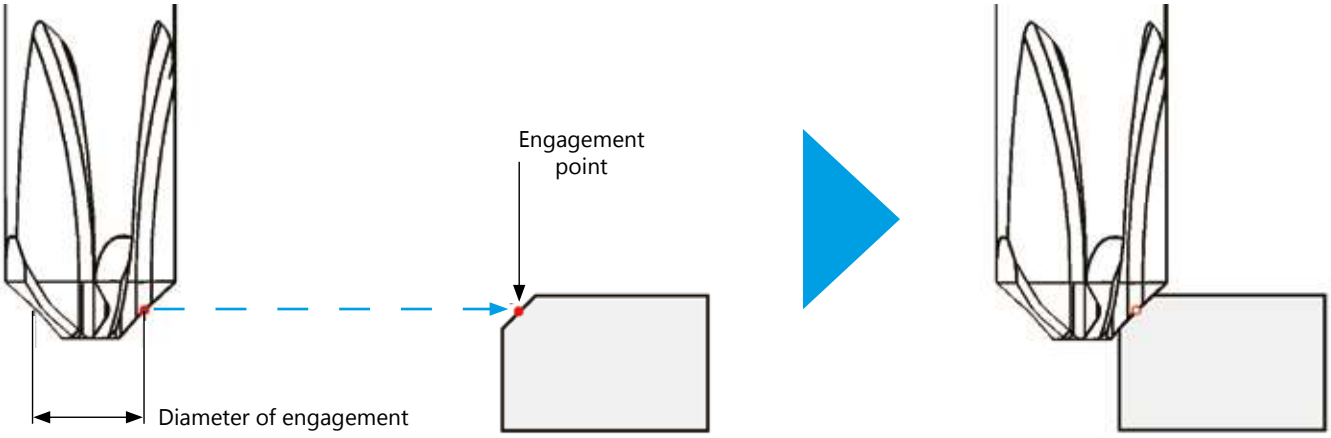
Material			STAIN-LESS	GG	AL	CuZn	S Inconel	Ti	THERMO PLAST	DURO PLAST	GFK CFK	GRAPHIT
v_c (m/min)		-	-	-	200-300	200-300	-	-	60-100	60-100	60-100	-
f_z (mm/Z)	BXCC03N	-	-	-	0.05	0.05	-	-	0.05	0.05	0.05	-
	BXCC06N	-	-	-	0.05	0.05	-	-	0.07	0.07	0.07	-

d_1 (mm)	d_c (mm)	Chamfer size C (mm)	l_3 (mm)	l_1 (mm)	d_2 h6 (mm)	Z	Cutting angle	max. cutting depth $a_{p\ max}$ (mm)	Item No.	EUR/Piece
3.0	2.0	0.3 - 0.6	5.0	50.0	6	3	45°	1.0	BXCC03N	
6.0	4.0	0.7 - 1.5	-	60.0	6	4	45°	2.0	BXCC06N	

PLEASE NOTE
- The rotational speed and feed rate of the standard machining conditions are recommended starting values for initial machining.
- To improve the quality of chamfer machining, please adjust the speed, feed rate and depth of cut.
- If vibration or abnormal noise occurs, reduce the speed and feed rate or adjust the depth of cut.
- If burrs form when chamfering a plastic workpiece, please maintain the feed rate of 0.07 (mm/t) and adjust the speed according to the speed of the tool currently in use.

PRESETTING REQUIREMENT

To ensure proper results with the BURRLESS CHAMFERING CUTTER, the correct positioning of the engagement diameter on the tool to the engagement point on the workpiece must be observed.



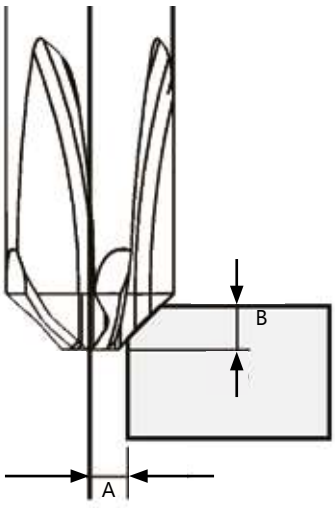
POSITIONING OF THE CUTTING EDGE CENTER IN THE CHAMFER CENTER

Create the machining program at taking note of the offsets A and B in the table below for the desired chamfer size. This will ensure that the tool is correctly aligned with the chamfer center point, thus ensuring the function of the V-shaped cutting edge.

CALCULATION OF OFFSETS A AND B

$A = (d_c - C) / 2$
$B = (a_{p\ max} + C) / 2$
C = chamfer size

Chamfering Cutter Type	Chamfer size (mm)	Offset (mm)	
		A	B
BXCC03M & BXCC03N	C0.2	0.9	0.6
	C0.3	0.85	0.65
	C0.4	0.8	0.7
	C0.5	0.75	0.75
	C0.6	0.7	0.8
BXCC06M & BXCC06N	C0.7	1.65	1.35
	C0.8	1.6	1.4
	C0.9	1.55	1.45
	C1.0	1.5	1.5
	C1.1	1.45	1.55
	C1.2	1.4	1.6
	C1.3	1.35	1.65
	C1.4	1.3	1.7
	C1.5	1.25	1.75



REVCUT
REVERSE CHAMFERING TOOL

Defined reverse chamfering of bores from drill diameter 1.00 mm

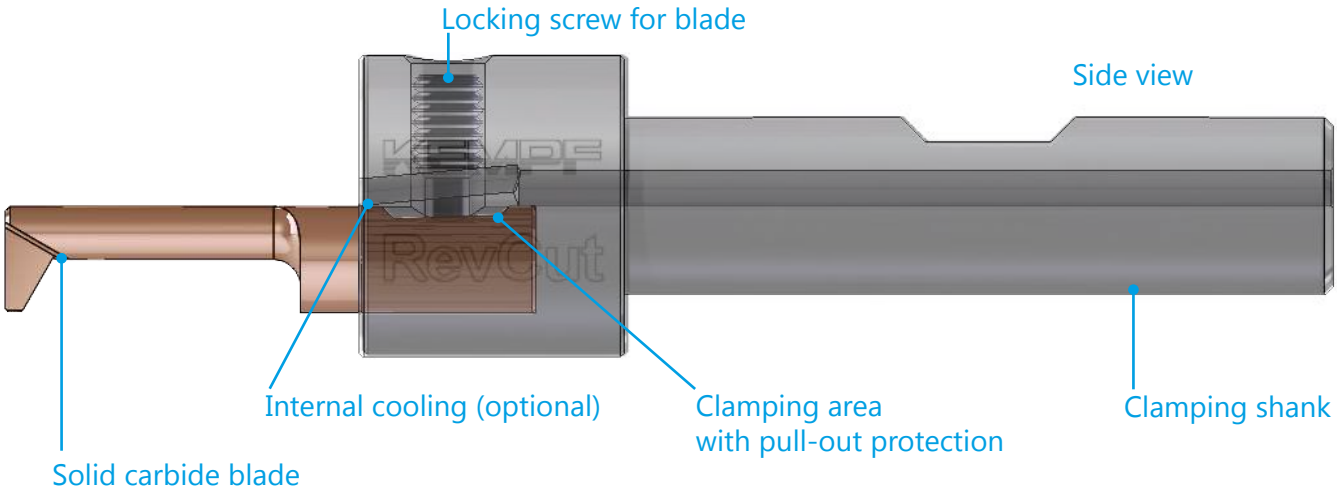
PLEASE NOTE

Please use our RevCut request form to request the tool.
You can find it at:
www.kempf.tools/revcut-en

FEATURES

- Eccentric traversing of the hole enables chamfering or countersinking on the rear side (chamfer-/countersink diameter up to 2x hole diameter)
- Robust and stable tool
  - ➔ No sensitive folding or spring-action mechanism
  - ➔ No risk of chip jamming
- Fast machining without changing the direction of rotation
- Cutting edges can be changed quickly and easily - even directly on the machine
- Efficient tool system thanks to modular design and low costs per solid carbide cutting edge
- Requires programming of 2 axes and orientation of cutting edge
- Fast delivery of customized blades through semi-standard

TOOL CONSTRUCTION



WORKING PRINCIPLE

1. PASSING THROUGH HOLE

The tool passes through the hole excentrically without rotation and with offset by the excentric dimension e.

2. CHAMFERING THE BACK SIDE

The tool and its base holder are moved back to the center of the hole. The chamfering operation is now carried out with spindle rotation (clockwise rotation) in retraction.

3. RETRACTING FROM THE HOLE

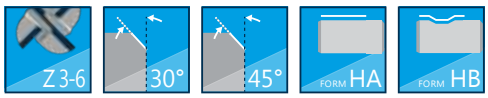
The tool is again offset by the excentric dimension e with oriented blade and retracted from the hole without rotation.

SUCCESSFUL APPLICATION

Workpiece: Powerplant component
Material: 1.4901 (heat resistant stainless steel)
Hole-Ø: 6.3 mm
Countersink-Ø 10.0 mm

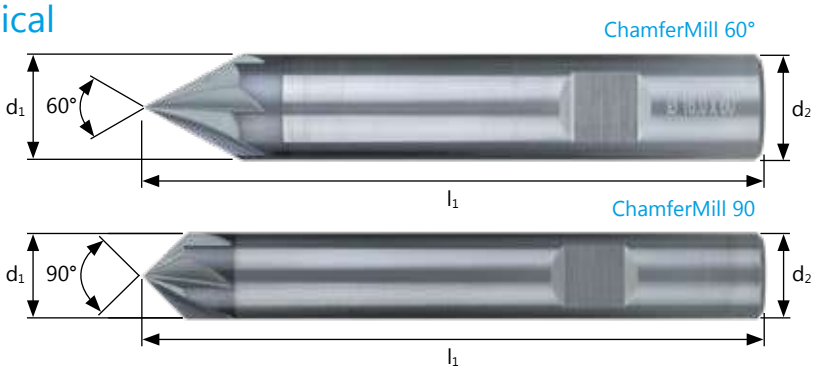
120° countersinks Ø 10.0 mm had to be made on the back of 400 Ø 6.3 mm holes in a power-plant component.
Conventional back chamfering milling cutters can‘t be used due to the high countersink-/ drill hole diameter ratio.

CHAMFERMILL 60°/90 KF160/KF190



The solution for fast & economical chamfering and deburring

- 3-6 cutting edges
- pointed finish
- Universal use
- Solid carbide, ZX-coated
- 60° or 90° point angle



Material		<700N	<1200N	<900N	<1400N	<900N	<1500N	STAIN-LESS <700N	STAIN-LESS <1000N	GG <300N	GGG <500N	GGG <800N	AL ≤7%Si	AL >7-12%Si	CuZn <1200N	Ti	H 45-55HRC
V_c [m/min]		140	90	90	70	60	55	80	70	140	110	90	260	200	160	50	35
f_z (mm/Z)	Ø 2	0.030	0.028	0.030	0.023	0.029	0.025	0.017	0.013	0.045	0.041	0.032	0.045	0.047	0.023	0.013	0.013
	Ø 6	0.050	0.045	0.050	0.036	0.047	0.040	0.028	0.022	0.072	0.065	0.052	0.072	0.076	0.036	0.022	0.022
	Ø 10	0.080	0.070	0.080	0.054	0.074	0.060	0.044	0.036	0.108	0.097	0.078	0.108	0.113	0.054	0.036	0.036
	Ø 16	0.120	0.105	0.120	0.081	0.110	0.090	0.066	0.053	0.162	0.146	0.117	0.162	0.170	0.081	0.053	0.053

CHAMFERMILL 60° KF160

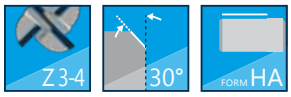
d_1 h6 (mm)	l_3 (mm)	l_1 (mm)	d_2 h6 (mm)	Shank shape	Z	Item No.	EUR/Piece
0.5	3	39	3	HA	3	KF1600050ZX	
0.6	3	39	3	HA	3	KF1600060ZX	
0.7	3	39	3	HA	3	KF1600070ZX	
0.8	3	39	3	HA	3	KF1600080ZX	
0.9	3	39	3	HA	3	KF1600090ZX	
1	3	39	3	HA	3	KF1600100ZX	
1.5	4.5	39	3	HA	3	KF1600150ZX	
2	6	39	3	HA	3	KF1600200ZX	
2.5	7.5	39	3	HA	3	KF1600250ZX	
3	-	39	3	HA	3	KF1600300ZX	
4	-	54	4	HA	4	KF1600400ZX	
6	-	57	6	HB	4	KF1600600ZX	
8	-	63	8	HB	5	KF1600800ZX	
10	-	72	10	HB	6	KF1601000ZX	
12	-	83	12	HB	6	KF1601200ZX	
16	-	92	16	HB	6	KF1601600ZX	
20	-	104	20	HB	6	KF1602000ZX	

CHAMFERMILL 90° KF190

d_1 h6 (mm)	l_3 (mm)	l_1 (mm)	d_2 h6 (mm)	Shank shape	Z	Item No.	EUR/Piece
0.5	3	39	3	HA	3	KF1900050ZX	
0.6	3	39	3	HA	3	KF1900060ZX	
0.7	3	39	3	HA	3	KF1900070ZX	
0.8	3	39	3	HA	3	KF1900080ZX	
0.9	3	39	3	HA	3	KF1900090ZX	
1	5.3	38	3	HA	3	KF1900100ZX	
1.5	4.5	39	3	HA	3	KF1900150ZX	
2	5.3	38	3	HA	3	KF1900200ZX	
2.5	7.5	39	3	HA	3	KF1900250ZX	
3	-	38	3	HA	3	KF1900300ZX	
4	-	54	4	HA	4	KF1900400ZX	
6	-	57	6	HB	4	KF1900600ZX	
8	-	63	8	HB	5	KF1900800ZX	
10	-	72	10	HB	6	KF1901000ZX	
12	-	83	12	HB	6	KF1901200ZX	
16	-	92	16	HB	6	KF1901600ZX	
20	-	104	20	HB	6	KF1902000ZX	

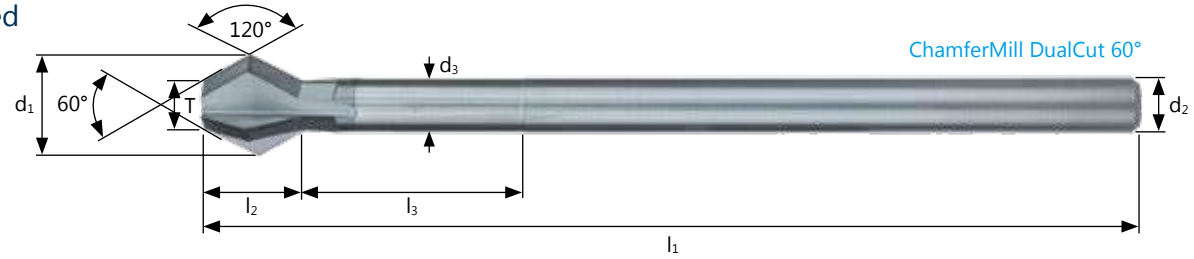
Other shank designs as well as uncoated cutters available on request

CHAMFERMILL DUALCUT 60° KF260



The solution for fast & economical back chamfering and deburring

- ZX-coated



ChamferMill DualCut 60°

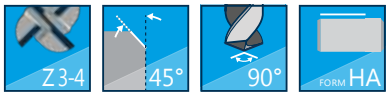
Material		<700N	<1200N	<900N	<1400N	<900N	<1500N	STAIN-LESS <700N	STAIN-LESS <1000N	GG <300N	GGG <500N	GGG <800N	AL ≤7%Si	AL >7-12%Si	CuZn <1200N	Ti	H 45-55HRC
V_c [m/min]		140	90	90	70	60	55	80	70	140	110	90	260	200	160	50	35
f_z (mm/Z)	Ø 2	0.030	0.028	0.030	0.023	0.029	0.025	0.017	0.013	0.045	0.041	0.032	0.045	0.047	0.023	0.013	0.013
	Ø 5	0.045	0.041	0.045	0.032	0.043	0.036	0.025	0.020	0.065	0.058	0.047	0.065	0.068	0.032	0.020	0.020
	Ø 12	0.096	0.084	0.096	0.065	0.088	0.072	0.053	0.043	0.130	0.117	0.093	0.130	0.136	0.065	0.043	0.043

d_1 (mm)	d_3 (mm)	l_3 (mm)	l_2 (mm)	l_1 (mm)	d_2 h6 (mm)	T	Z	Item No.	EUR/Piece
2	1.5	8	1.7	100	3	0.6	3	KF2600200ZX	
5	3.4	15	2.8	100	6	3.4	4	KF2600500ZX	
8	4.9	34	5.4	100	6	4.9	4	KF2600800ZX	
12	5.9	34	10.6	100	6	5.9	4	KF2601200ZX	

Uncoated milling cutters available on request

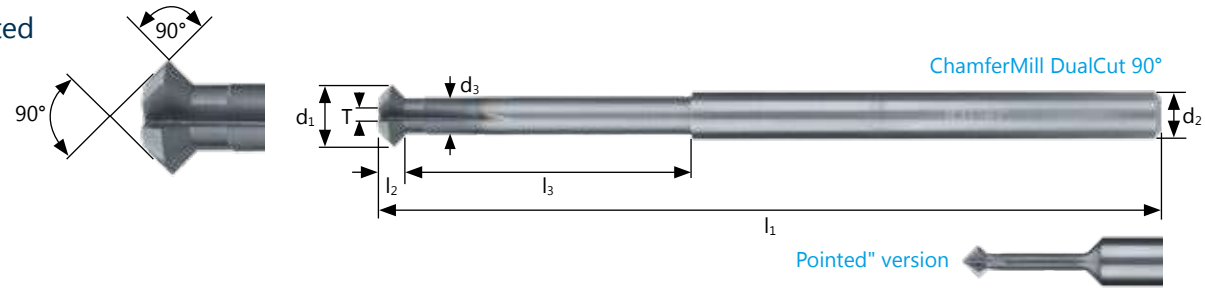
A
4.3

CHAMFERMILL DUALCUT 90° KF290



The solution for fast & economical back chamfering and deburring

- ZX-coated

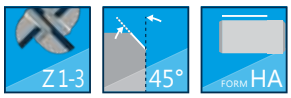


Material		<700N	<1200N	<900N	<1400N	<900N	<1500N	STAIN-LESS <700N	STAIN-LESS <1000N	GG <300N	GGG <500N	GGG <800N	AL ≤7%Si	AL >7-12%Si	CuZn <1200N	Ti	H 45-55HRC
V_c [m/min]		140	90	90	70	60	55	80	70	140	110	90	260	200	160	50	35
f_z (mm/Z)	Ø 2	0.030	0.028	0.030	0.023	0.029	0.025	0.017	0.013	0.045	0.041	0.032	0.045	0.047	0.023	0.013	0.013
	Ø 6	0.050	0.045	0.050	0.036	0.047	0.040	0.028	0.022	0.072	0.065	0.052	0.072	0.076	0.036	0.022	0.022
	Ø 10	0.080	0.070	0.080	0.054	0.074	0.060	0.044	0.036	0.108	0.097	0.078	0.108	0.113	0.054	0.036	0.036
	Ø 16	0.120	0.105	0.120	0.081	0.110	0.090	0.066	0.053	0.162	0.146	0.117	0.162	0.170	0.081	0.053	0.053

d_1 (mm)	d_3 (mm)	l_3 (mm)	l_2 (mm)	l_1 (mm)	d_2 h6 (mm)	T	Z	Item No.	EUR/Piece
1.8	1.2	9	1.2	100	6	pointed	3	KF2900180SZX	
2.8	2.2	10	1.1	100	6	1.2	4	KF2900280ZX	
2.8	2	10	1.8	100	6	pointed	4	KF2900280SZX	
3	2.2	10	1.3	100	6	1.2	4	KF2900300ZX	
3	2.2	20	1.3	100	6	1.2	4	KF2900300LZX	
3.8	2.9	12	1.55	100	6	1.6	4	KF2900380ZX	
4	2.9	12	1.75	100	6	1.6	4	KF2900400ZX	
4	2.9	25	1.75	100	6	1.6	4	KF2900400LZX	
4	2	13	3	100	6	pointed	4	KF2900400SZX	
4.8	3.4	15	2.1	100	6	2	4	KF2900480ZX	
5	3.4	15	2.3	100	6	2	4	KF2900500ZX	
5	3.4	30	2.3	100	6	2	4	KF2900500LZX	
5.8	3.8	18	2.7	100	6	2.4	4	KF2900580ZX	
6	3.8	18	2.9	100	6	2.4	4	KF2900600ZX	
6	3.8	35	2.9	100	6	2.4	4	KF2900600LZX	
6	4	19	4	100	6	pointed	4	KF2900600SZX	
7.8	4.9	34	2.8	100	6	4.9	4	KF2900780ZX	
8	4.9	34	3.1	100	6	4.9	4	KF2900800ZX	
8	4.9	45	3.1	100	6	4.9	4	KF2900800LZX	
9.8	5.9	34	3.8	100	6	5.9	4	KF2900980ZX	
10	5.9	34	4.1	100	6	5.9	4	KF2901000ZX	
11.8	5.9	34	5.8	100	6	5.9	4	KF2901180ZX	
12	5.9	34	6.1	100	6	5.9	4	KF2901200ZX	
15.8	7.9	34	7.8	100	10	7.9	4	KF2901580ZX	
16	7.9	34	8.1	100	10	7.9	4	KF2901600ZX	

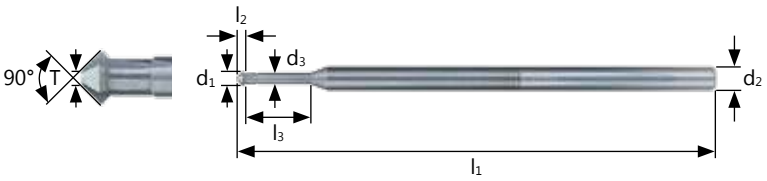
Uncoated milling cutters available on request

CHAMFERMILL DUALCUT 90° MINI KF291



Back chamfering and deburring of small diameter

- ZX-coated



Material		<700N	<1200N	<900N	<1400N	<900N	<1500N	STAIN-LESS <700N	STAIN-LESS <1000N	GG <300N	GGG <500N	GGG <800N	AL ≤7%Si	AL >7-12%Si	CuZn <1200N	Ti	H 45-55HRC
V_c [m/min]		140	90	90	70	60	55	80	70	140	110	90	260	200	160	50	35
f_z (mm/Z)	Ø 1	0.015	0.014	0.015	0.011	0.014	0.013	0.008	0.007	0.023	0.020	0.016	0.023	0.024	0.011	0.007	0.007
	Ø 2	0.030	0.028	0.030	0.023	0.029	0.025	0.017	0.013	0.045	0.041	0.032	0.045	0.047	0.023	0.013	0.013

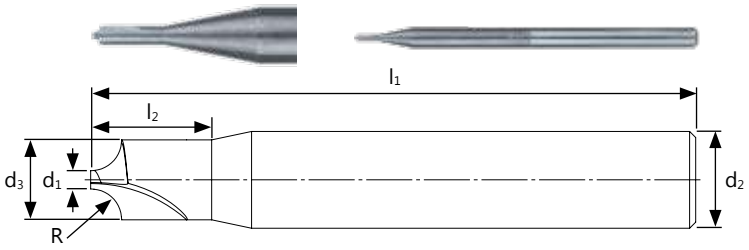
d_1 (mm)	d_3 (mm)	l_3 (mm)	l_2 (mm)	l_1 (mm)	d_2 h6 (mm)	T	Z	Item No.	EUR/Piece
0.2	0.12	0.29	0.11	39	3	0.12	1	KF2910020ZX	
0.3	0.15	0.37	0.13	39	3	0.15	1	KF2910025ZX	
0.3	0.18	0.45	0.15	39	3	0.18	1	KF2910030ZX	
0.4	0.24	0.61	0.19	39	3	0.24	1	KF2910040ZX	
0.5	0.3	0.77	0.23	39	3	0.3	1	KF2910050ZX	
0.6	0.36	0.93	0.27	39	3	0.36	3	KF2910060ZX	
0.8	0.48	1.25	0.35	39	3	0.48	3	KF2910080ZX	
1.0	0.7	5	0.5	60	3	0.3	3	KF2910100ZX	
1.5	1.1	6	0.73	60	3	0.45	3	KF2910150ZX	
1.8	1.4	8	0.75	60	3	0.6	3	KF2910180ZX	
2.0	1.5	8	0.95	60	3	0.6	3	KF2910200ZX	
2.8	2.1	10	1.3	60	3	0.9	3	KF2910280ZX	
3.0	2.1	10	1.5	60	3	0.9	3	KF2910300ZX	

Uncoated milling cutters available on request

A
4.5

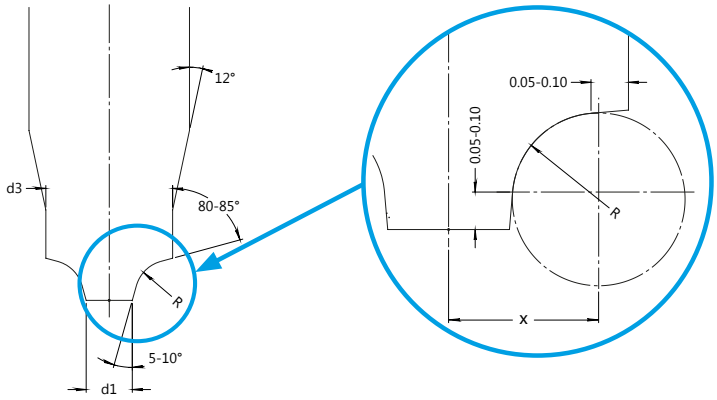
CHAMFERMILL RADIUS KF292

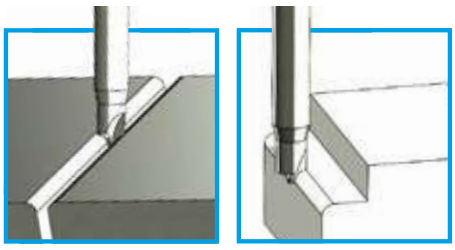
- solid carbide concave cutter
- ZX-coated



Material		<700N	<1200N	<900N	<1400N	<900N	<1500N	STAIN-LESS <700N	STAIN-LESS <1000N	GG <300N	GGG <500N	GGG <800N	AL ≤7%Si	AL >7-12%Si	CuZn <1200N	Ti	H 45-55HRC
V_c [m/min]		140	90	90	70	60	55	80	70	140	110	90	260	200	160	50	35
f_z (mm/Z)	R=0.25	0.010	0.010	0.010	0.008	0.010	0.008	0.010	0.008	0.012	0.010	0.010	0.010	0.010	0.010	0.008	-
	R=0.6	0.016	0.016	0.016	0.014	0.016	0.014	0.016	0.014	0.018	0.016	0.016	0.016	0.016	0.016	0.014	-
	R=1.5	0.022	0.022	0.022	0.020	0.022	0.020	0.022	0.020	0.024	0.022	0.022	0.022	0.022	0.022	0.020	-
	R=3.0	0.032	0.032	0.032	0.026	0.032	0.026	0.032	0.028	0.036	0.032	0.032	0.032	0.032	0.032	0.026	-

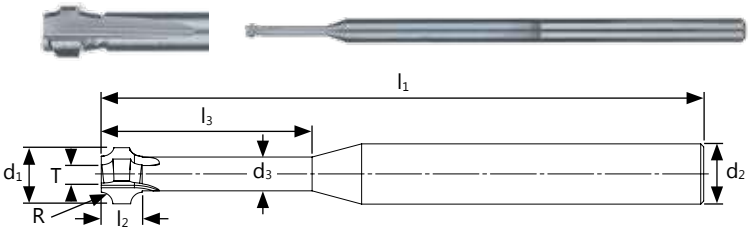
R (mm)	d_1 (mm)	d_3 (mm)	l_2 (mm)	l_1 (mm)	d_2 h6 (mm)	X	Item No.	EUR/Piece
0.1	0.5	0.8	2.5	50	3	0.35	KF292005010	
0.15	0.5	0.9	2.5	50	3	0.4	KF292005015	
0.2	0.5	1	2.5	50	3	0.45	KF292005020	
0.25	0.5	1.1	2.5	50	3	0.5	KF292005025	
0.3	0.5	1.2	2.5	50	3	0.55	KF292005030	
0.4	0.5	1.4	2.5	50	3	0.65	KF292005040	
0.5	0.5	1.6	2.5	50	3	0.75	KF292005050	
0.6	0.5	1.8	3	50	3	0.85	KF292005060	
0.7	0.5	2	3	50	3	0.95	KF292005070	
0.75	0.5	2.1	3	50	3	1	KF292005075	
0.8	0.8	2.5	4	50	3	1.2	KF292008080	
0.9	0.8	2.7	4	50	3	1.3	KF292008090	
1.0	0.8	2.9	4	50	3	1.4	KF292008100	
1.25	0.8	3.4	4	50	4	1.65	KF292008125	
1.5	1.5	4.6	6	50	5	2.25	KF292015150	
1.75	1.5	5.1	6	50	6	2.5	KF292015175	
2	1.5	5.6	8	50	6	2.75	KF292015200	
2.25	1.5	6.1	10	50	8	3	KF292015225	
2.5	1.5	6.6	10	50	8	3.25	KF292015250	
3	1.5	7.6	10	50	8	3.75	KF292015300	
4	1.9	10	-	55	10	4.95	KF292019400	
5	1.9	12	-	63	12	5.95	KF292019500	
6	1.9	14	-	74	14	6.95	KF292019600	





CHAMFERMILL DUALCUT RADIUS KF293

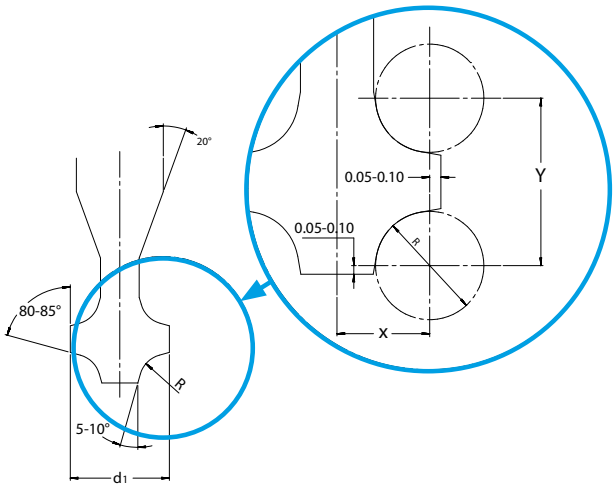
- solid carbide reverse concave cutter
- ZX-coated



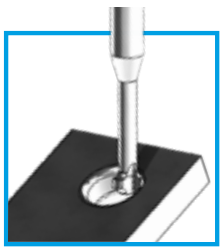
Material		<700N	<1200N	<900N	<1400N	<900N	<1500N	STAIN-LESS <700N	STAIN-LESS <1000N	GG <300N	GGG <500N	GGG <800N	AL ≤7%Si	AL >7-12%Si	CuZn <1200N	Ti	H 45-55HRC
V_c [m/min]		140	90	90	70	60	55	80	70	140	110	90	260	200	160	50	35
f_z (mm/Z)	R=0.3	0.010	0.010	0.010	0.008	0.010	0.008	0.010	0.008	0.012	0.010	0.010	0.010	0.010	0.010	0.008	-
	R=0.6	0.016	0.016	0.016	0.014	0.016	0.014	0.016	0.014	0.018	0.016	0.016	0.016	0.016	0.016	0.014	-
	R=1.5	0.022	0.022	0.022	0.020	0.022	0.020	0.022	0.020	0.024	0.022	0.022	0.022	0.022	0.022	0.020	-
	R=3.0	0.032	0.032	0.032	0.026	0.032	0.026	0.032	0.028	0.036	0.032	0.032	0.032	0.032	0.032	0.026	-

R (mm)	d_1 (mm)	d_3 (mm)	l_3 (mm)	l_2 (mm)	l_1 (mm)	d_2 h6 (mm)	T	X	Y	Z	Item No.	EUR/Piece
0.2	1.9	1.25	8	1.45	60	3	0.9	0.87	1.32	2	KF293019020	
0.3	2.3	1.45	9	1.95	60	3	1.2	1.07	1.82	2	KF293023030	
0.4	2.6	1.55	10	2.5	60	3	1.55	1.22	2.37	2	KF293026040	
0.5	2.9	1.65	12	3	60	3	1.85	1.37	2.87	2	KF293029050	
0.5	4.9	3.65	20	3.3	100	6	2.15	2.37	3.17	3	KF293049050	
0.6	5.2	3.75	25	3.5	100	6	2.14	2.52	3.37	3	KF293052060	
0.8	5.9	4.05	30	3.9	100	6	2.14	2.89	3.77	3	KF293059080	
1	6.6	4.35	35	4.3	100	8	2.23	3.22	4.19	3	KF293066100	
1.2	7.4	4.75	35	5.2	100	8	2.63	3.62	5.07	3	KF293074120	
1.5	8.4	5.1	35	5.8	100	10	2.73	4.12	5.77	3	KF293084150	
1.8	9.3	5.4	35	6.4	100	10	2.72	4.57	6.37	3	KF293093180	
2	9.9	5.6	35	6.8	100	10	2.82	4.87	6.87	3	KF293099200	
2.5	10.9	5.6	35	7.8	100	12	2.9	5.37	7.97	3	KF293109250	
3	11.9	5.6	35	8.8	100	12	3	5.87	9.07	3	KF293119300	

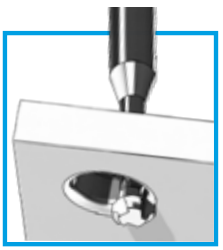
The Back-Burr Cutter & Path Deburring System (see from page 36) can also be used for concave processing of 3D contours.



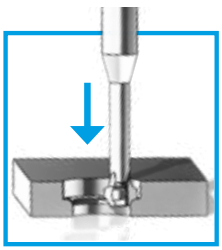
FORWARD DEBURRING

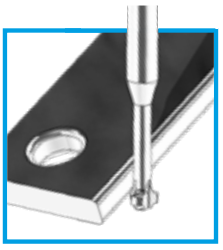


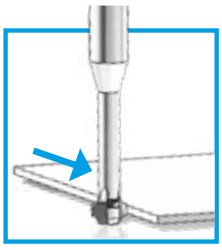
BACKWARD DEBURRING



PROFILE MILLING







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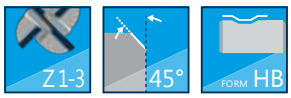
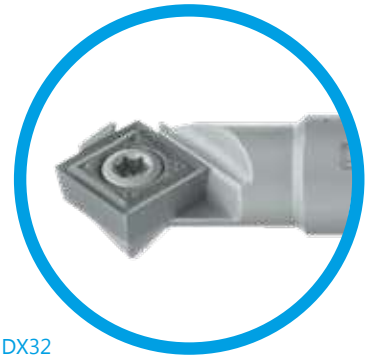
5.1

MICROCUT F
CHAMFER MILLING CUTTER

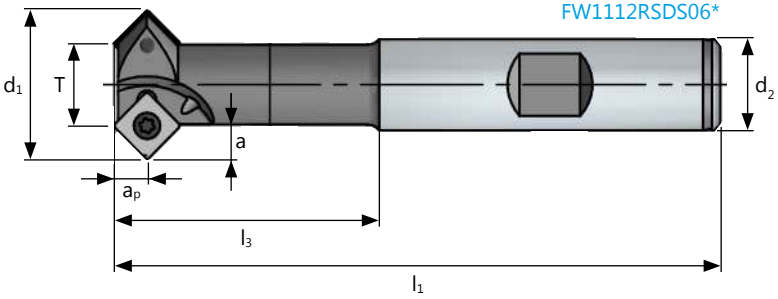


Mini indexable chamfer milling cutter for bores from Ø 2.0 mm



Example:
SCGT 060202 FN DX32

FW1112RSDS06*

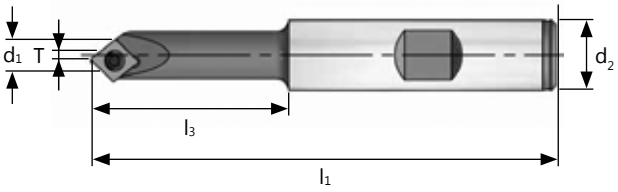


Material		<700N	<1200N	<900N	<1400N	<900N	<1500N	STAIN-LESS <700N	STAIN-LESS <1000N	GG <300N	GGG <500N	GGG <800N	AL ≤7%Si	AL >7-12%Si	CuZn <1200N	Ti
V_c [m/min]		300	250	260	210	220	190	180	140	240	200	150	1800	500	450	55
f_z (mm/Z)	CPGT 05T102 FN DX30	0.060	0.050	0.050	0.040	0.040	0.035	0.045	0.040	0.065	0.055	0.045	-	-	-	-
	CPGT 05T102 FN-20 DX30	-	-	-	-	-	-	-	-	-	-	-	0.060	0.060	0.035	0.030
	SCGT 060202 FN DX32	0.060	0.050	0.050	0.040	0.040	0.035	0.045	0.040	0.065	0.055	0.045	0.040	0.040	0.050	0.035
	VCGT 070202-12 DX30	0.050	0.040	0.040	0.030	0.035	0.025	0.040	0.030	0.065	0.055	0.045	-	-	0.050	-
	VCGT 070202-25 DX30	-	-	-	-	-	-	0.040	0.025	-	-	-	0.065	0.060	0.035	0.030

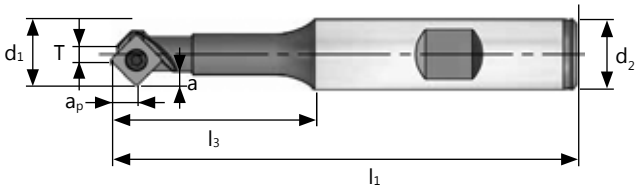
d_1 (mm)	T (mm)	l_3 (mm)	l_1 (mm)	d_2 h6 (mm)	a (mm)	a_p (mm)	Z	Insert	Item No.	EUR/Piece
5	2	35	80	12	-	1.58	1	CP...05T1	FW0212RCDS05	
11	3.9	28	80	12	1.5	3.9	1	SC..0602	FW0412RSDS06	
19.5	11.4	33	80	12	3.9	4.05	2	SC..0602	FW1112RSDS06*	
15.6	6.9	-	73	16	-	4.4	3	VC..0702	FW0616RVDS07	

*With internal coolant supply

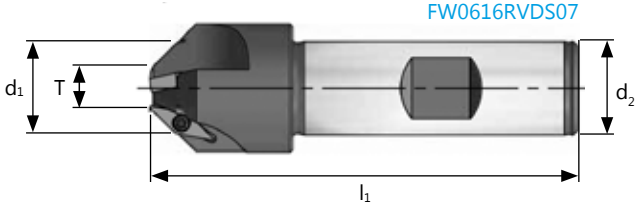
FW0212RCDS05



FW0412RSDS06



FW0616RVDS07

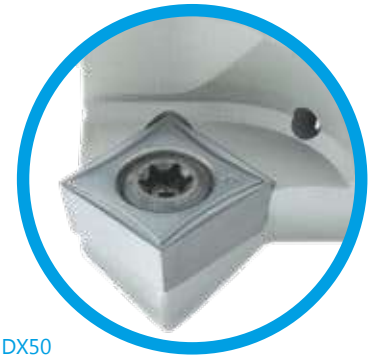


MATCHING INSERTS

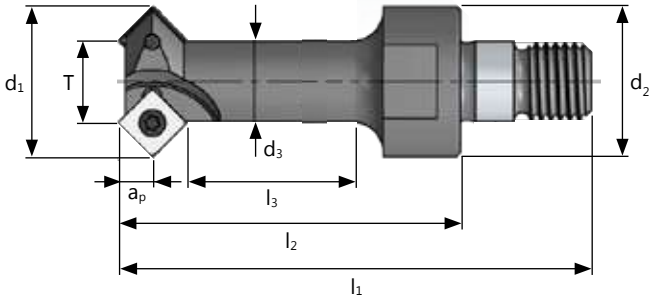
Designation	Coating	Item No.	EUR/Piece
CPGT 05T102 FN	DX30	CPGT052FNX3	
CPGT 05T102 FN-20	DX30	CPGT052N20X3	
SCGT 060202 FN	DX32	SCGT062NX4	
VCGT 070202-12	DX30	VCGT07212X3	
VCGT 070202-25	DX30	VCGT07225X3	

MICROMILL
CHAMFER MILLING CUTTER

Chatter-free forward and backward chamfering operations with cutting inserts



Example:
SCGT 09T302 EN DX50



Material		<700N	<1200N	<900N	<1400N	<900N	<1500N	STAIN-LESS <700N	STAIN-LESS <1000N	GG <300N	GGG <500N	GGG <800N	AL ≤7%Si	AL >7-12%Si	CuZn <1200N	Ti
V_c [m/min]		300	250	260	210	220	190	180	140	240	200	150	1800	500	450	55
f_z (mm/Z)	SCGT 060202 FN DX32	0.060	0.050	0.050	0.040	0.040	0.035	0.045	0.040	0.065	0.055	0.045	0.040	0.040	0.050	0.035
	SCGT 09T302 EN DX50	0.060	0.050	0.050	0.040	0.040	0.035	-	-	0.060	0.050	-	-	0.040	0.050	-

d_1 (mm)	T (mm)	l_3 (mm)	l_2 (mm)	l_1 (mm)	d_3 (mm)	d_2 (mm)	Adaptation	a_p (mm)	Z	Insert	Item No.	EUR/Piece
11	4	20.4	39	56	7	15.5	M10x1.25	4	1	SC..0602	FA0216RSDS06	
19.5	11.4	25.4	44	61	10.5	19.5	M10x1.25	4	2	SC..0602	FA1120RSDS06	
29	16		31.5	48.5		15.5	M10x1.25	5	2	SC..09T3	FA1616RSDS09	
33	20		36.5	53.5		19.5	M10x1.25	5	2	SC..09T3	FA2020RSDS09	
38	25		41.5	68.5		24.5	M16x1.50	5	2	SC..09T3	FA2525RSDS09	
45	32		46.5	73.5		32	M16x1.50	5	3	SC..09T3	FA3232RSDS09	

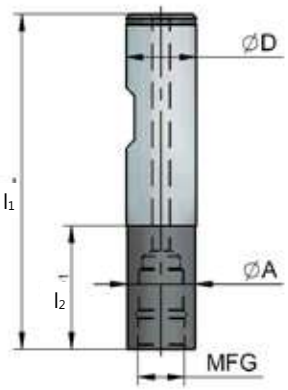
Extensions and reductions are available on request.

MATCHING INSERTS

Designation	Coating	Item No.	EUR/Piece
SCGT 060202 FN	DX32	SCGT062NX4	
SCGT 09T302 EN	DX50	SCGT092ENX5	

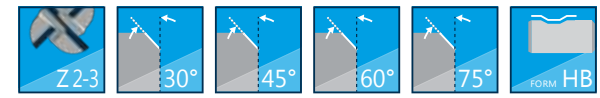
MATCHING TOOL HOLDERS

ForMoun-tingThread	Ø D h6	Ø A	l_1	l_2	Item No.	EUR/Piece
M10x1.25	16	-	50	-	WS16050W	
M10x1.25	20	-	55	-	WS20055W	
M10x1.25	20	19.5	95	45	WS20095W	
M16x1.5	25	-	65	-	WS25065W	
M16x1.5	32	-	85	-	WS32085W	

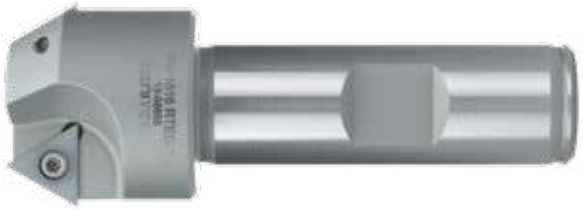


A
5.3

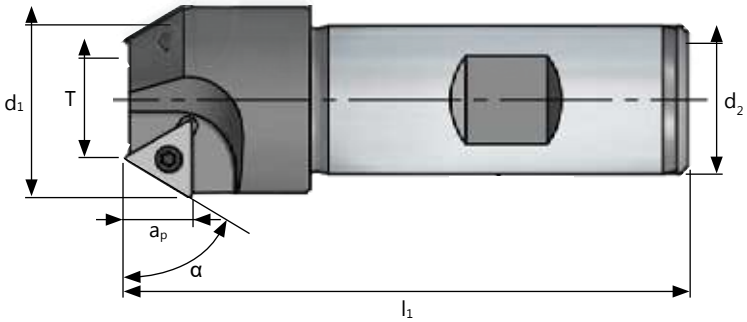
FACECUT T
CHAMFER MILLING CUTTER



Chamfer milling cutter with positive geometry for chatter-free, clean chamfers



Example:
TPHW 110202 FN DX30



Material		<700N	<1200N	<900N	<1400N	<900N	<1500N	<700N	<1000N	<300N	<500N	<800N	≤7%Si	>7-12%Si	<1200N		45-55HRC
V_c [m/min]		300	250	260	210	220	190	180	140	240	200	150	1800	500	450	55	-
f_z (mm/Z)	TPHW 110202 FN DX30	0.080	0.055	0.070	0.050	0.060	0.040	0.060	0.050	0.080	0.070	0.050	-	-	-	-	-
	TPHT 110202 FR DX30	-	-	-	-	-	-	-	-	-	-	-	0.160	0.120	0.050	0.035	-
	TPHW 16T304 FN DX30	0.100	0.070	0.090	0.060	0.070	0.050	0.070	0.050	0.120	0.100	0.070	-	-	-	-	-
	TPGT 16T304-25 DX30	-	-	-	-	-	-	-	-	-	-	-	0.200	0.180	0.050	0.040	-

Chamfer angle α	d_1 (mm)	T (mm)	l_1 (mm)	d_2 h6 (mm)	a_p (mm)	Z	Insert	Item No.	EUR/Piece
75°	21	16	73	16	8	2	TP..1102	FW1616RTBS11	
	21	16	75	20	8	2	TP..1102	FW1620RTBS11	
	33	25	80	20	14	2	TP..16T3	FW2520RTBS16	
	40	32	80	20	14	2	TP..16T3	FW3220RTBS16	
	40	32	86	25	14	2	TP..16T3	FW3225RTBS16	
	48	40	86	25	14	3	TP..16T3	FW4025RTBS16	
60°	26	16	73	16	7	2	TP..1102	FW1616RTES11	
	26	16	75	20	7	2	TP..1102	FW1620RTES11	
	41	25	80	20	12	2	TP..16T3	FW2520RTES16	
	48	32	80	20	12	3	TP..16T3	FW3220RTES16	
	48	32	86	25	12	3	TP..16T3	FW3225RTES16	
45°	30	16	73	16	6	2	TP..1102	FW1616RTDS11	
	30	16	75	20	6	2	TP..1102	FW1620RTDS11	
	47	25	80	20	9	2	TP..16T3	FW2520RTDS16	
	54	32	80	20	9	3	TP..16T3	FW3220RTDS16	
	54	32	86	25	9	3	TP..16T3	FW3225RTDS16	
30°	34	16	73	16	4	3	TP..1102	FW1616RTWS11	
	34	16	80	20	4	3	TP..1102	FW1620RTWS11	
	43	25	80	20	4	3	TP..16T3	FW2520RTWS11	
	53	25	80	20	6	3	TP..16T3	FW2520RTWS16	
	60	32	86	25	6	3	TP..16T3	FW3225RTWS16	

MATCHING INSERTS

Designation	Coating	Item No.	EUR/Piece
TPHW 110202 FN	DX30	TPHW112FNX3	
TPHT 110202 FR	DX30	TPHT112RX3	
TPHW 16T304 FN	DX30	TPHW164FNX3	
TPGT 16T304-25	DX30	TPGT16425X3	

B FORCE-CONTROLLED DEBURRING TOOLS

WITH POWER AGAINST ANY BURR

The deburring of force-controlled tools is based on the operating principle of a non-rigid, movably mounted cutting edge. A force is applied to the cutting edge of the tool, which results in a deflection of the blade/cutting edge. As a result, the deburring cutting edge engages with the burr-contaminated edge, removes the burr and creates a chamfer.

B
1

AGILE - IN ROUGH TERRAIN

The ibex (Capricorn) is perfectly adapted to its environment. Thanks to its special hooves, for example, it finds a good grip even on the steepest terrain and can jump several meters high from a standing position, thus overcoming rocky edges or crevices with ease. The ibex is a master when it comes to moving where it's no move forward for others. No matter what kind of ground - the ibex is not called "the king of the mountains" for nothing.

KEMPF ibex

When the name says it all.

AGILE - IN ROUGH COMPONENTS

We have taken these features as a model and developed the "KEMPF ibex". Wherever edges have to be deburred, the innovative compensation holder is used and shows its strengths. Due to the high flexibility and the possibility to deburr with tension and pressure compensation, the clamped milling cutter can adapt to any component geometry and thus also deburrs UNDEFINED EDGES cleanly, reliably and evenly. Subsequent manual deburring is no longer necessary.

B
1.1

IBEX DEBURRING SYSTEM SOFT, MEDIUM & HARD

Spring-loaded compensating holder for deburring, especially for undefined contours

FEATURES

IBEX DEBURRING TOOL HOLDER

- Tension and pressure compensation with 10 mm each
- Uniform deburring result
- Shorter cycle times
- Low programming effort
- Very high wear resistance, sealing against pollution
- Slim design enables better access to the workpiece

IBEX CARBIDE CHAMFER MILLING CUTTER

- Low chattering due to specially developed cutter geometry
- Extremely high tool life of the milling cutters due to special geometry
- High feed rates due to cross-cut design

The ibex compensation holder is available with three pressure levels:

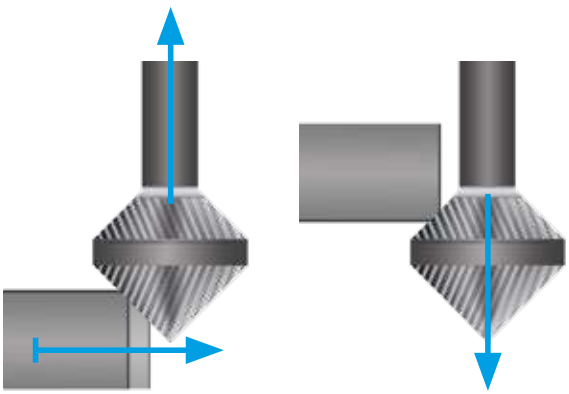
for soft materials

for harder materials

for hard and heavy machinable materials

WORKING PRINCIPLE

As soon as the cutter hits the edge of the workpiece, it can perform the axial movement both forwards and backwards due to the linear mounted compensation of the ibex. In interaction with the tapered ibex deburring cutters, radial deviations of the component can thus also be compensated. Thus, the deburring cutter always has the same cutting performance on the workpiece and produces a uniform deburring quality.



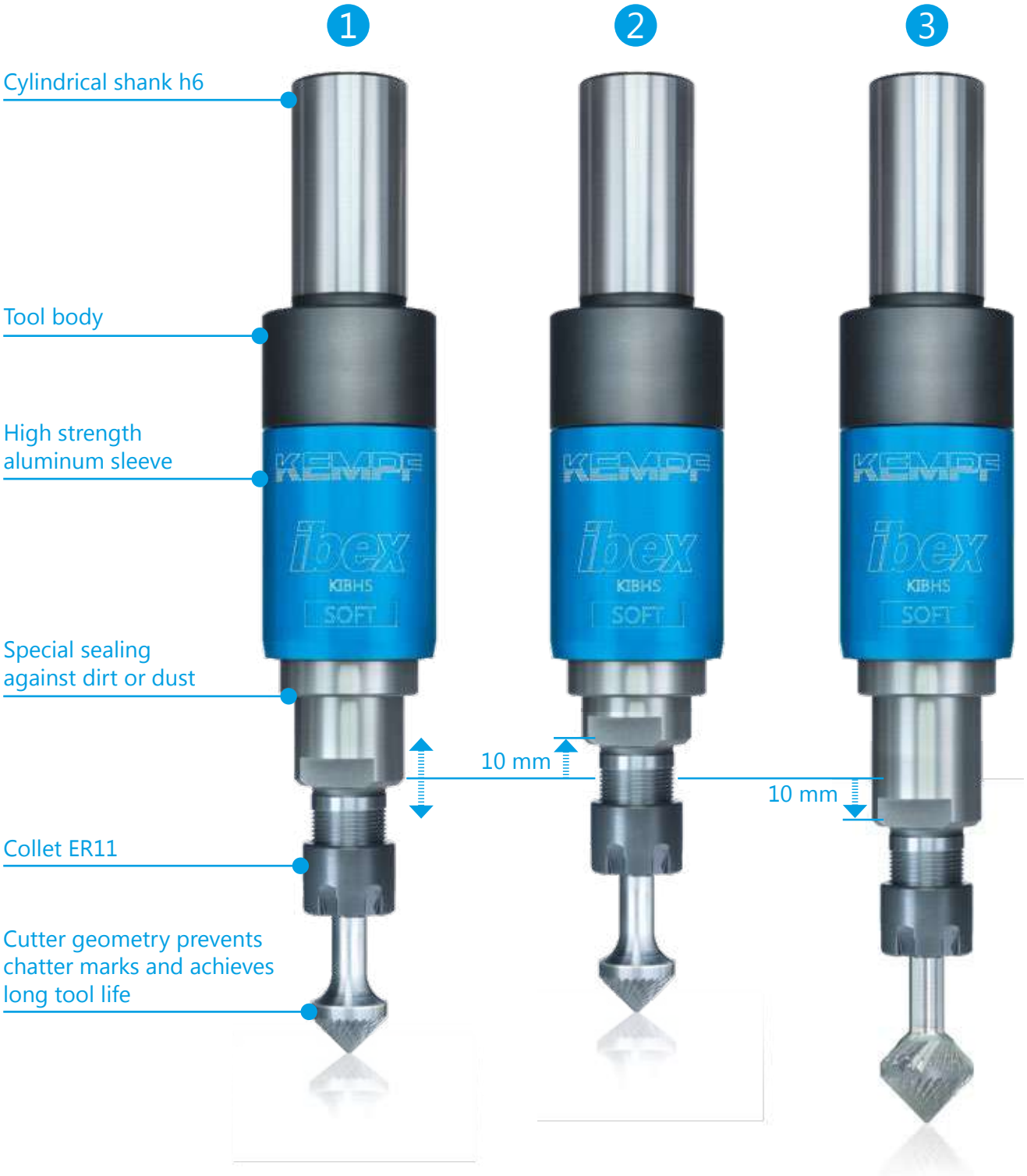
IBEX DEBURRING TOOL HOLDER (SOFT, MEDIUM & HARD) FEATURES

1. INITIAL POSITION OF THE IBEX
2. CUTTER "RETRACTED"
3. CUTTER "EXTRACTED"

In this position, the ibex hits the component during the machining phase (see also graphic "Working Principle" on page 72, bottom right).

When deburring on the front side (e.g. at the top edge of the workpiece), the ibex compensates uneven contours up to 10 mm upwards with the spring inside.

When deburring on the back side, the ibex can also compensate up to 10 mm downwards.



B
1.2

IBEX DEBURRING SYSTEM FLEX

Spring-loaded and compression-adjustable compensating holder for deburring, especially for undefined contours

FEATURES

IBEX FLEX DEBURRING TOOL HOLDER

- 3 adjustable pressure levels (SOFT, MEDIUM, HARD)
- Pressure compensation with 10 mm
- Uniform deburring result
- Shorter cycle times
- Low programming effort
- Very high wear resistance, sealing against pollution
- Slim design enables better access to the workpiece

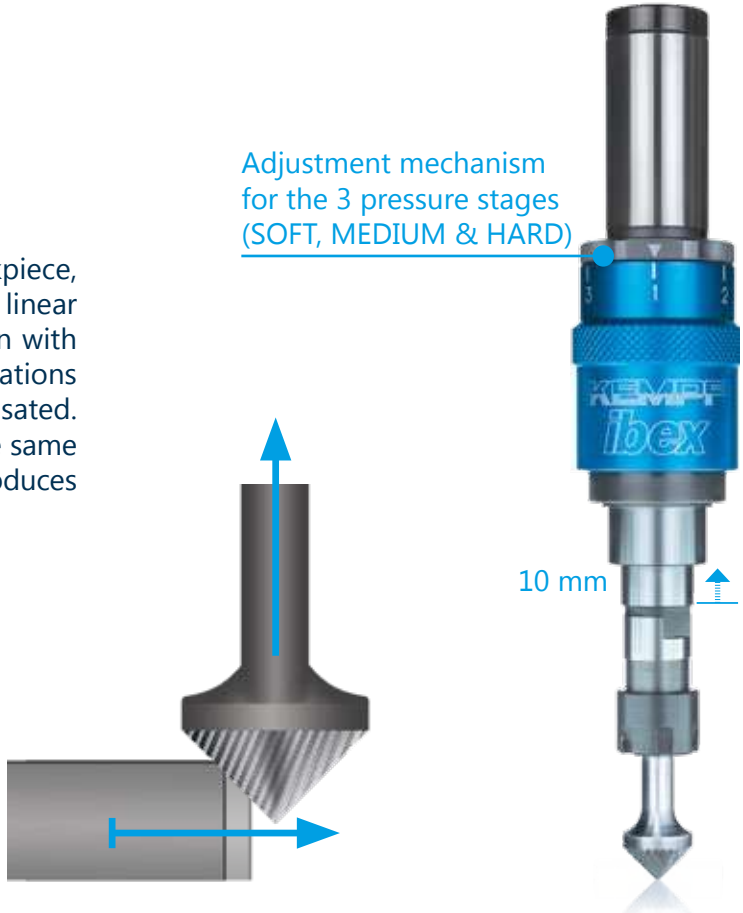
IBEX CARBIDE CHAMFER MILLING CUTTER

- Low chatter due to specially developed cutter geometry
- Extremely high tool life of the milling cutters due to special geometry
- High feed rates due to cross-cut design

FUNCTION

As soon as the cutter hits the edge of the workpiece, it can perform the axial movement due to the linear compensation of the ibex FLEX. In interaction with the tapered ibex deburring cutters, radial deviations of the component can thus also be compensated. Therefore, the deburring cutter always has the same cutting performance on the workpiece and produces a uniform deburring quality.

IMPORTANT:
The initial contact of the milling cutter with the workpiece must take place in the area of the 45° cone so that the compensation function of the ibex holder is guaranteed during machining.
Before use, follow the instructions enclosed in the packaging.



CUTTING DATA

Speed n	Feed v_f
6,000 - 8,000 rpm	2,000 - 10,000 mm/min*
max. 10,000 rpm	

*depending on the desired chamfer size

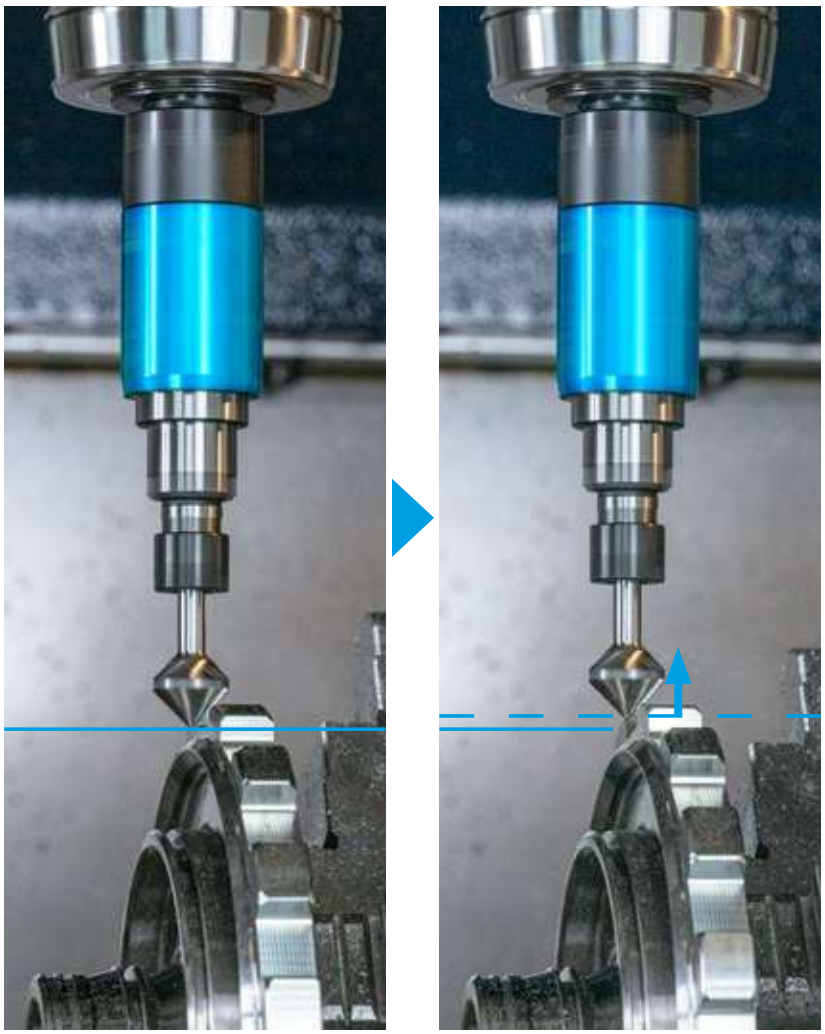
Radial engagement a_e	Cutting depth a_p
approx. 25 % from cutter diameter	approx. 30 % from cutter diameter

TIPS & TRICKS

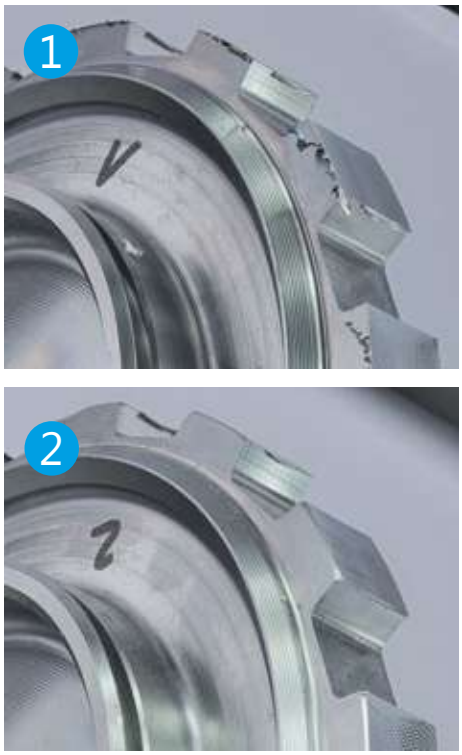
- Increase of feed rate → Chamfer becomes smaller
- Reduction of feed rate → Chamfer becomes larger
- We strongly advise dry machining to avoid thermal shock
- Simultaneous milling prevents the formation of chatter marks and leads to a uniform deburring quality
- Increase a_e in the case of secondary burrs
- Increase speed to improve the chamfer surface finish
- If space is limited, it is also possible to approach and depart from the workpiece by "ramping"

IBEX - PREDESTINED FOR...

... workpieces with contours that are not on one plane - for example, in this output shaft of an automatic transmission. The ibex compensates the contour variations along the entire path and thus ensures a perfect and reliable deburring quality.



In the starting position, the milling cutter hits the contour, which in this machining example causes the milling cutter to be pressed upwards. The ibex compensates this movement and ensures that the milling cutter moves back to the starting position as quickly as possible after the deburring cycle.



1 BEFORE: The large burrs are clearly visible directly after the milling process.

2 AFTER: After deburring with the ibex compensation holder, the result is a uniform contour.

TOOL VIDEO LINK

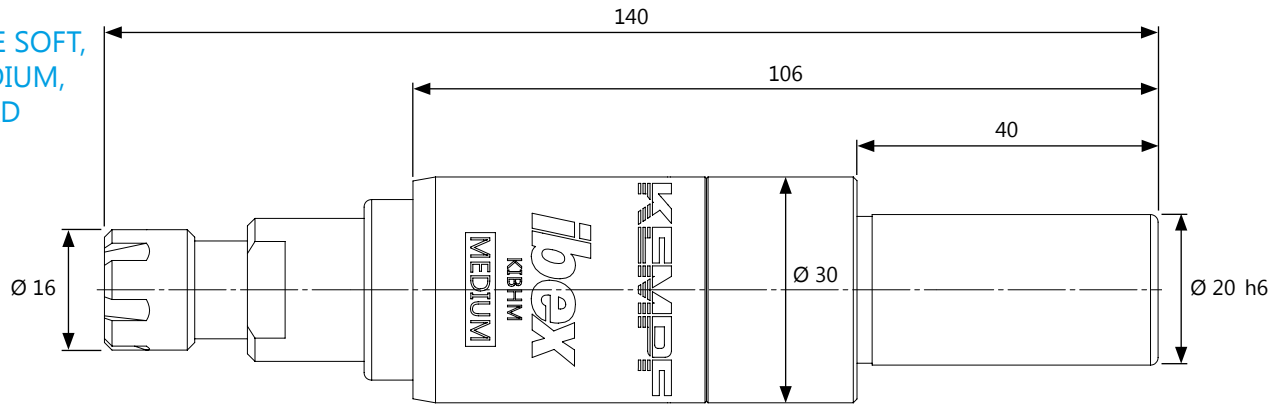
VIDEO
Deburring the tooth flanks

B
1.4

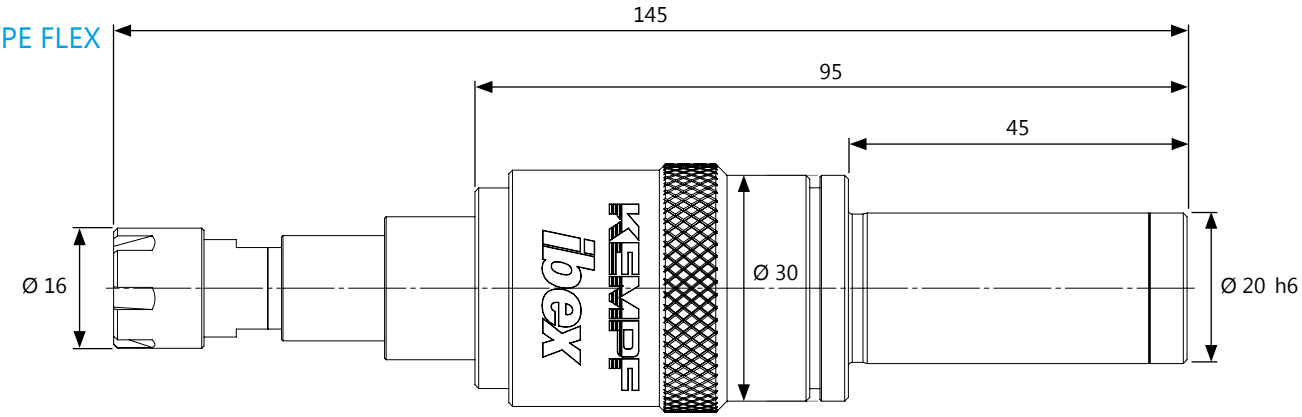
IBEX DEBURRING TOOL HOLDER, CARBIDE CHAMFER MILLING CUTTER & ACCESSORIES

• IBEX DEBURRING TOOL HOLDER

TYPE SOFT, MEDIUM, HARD



TYPE FLEX



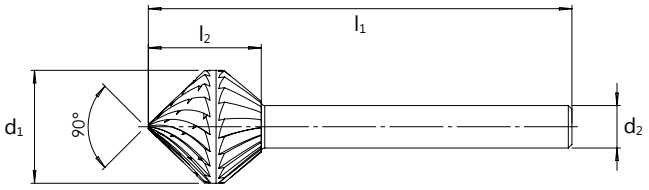
ibex type	ER collet	Deflection Tension	Deflection Compression	P	M	K	N	S	O	Item No.	EUR/Piece
SOFT	ER11	10 mm	10 mm	–	–	–	•	–	•	KIBHS	
MEDIUM				•	–	•	–	–	–	KIBHM	
HARD				–	•	–	–	•	–	KIBHH	
FLEX	ER11	-	10 mm	•	•	•	•	•	•	KIBHF	

PLEASE NOTE: Each ibex compensation holder is supplied with 1x clamping nut KIBHN. Please order clamping wrench KIBHW and collet KIBHC separately.

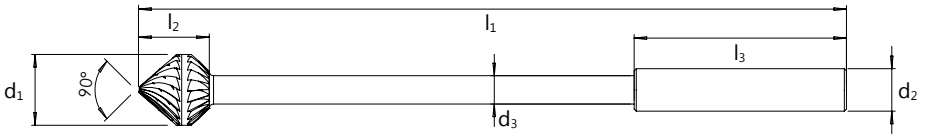
• IBEX CARBIDE CHAMFER MILLING CUTTER

FORWARD & BACKWARD CUTTER

KIBCD16...



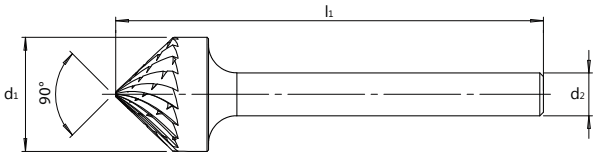
KIBCD10...



d_1 (mm)	d_2 (mm)	d_3 (mm)	l_1 (mm)	l_2 (mm)	l_3 (mm)	Z	Item No.	EUR/Piece
10	6	4	60	11	20	24	KIBCD10060	on request
10	6	4	100	11	20	24	KIBCD10100	on request
16	6	-	60	13	-	28	KIBCD16060	on request
16	6	-	120	13	-	28	KIBCD16120	on request

FORWARD CUTTER

d_1 (mm)	d_2 (mm)	l_1 (mm)	Z	Item No.	EUR/Piece
8	6	60	24	KIBCF08060	on request
13	6	60	28	KIBCF13060	on request
16	6	60	28	KIBCF16060	on request
16	6	120	28	KIBCF16120	on request
25	8	60	28	KIBCF25060	on request



NOTE: Special dimensions are available on request.

• IBEX ACCESSORIES

Designation	Size	Item No.	EUR/Piece
ibex collet	ER11 Ø 6.0 - 5.5 mm	KIBHC	on request
ibex collet	ER11 Ø 8.0 - 7.5 mm	KIBHC8	on request
ibex clamping nut	for ER11	KIBHN	on request
ibex wrench	for ER11	KIBHW	on request

• IBEX SET

Designation	Item No.	Set content*	EUR/Piece
ibex set SOFT	KIBSETSOFT	1x KIBHS, 1x KIBHC, 1x KIBHW	reduced set price on request
ibex set MEDIUM	KIBSETMEDIUM	1x KIBHM, 1x KIBHC, 1x KIBHW	reduced set price on request
ibex set HARD	KIBSETHARD	1x KIBHH, 1x KIBHC, 1x KIBHW	reduced set price on request
ibex set FLEX	KIBSETFLEX	1x KIBHF, 1x KIBHC, 1x KIBHW	reduced set price on request

*The IBEX-SET can only be ordered in combination with at least 2 ibex cutters (at choice).

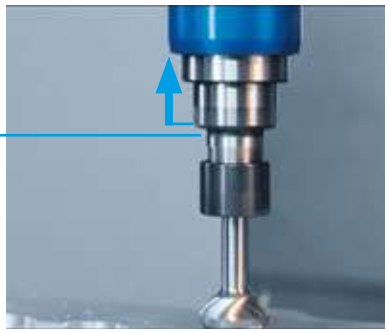
PROCESSING EXAMPLES

• DEBURRING OF CIRCULAR CONTOURS

When circular contours of such an aluminum component need to be deburred, this is achieved either by complex programming and precise contour tracing with a milling cutter or the ibex deburring system is used. At maximum speed, the compensating holder swallows the radial deviations caused by the circular contours. This feature ensures that the ibex carbide chamfer milling cutter maintains constant contact with the contour and a uniform deburring result.

By using the ibex deburring system, one side of the nearly 34 cm long aluminum component could be deburred in approx. 3.8 seconds - and without any time-consuming programming work.

Since the compensating holder is elaborately sealed, no chips can enter. This is not the only reason why this system is perfectly suited for use in series production, where high process reliability is a must.



The relatively large axial deflection that occurs during machining is clearly visible in this example (see video link). Without compensation, the cutter and component would be damaged after a few cycles.

TOOL VIDEO LINK

VIDEO
Deburring without programmed correction

• FORWARD AND BACKWARD DEBURRING IN ONE OPERATION

The ibex forward and backward milling cutters are particularly suitable when, as in this example, the outer and the inner edge of the hole must be deburred. Due to the uneven contour, either an NC data record must specify the "deburring path" or the tool compensates for the resulting strokes. The ibex deburring system needs less than 4 seconds for both contours of this application.

TOOL VIDEO LINK

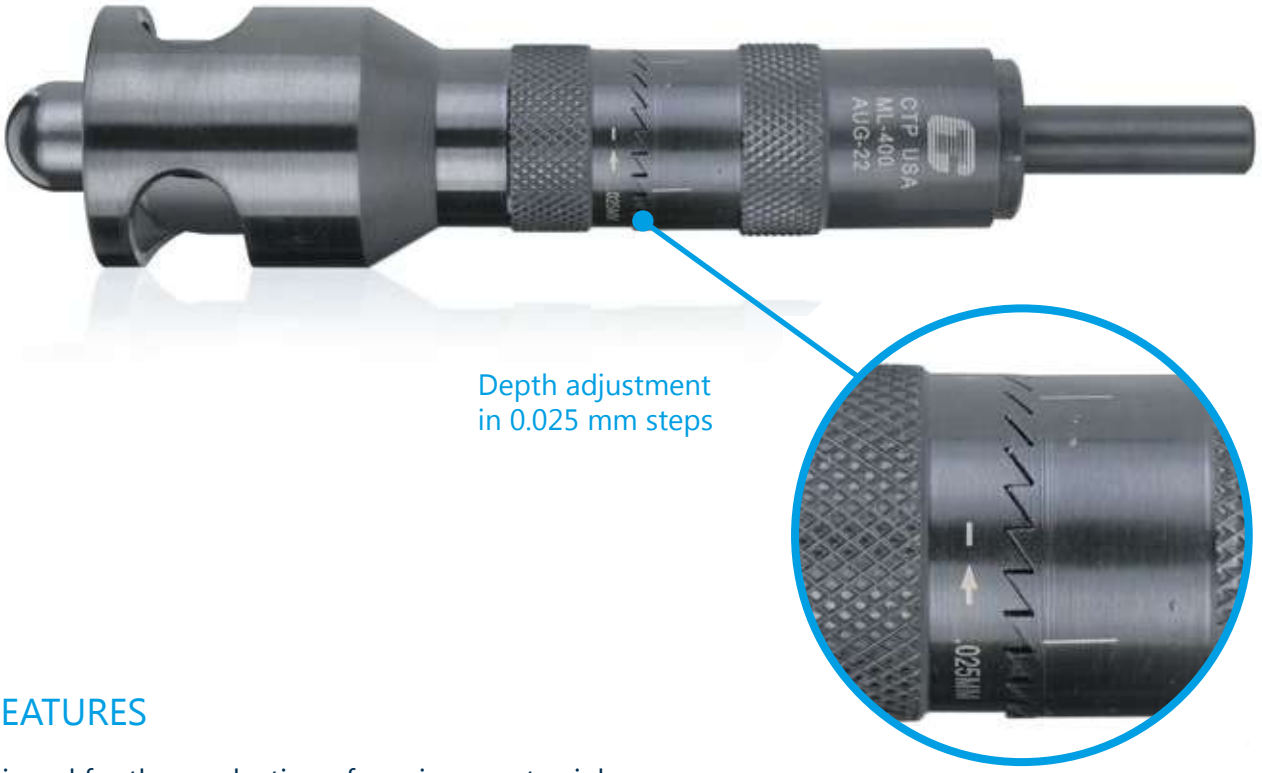
VIDEO
Front and back deburring

MICRO LIMIT COUNTERSINKING TOOL

Tool for precise countersinking

PLEASE NOTE

Please order the following components separately:
- BASE BODY
- COUNTERSINK
- PILOT PIN



FEATURES

- Designed for the production of precise countersinks
- Cutting pressure is absorbed axially via the plane bearing and radially via the radial bearing
- Adjustments are possible in 0.025 mm steps
- Long tool life due to high-performance HSS cutting material
- Made of pilot pin, countersink and depth control device (base body)

INFO

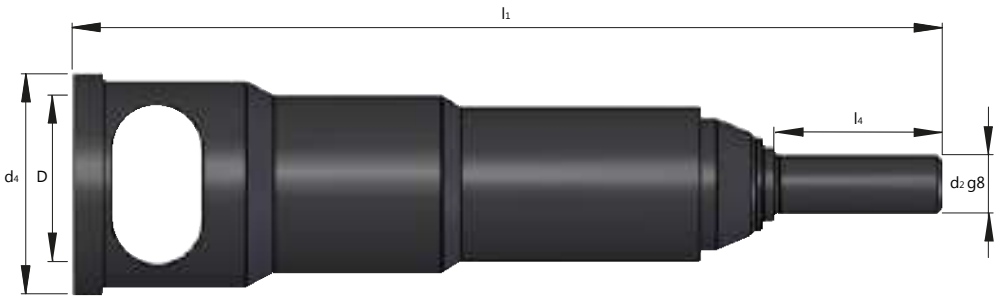
The MICRO LIMIT countersinking tool is also available with an overflow device that is built into the standard tool*. This protection is ideal for use on automatic units. The overflow device compensates for different workpiece thicknesses, ensuring that damage to the machine spindle is prevented. The MICRO-Limit with overflow device also simplifies work on multi-spindle machines.

SPECIAL CONSTRUCTIONS

In addition to the MICRO LIMIT in the standard version, we also offer designs specially adapted or modified for your application. All we need is a workpiece drawing.

B
2.1

MICRO LIMIT
BASE BODY, COUNTERSINKS & PILOT PINS



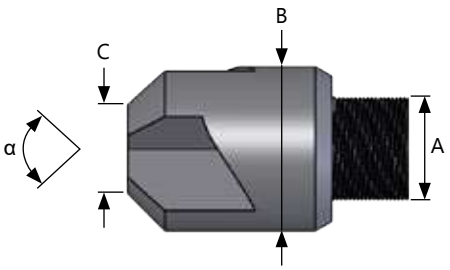
• BASE BODY

Counterbore Ø max.	d_2 g8 (mm)	l_4 (mm)	l_1 (mm)	D (mm)	d_4 (mm)	Item No.	EUR/piece
9.9	4.75	23.36	98.29	11.93	15.74	MICRO200	
12.7	7.92	26.41	107.95	15.74	19.05	MICRO300	
12.7	12.7	38.1	165.1	15.74	19.05	MICRO300OT*	
22.22	7.92	26.41	122.17	26.16	29.97	MICRO400	
22.22	12.7	38.1	184.15	26.16	29.97	MICRO400OT*	

*OT = With overflow device

• COUNTERSINK

for MICRO LIMIT	Angle α	Thread A	Dimension B	Dimension C	Item No.	EUR/piece
MICRO200	82°	5/16-32	9.9	3.17	SENKER2082	
	90°	5/16-32	9.9	3.17	SENKER2090	
	100°	5/16-32	9.9	3.17	SENKER20100	
	120°	5/16-32	9.9	3.17	SENKER20120	
MICRO300/300OT	60°	1/4-28	12.7	3.17	SENKER3060	
	82°	1/4-28	12.7	3.17	SENKER3082	
	90°	1/4-28	12.7	3.17	SENKER3090	
	100°	1/4-28	12.7	3.17	SENKER30100	
	120°	1/4-28	12.7	3.17	SENKER30120	
MICRO400/400OT	82°	7/16-20	22.22	5.53	SENKER4082	
	90°	7/16-20	22.22	5.53	SENKER4090	
	100°	7/16-20	22.22	5.53	SENKER40100	
	120°	7/16-20	22.22	5.53	SENKER40120	



• PILOT PIN

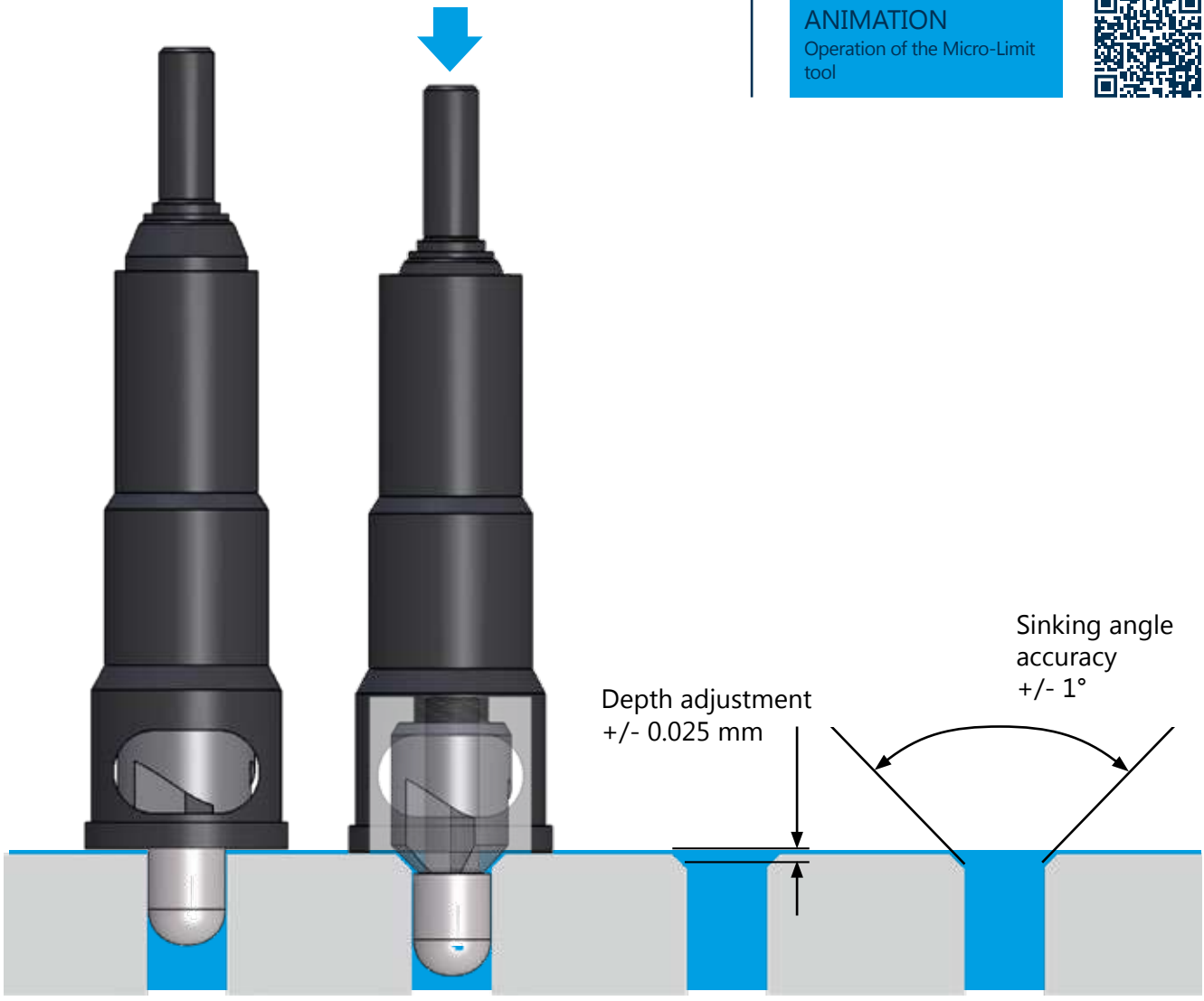
for MICRO LIMIT	Bore Ø (mm)	Dimension B	Item No.	EUR/piece
MICRO200 MICRO300 MICRO300OT	3.18	2.36	ZAPFEN3.125	
	3.25		ZAPFEN3.128	
	3.96		ZAPFEN3.156	
	4.09		ZAPFEN3.161	
	4.75		ZAPFEN3.187	
	6.35		ZAPFEN3.250	
	7.92		ZAPFEN3.312	
MICRO400 MICRO400OT	6.35	4.74	ZAPFEN4.250	
	7.92		ZAPFEN4.312	
	9.53		ZAPFEN4.375	
	12.7		ZAPFEN4.500	

WORKING PRINCIPLE

The MICRO LIMIT is set to the proper countersink depth. The countersink and the pilot pin are screwed in to machine the required countersink diameter.
The tool is inserted into the bore with the pilot pin. The pin enables optimum guidance and stability of the countersink. The tool is now moved to the stop, thereby continuously achieving the same precise countersinking.

TOOL VIDEO LINK

ANIMATION
Operation of the Micro-Limit tool



APPLICATION NOTES FOR MICRO LIMIT

Application:
In principle, you can use the Micro Limit on all types of machines. No special user knowledge is required.

Tool adjustments are made manually on the knurled adjustable ring that controls the size of the chamfer. Adjustments are possible in 0.001 inch or 0.025 mm steps.

Rotational Speed & Feed:
Apply approximately the same rotational speed and feed rate as for a standard drill. However, the larger the countersink, the lower is the rotational speed required (to avoid drilling noise).

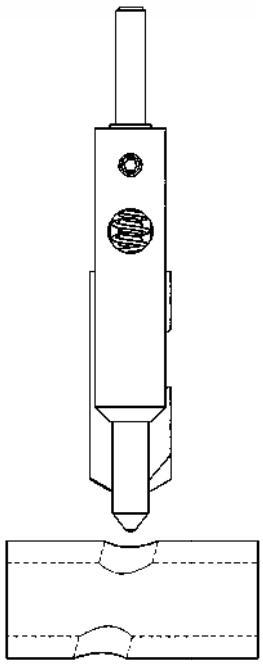
Maintenance:
To maintain the tool life as long as possible, the Micro-Limit should be kept free of chips and dirt. The countersink should be replaced as soon as the cutting edges have become blunt. To do this, loosen the screw on the side of the tool to remove the countersink head. Unscrew the countersink head to remove it from the guide shaft and replace it with a new one.

ELLIPTI-BUR®
DEBURRING TOOL

The solution for fast & thorough deburring of elliptical bores

FEATURES

- Uniform deburring of elliptical bores
- Change of rotation direction not required
- Affordable tool and spare blades
- Easy change and long tool life of the blades
- Deburring thickness adjustable by spring tension
- Solutions can be implemented for a wide range of applications
- Standard tools available for bore Ø 3.96 mm to Ø 25.4 mm



FUNCTION

The ELLIPTI-BUR is made of a spring-loaded as well as a self-steering conical drill head that precisely positions the tool to achieve optimum and consistent results. In use, the ELLIPTI-BUR is first centered over the hole to be deburred. As soon as the tool is moved forward, the drill head is pressed back into the shank against the spring so that the cutting edge comes into contact with the edge of the drill hole.

By moving the rotating tool (in the working feed) to the countersinking depth and a short retention time, the bore is deburred uniformly. Due to the spring-loaded cutting edge, it centers flexibly in axial as well as radial direction on the bore edge and almost uniformly approaches it.

Conventional deburring with countersink

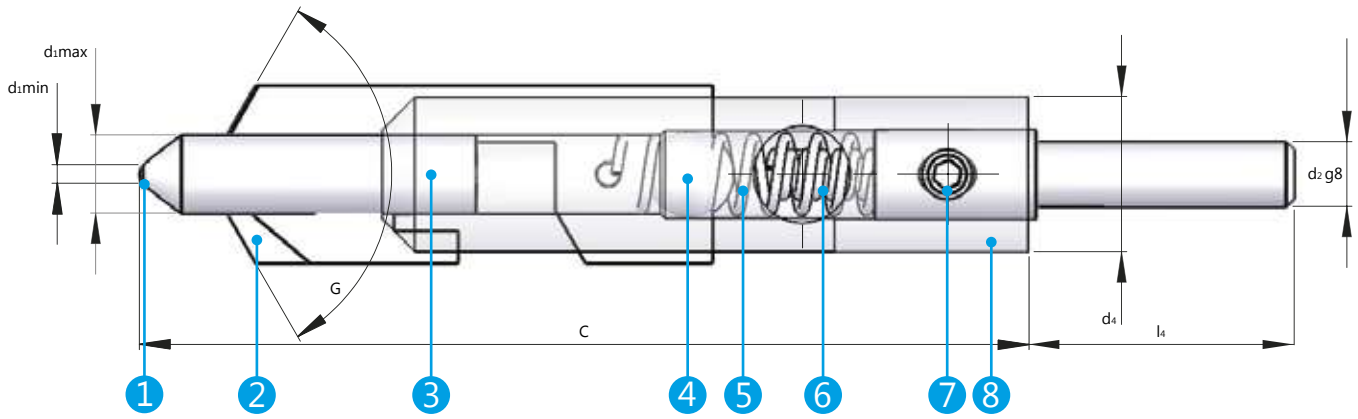
Uniform deburring with Ellipti-Bur

INFO

All important tool parts are hardened. The cutting part, which has two crosswise opposing cutting edges, is made of hardened high-speed steel. An additional surface treatment guarantees an even longer tool life. The ELLIPTI-BUR is designed so that the blade can be easily replaced if necessary.
Use our cost-effective RESHARPENING SERVICE for ELLIPTI-BUR blades and your tool will quickly be ready for use again!

ELLIPTI-BUR®
Ø 3.96 mm to Ø 25.40 mm

1 Pilot
2 Blade
3 Pilot spring
4 Ball
5 Blade spring
6 Shank spring
7 Adjusting screw
8 Body



• TOOL (BASE BODY WITH BLADE)

Application area		Tool length C (mm)	Shank length l_4 (mm)	Tool body Ø d_4 (mm)	Shank Ø d_2 g8 (mm)	Angle G	Item No.	EUR/Piece
$d_1$min (mm)	$d_1$max (mm)							
3.96	7.93	79.37	38.10	15.87	6.35	120°	EL5	
3.96	7.93	79.37	38.10	15.87	6.35	120°	EL5XT*	
6.35	12.7	82.55	38.10	19.05	6.35	120°	EL8	
9.52	25.4	120.65	31.75	25.4	12.7	120°	EL16	

• BLADE

Replacement blades suitable for Ellipti-Bur	For Bore Ø d_1		Cutting edge width (mm)	HSS (standard) Item No.	EUR/Piece
	$d_1$min	$d_1$max			
EL5	3.96	7.93	16	EL5KLINGE	
EL5XT*	3.96	7.93	16	EL5XTKLINGE*	
EL8	6.35	12.7	16	EL8KLINGE	
EL16	9.52	25.4	31	EL16KLINGE	

*Blades for the ELLIPTI-BUR EL5XT are made of a special high-speed steel and are recommended for applications where a longer tool life is desired; e.g. when coolant is not available.

NOTICE:
The working range is determined by the pilot diameter, not by the cutting diameter. The ELLIPTI-BUR is not suitable for extremely soft metals and for applications where the diameter of a cylindrical part with a cross hole is smaller than two and a half times the diameter of the main hole (the softer and smoother the metal, the more this applies).

BURRAWAY®
UNIVERSAL DEBURRING TOOL

Forward and backward deburring
as well as chamfering of bores in only one operation

ACCESSORIES AVAILABLE!

- COMPRESSION SPRINGS
- PUSH PINS
- RETAINING PINS
- Other replacement parts on request

PLEASE NOTE

For the Burraway for bore-Ø 2.00 mm to 5.16 mm, the base body and Arbor Assy holder (incl. blade) must be ordered separately. Additional blades are available separately.

Ø 2.00 mm to
Ø 5.16 mm

Ø 5.50 mm to
Ø 19.05 mm

Ø 20.00 mm to
Ø 50.80 mm

FEATURES

- Easy handling on all machines
- No change of rotation direction required
- Affordable tools and spare blades
- Easy change and long service life of the blades
- Deburring thickness adjustable by spring tension
- Solutions for various applications can be realized
- Tools are available in both imperial and metric sizes.
  The adjustment screws of the inch program are supplied with inch threads, those of the metric program with metric screws
- Standard tools of the metric program are available from stock from Ø 2.0 mm to Ø 50.0 mm and standard tools of the inch program from Ø 0.093 inch to Ø 2.0 inch

INFO

The BURRAWAY tool is made of the base body, the blade, the blade holder, a tension spring and an adjusting screw. Blade and spring can also be ordered separately. For the diameter range 2.00 mm to 5.16 mm, only the front part without shank is also available separately.

WORKING PRINCIPLE

1. FRONT DEBURRING

Upon entry, spring tension holds the (replaceable and adjustable) cutting blade in the extended position as it removes the burr on the front of the hole.

2. PASSING THROUGH HOLE

As the feed load increases, the pre-set spring tension is exceeded and the blade retracts automatically as the tool passes through the workpiece. (The crowned and polished top surface of the blade will not damage the inside surface of the hole.)

3. BACK DEBURRING

Spring tension again causes the blade to extend as it emerges from the ID of the part; the burr is removed on the back side of the hole on the return stroke.

TOOL VIDEO LINK

ANIMATION
Functionality of the Burraway

ANIMATION
Functionality for interrupted bores

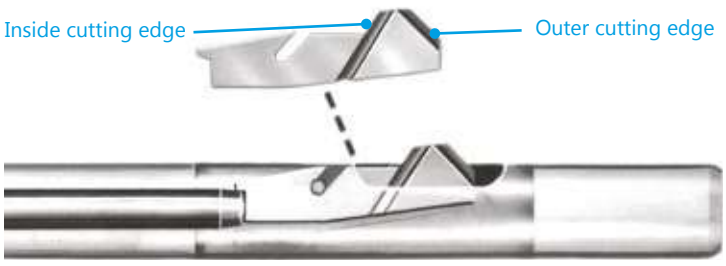
ANIMATION
Blade change and components view

TYPES OF BLADES

Two types of blades are available. One is a DA (Dual Acting) blade, which ensures front and back deburring in one operation. On the other hand, we offer a BA blade (Back Acting), which only deburrs the back side of the workpiece. The front side is then rounded. Both variants are offered with 7° and 0° rake angle.

- Inner cutting edge sharp
  = TYPE BA (Back Acting),
  with 7° or 0° rake angle

- Outer & inner cutting edge sharp
  = DA (Dual Acting),
  with 7° or 0° rake angle



Blade type	Front Deburring	Back Deburring	rake angle	HSS uncoated	HSS TiN-coated	HSS Carbide tipped
DA	●	●	7°	ex stock	ex stock	on request
DA	●	●	0°	ex stock	ex stock	on request
BA		●	7°	ex stock	ex stock	on request
BA		●	0°	ex stock	ex stock	on request

Negative rake angles are available on request.

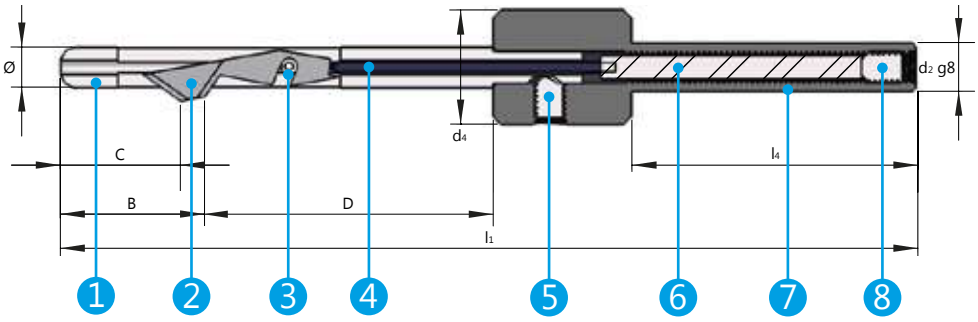
B
4.1

BURRAWAY® - FOR Ø 2.00 mm TO Ø 5.16 mm BASE BODY, CUTTING INSERT & BLADE

for metric & inch bores

1 Arbor
2 Blade
3 Retaining pin
4 Plunger
5 Fixing screw
6 Tension spring
7 Base body with shank
8 Adjustment screw

NOTE:
The tool diameter is 0.15 mm
up to 0.20 mm below the hole-Ø



• TOOL FOR Ø 2.0 mm TO Ø 5.16 mm

für hole-Ø (mm)	für hole-Ø (Zoll)	Blade size	l_1 (mm)	B (mm)	C (mm)	D (mm)	l_4 (mm)	d_2 g8 (mm)	d_4 (mm)	Item No.	EUR/Piece
2.00	-	2.0	84.6	11.4	6.4	22.2	35.0	6.00	14.0	BWY0200	
2.30	-	3/32	84.6	11.4	6.4	22.2	35.0	6.00	14.0	BWY0230	
2.38	.0930"	3/32	85.6	11.4	7.1	21.9	36.6	6.35	12.7	BWY0238	
2.50	-	3/32	84.6	11.4	6.4	22.2	35.0	6.00	14.0	BWY0250	
2.78	.1094"	3/32	85.6	11.4	7.1	21.9	36.6	6.35	12.7	BWY0280	
3.00	-	3.0	84.6	11.4	6.4	22.2	35.0	6.00	14.0	BWY0300	
3.18	.1250"	1/8	85.6	11.4	7.1	21.9	36.6	6.00	12.7	BWY0318-D6	
3.18	.1250"	1/8	85.6	11.4	7.1	21.9	36.6	6.35	12.7	BWY0320	
3.50	-	1/8	84.6	11.4	6.4	22.2	35.0	6.00	14.0	BWY0350	
3.57	.1406"	1/8	85.6	11.4	7.1	21.9	36.6	6.35	12.7	BWY0360	
3.97	.1562"	1/8	85.6	11.4	7.1	21.9	36.6	6.35	12.7	BWY0390	
4.00	-	5/32	84.6	11.4	6.4	22.2	35.0	6.00	14.0	BWY0400	
4.37	.1719"	5/32	85.6	11.4	7.1	21.9	36.6	6.35	12.7	BWY0430	
4.50	-	3/16	103.4	18.3	11.2	34.1	35.0	6.00	14.0	BWY0450	
4.76	.1875"	3/16	104.6	18.3	11.2	34.0	36.6	6.35	12.7	BWY0470	
5.00	-	3/16	103.4	18.3	11.2	34.1	35.0	6.00	14.0	BWY0500	
5.16	.2031"	3/16	104.6	18.3	11.2	34.0	36.6	6.35	12.7	BWY0520	

PLEASE NOTE:
The standard delivery includes the blade type DA 7° (Dual Acting) in assembled condition.

• CUTTING INSERT "ARBOR ASSY" INCL. BLADE FOR Ø 2.00 mm TO Ø 5.16 mm

Cutting insert "ARBOR ASSY" suitable for BURRAWAY	for hole Ø		Incl. blade	Item No.	EUR/Piece
	(mm)	(inch)			
BWY0200	2.00		MES20DA7HSS	ASSY20	
BWY0200	2.00		MES20BA7HSS	ASSY20BA7HSS	
BWY0230	2.30		MES332DA7HSS	ASSY23	
BWY0238	2.38	0.0930"	MES332DA7HSS	ASSY238	
BWY0250	2.50		MES332DA7HSS	ASSY25	
BWY0280	2.78	.1094"	MES332DA7HSS	ASSY28	
BWY0300	3.00		MES30DA7HSS	ASSY30	
BWY0320	3.18	.1250"	MES18DA7HSS	ASSY32	
BWY0350	3.50		MES18DA7HSS	ASSY35	
BWY0360	3.57	.1406"	MES18DA7HSS	ASSY36	
BWY0390	3.97	.1562"	MES18DA7HSS	ASSY39	
BWY0400	4.00		MES532DA7HSS	ASSY40	
BWY0430	4.37	.1719"	MES532DA7HSS	ASSY43	
BWY0450	4.50		MES316DA7HSS	ASSY45	
BWY0470	4.76	.1875"	MES316DA7HSS	ASSY47	
BWY0500	5.00		MES316DA7HSS	ASSY50	
BWY0520	5.16	.2031"	MES316DA7HSS	ASSY52	

PLEASE NOTE:
A complete cutting insert incl. blade („Arbor Assy") is offered for this diameter range of the tool.
The scope of delivery also includes the retaining pin and the pressure pin. The Arbor Assy is fixed in the base body.

CUTTING DATA
Page 95

• BLADES FOR Ø 2.00 mm TO Ø 5.16 mm

Blade size	Blade suitable for BURRAWAY Item No.	Blade type	Rake angle	HSS uncoated Item No.	HSS uncoated EUR/Piece	HSS TiN-coated Item No.	HSS TiN-coated EUR/Piece	HSS carbide tipped Item No.	HSS carbide tipped EUR/Piece
2.0*	BWY0200	DA	7°	MES20DA7HSS		MES20DA7TIN		-	-
		DA	0°	MES20DA0HSS		-	-	-	-
		BA	7°	MES20BA7HSS		-	-	-	-
3/32*	BWY0230 BWY0238 BWY0250 BWY0280	DA	7°	MES332DA7HSS		MES332DA7TIN		-	-
		DA	0°	MES332DA0HSS		-	-	-	-
		BA	7°	MES332BA7HSS		MES332BA7TIN		-	-
		BA	0°	MES332BA0HSS		-	-	-	-
3.0	BWY0300	DA	7°	MES30DA7HSS		MES30DA7TIN		-	-
		DA	0°	MES30DA0HSS		-	-	-	-
		BA	7°	MES30BA7HSS		MES30BA7TIN		-	-
		BA	0°	MES30BA0HSS		-	-	-	-
1/8	BWY0318-D6 BWY0320 BWY0350 BWY0360 BWY0390	DA	7°	MES18DA7HSS		MES18DA7TIN		-	-
		DA	0°	MES18DA0HSS		-	-	MES18DA0HM	
		BA	7°	MES18BA7HSS		MES18BA7TIN		-	-
		BA	0°	MES18BA0HSS		-	-	-	-
5/32	BWY0400 BWY0430	DA	7°	MES532DA7HSS		MES532DA7TIN		-	-
		DA	0°	MES532DA0HSS		-	-	MES532DA0HM	
		BA	7°	MES532BA7HSS		MES532BA7TIN		-	-
		BA	0°	MES532BA0HSS		-	-	-	-
3/16	BWY0450 BWY0470 BWY0500 BWY0520	DA	7°	MES316DA7HSS		MES316DA7TIN		-	-
		DA	0°	MES316DA0HSS		-	-	MES316DA0HM	
		BA	7°	MES316BA7HSS		MES316BA7TIN		-	-
		BA	0°	MES316BA0HSS		-	-	MES316BA0HM	

PLEASE NOTE:
Blades of sizes 2.0 and 3/32 are designed with a hole instead of a groove. Therefore, a blade can only be changed after the retaining pin (see sketch on page 82) has been removed. The new blade must then be fixed with a new retaining pin. For easier handling, we recommend changing the entire cutting insert (Arbor Assy).

CUTTING DATA
Page 95

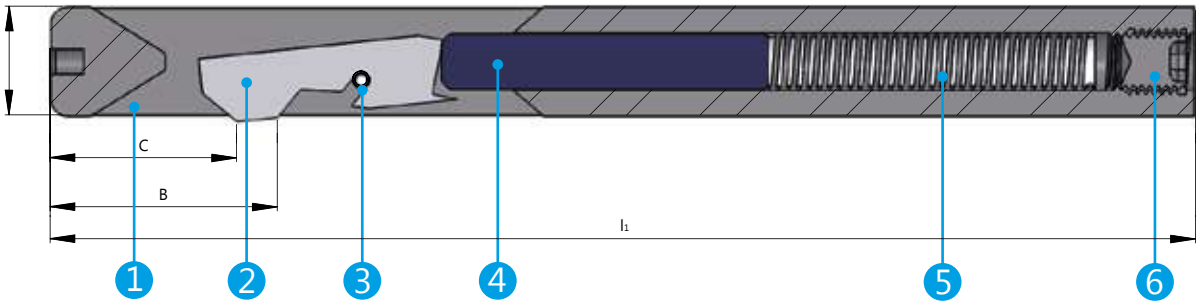
BURRAWAY® - FOR Ø 5.50 mm TO Ø 19.05 mm ENTIRE TOOL & BLADE

for metric & inch bores

1 Base body
2 Blade
3 Retaining pin
4 Plunger
5 Tension spring
6 Adjustment screw

Pilot length (C) can be shortened on request

NOTE:
The tool-Ø is 0.15 mm to 0.20 mm below the hole-Ø



• TOOL FOR Ø 5.50 mm UP TO Ø 19.05 mm

for hole-Ø		Blade size	l_1 (mm)	B (mm)	C (mm)	Item No.	EUR/Piece
(mm)	(inch)						
5.50		1	114.0	22.1	14.2	BWY0550	
5.56	.2188"	1	114.3	22.1	14.2	BWY0556	
5.95	.2340"	1	114.3	22.1	14.2	BWY0595	
6.00		1	114.0	22.1	14.2	BWY0600	
6.35	.2500"	1	114.3	22.1	14.2	BWY0635	
6.50		1	114.0	22.1	14.2	BWY0650	
6.75	.2656"	1	114.3	22.1	14.2	BWY0675	
7.00		1	114.0	22.1	14.2	BWY0700	
7.14	.2812"	1	114.3	22.1	14.2	BWY0714	
7.50		2	114.0	24.4	17.3	BWY0750	
7.54	.2969"	2	114.3	24.4	17.3	BWY0754	
7.94	.3125"	2	114.3	24.4	17.3	BWY0795	
8.00		2	114.0	24.4	17.3	BWY0800	
8.33	.3281"	2	114.3	24.4	17.3	BWY0833	
8.50		2	114.0	24.4	17.3	BWY0850	
8.74	.3438"	2	114.3	24.4	17.3	BWY0874	
9.00		3	127.0	25.4	17.3	BWY0900	
9.12	.3594"	3	127.0	25.4	17.3	BWY0912	
9.50		3	127.0	25.4	17.3	BWY0950	
9.53	.3750"	3	127.0	25.4	17.3	BWY0953	
9.93	.3906"	3	127.0	25.4	17.3	BWY0993	
10.00		3	127.0	25.4	17.3	BWY1000	
10.30	.4062"	3	127.0	25.4	17.3	BWY1030	
10.50		3 1/2	140.0	26.2	18.3	BWY1050	
10.70	.4219"	3 1/2	139.7	27.7	18.3	BWY1070	

PLEASE NOTE:
The standard delivery includes the blade type DA 7° (Dual Acting) in assembled condition.

CUTTING DATA
Page 95

• TOOL FOR Ø 5.50 mm UP TO Ø 19.05 mm

for hole-Ø		Blade size	Dimension A	Dimension B	Dimension C	Item No.	EUR/Piece
(mm)	(inch)						
11.00		3 1/2	140.0	26.2	18.3	BWY1100	
11.10	.4375"	3 1/2	139.7	27.7	18.3	BWY1110	
11.50		3 1/2	140.0	26.2	18.3	BWY1150	
11.51	.4530"	3 1/2	139.7	27.7	18.3	BWY1151	
11.89	.4688"	3 1/2	139.7	27.7	18.3	BWY1180	
12.00		3 1/2	140.0	26.2	18.3	BWY1200	
12.30	.4844"	3 1/2	139.7	27.7	18.3	BWY1230	
12.50		3 1/2	140.0	26.2	18.3	BWY1250	
12.70	.5000"	3 1/2	139.7	27.7	18.3	BWY1270	
13.00		3 1/2	140.0	26.2	18.3	BWY1300	
13.08	.5156"	3 1/2	139.7	27.7	18.3	BWY1308	
13.49	.5310"	3 1/2	139.7	27.7	18.3	BWY1349	
13.50		3 1/2	140.0	26.2	18.3	BWY1350	
13.87	.5469"	4	163.6	33.3	22.9	BWY1387	
14.00		4	165.0	33.3	22.9	BWY1400	
14.30	.5625"	4	163.6	33.3	22.9	BWY1430	
14.50		4	165.0	33.3	22.9	BWY1450	
14.70	.5781"	4	163.6	33.3	22.9	BWY1470	
15.00		4	165.0	33.3	22.9	BWY1500	
15.06	.5930"	4	163.6	33.3	22.9	BWY1506	
15.47	.6090"	4	163.6	33.3	22.9	BWY1547	
15.50		4	165.0	33.3	22.9	BWY1550	
15.88	.6250"	4	163.6	33.3	22.9	BWY1588	
16.00		4	165.0	33.3	22.9	BWY1600	
16.30	.6406"	4	163.6	33.3	22.9	BWY1630	
16.50		4	165.0	33.3	22.9	BWY1650	
16.70	.6562"	4	163.6	33.3	22.9	BWY1670	
17.00		4	165.0	33.3	22.9	BWY1700	
17.04	.6719"	4	163.6	33.3	22.9	BWY1704	
17.46	.6875"	4	163.6	33.3	22.9	BWY1746	
17.50		4	165.0	33.3	22.9	BWY1750	
18.00		4	165.0	33.3	22.9	BWY1800	
18.50		4	165.0	33.3	22.9	BWY1850	
19.00		4	165.0	33.3	22.9	BWY1900	
19.05	.7500"	4	163.6	33.3	22.9	BWY1905	

CUTTING DATA
Page 95

• BLADE FOR Ø 5.50 mm TO Ø 19.05 mm

Blade size	Blade suitable for BURRAWAY	Blade type	Rake angle	HSS uncoated		HSS TiN-coated		HSS carbide tipped	
	Item No.			Item No.	EUR/Piece	Item No.	EUR/Piece	Item No.	EUR/Piece
1	BWY0550 to BWY0714	DA	7°	MES1DA7HSS		MES1DA7TIN		-	-
		DA	0°	MES1DA0HSS		-	-	MES1DA0HM	
		BA	7°	MES1BA7HSS		MES1BA7TIN		-	-
		BA	0°	MES1BA0HSS		-	-	MES1BA0HM	
2	BWY0750 to BWY0874	DA	7°	MES2DA7HSS		MES2DA7TIN		-	-
		DA	0°	MES2DA0HSS		-	-	MES2DA0HM	
		BA	7°	MES2BA7HSS		MES2BA7TIN		-	-
		BA	0°	MES2BA0HSS		-	-	MES2BA0HM	
3	BWY0900 to BWY1030	DA	7°	MES3DA7HSS		MES3DA7TIN		-	-
		DA	0°	MES3DA0HSS		-	-	MES3DA0HM	
		BA	7°	MES3BA7HSS		MES3BA7TIN		-	-
		BA	0°	MES3BA0HSS		-	-	MES3BA0HM	
3 1/2	BWY1050 to BWY1387	DA	7°	MES312DA7HSS		MES312DA7TIN		-	-
		DA	0°	MES312DA0HSS		-	-	MES312DA0HM	
		BA	7°	MES312BA7HSS		MES312BA7TIN		-	-
		BA	0°	MES312BA0HSS		-	-	MES312BA0HM	
4	BWY1400 to BWY1905	DA	7°	MES4DA7HSS		MES4DA7TIN		-	-
		DA	0°	MES4DA0HSS		-	-	MES4DA0HM	
		BA	7°	MES4BA7HSS		MES4BA7TIN		-	-
		BA	0°	MES4BA0HSS		-	-	MES4BA0HM	

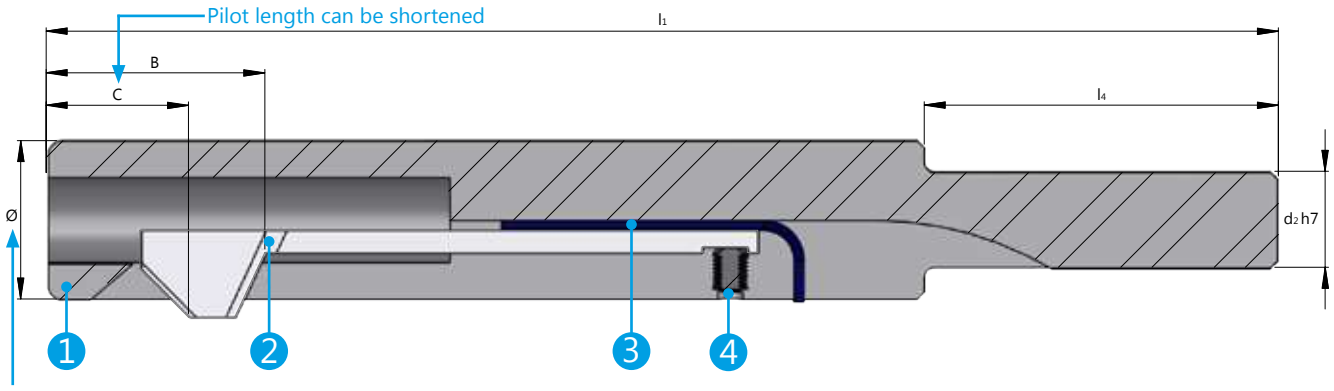
CUTTING DATA
Page 95

B
4.3

BURRAWAY® - FOR Ø 20.00 mm TO Ø 50.80 mm ENTIRE TOOL & BLADE

for metric & inch bores

1. Base body
2. Blade
3. Adjustment bar
4. Adjustment screw



NOTE: The tool-Ø is 0.15 mm to 0.20 mm below the hole-Ø

• TOOL FOR Ø 20.00 mm UP TO Ø 50.80 mm

for hole-Ø		Blade size	l_1 (mm)	B (mm)	C (mm)	l_4 (mm)	d_2 h7 (mm)	Item No.	EUR/Piece
(mm)	(inch)								
20.00		110	178	30.2	19.1	50.8	14.0	BWY2000	
20.62	.8120"	110	178	30.2	19.1	50.8	12.7	BWY2062	
21.00	.8267"	110	178	30.2	19.1	50.8	12.7	BWY2100	
22.00	.8661"	110	178	30.2	19.1	50.8	12.7	BWY2200	
22.20	.8750"	110	178	30.2	19.1	50.8	12.7	BWY2220	
23.00	.9055"	110	178	30.2	19.1	50.8	12.7	BWY2300	
23.82	.9375"	110	178	30.2	19.1	50.8	12.7	BWY2382	
24.00	.9448"	110	178	30.2	19.1	50.8	12.7	BWY2400	
25.00		110	178	30.2	19.1	50.8	14.0	BWY2500	
25.40	1.0000"	110	178	30.2	19.1	50.8	12.7	BWY2540	
26.90	1.0625"	110	178	30.2	19.1	50.8	12.7	BWY2690	
28.60	1.1250"	110	178	30.2	19.1	50.8	12.7	BWY2860	
30.00		110	178	30.2	19.1	50.8	14.0	BWY3000	
30.15	1.1875"	110	178	30.2	19.1	50.8	12.7	BWY3015	
31.75	1.2500"	110	178	30.2	19.1	50.8	12.7	BWY3175	
33.30	1.3125"	110	178	30.2	19.1	50.8	12.7	BWY3330	
34.90	1.3750"	110	178	30.2	19.1	50.8	12.7	BWY3490	
35.00		110	178	30.2	19.1	50.8	14.0	BWY3500	
38.10	1.5000"	110	178	30.2	19.1	50.8	12.7	BWY3810	
40.00		110	178	30.2	19.1	50.8	25.0	BWY4000	
41.30	1.6250"	110	178	30.2	19.1	50.8	25.4	BWY4130	
44.45	1.7500"	110	178	30.2	19.1	50.8	25.4	BWY4445	
45.00		110	178	30.2	19.1	50.8	25.0	BWY4500	
50.00		110	178	30.2	19.1	50.8	25.0	BWY5000	
50.80	2.000"	110	178	30.2	19.1	50.8	25.4	BWY5080	

PLEASE NOTE:
Standard delivery includes the blade type DA 7° (Dual Acting) in assembled condition.

CUTTING DATA
Page 95

• BLADES FOR Ø 20.00 mm TO Ø 50.80 mm

Blade size	Blade suitable for BURRAWAY	Blade type	Rake angle	HSS uncoated		HSS TiN-coated		HSS carbide tipped	
	Item No.			Item No.	EUR/Piece	Item No.	EUR/Piece	Item No.	EUR/Piece
110	BWY2000 to BWY5080	DA	7°	MES110DA7HSS		MES110DA7TIN		-	-
		DA	0°	MES110DA0HSS		-		MES110DA0HM	
		BA	7°	MES110BA7HSS		MES110BA7TIN		-	-
		BA	0°	MES110BA0HSS	-	-		MES110BA0HM	

CUTTING DATA
Page 95

B
4.4

OPTIONAL ACCESSORIES / SPARE PARTS
COMPRESSION SPRING, PLUNGER & RETAINING PIN

• COMPRESSION SPRING

for BURRAWAY	Item No.	EUR/Piece
BWY0200 - BWY0520	DRUCKFEDER1	
BWY0550 - BWY0714	DRUCKFEDER2	
BWY0750 - BWY0953	DRUCKFEDER3	
BWY0993 - BWY1030	DRUCKFEDER4	
BWY1050 - BWY1350	DRUCKFEDER5	
BWY1350 - BWY1905	DRUCKFEDER6	

• PLUNGER

for BURRAWAY	Item No.	EUR/Piece
BWY0200 - BWY0430	DRUCKSTIFT1	
BWY0450 - BWY0520	DRUCKSTIFT2	
BWY0550	DRUCKSTIFT3	
BWY0565 - BWY0600	DRUCKSTIFT4	
BWY0635 - BWY0714	DRUCKSTIFT6	
BWY0750 - BWY0800	DRUCKSTIFT7	
BWY0833 - BWY0874	DRUCKSTIFT8	
BWY0900 - BWY0993	DRUCKSTIFT9	
BWY1000 - BWY1030	DRUCKSTIFT10	
BWY1050 - BWY1110	DRUCKSTIFT11	
BWY1150 - BWY1200	DRUCKSTIFT12	
BWY1230 - BWY1270	DRUCKSTIFT13	
BWY1300 - BWY1350	DRUCKSTIFT14	
BWY1387 - BWY1430	DRUCKSTIFT15	
BWY1450 - BWY1506	DRUCKSTIFT16	
BWY1547 - BWY1588	DRUCKSTIFT17	
BWY1600 - BWY1670	DRUCKSTIFT18	
BWY1700 - BWY1746	DRUCKSTIFT19	
BWY1750 - BWY1800	DRUCKSTIFT20	
BWY1850 - BWY1905	DRUCKSTIFT21	

• RETAINING PIN

for BURRAWAY	Item No.	EUR/Piece
BWY0200 - BWY0430	STIFT1	
BWY0450 - BWY0520	STIFT2	
BWY0550 - BWY0714	STIFT3	
BWY0750 - BWY0874	STIFT4	
BWY0900 - BWY1350	STIFT5	
BWY1387 - BWY1905	STIFT6	

CUTTING DATA
BURRAWAY® UNIVERSAL DEBURRING TOOL

ISO	Material	Tensile strength	v_c (m/min)		f (mm/rev)				
			HSS	HSS-TiN	Ø 3 mm	Ø 10 mm	Ø 15 mm	Ø 20 mm	Ø 40 mm
	Construction-, case hardening- and tempered steel, unalloyed	< 700N/mm²	18-32	20-38	0.05	0.15	0.18	0.2	0.35
	Construction-, case hardening- and tempered steel, unalloyed	< 1,200 N/mm²	10-20	15-25	0.03	0.1	0.15	0.2	0.35
	Nitrided-, case hardening- and tempered steel, alloyed	< 900 N/mm²	10-16	15-20	0.05	0.15	0.18	0.2	0.35
	Nitrided-, case hardening- and tempered steel, alloyed	< 1,400 N/mm²	5-10	8-12	0.03	0.1	0.15	0.2	0.35
	Tool-, rolling bearing- and spring steel	< 900 N/mm²	6-12	12-18	0.03	0.1	0.15	0.2	0.35
	Tool-, rolling bearing- and spring steel	< 1,500 N/mm²	4-10	6-12	0.03	0.08	0.14	0.18	0.26
	Stainless steel		6-10	8-15	0.03	0.08	0.14	0.18	0.26
	Casting		12-32	15-38	0.03	0.1	0.15	0.2	0.35
	Aluminum		20-50	-	0.06	0.15	0.18	0.2	0.35
	Brass, bronze		20-40	20-50	0.06	0.15	0.2	0.25	0.4
	Titanium, heat resistant alloys		5-10	6-12	0.03	0.08	0.14	0.18	0.22
	Plastics		20-50	-	0.06	0.15	0.2	0.25	0.35

NOTE: Please keep the maximum speed of the tool of n_{max} = 3,500 rpm in mind!

The cutting data listed are starting values for machining bore exits on flat surfaces. Lower cutting data for deburring may be required for bore exits on curved surfaces.

Cutting data recommendations apply during cutting engagement. Higher feed rates can be selected when passing through the bore.

MICRO BURRAWAY® DEBURRING TOOL

Front and back deburring & chamfering of smallest bores from Ø 1.00 mm

PLEASE NOTE

For the Micro Burraway, the base body and cutting insert „Micro Arbor Assy" (incl. blade) must be ordered separately.

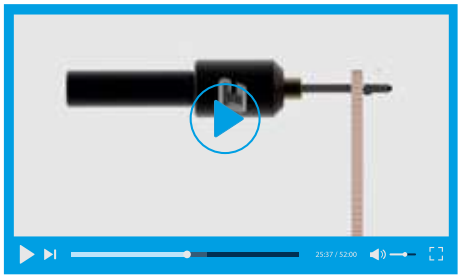
INFO

Applications in the medical technology, automotive and electrical industries require more and more machining and deburring of very small bores. The new MICRO BURRAWAY was developed for this type of application and can deburr the front and back of even the smallest bores starting from Ø 1.00 mm in a single operation. The tool is suitable for materials such as aluminum, steel, stainless steel, titanium and even composite materials.

The MICRO BURRAWAY series is equipped with a flexible blade that retracts into the mandrel to adapt to the bore diameter. The tool is composed of cost-effective, interchangeable cutting inserts (in various sizes) and a standard base body equipped with a 6 mm shank, which allows it to be easily clamped into various tool holders.

The two-piece design allows to replace a cutting insert (MICRO ARBOR ASSY) in seconds while the base body is still in the spindle. Each cutting insert has an HSS blade that allows you to deburr countless bores before the holder needs to be replaced. The special surface of the blade does not damage the inner surface of the bore.

TOOL VIDEO LINK



ANIMATION
Mode of operation of the Micro-Burraway

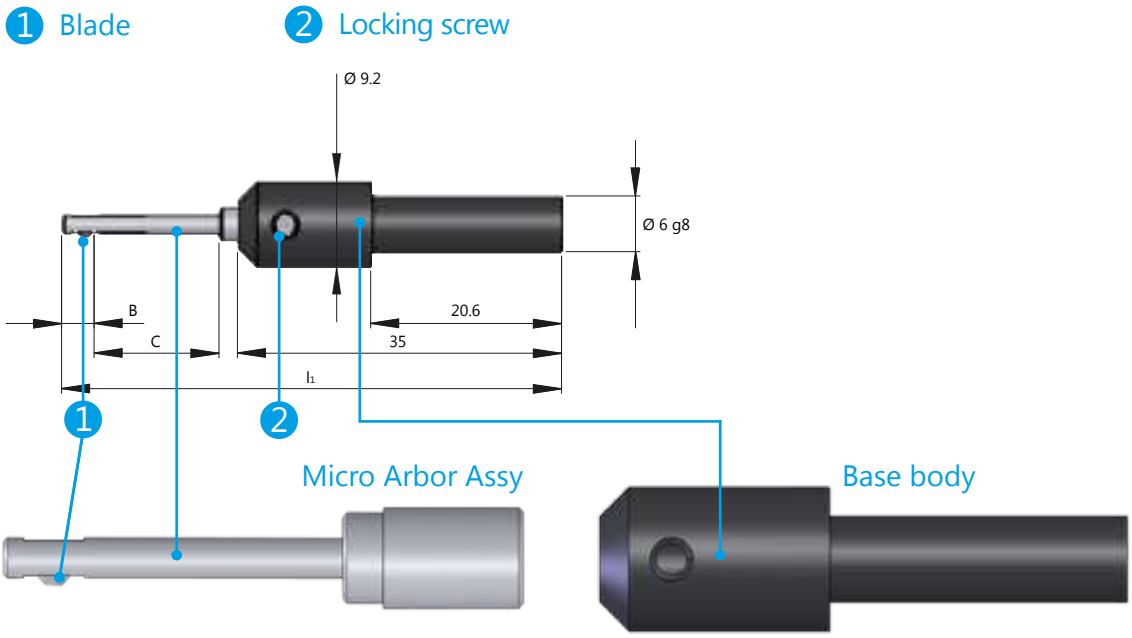
ANIMATION
Replacing the Micro Arbor Assy

TYPES OF BLADES

Two types of blades are offered; On the one hand a DA-blade (Dual Acting), which ensures front and back deburring in one operation. On the other hand, we offer a BA blade (Back Acting), which only deburrs the back of the workpiece. The front side is then rounded.

MICRO BURRAWAY® FOR Ø 1.00 mm TO Ø 2.34 mm BASE BODY & MICRO ARBOR ASSY

for metric & inch bores



• BASE BODY

• MICRO ARBOR ASSY

Item No. Base body	EUR/Piece	for hole-Ø (mm)	l_1 (mm)	B (mm)	C (mm)	Item No. Micro Arbor Assy with blade STANDARD (DA = outer and inner cutting edge sharp)	Item No. Micro Arbor Assy with blade (BA = only inner cutting edge sharp)	EUR/ Piece
BWYM0635		1.00 - 1.06	48.3	3.8	6.34	ASSYM100DA0	ASSYM100BA0	
		1.07 - 1.13	48.3	3.8	6.34	ASSYM110DA0	ASSYM110BA0	
		1.14 - 1.22	48.3	3.8	6.34	ASSYM118DA0	ASSYM118BA0	
		1.23 - 1.31	50.0	4.1	7.9	ASSYM127DA0	ASSYM127BA0	
		1.32 - 1.36	50.0	4.1	7.9	ASSYM134DA0	ASSYM134BA0	
		1.37 - 1.44	50.0	4.1	7.9	ASSYM140DA0	ASSYM140BA0	
		1.45 - 1.55	52.3	4.8	9.7	ASSYM150DA0	ASSYM150BA0	
		1.56 - 1.65	53.3	4.8	10.4	ASSYM160DA0	ASSYM160BA0	
		1.66 - 1.74	54.1	4.8	11.2	ASSYM170DA0	ASSYM170BA0	
		1.75 - 1.82	56.1	5.3	12.7	ASSYM178DA0	ASSYM178BA0	
		1.83 - 1.89	56.1	5.3	12.7	ASSYM186DA0	ASSYM186BA0	
		1.90 - 1.97	56.1	5.3	12.7	ASSYM193DA0	ASSYM193BA0	
		1.98 - 2.00	56.9	6.1	12.7	ASSYM200DA0	ASSYM200BA0	
		2.04 - 2.10	56.9	6.1	12.7	ASSYM207DA0	ASSYM207BA0	
		2.13 - 2.20	56.9	6.1	12.7	ASSYM217DA0	ASSYM217BA0	
		2.23 - 2.34	56.9	6.1	12.7	ASSYM228DA0	ASSYM228BA0	

Please note: All Micro Arbor Assies listed here must be used with the Micro-Burraway base body BWYM0635. The blades installed in the respective cutting inserts cannot be changed or ordered separately due to their small size. The rake angle is generally 0°.

E-Z-BURR®
UNIVERSAL DEBURRING TOOL

Forward and backward deburring of bores in only one operation with adjustable cutting circle diameter

COMPONENT PARTS AVAILABLE!

- ADJUSTING SCREWS
- FIXING SCREWS
- Other replacement line on request

FEATURES

- Easy handling on all machines
- No change of rotation direction required
- Patented quick-change blade system without removing the deburring tool
- Chamfer size and deburring thickness adjustable through height adjustable flex-arm blade
- Adjustment of the cutting diameter enables the use in unfavorable conditions (e.g. cross-bore exits close to the bottom of the main bore)
- Cutting edge variants in HSS or solid carbide. Standard tools of the metric program are available from Ø 2.38 mm to Ø 50.8 mm and of the inch program from Ø 0.0937 inch to Ø 2.00 inch.

TOOL VIDEO LINK

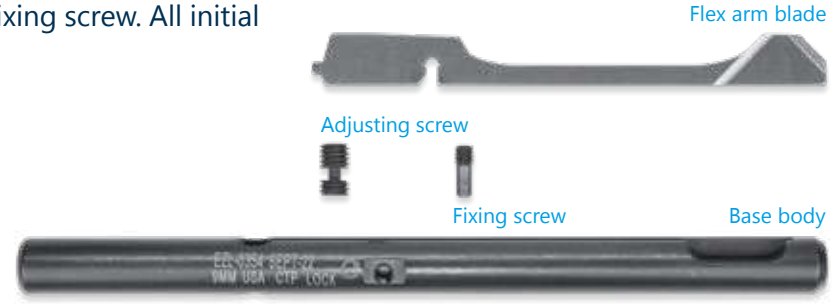
ANIMATION
Functionality of the E-Z-Burr tool

INFO

The E-Z-BURR consists of a base body, the spring-loaded flex-arm blade and the adjustment & fixing screw. All initial spare parts can be ordered separately.

Item-No. code for tool

EZ	H	0700
Tool designation	Cutting material	Diameter
	C = Carbide H = HSS	7.00 mm



WORKING PRINCIPLE

1. FRONT DEBURRING

As the rotating tool is fed into the workpiece, the extended blade cuts and deburrs the front burr as the blade is collapsing into the blade slot.

2. PASSING THROUGH HOLE

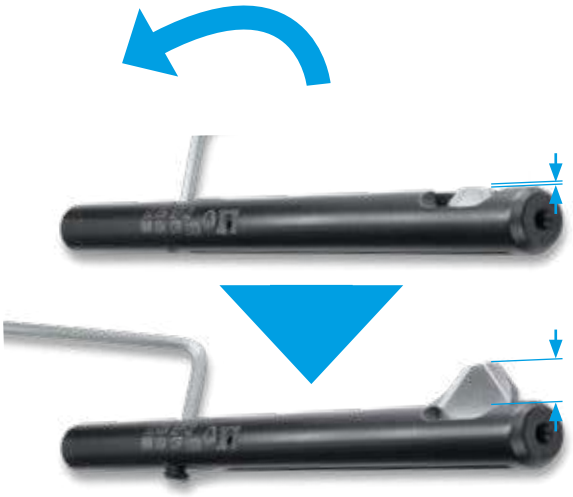
When it's completely collapsed, the tool continues through the hole. The top of the blade has a polished crown so it does not mark the bore while being fed through.

3. BACK DEBURRING

Once the tool has cleared the backside of the hole, the blade springs back out of the arbor, the feed direction is reversed and the rear burr is cut as the tool is withdrawn.

CUTTING PRESSURE ADJUSTMENT

With the E-Z Burr Tool, cutting pressure adjusts with a simple turn of the Allen screw conveniently exposed on the side of the shank. This provides a range of cutting pressure from extreme low to extreme high, depending on the nature of the burr size, the amount of material to be removed and the composition of the workpiece.



BLADE TYPES & BLADE CHANGE

There are various types of blades available. One is the B-style blade which allows front and back deburring in one operation. On the other hand, we offer R-style blades, which only deburr the back side of the workpiece. The front side of the blade is then rounded. Variants with 45° and 60° cutting edge angle (back side) are available. The blade can be exchanged very easily (see below).

Item-No. code for blades

EZ	H	L2A	-	01
Tool designation	Cutting material	Size designation	Separator	Blade variant
	C = Carbide H = HSS	L1A L1B L2A ...		01 = 0° DA 45°/45° 02 = +DA 45°/45° 03 = - DA 45°/45° ...

The tool is supplied as standard with built-in blade variant 02 (positive rake angle, front and rear, 45° chamfer angle).

- Inner cutting edge sharp
  with positive, negative or 0° rake angle;
  with 45° or 60° cutting edge angle

- Outer & inner cutting edge sharp
  with positive, negative or 0° rake angle;
  with 45° or 60° cutting edge angle

In the "Lock" position the blade is locked.

Turned counterclockwise, the blade lock is "unlocked" and the blade can be easily removed and replaced.

BURR-OFF®
UNIVERSAL DEBURRING TOOL

Front and back deburring & chamfering of holes in one operation

FEATURES

- Easy handling on all machines
- HSS cutting edge for high flexibility and high wear resistance at the same time
- No change of rotational direction required
- Cost-effective tool, re-sharpening up to 4x
- No chip accumulation due to the open slot design
- Two cutting-edge design for diameters above 5.56 mm
- Standard tools from Ø 1.57 mm to Ø 16.28 mm available from stock
- Deburring intensity adjustable by optionally available adjustment screw for larger tools

INFO

The BURR-OFF tool is one of the most efficient and economical deburring tools ever made for mass production. The simple, one-piece design is best suited for automated deburring processes with high productivity. The tool's open slot design prevents chips from contaminating the tool, making it perfectly suitable for automatic equipment and multi-spindle machines. Just like the BURRAWAY, the BURR-OFF deburrs the front and/or back of holes in one operation. BURR-OFF tools from 1.57 mm to 5.56 mm are equipped with one cutting edge. Larger tools have two cutting edges.

SPECIAL DESIGNS

In addition to the BURR-OFF tool in the standard version, we also offer specially adapted/modified versions for your application, based on a workpiece drawing.

* For some BURR-OFF variants, the tool can be optionally equipped with an adjustment screw. With this, depending on the position, the tension or strength can be adjusted.

WORKING PRINCIPLE

1. FRONT DEBURRING

Integral cutting edges remove the burr from the front of the hole as the tool enters the hole.

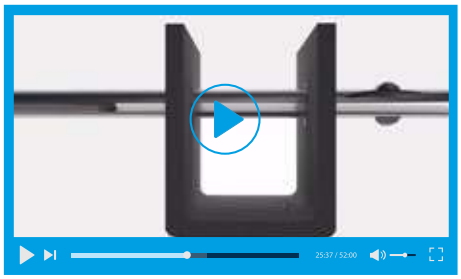
2. PASSING THROUGH HOLE

The slotted design allows the tool to “collapse” under load as the tool feeds through the workpiece. The crowned and polished top surface of the cutting edges will not damage the inside surface of the hole.

3. BACK DEBURRING

The back of the hole is deburred on the return stroke.

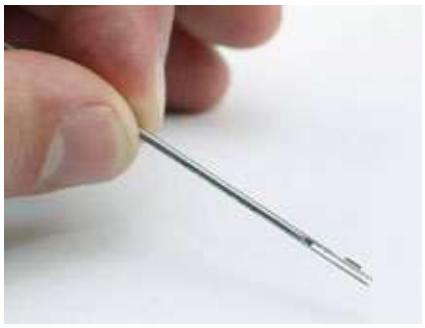
TOOL VIDEO LINK

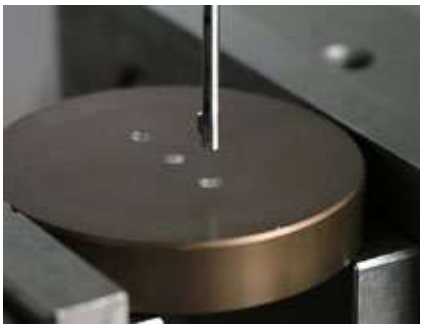


ANIMATION
Functionality of the Burr-Off tool

ANIMATION
Deburring with Burr-Off on machining center

Despite its simple design, the BURR-OFF offers many time-saving advantages. For example, this tool does not require counterclockwise rotation while exit.





APPLICATION NOTES FOR BURRAWAY & BURR-OFF DEBURRING TOOLS

Application:
The BURRAWAY & BURR-OFF tools can be used on hand drills and drilling machines, as well as on CNC machines and on all machining centers.

Maintenance:
The tools should be inspected regularly for dirt, chips & other objects. Always keep the tools clean.

Tool life of the cutting edges:
The BURRAWAY blades have a four to ten times longer tool life than conventional twist drills for the corresponding bore machining. The cutting edges of the blades can be resharpened five to ten times up to 0.25 mm. The cutting edges of the BURR-OFF can also be resharpened up to four times.

Deburring of cross holes:
When deburring a cross hole in intersection with a crossing bore, BURRAWAY- and BURR-OFF tools produce an uneven, elliptical chamfer due to the concave inner contour. BURRAWAY and BURR-OFF are not recommended with a cross hole to main bore ratio < 1:3.
For this deburring operation we recommend GMO deburring tools.

Neither the BURRAWAY nor the BURR-OFF are recommended for cross holes that do not intersect at right angles or have a ratio of 1:3 or smaller.

CUTTING DATA
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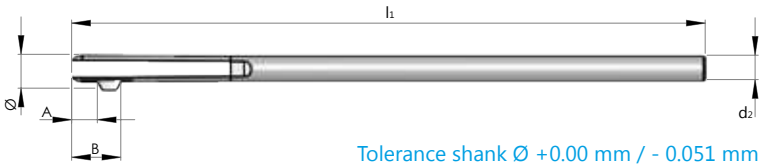
BURR-OFF®
FOR HOLE-Ø 1.57 mm TO Ø 5.56 mm

SINGLE-EDGED; Z=1

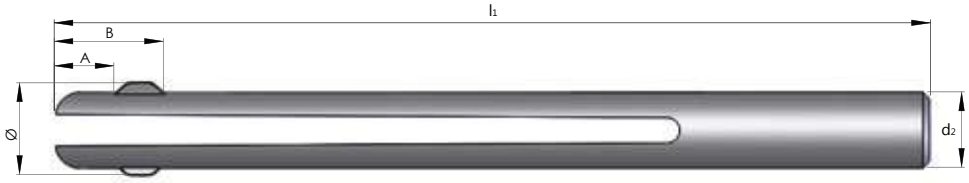


Tolerance shank Ø +0.00 mm / - 0.051 mm

Hole-Ø (mm)	Shank Ø d_2 (mm)	Total length l_1 (mm)	Dimension A (mm)	Dimension B (mm)	Item No.	EUR/Piece
1.57 - 1.98	1.55	76.2	2.11	5.56	BOFCP04	
1.98 - 2.39	1.96	76.2	2.11	5.56	BOFCP05	
2.36 - 2.77	2.34	101.6	2.36	6.35	BOFCP06	
2.77 - 3.18	2.74	101.6	2.36	6.35	BOFCP07	
3.18 - 3.56	3.14	101.6	3.3	7.62	BOFCP08	
3.56 - 3.96	3.53	101.6	3.3	7.62	BOFCP09	
3.96 - 4.37	3.93	101.6	3.3	7.62	BOFCP10	
4.37 - 4.75	4.34	10.6	3.3	7.62	BOFCP11	
4.75 - 5.16	4.72	101.6	3.3	9.39	BOFCP12	
5.16 - 5.56	5.13	101.6	3.3	9.39	BOFCP13	

BURR-OFF®
FOR HOLE-Ø 5.56 mm to Ø 25.40 mm

DOUBLE-EDGED; Z=2



Tolerance shank Ø +0.00 mm / - 0.051 mm

Hole-Ø (mm)	Shank Ø d_2 (mm)	Total length l_1 (mm)	Dimension A (mm)	Dimension B (mm)	Item No.	EUR/Piece
5.56 - 5.94	5.53	101.6	6.35	12.7	BOFCP14	
5.94 - 6.35	5.91	101.6	6.35	12.7	BOFCP15	
6.35 - 6.76	6.32	101.6	6.35	12.7	BOFCP16	
6.76 - 7.14	6.73	101.6	6.35	12.7	BOFCP17	
7.14 - 7.54	7.11	101.6	6.35	12.7	BOFCP18	
7.54 - 7.95	7.51	101.6	7.36	13.71	BOFCP19	
7.95 - 8.33	7.92	101.6	7.36	13.71	BOFCP20	
8.33 - 8.71	8.3	101.6	7.36	13.71	BOFCP21	
8.71 - 9.12	8.68	101.6	7.36	13.71	BOFCP22	
9.12 - 9.53	9.09	101.6	7.36	13.71	BOFCP23	
9.53 - 9.91	9.49	112.5	8.12	13.97	BOFCP24	
9.91 - 10.31	9.88	112.5	8.12	13.97	BOFCP25	
10.31 - 10.72	10.28	112.5	8.12	13.97	BOFCP26	
10.72 - 11.10	10.66	112.5	8.12	13.97	BOFCP27	
11.10 - 11.51	11.07	139.7	8.89	15.74	BOFCP28	
11.51 - 11.89	11.48	139.7	8.89	15.74	BOFCP29	
11.89 - 12.29	11.86	139.7	8.89	15.74	BOFCP30	
12.29 - 12.70	12.26	139.7	8.89	15.74	BOFCP31	
12.70 - 13.08	12.67	177.8	9.65	17.27	BOFCP32	
13.08 - 13.49	13.05	177.8	9.65	17.27	BOFCP33	
13.49 - 13.89	13.46	177.8	9.65	17.27	BOFCP34	
13.89 - 14.30	13.84	177.8	9.65	17.27	BOFCP35	

Other BURR-OFF tools for larger hole diameters up to 25.4 mm are available on request.

CUTTING DATA
BURR-OFF® UNIVERSAL DEBURRING TOOL

ISO	Material	Tensile strength	v_c (m/min)		f (mm/rev)			
					single-edged Z=1		double-edged Z=2	
			HSS	HSS-TiN	≤ Ø 5.56 mm	Ø 6 mm	Ø 10 mm	Ø 15 mm
	Construction-, case hardening- and tempered steel, unalloyed	< 700N/mm²	18-32	20-38	0.04	0.06	0.15	0.28
	Construction-, case hardening- and tempered steel, unalloyed	< 1,200 N/mm²	10-20	15-25	0.03	0.06	0.15	0.28
	Nitrided-, case hardening- and tempered steel, alloyed	< 900 N/mm²	10-16	15-20	0.04	0.06	0.15	0.28
	Nitrided-, case hardening- and tempered steel, alloyed	< 1,400 N/mm²	5-10	8-12	0.03	0.06	0.15	0.26
	Tool-, rolling bearing- and spring steel	< 900 N/mm²	6-12	12-18	0.03	0.06	0.15	0.28
	Tool-, rolling bearing- and spring steel	< 1,500 N/mm²	4-10	6-12	0.03	0.05	0.12	0.25
STAIN-LESS	Stainless steel		6-10	8-15	0.03	0.05	0.12	0.26
GGG	Casting		12-32	15-38	0.03	0.06	0.15	0.28
AL	Aluminum		20-50	-	0.05	0.06	0.16	0.32
CuZn	Brass, bronze		20-40	20-50	0.05	0.06	0.15	0.32
Ti	Titanium, heat resistant alloys		5-10	6-12	0.03	0.05	0.12	0.25
O	Plastics		20-50	-	0.05	0.06	0.15	0.34

NOTE: Please keep the maximum speed of the tool of n_{max} = 3,500 rpm in mind!

The cutting data recommendations are starting values for machining bore exits on flat surfaces. Lower cutting data for deburring may be required for bore exits on curved surfaces.

Cutting data recommendations apply during cutting engagement. Higher feed rates can be selected when passing through the hole.

GMO
DEBURRING TOOL

Precise and thorough deburring of flat and curved bore edges on difficult to access areas (e.g. cross holes) & chamfering of front and rear sides of bores

COMPONENT PARTS AVAILABLE!

- COMPRESSION SPRINGS
- INSERTS
- DOWEL PINS
- SCREWS

PLEASE NOTE

The blades must always be ordered separately and are not part of the GMO tool or the GMO sets.

FEATURES

- Deburring process in seconds
- Deburring of smallest holes from only Ø 0.8 mm
- Rotating tool with solid carbide blade
- Clean and reliable deburring process
- Easy handling, no special requirements necessary
- Can be used on any machine, perfect for use on CNC machines
- Deburring intensity and cutting circle can be adjusted by adjusting screws and 4 different spring loads
- Patented tooling system

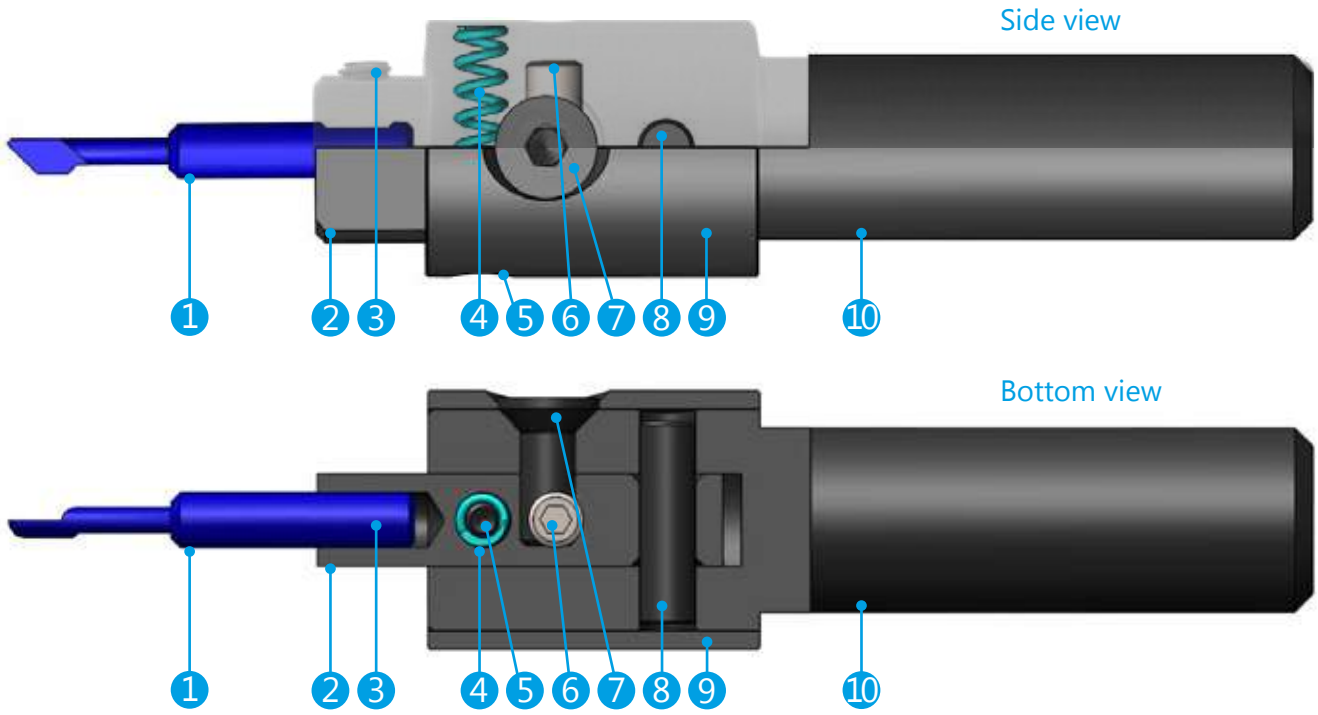
INFO

The GMO deburring tool is designed for holes from diameter 0.8 mm. By changing some of the components of the GMO tool, different workpiece diameters can be processed with only one tool.

The tool also allows two different application options (see page 106):
- On the one hand, deburring with spring force: By means of 4 different spring types (soft, medium, strong and very strong), it is possible to regulate the contact pressure of the tool on the workpiece. An adjusting screw can be used to limit the swing out dimension of the blade and setup the tool exactly for the diameter that needs to be deburred.
- On the other hand, machining with a fixed setting is also possible: In this case, the spring is removed and replaced by a rigid M3 screw, so that defined chamfers can be manufactured or larger burrs can be removed. This is useful for threaded bores, for example.

There are various designs of blades available for the tool. These allow not only to deburr the rear side of a hole, but also the front side of a hole and even deburring of strongly curved workpiece surfaces.

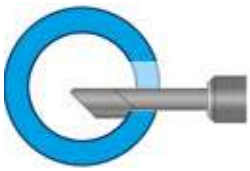
TOOL CONSTRUCTION



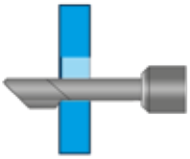
1. Solid carbide blade
2. Insert (e.g. type E00); interchangeable in each case to suit the hole diameter
3. Locking screw for blade
4. Compression spring
5. Adjustment screw for setting the spring load
6. Adjustment screw for setting the swing-out dimension depending on the hole diameter
7. Screw for body housing
8. Dowel pin
9. Sleeve
10. Shank

WORKING PRINCIPLE

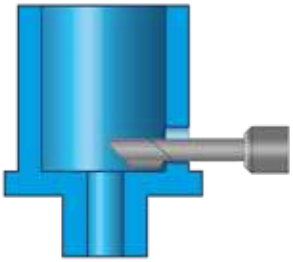
Deburring of bores with curved bore edges, e.g. cross holes



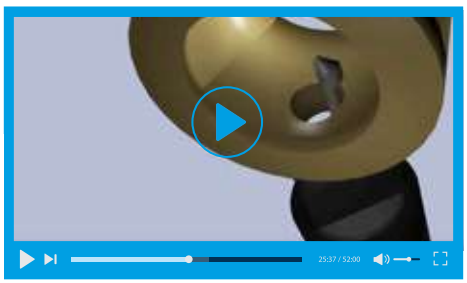
Deburring of holes with flat bore edges



Deburring of holes on difficult to access areas



TOOL VIDEO LINK



ANIMATION
Mode of operation of the GMO tool

In order to support you in tool selection and to simplify the programming of the tool for your application, it is possible to enter the corresponding machining values via the online programming assistance to receive a simulated work sequence there. The values then displayed can simply be adopted for machine programming. INFO ON PAGE 113.

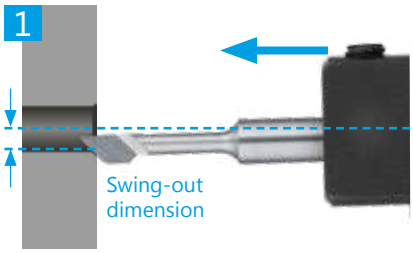
www.kempf-tools.com/gmo/en/

POSSIBLE APPLICATIONS

• DEBURRING WITH SPRING FORCE

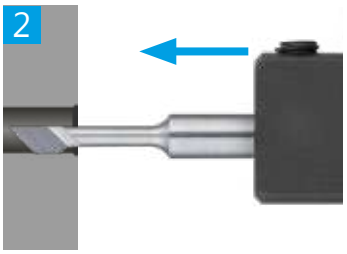
There are several compression springs with different compression forces available. The spring is selected depending on deburring intensity or workpiece material properties. E.g. for aluminum a soft spring, for stainless steel a strong pressure spring. In addition, the pressure force can be set by an adjusting screw. The spring force determines the chamfer size or deburring intensity.

APPROACHING THE HOLE



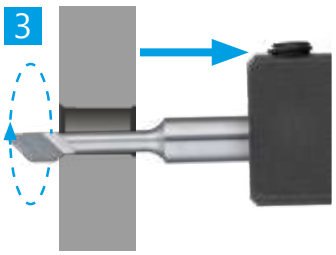
Position the center axis of the tool on the center of the hole. Set the swing-out dimension so that the center of the cutting edge meets the edge of the bore. The tool is pressed towards the axis against the spring force.

PASSING THROUGH HOLE



Drive into the bore with rotating tool and large feed rate (approx. f=500 mm/min). The front edge of the blade is rounded to allow an easy drive-through and to prevent damage to the outer chamfer.

BACK DEBURRING



Only drive in until the tool swings outwards and the offset neck of the blade is in contact with the bore. Then move backwards at a low feed rate, depending on the desired deburring intensity (about f=100 mm/min). This removes the burr as the cutting edge is pressed against the edge by the spring force. After contact with the workpiece, move out of the bore at increased feed rate.

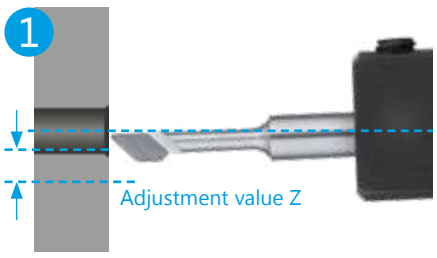
NOTE ABOUT ADJUSTMENT SCREW FOR SETTING THE SWING-OUT DIMENSION

The adjustment screw (6) is secured against rotation with threadlocking varnish. If the adjustment screw is too loose so that it can become misaligned during use, it should be replaced with a spare screw. Each tool is supplied with an additional M3x3 and M3x10 adjustment screw with threadlocking varnish and M3x4 and M3x5 locking screws as replacements.

• DEBURRING WITH FIXED SETTING

The spring is removed and replaced with the included M3x10 screw. The swing-out dimension is now precisely set and fixed with two screws. A tool simulation and the free programming assistance enable optimal machine programming (www.kempf-tools.com/gmo/en).

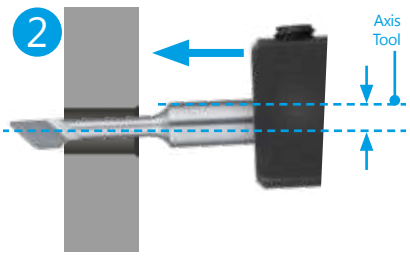
ADJUST CUTTING EDGE



Position the center axis of the tool on the center of the hole. Adjust the swing-out dimension so that the center of the cutting edge meets the edge of the bore.

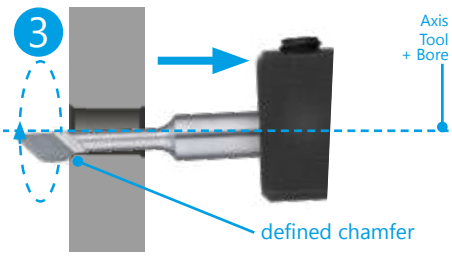
The spindle or the workpiece must be adjusted in Z-direction so that the blade can drive through the hole without contact.

PASSING THROUGH HOLE



After adjusting the blade, move through the hole in rapid traverse and without rotation.

BACK CHAMFERING



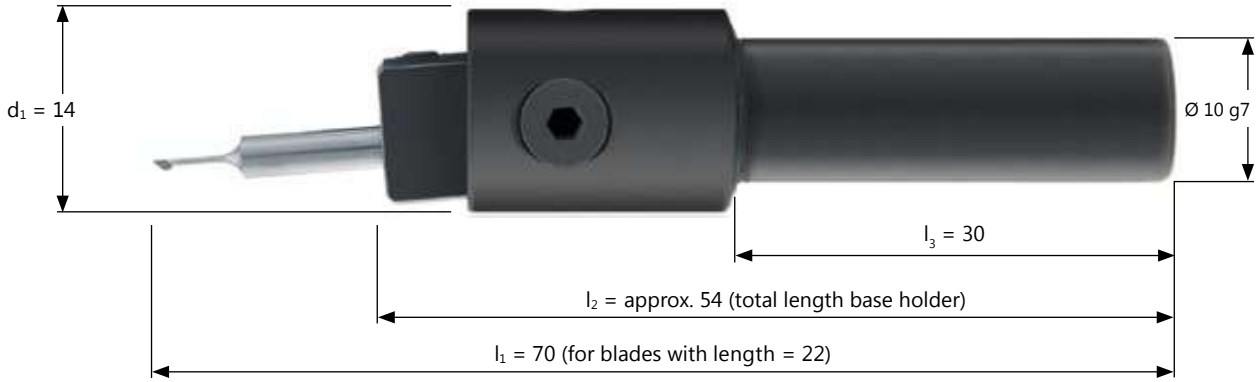
Then the spindle or workpiece is set back by the adjustment value Z. Now, switch on rotation and slowly retract until the desired chamfer size is reached.

Rotation is now switched off. The spindle or the workpiece is moved again by the adjustment value so that the tool can be moved out of the hole at rapid traverse.

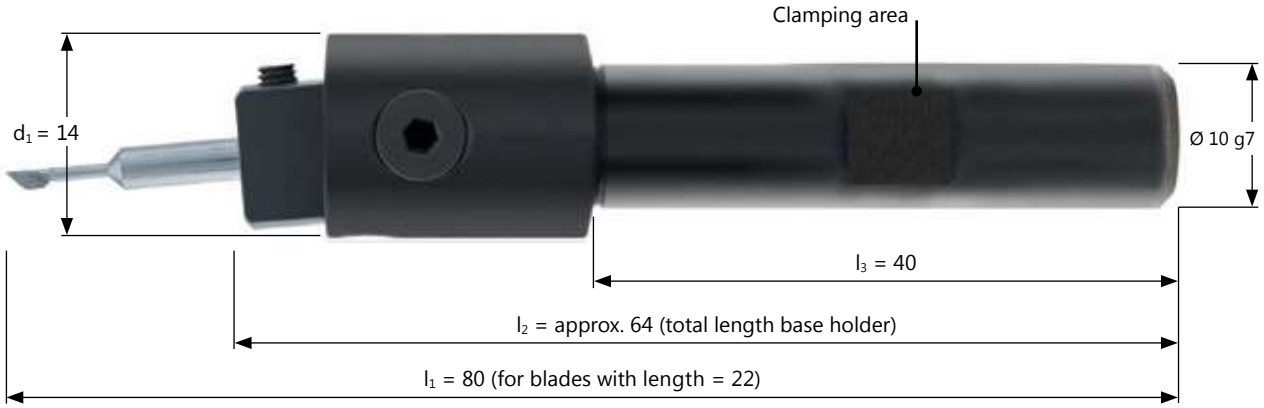
GMO BASE HOLDER

3 different GMO base holders are available. All three base holders can be paired with all blades. We recommend using the BASE HOLDER XL for machining operations that require more cutting pressure. Due to the more solid design, this version is more rigid and stronger springs can be used. For machining operations with hole diameters from 10.0 mm, the BASE HOLDER XL must be used. Pay attention to the separate inserts here.

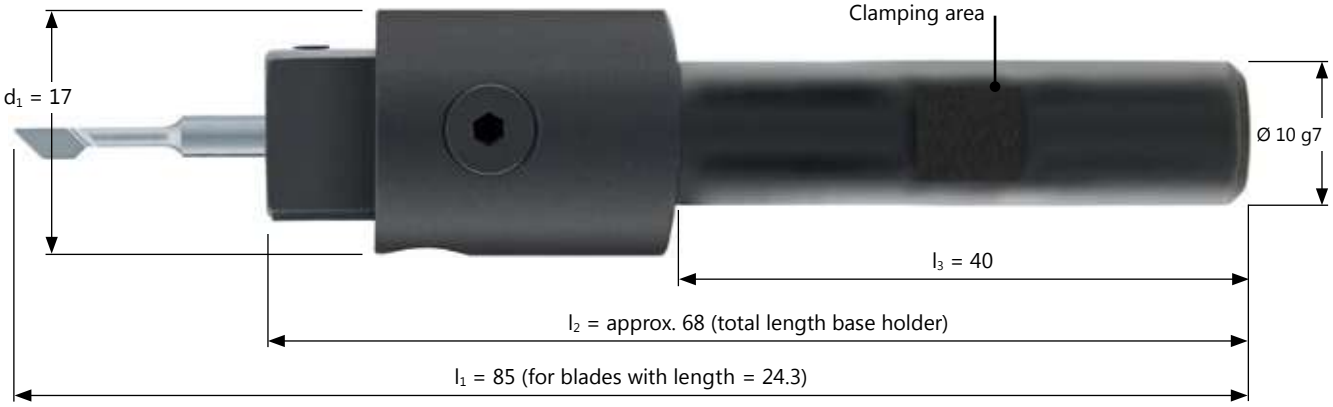
1 BASE HOLDER STANDARD



2 BASE HOLDER V (WITH CLAMPING AREA)



3 BASE HOLDER XL (WITH CLAMPING AREA)



B
8.1

GMO SETS

GMO SET 1 - BASE HOLDER WITH LARGE ACCESSORY SET (without blade)

Designation	Content	Type / size	Item No.	EUR/Set
GMO SET 1 Standard base holder	1x GMO base holder	l_1 = 70 mm*, l_2 = 54 mm, l_3 = 30 mm, d_1 = 14 mm	GMOSET1	
	6x inserts	E00, E05, E10, E15, E20, E25		
	4x springs	soft, medium, strong, very strong		
	2x Allen keys	-		
GMO-SET 1V Base holder V with clamping area	1x GMO base holder V	l_1 = 80 mm*, l_2 = 64 mm, l_3 = 40 mm, d_1 = 14 mm	GMOSET1V	
	6x inserts	E00, E05, E10, E15, E20, E25		
	4x springs	soft, medium, strong, very strong		
	2x Allen keys	-		
GMO-SET 1XL Base holder XL with clamping area	1x GMO base holder XL	l_1 = 85 mm**, l_2 = 68 mm, l_3 = 40 mm, d_1 = 17 mm	GMOSET1XL	
	8x inserts	EX00, EX05, EX10, EX15, EX20, EX25, EX30, EX35		
	4x springs	soft, medium, strong, very strong		
	3x Allen keys	-		

GMO-SET 2 - BASE HOLDER WITH SMALL ACCESSORY SET (without blade)

Designation	Content	Type / size	with insert	Item No.	EUR/Set
GMO SET 2 Standard base holder	1x GMO base holder	l_1 = 70 mm*, l_2 = 54 mm, l_3 = 30 mm, d_1 = 14 mm	E 00	GMOSET2E00	
			E 05	GMOSET2E05	
			E 10	GMOSET2E10	
	4x springs	soft, medium, strong, very strong	E 15	GMOSET2E15	
			E 20	GMOSET2E20	
	2x Allen keys	-	E 25	GMOSET2E25	
GMO-SET 2V Base holder V with clamping area	1x GMO base holder V	l_1 = 80 mm*, l_2 = 64 mm, l_3 = 40 mm, d_1 = 14 mm	E 00	GMOSET2VE00	
			E 05	GMOSET2VE05	
			E 10	GMOSET2VE10	
	4x springs	soft, medium, strong, very strong	E 15	GMOSET2VE15	
			E 20	GMOSET2VE20	
	2x Allen keys	-	E 25	GMOSET2VE25	
GMO-SET 2XL Base holder XL with clamping area	1x GMO base holder XL	l_1 = 85 mm**, l_2 = 68 mm, l_3 = 40 mm, d_1 = 17 mm	EX 00	GMOSET2XLE00	
			EX 05	GMOSET2XLE05	
			EX 10	GMOSET2XLE10	
	4x springs	soft, medium, strong, very strong	EX 15	GMOSET2XLE15	
			EX 20	GMOSET2XLE20	
	3x Allen keys	-	EX 25	GMOSET2XLE25	
			EX 30	GMOSET2XLE30	
			EX 35	GMOSET2XLE35	

PLEASE NOTE: Order solid carbide blades (see page 111) separately. These are not included in the scope of delivery.
*for cutting edge length 22 mm; **for cutting edge length 24.3 mm

SPARE PARTS & ACCESSORIES

• COMPRESSION SPRINGS

FOR BASE HOLDER STANDARD AND BASE HOLDER V

Spring type	Item No.	EUR/Piece
Soft	GMOF40	
Medium spring force	GMOF50	
Strong spring force	GMOF55	
Very strong spring force	GMOF63	

FOR BASE HOLDER XL

Spring type	Item No.	EUR/Piece
Soft	GMOFXL63	
Medium spring force	GMOFXL80	
Strong spring force	GMOFXL90	
Very strong spring force	GMOFXL100	

• INSERTS

FOR BASE HOLDER STANDARD AND BASE HOLDER V

For hole diameter (mm)	Item No.	EUR/piece
0.80 - 1.00	GMOE00	
1.00 - 1.20		
1.20 - 1.50		
1.50 - 2.00		
2.00 - 2.50		
2.50 - 3.50	GMOE05	
3.50 - 4.50	GMOE10	
4.50 - 5.50	GMOE15	
5.50 - 6.50	GMOE20	
6.50 - 10.00	GMOE25	

FOR BASE HOLDER XL

For hole diameter (mm)	Item No.	EUR/Piece
2.0 - 2.5	GMOEX00	
2.5 - 4.0	GMOEX05	
4.0 - 5.0	GMOEX05	
3.5 - 6.0	GMOEX10	
4.5 - 7.0	GMOEX15	
5.5 - 8.0	GMOEX20	
8.0 - 11.0	GMOEX25	
11.0 - 14.0	GMOEX30	
14.0 - 18.0	GMOEX35	

• DOWEL PIN

FOR ALL BASE HOLDERS

Dowel pin	Designation	Item No.	EUR/Piece
Dowel pin	as axis for insert	GMOPASS	

• SCREWS

FOR ALL BASE HOLDERS

Screws	Designation	Item No.	EUR/Piece
M3x3	Adjustment screw for spring force with locking varnish	GMOM3X3	
M3x4	Locking screw for insert E00	GMOM3X4	
M3x5	Locking screw from insert E05	GMOM3X5	
M3x10	Adjustment screw for swing-out dimension with locking varnish	GMOM3X10	
Countersunk screw M3x4	Housing screw for sleeve	GMOM3X4S	
M3x10	Fixing screw for defined chamfering	GMOM3X10FIX	

B
8.3

GMO SOLID CARBIDE BLADES FOR HOLES FROM Ø 0.8 mm TO Ø 18.0 mm

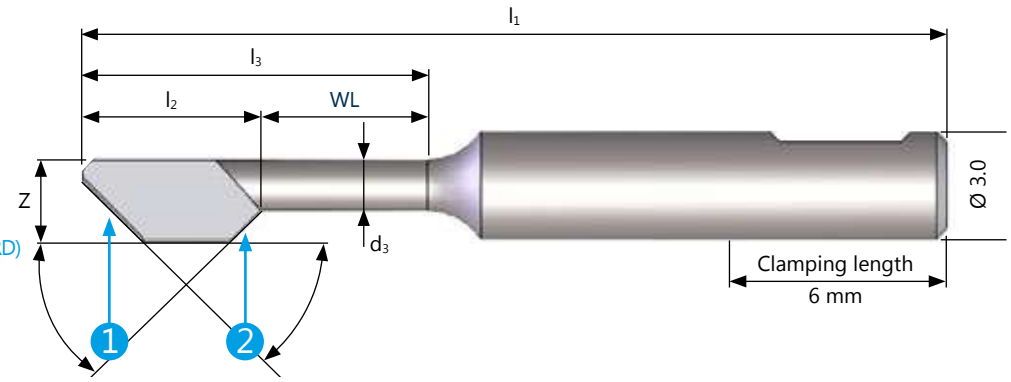
Simple and fast blade change - different sizes and geometries available

1

OUTER CUTTING EDGE 45°
- cutting (for front and back deburring) or
- rounded (only front deburring)

2

INNER CUTTING EDGE 45° (STANDARD)
For special applications also available with 25° angle



BLADE TYPES & ORDER EXAMPLES

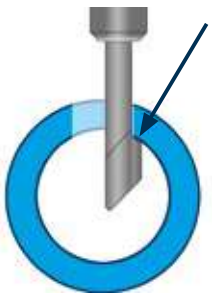
GMO solid carbide blades are available in different variants.

1. STANDARD Inner cutting edge 45°	2. FORM B Inner & outer cutting edge 45°	3. FORM 25 Inner cutting edge 25°
Only for back deburring. The outer cutting edge is rounded here.	Front and back deburring is possible.	Suitable for cross holes in strongly curved workpiece areas.
ORDER EXAMPLE: GMO S23A6	ORDER EXAMPLE: GMO S23 B A6	ORDER EXAMPLE: GMO S23 25 A6

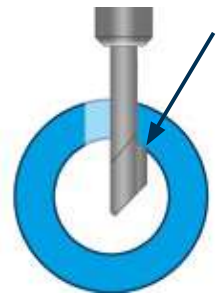
4. FORM B25 Inner cutting edge 25°, outer cutting edge 45°	5. POSITIVE Inner cutting edge 45°	6. FORM 25 POSITIVE Inner cutting edge 25°
For strongly curved workpiece surfaces as well as for front deburring.	Only for back deburring. 7° positive chip angle for soft cutting.	For strongly curved contours. 7° positive chip angle for soft cutting.
ORDER EXAMPLE: GMO S23 B 25 A6	ORDER EXAMPLE: GMO P23 A6	ORDER EXAMPLE: GMO P23 25 A6

NOTE: In addition, we also offer modified blades with extended working depth by increasing the l_3 dimensions (special production).

CUTTING EDGE ANGLE 45°
Ratio of cross hole to main hole is ok.



CUTTING EDGE ANGLE 45°
Ratio of cross hole to main hole is too small.



CUTTING EDGE ANGLE 25°
Ratio of cross hole to main hole with 25° angle is ok.

The free tool simulation and programming assistance (www.kempf-tools.com/gmo/en/) helps selecting the optimum blade.
INFO ON PAGE 113.

Hole-Ø (mm)	Depth of hole (mm)	Insert E for base holder Standard & V	Insert EX for base holder XL	Blades							
		Item No.	Item No.	WL (mm)	l_1 (mm)	l_2 (mm)	l_3 (mm)	d_3 (mm)	Z (mm)	Item No.	EUR/ Piece
0.80 to 1.00	2.0	GMOE00		2	22.0	1.40	3.40	0.5	0.75	GMOS08...A2	
	3.0	GMOE00		3	22.0	1.40	4.40	0.5	0.75	GMOS08...A3	
1.00 to 1.20	3.0	GMOE00		3	22.0	2.00	5.00	0.65	0.95	GMOS10...A3	
	4.0	GMOE00		4	22.0	2.00	6.00	0.65	0.95	GMOS10...A4	
1.20 to 1.50	3.0	GMOE00		3	22.0	2.65	5.65	0.70	1.10	GMOS12...A3	
	4.0	GMOE00		4	22.0	2.65	6.65	0.70	1.10	GMOS12...A4	
	5.0	GMOE00		5	22.0	2.65	7.65	0.70	1.10	GMOS12...A5	
1.50 to 2.00	4.0	GMOE00		4	22.0	3.10	7.10	1.00	1.40	GMOS15...A4	
	5.0	GMOE00		5	22.0	3.10	8.10	1.00	1.40	GMOS15...A5	
	6.0	GMOE00		6	22.0	3.10	9.10	1.00	1.40	GMOS15...A6	
	7.0	GMOE00		7	22.0	3.10	10.10	1.00	1.40	GMOS15...A7	
2.00 to 2.50	5.0	GMOE00	GMOEX00	5	22.0	3.80	8.80	1.40	1.90	GMOS20...A5	
	6.0	GMOE00	GMOEX00	6	22.0	3.80	9.80	1.40	1.90	GMOS20...A6	
	7.0	GMOE00	GMOEX00	7	22.0	3.80	10.80	1.40	1.90	GMOS20...A7	
	8.0	GMOE00	GMOEX00	8	23.0	3.80	11.80	1.40	1.90	GMOS20...A8	
	10.0	GMOE00	GMOEX00	10	24.0	3.80	13.80	1.40	1.90	GMOS20...A10	
	12.0	GMOE00	GMOEX00	12	25.0	3.80	15.80	1.40	1.90	GMOS20...A12	
2.50 to 3.50	5.0	GMOE05	GMOEX05	5	24.3	5.00	10.00	1.40	2.20	GMOS23...A5	
	6.0	GMOE05	GMOEX05	6	24.3	5.00	11.00	1.40	2.20	GMOS23...A6	
	7.0	GMOE05	GMOEX05	7	24.3	5.00	12.00	1.40	2.20	GMOS23...A7	
	8.0	GMOE05	GMOEX05	8	24.3	5.00	13.00	1.40	2.20	GMOS23...A8	
	10.0	GMOE05	GMOEX05	10	25.0	5.00	15.00	1.40	2.20	GMOS23...A10	
	12.0	GMOE05	GMOEX05	12	26.0	5.00	17.00	1.40	2.20	GMOS23...A12	
3.00 to 3.50	6.0	GMOE05	GMOEX05	6	24.3	5.50	11.00	1.80	2.90	GMOS30...A6	
	10.0	GMOE05	GMOEX05	10	25.0	5.50	15.00	1.80	2.90	GMOS30...A10	
	14.0	GMOE05	GMOEX05	14	28.0	5.50	19.00	1.80	2.90	GMOS30...A14	
3.50 to 4.50	5.0	GMOE10	GMOEX10	5	24.3	5.00	10.00	1.40	2.20	GMOS23...A5	
	6.0	GMOE10	GMOEX10	6	24.3	5.00	11.00	1.40	2.20	GMOS23...A6	
	7.0	GMOE10	GMOEX10	7	24.3	5.00	12.00	1.40	2.20	GMOS23...A7	
	8.0	GMOE10	GMOEX10	8	24.3	5.00	13.00	1.40	2.20	GMOS23...A8	
	10.0	GMOE10	GMOEX10	10	25.0	5.00	15.00	1.40	2.20	GMOS23...A10	
	12.0	GMOE10	GMOEX10	12	26.0	5.00	17.00	1.40	2.20	GMOS23...A12	
3.50 to 4.50	6.0	GMOE10	GMOEX10	6	24.3	5.50	11.00	1.80	2.90	GMOS30...A6	
	10.0	GMOE10	GMOEX10	10	25.0	5.50	15.00	1.80	2.90	GMOS30...A10	
	14.0	GMOE10	GMOEX10	14	28.0	5.50	19.00	1.80	2.90	GMOS30...A14	
4.00 to 5.00	17.0		GMOEX05	17	29.0	5.90	22.90	3.00	3.90	GMOS40...A17	
	25.0		GMOEX05	25	37.0	5.90	30.90	3.00	3.90	GMOS40...A25	
4.50 to 5.50	5.0	GMOE15	GMOEX15	5	24.3	5.00	10.00	1.40	2.20	GMOS23...A5	
	6.0	GMOE15	GMOEX15	6	24.3	5.00	11.00	1.40	2.20	GMOS23...A6	
	7.0	GMOE15	GMOEX15	7	24.3	5.00	12.00	1.40	2.20	GMOS23...A7	
	8.0	GMOE15	GMOEX15	8	24.3	5.00	13.00	1.40	2.20	GMOS23...A8	
	10.0	GMOE15	GMOEX15	10	25.0	5.00	15.00	1.40	2.20	GMOS23...A10	
	12.0	GMOE15	GMOEX15	12	26.0	5.00	17.00	1.40	2.20	GMOS23...A12	
4.50 to 5.50	6.0	GMOE15	GMOEX15	6	24.3	5.50	11.00	1.80	2.90	GMOS30...A6	
	10.0	GMOE15	GMOEX15	10	25.0	5.50	15.00	1.80	2.90	GMOS30...A10	
	14.0	GMOE15	GMOEX15	14	28.0	5.50	19.00	1.80	2.90	GMOS30...A14	
5.00 to 6.00	17.0		GMOEX10	17	29.0	5.90	22.90	3.00	3.90	GMOS40...A17	
	25.0		GMOEX10	25	37.0	5.90	30.90	3.00	3.90	GMOS40...A25	
5.50 to 6.50	5.0	GMOE20	GMOEX20	5	24.3	5.00	10.00	1.40	2.20	GMOS23...A5	
	6.0	GMOE20	GMOEX20	6	24.3	5.00	11.00	1.40	2.20	GMOS23...A6	
	7.0	GMOE20	GMOEX20	7	24.3	5.00	12.00	1.40	2.20	GMOS23...A7	
	8.0	GMOE20	GMOEX20	8	24.3	5.00	13.00	1.40	2.20	GMOS23...A8	
	10.0	GMOE20	GMOEX20	10	25.0	5.00	15.00	1.40	2.20	GMOS23...A10	
	12.0	GMOE20	GMOEX20	12	26.0	5.00	17.00	1.40	2.20	GMOS23...A12	
5.50 to 6.50	6.0	GMOE20	GMOEX20	6	24.3	5.50	11.00	1.80	2.90	GMOS30...A6	
	10.0	GMOE20	GMOEX20	10	25.0	5.50	15.00	1.80	2.90	GMOS30...A10	
	14.0	GMOE20	GMOEX20	14	28.0	5.50	19.00	1.80	2.90	GMOS30...A14	
6.00 to 7.00	17.0		GMOEX15	17	29.0	5.90	22.90	3.00	3.90	GMOS40...A17	
	25.0		GMOEX15	25	37.0	5.90	30.90	3.00	3.90	GMOS40...A25	
6.50 to 7.50	5.0	GMOE25	GMOEX25	5	24.3	5.00	10.00	1.40	2.20	GMOS23...A5	
	6.0	GMOE25	GMOEX25	6	24.3	5.00	11.00	1.40	2.20	GMOS23...A6	
	7.0	GMOE25	GMOEX25	7	24.3	5.00	12.00	1.40	2.20	GMOS23...A7	
	8.0	GMOE25	GMOEX25	8	24.3	5.00	13.00	1.40	2.20	GMOS23...A8	
	10.0	GMOE25	GMOEX25	10	25.0	5.00	15.00	1.40	2.20	GMOS23...A10	
	12.0	GMOE25	GMOEX25	12	26.0	5.00	17.00	1.40	2.20	GMOS23...A12	
6.50 to 7.50	6.0	GMOE25	GMOEX25	6	24.3	5.50	11.00	1.80	2.90	GMOS30...A6	
	10.0	GMOE25	GMOEX25	10	25.0	5.50	15.00	1.80	2.90	GMOS30...A10	
	14.0	GMOE25	GMOEX25	14	28.0	5.50	19.00	1.80	2.90	GMOS30...A14	
7.00 to 8.00	17.0		GMOEX20	17	29.0	5.90	22.90	3.00	3.90	GMOS40...A17	
	25.0		GMOEX20	25	37.0	5.90	30.90	3.00	3.90	GMOS40...A25	
8.00 to 11.00	17.0		GMOEX25	17	29.0	5.90	22.90	3.00	3.90	GMOS40...A17	
	25.0		GMOEX25	25	37.0	5.90	30.90	3.00	3.90	GMOS40...A25	
11.00 to 14.00	17.0		GMOEX30	17	29.0	5.90	22.90	3.00	3.90	GMOS40...A17	
	25.0		GMOEX30	25	37.0	5.90	30.90	3.00	3.90	GMOS40...A25	
14.00 to 18.00	17.0		GMOEX35	17	29.0	5.90	22.90	3.00	3.90	GMOS40...A17	
	25.0		GMOEX35	25	37.0	5.90	30.90	3.00	3.90	GMOS40...A25	

All blades listed above are available in various different blade types (see left side).

NOTES

Problem	Possible cause	Solution
Chamfer too large	Spring pressure too high	Reduce spring pressure
	Cutting circle too large	Reduce cutting circle
Chamfer uneven	Cutting circle too large	Reduce cutting circle
	Rotation speed too high	Reduce rotation speed
	unfavorable bore ratio	Use 25° cutting edge
Deburring insufficient	Spring pressure too low	Increase spring pressure
	Cutting circle too small	Increase cutting circle
	unfavorable bore ratio	Use 25° cutting edge
Secondary burr	Spring pressure too high	Reduce spring pressure
	Feed rate too high	Reduce feed rate
Chattered edge	Spring pressure too low	Increase spring pressure
	Feed rate too low	Increase feed rate
	Rotational speed too high	Reduce rotation speed

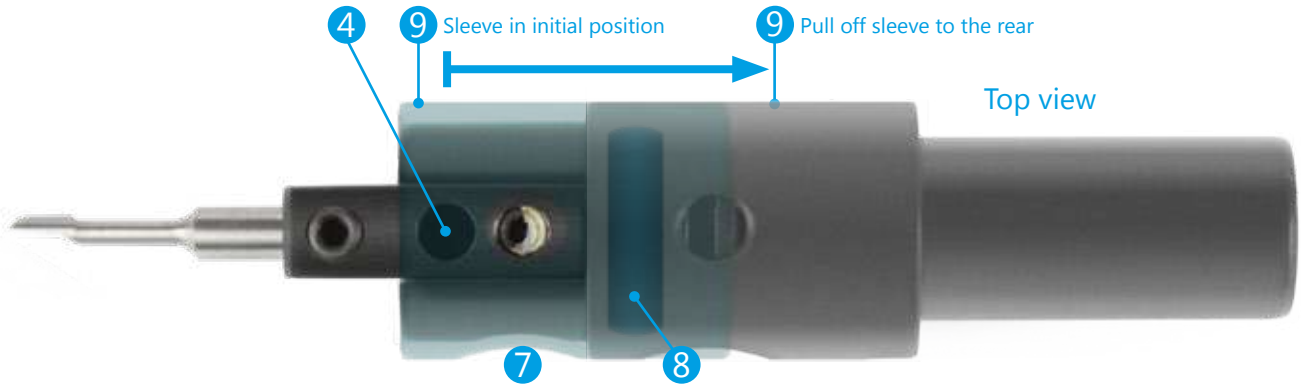
ASSEMBLY

REPLACING THE COMPRESSION SPRING

1. Loosen countersunk screw (7) and push sleeve (9) back (Caution: use finger to hold back pressure spring (4)).
2. Push the sleeve to the rear until the spring is free.
3. Replace the spring and push sleeve back to initial position and fix it with countersunk screw (7).

INSERT CHANGE

1. Loosen countersunk screw (7) and pull off sleeve (9) completely (Caution: hold back pressure spring (4) with finger).
2. Carefully drive out the dowel pin (8).
3. When inserting the new insert, lightly grease the bearing point.
4. Push the dowel pin back into the bore and mount the sleeve.



CUTTING DATA (RECOMMENDATIONS)

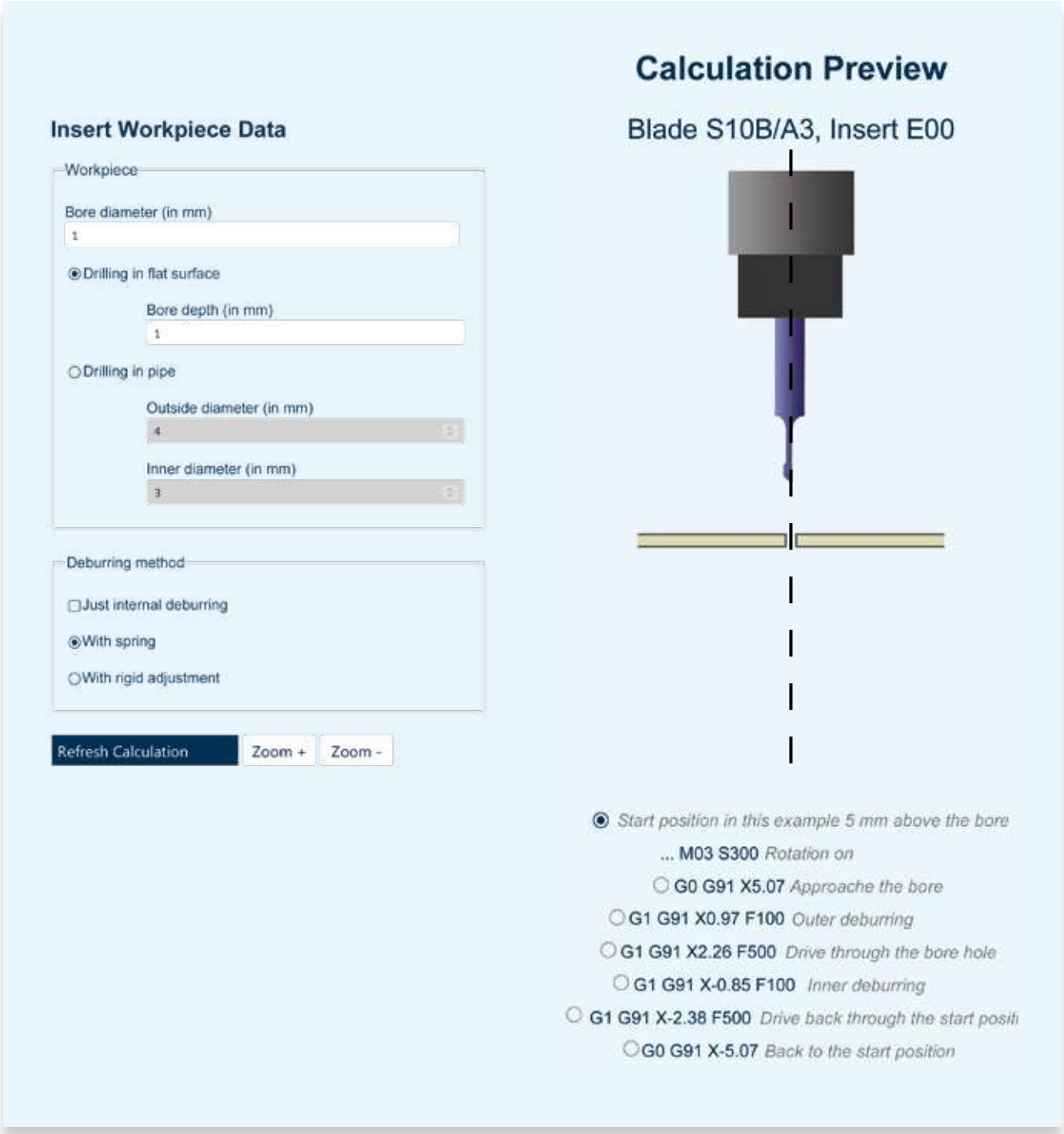
Materials	Feed (mm/min)	Speed (rpm)
Nonferrous metals	150 to 200	Plain surface: 300 to 500 Curved surface: 200 to 300
Unalloyed steels	100 till 150	
High alloy steels	50 to 100	

NOTE
These are only reference values for initial tests. The actual values must be determined in the test.
Application example: 1,200 rpm, feed rate 60 mm/min, spring pressure "extra strong F63" on strongly curved surface on high-alloy steel.

SPRING SELECTION

Materials	for Base holder V	for Base holder XL
Aluminum, brass,... (soft)	F40	FXL63
Steel (normal)	F50	FXL80
Stainless steel	F55	FXL90
highly quenched and tempered steels (hard)	F63	FXL100

GMO DEBURRING TOOL
ONLINE SIMULATION & PROGRAMMING ASSISTANCE



On our site with link www.kempf-tools.com/gmo/en/ we have set up a programming assistance which allows to check the appliability of the GMO Deburring Tool for a specific application by entering application data. The appropriate cutting edge and insert are displayed. In addition, the required G-code program steps are output at the same time and a movement simulation of the tool is created.

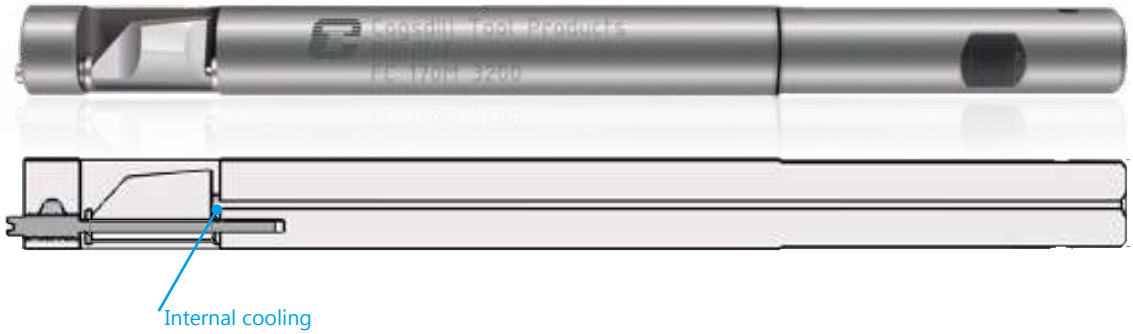
FLIPCUT™ BACK SPOTFACING & CHAMFERING TOOL

For back-spotfacing and back- or front-chamfering operations - from one side, in one set-up

PLEASE NOTE

Blades must be ordered separately and are not part of the tool.

Spare parts such as screws, spacers and pads are also available.



FEATURES

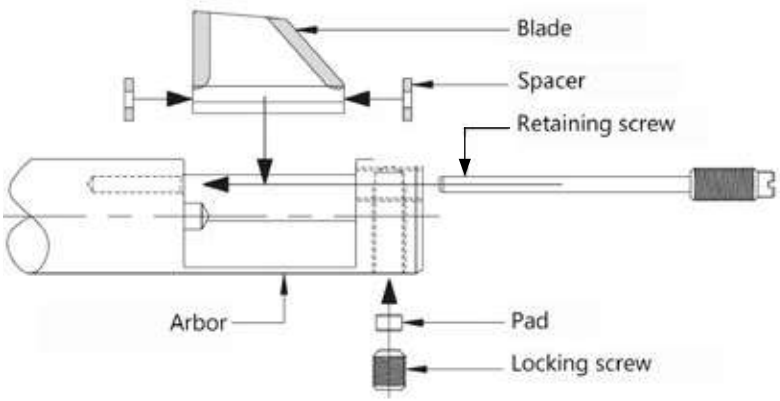
- Right-hand rotation opens blade; left-hand rotation closes it
- Brazed carbide blade construction. Blade is rigidly supported for enhanced accuracy and loong tool life
- Internal coolant supply (from Ø 7.92 mm) ensures chip removal and guarantees optimum flipping in or out of the carbide blade
- Standard tools are available from Ø 7.0 mm to Ø 34.0 mm
- Standard blades are available for back-spotfacing and forward chamfering, as well as for backward and forward chamfering

Other versions on request.

INFO

FLIPCUT is made of only five individual parts, which allow easy handling. The blades are a brazed carbide design and thus prevent thermal expansion, so that the flipping of the blades is always guaranteed. In case of wear, the blade can be replaced quickly and easily.

FLIPCUT's blade can be replaced in just a few steps using a standard screwdriver. Please refer to the instructions for use on page 115.



WORKING PRINCIPLE

1. FRONT CHAMFERING

The front chamfer is machined upon entry into the hole, using right hand rotation (clockwise) of the machine spindle at the appropriate speed and feed.

2. PASSING THROUGH HOLE

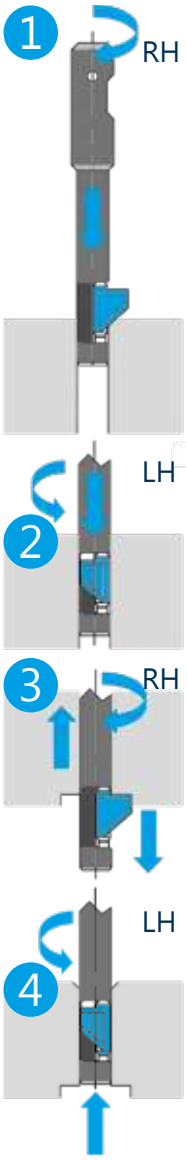
Left hand rotation (counterclockwise) at a maximum of 0.20 mm/rev will effect mechanical closure of the cutter (aided by centrifugal force) so that the tool can feed through the bore.

3. BACK SPOTFACING

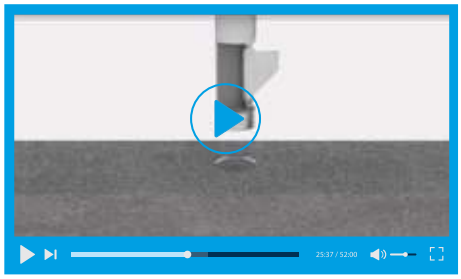
The back spotface is machined, using right hand rotation (clockwise) at the appropriate speed and feed.

4. RETRACING TO INITIAL POSITION

Left hand rotation (counterclockwise) at a maximum of 0.20 mm/rev will close the cutter so that the tool can be retracted from the bore.



TOOL VIDEO LINK



ANIMATION
Operation of the Flipcut tool

ANIMATION
Mode of operation in a machining center

APPLICATION NOTES FOR FLIPCUT BACK SPOTFACING & CHAMFERING TOOL

Application:

- Always ensure that the cutter rotates freely in the arbor and that no end float can be detected. This can be accomplished by adjusting the retaining screw until the cutter binds, then backing off approximately 5° Using the locking screw, lock the retaining screw at this position.
- Ensure that the spindle speed is sufficient to allow the cutter to open.
- After the cut has been completed, and the tool withdrawn from the hole, make sure that enough coolant is supplied to the end of the tool to flush away any remaining chips that might prevent the tool from opening and closing freely in subsequent operations.
- NEVER run the tool without coolant.
- The tool cannot be used in a lathe with a static turret, since it must be rotated in order for the cutter to extend and retract. The tool may only be used in a live spindle in lathe applications.
- After completing the cut, always feed the tool off the part before stopping the spindle and reversing for withdrawal.

NOTE: In some cases, the cutting edge may not fully close into the arbor when turning the spindle. The cutting edge will fully retract when the tool is fully retracted through the hole. The retraction feed rate should be the same as the machining feed rate until the cutting edge is fully retracted. A faster feed rate can then be used.

NOTE: Coolant flow should be stopped when the blade is retracted to ensure blade closure.

Hole-Ø (mm)	Spindle speed (rpm)	Feed rate chamfering* (mm/rev)	Feed rate spotfacing* (mm/rev)
8.0	600	0.1	0.03
17.5	550		
21.0	350		
25.5	275		
34.0	250		

In case of horizontal application, the tool should be used at twice the recommended speed.

*The specified feed rate value is the maximum value for engagement.
While passing through the bore without engagement, especially during retraction, use the reverse spindle rotation and max. 0.20 mm/rev.

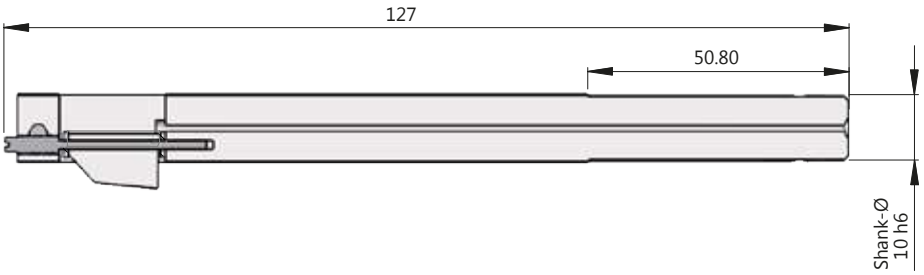
B
9.1

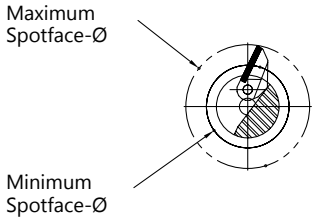
FLIPCUT™ - FOR HOLES WITH Ø 7.0 mm to Ø 9.0 mm

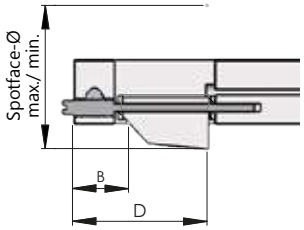
for metric & inch diameters

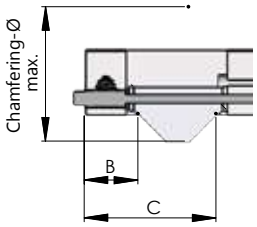
PLEASE NOTE

FLIPCUT tools for hole-Ø 7.0 mm to 7.5 mm do not have inner coolant supply.









• TOOL HOLDER

For hole-Ø (mm)	For hole-Ø (inch)	Tool-Ø (mm)	Item No.	EUR/ Piece
7.00		6.97	FC070M*	
7.14	0.281"	7.09	FC0281*	
7.50		7.44	FC075M*	
7.92	0.312"	7.87	FC0312	
8.00		7.95	FC080M	
8.50		8.46	FC085M	
8.74	0.344"	8.69	FC0344	
9.00		8.94	FC090M	

* Base holder without coolant supply

• BLADE WITH 90° CUTTING EDGE*

Spotface-Ø (mm) min.	Spotface-Ø (mm) max.	Dimension D (mm)
10.52	13.36	
10.52	13.74	18.03
10.52	13.74	
11.38	16.10	
11.37	16.10	
11.79	16.48	18.03
11.79	17.65	
11.79	17.65	

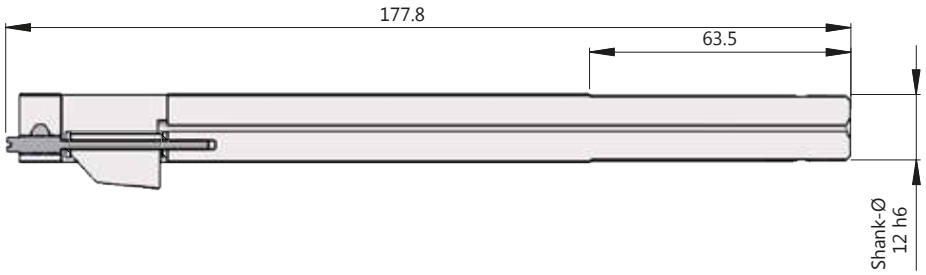
* Blades with 90° cutting edges are manufactured individually according to your dimensional specifications. Please indicate the desired spotfacing-Ø in mm as well as the desired tool with the corresponding Item No. We deliver within 4 weeks at the same price as the 45° cutting edge.

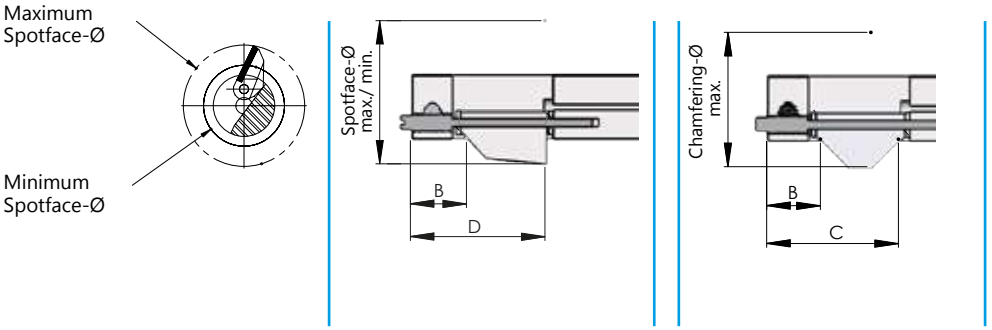
• BLADE WITH 45° CUTTING EDGE

Chamfer-Ø (mm) max	Dim. B (mm)	Dim. C (mm)	Item No.	EUR/ Piece
13.18	7.75	17.40		
13.18	7.80	17.35	FW245	
13.18	7.98	17.20		
14.02	7.77	17.37		
14.02	7.80	17.35		
14.43	7.82	17.32	FW245	
14.43	7.95	17.20		
14.43	8.05	17.09		

FLIPCUT™- FOR HOLES WITH Ø 9.5 mm to Ø 14.27 mm

for metric & inch diameters





- TOOL HOLDER
- BLADE WITH 90° CUTTING EDGE*
- BLADE WITH 45° CUTTING EDGE

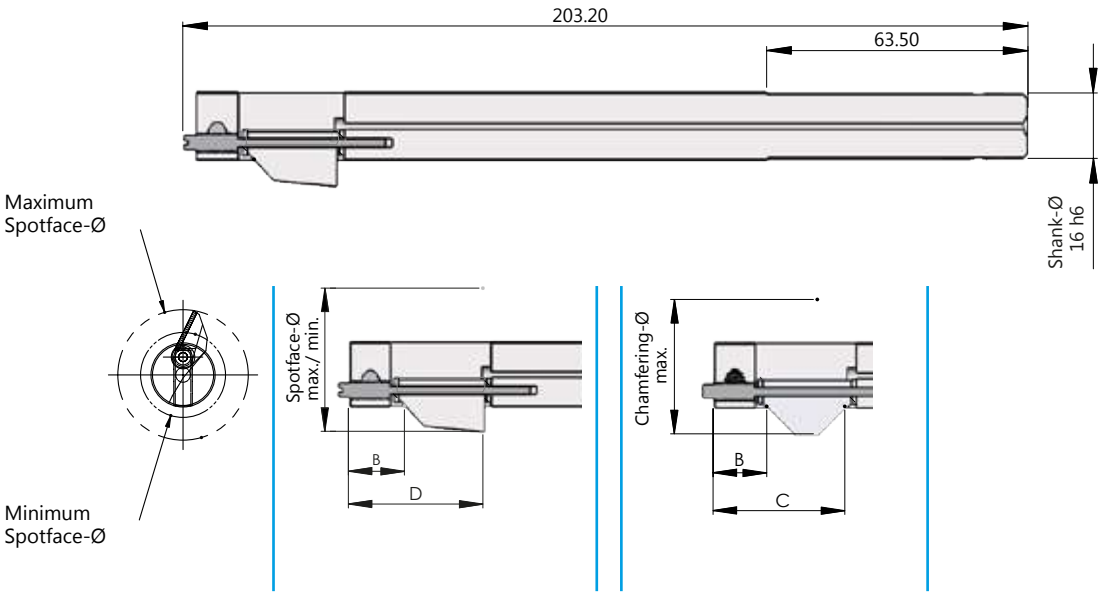
For hole-Ø		Tool-Ø	Item No.	EUR/ Piece	Spotface-Ø (mm)		Dimension D	Chamfer-Ø (mm)	Dim. B	Dim. C	Item No.	EUR/ Piece
(mm)	(inch)	(mm)			min.	max.	(mm)	max	(mm)	(mm)		
9.50		9.42	FC095M		13.77	19.05		18.06	8.73	22.89		
9.53	0.375"	9.45	FC0375		13.77	19.05		18.06	8.76	22.86		
10.00		9.93	FC100M		14.53	19.81	23.62	18.82	8.64	22.89	FW345	
10.31	0.406"	10.24	FC0406		14.53	21.21		18.82	8.76	22.86		
11.00		10.92	FC110M		14.53	21.21		18.82	9.07	22.56		
11.13	0.438"	11.05	FC0438		14.53	22.00		18.82	9.12	22.50		
11.91	0.469"	11.84	FC0469		17.60	24.38		22.53	9.63	27.46		
12.00		11.91	FC120M		17.60	24.38		22.53	9.68	27.41		
12.70	0.500"	12.62	FC0500		17.60	25.12		22.53	9.98	27.10		
13.00		12.93	FC130M		17.60	25.12	27.81	22.53	10.11	26.97	FW445	
13.49	0.531"	13.41	FC0531		18.87	27.81		23.80	10.34	26.75		
14.00		13.92	FC140M		18.87	28.22		23.80	10.57	26.52		
14.27	0.562"	14.20	FC0562		18.87	27.81		23.80	10.69	26.42		

* Blades with 90° cutting edges are manufactured individually according to your dimensional specifications. Please indicate the desired spotfacing-Ø in mm as well as the desired tool with the corresponding article no. We deliver within 4 weeks at the same price as the 45° cutting edge.

B
9.3

FLIPCUT™ - FOR HOLES WITH Ø 15.0 mm to Ø 17.47 mm

for metric & inch diameters



• TOOL HOLDER

For hole-Ø		Tool-Ø	Item No.	EUR/ Piece
(mm)	(inch)	(mm)		
15.00		14.88	FC150M	
15.09	0.594"	14.96	FC0594	
15.88	0.625"	15.75	FC0625	
16.00		15.88	FC160M	
16.66	0.656"	16.54	FC0656	
17.00		16.87	FC170M	
17.47	0.688"	17.35	FC0688	

• BLADE WITH 90° CUTTING EDGE*

Spotface-Ø (mm)		Dimension D
min.	max.	(mm)
21.72	30.00	
21.72	30.61	
21.72	31.42	
21.72	31.42	34.80
22.99	34.52	
22.99	34.51	
22.99	35.31	

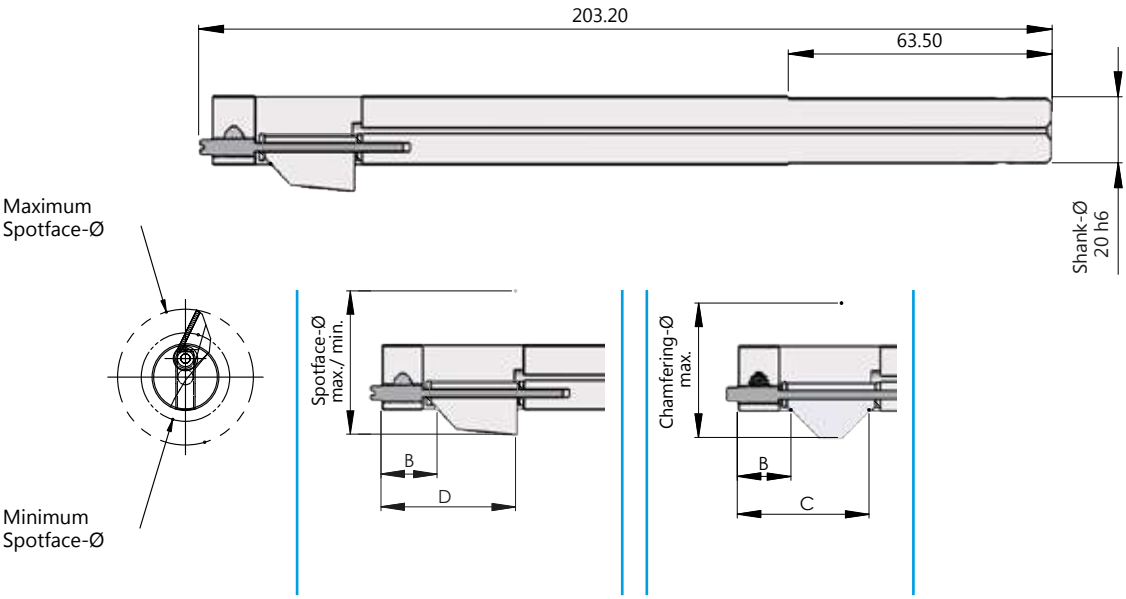
• BLADE WITH 45° CUTTING EDGE

Chamfer-Ø (mm)	Dim. B	Dim. C	Item No.	EUR/ Piece
max	(mm)	(mm)		
28.24	13.56	33.30		
28.24	13.61	33.25		
28.24	13.97	32.92		
28.24	14.02	32.84	FW545	
29.49	13.74	33.12		
29.49	13.89	32.97		
29.49	14.10	32.77		

* The blades with 90° cutting edges are manufactured individually according to your dimensional specifications. Please indicate the desired spotfacing-Ø in mm as well as the desired tool with the corresponding Item no. We deliver within 4 weeks at the same price as the 45° cutting edge.

FLIPCUT™ - FOR HOLES WITH Ø 18.0 mm to Ø 25.0 mm

for metric & inch diameters



- TOOL HOLDER
- BLADE WITH 90° CUTTING EDGE*
- BLADE WITH 45° CUTTING EDGE

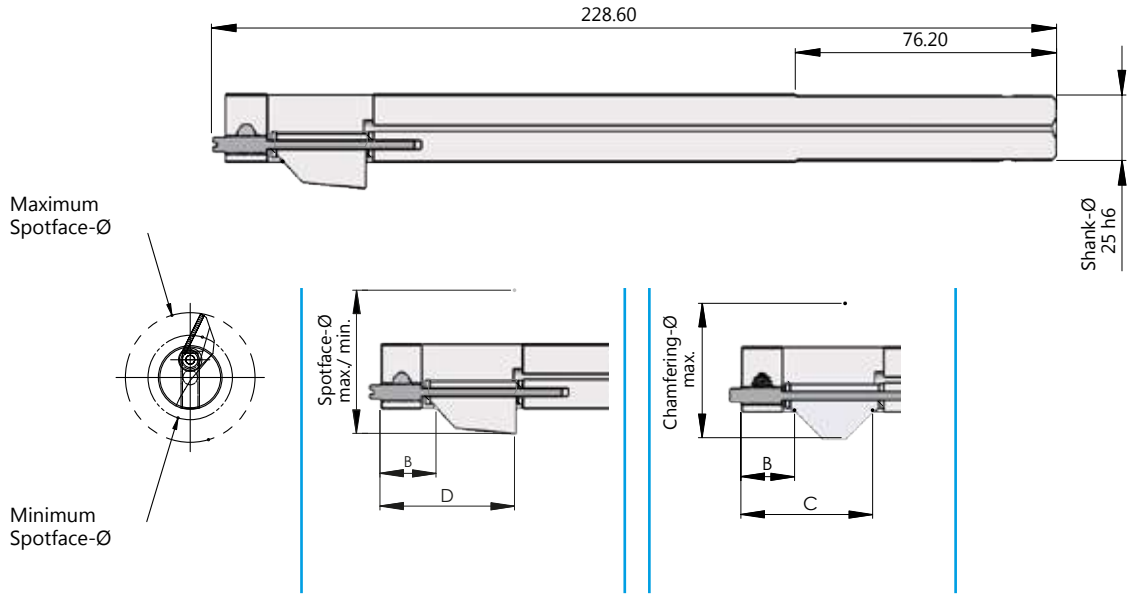
For hole-Ø		Tool-Ø	Item No.	EUR/ Piece	Spotface-Ø (mm)		Dimension D	Chamfer-Ø max.	Dim. B	Dim. C	Item No.	EUR/ Piece
(mm)	(inch)	(mm)			min.	max.	(mm)	(mm)	(mm)	(mm)		
18.00		17.88	FC180M		26.90	37.44		34.52	13.67	36.88		
18,26	0.719"	18.14	FC0719		26.90	38.23		34.52	13.77	36.78		
19.00		18.87	FC190M		26.90	38.99	38.48	34.52	14.12	36.42		
19.05	0.750"	18.92	FC0750		26.90	38.99		34.52	14.12	36.42	FW645	
19.84	0.781"	19.71	FC0781		26.90	39.73		34.52	14.48	36.07		
20.00		19.86	FC200M		26.90	39.72		34.52	14.55	36.02		
20.62	0.812"	20.50	FC0812		31.52	40.87		40.71	17.48	50.29		
21.00		20.88	FC210M		31.52	40.86		40.71	17.63	50.14		
21.44	0.844"	21.31	FC0844		31.52	41.66		40.71	17.86	49.94		
22.00		21.87	FC220M		33.05	43.18		42.21	17.40	50.37		
22.23	0.875"	22.10	FC0875		33.05	45.26		42.21	17.50	50.27		
23.00		22.89	FC230M		33.05	46.78	5281	42.21	17.86	49.91	FW745	
23.01	0.906"	22.89	FC0906		33.05	46.02		42.21	17.86	49.91		
23.83	0.938"	23.70	FC0938		33.05	46.79		42.21	18.21	49.56		
24.00		23.88	FC240M		33.05	46.78		42.21	18.29	49.48		
24.61	0.969"	24.49	FC0969		33.05	47.55		42.21	18.57	50.37		
25.00		24.87	FC250M		33.05	46.78		42.21	18.72	49.05		

* The blades with 90° cutting edges are manufactured individually according to your dimensional specifications. Please indicate the desired spotfacing-Ø in mm as well as the desired tool with the corresponding Item no. We deliver within 4 weeks at the same price as the 45° cutting edge.

B
9.5

FLIPCUT™ - FOR HOLES WITH Ø 25.4 mm to Ø 34.14 mm

for metric & inch diameters



• TOOL HOLDER

For hole-Ø		Tool-Ø	Item No.	EUR/ Piece
(mm)	(inch)	(mm)		
25.40	1.000"	25.22	FC1000	
26.00		25.83	FC260M	
26.19	1.031"	26.01	FC1031	
26.50		26.31	FC265M	
26.97	1.062"	26.80	FC1062	
27.00		26.82	FC270M	
27.76	1.093"	27.58	FC1093	
28.00		27.81	FC280M	
28.58	1.125"	28.40	FC1125	
29.00		28.83	FC290M	
29.36	1.156"	29.18	FC1156	
30.00		29.82	FC300M	
30.15	1.187"	29.97	FC1187	
30.96	1.219"	30.78	FC1219	
31.00		30.81	FC310M	
31.75	1.250"	31.57	FC1250	
32.00		31.83	FC320M	
32.54	1.281"	32.36	FC1281	
33.00		32.82	FC330M	
33.32	1.312"	33.15	FC1312	
34.00		33.83	FC340M	
34.14	1.344"	33.96	FC1344	

• BLADE WITH 90° CUTTING EDGE*

Spotface-Ø (mm)		Dimension D
min.	max.	(mm)
36.35	54.41	42.80
36.35	54.40	
36.35	55.17	
36.35	55.16	
36.35	55.91	
36.35	55.90	
36.35	56.67	
38.89	59.15	
38.89	62.08	
38.89	62.07	
38.89	62.84	
38.89	62.83	
38.89	63.58	
38.89	64.36	
38.89	64.36	
42.19	67.61	
42.19	67.61	
42.19	67.61	
42.19	67.61	
42.19	67.61	
42.19	67.61	
42.19	67.61	

• BLADE WITH 45° CUTTING EDGE

Chamfer-Ø (mm)	Dim. B	Dim. C	Item No.	EUR/ Piece
max	(mm)	(mm)		
45.51	17.45	50.32	FW745	
45.51	17.70	50.06		
45.51	17.78	49.99		
45.51	17.93	49.83		
45.51	18.14	49.63		
45.51	18.16	49.61		
45.51	18.49	49.28		
48.01	17.48	50.29		
48.01	17.73	50.04		
48.01	17.91	49.86		
48.01	18.08	49.68		
48.01	18.36	49.40		
48.01	18.42	49.35		
48.01	18.80	48.97		
48.01	18.80	48.97		
51.33	17.68	50.09		
51.33	17.78	49.99		
51.33	18.01	49.76		
51.33	18.14	49.63		
51.33	18.36	49.40		
51.33	18.67	49.10		
51.33	18.72	49.05		

* The blades with 90° cutting edges are manufactured individually according to your dimensional specifications. Please indicate desired spotfacing- Ø in mm as well as the desired tool with the corresponding Item no. We deliver within 4 weeks at the same price as the 45° cutting edge.

CNF PRECISION CHAMFERING TOOL

Consistent chamfers on the front and back of holes in just one operation

FEATURES

- Constant and precise chamfer production
- Designed for series production
- Fast cycle times
- Change of direction of rotation not required
- Favorable cutter prices
- Available with high-speed steel or solid carbide cutters for diamters from 0.059 to 0.390 inch (1.50 mm to 9.90 mm)
- Tools for diameters of 10 mm or larger use standard replaceable ISO inserts
- Combination tools possible

FUNCTION

1. PILOTING

The tool diameter pilots into the hole up to the pre-formed cam opposite to the cutting edge.

2. CHAMFER POSITION BACK SIDE

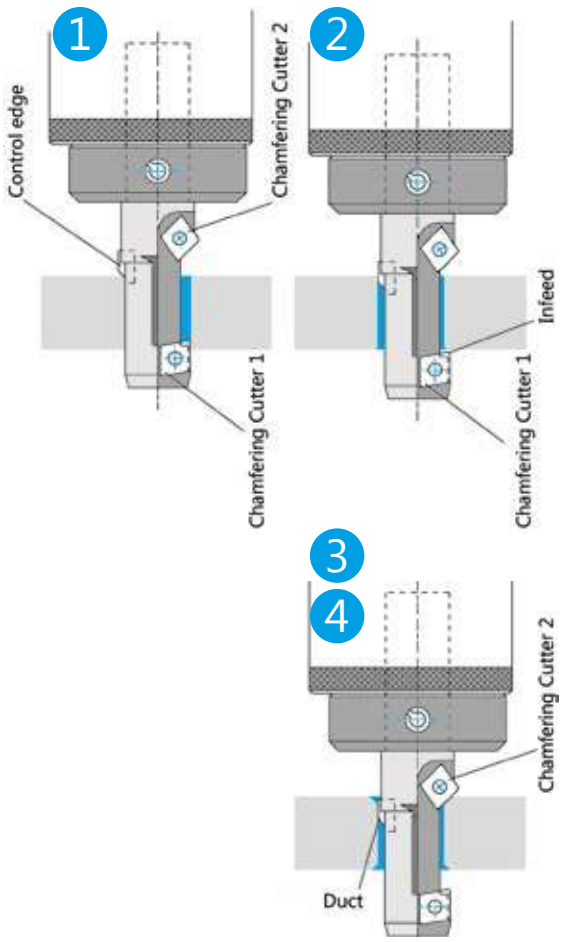
The tool travels forward and is actuated by the cam, generating the back chamfer.

3. CHAMFER POSITION FRONT

The tool continues to travel forward, forming the top chamfer.

4. RETRACTION

In the working feed rate move back until the control edge is exposed as shown in fig. 1 and move out of the hole.



NOBUR JB PRECISION CHAMFERING TOOL FOR HOLE Ø 4.0 mm - Ø 25.0 mm

For back chamfering or deburring of holes with pilot in the workpiece for precise results

FEATURES

- Consistently accurate back-chamfering, deburring, and back-countersinking operations
- Pilots in hole for precise concentricity
- Rigid support of the cutter virtually eliminates deflection
- Pilot enables optimum support in workpieces with extreme working depths (up to 10 x Ø)
- Micrometer-stop adjustment
- Standard pilots and cutters for hole sizes from 3/16 to 3/4" (4.75 mm to 19.05 mm)
- Special pilots and cutters available upon request
- One basic tool covers wokpiece Ø 4.0 mm to 25.0 mm, only the cutting edge and pilot must be adapted to the workpiece

FUNCTION

1. ENTRY POSITION

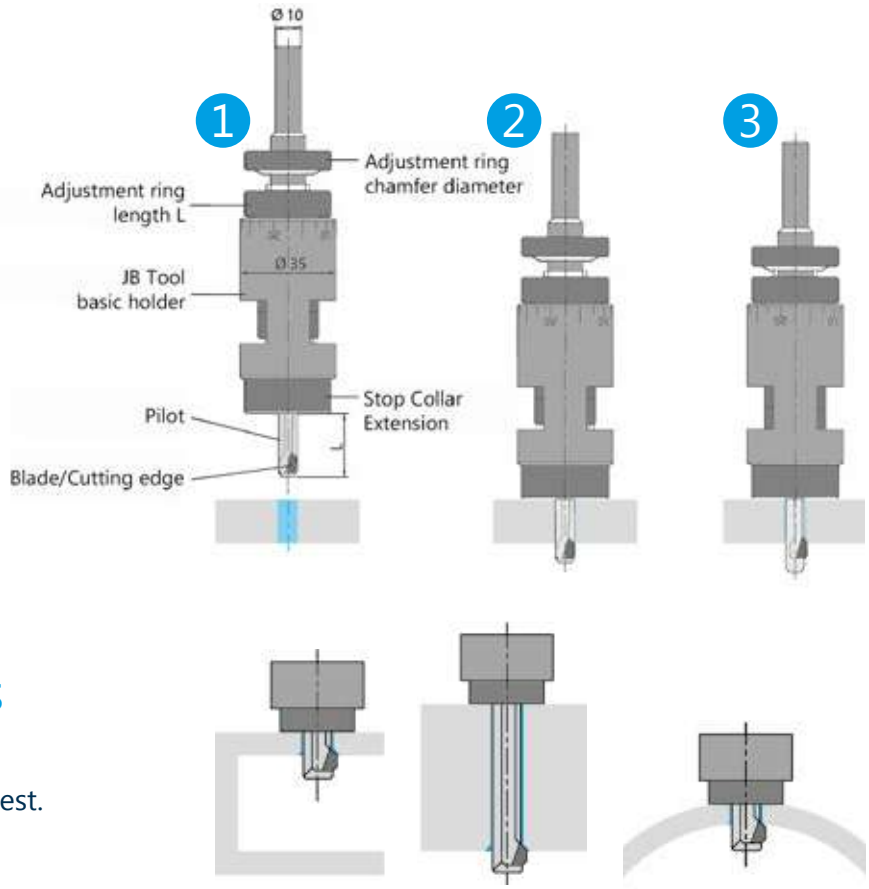
Insert tool rotating in chamfer position.

2. WORK FEED

Radial control is achieved by further axial feed rate of the bearing-mounted thrust piece.

3. BACK SIDE

End of working feed adjustable via adjusting ring. Retraction in the working feed to the starting position.



POSSIBLE APPLICATIONS

Further product information and technical data are available on request.

#burrfree
straight out of the machine
The online seminar from deburring specialist

The requirements of high-precision components are constantly increasing and perfect deburring is becoming more and more important. We want to help you automate the deburring step as completely as possible so that you can produce #burrfree straight out of the machine in the future.

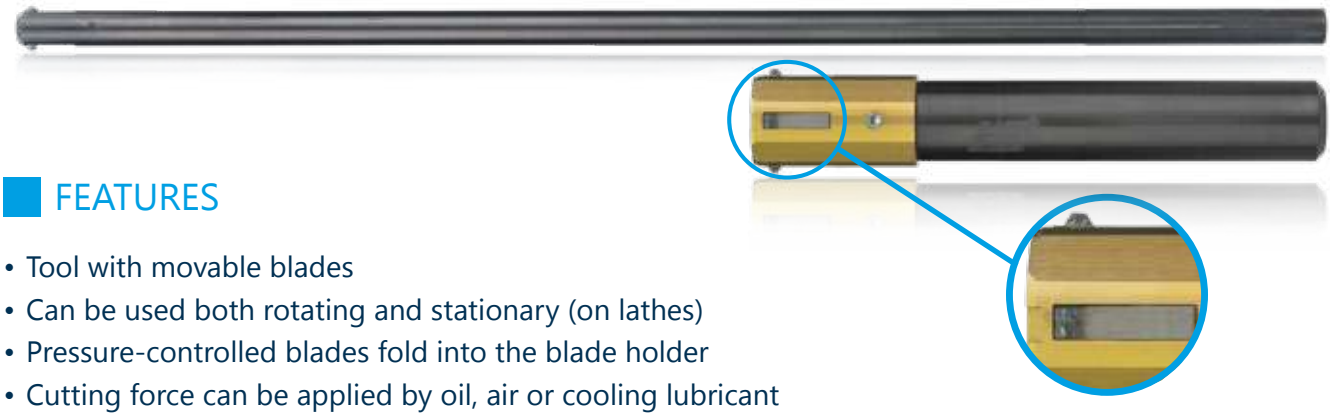
- What are burrs and how are they defined?
- How do burrs form?
- How can burr formation already be prevented or minimized during machining?
- Which deburring solutions do we offer for which applications?

KEMPF
LIVE
WEBINAR

QR code to register
on the back page of the catalog

HSD-HIGH SPEED DEBURRING TOOL

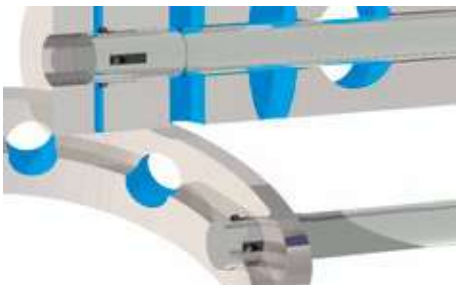
Deburring of cross holes, slots and steps in one operation



FEATURES

- Tool with movable blades
- Can be used both rotating and stationary (on lathes)
- Pressure-controlled blades fold into the blade holder
- Cutting force can be applied by oil, air or cooling lubricant
- Deburring intensity is determined by the pressure of the medium (oil, air or coolant), feed rate and the spindle speed
- High feed rates possible with multi-bladed HSD tools
- Machining of 1:1 bore intersections, grooves, steps and angled bores (limited)
- Tool available from Ø 2.8 mm, not limited upwards
- Deburring of cross holes from Ø 1.0 mm possible
- Deep-hole machining possible
- Patented tooling system

Fig. 1



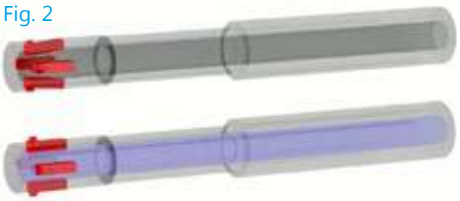
FUNCTION

The HSD deburring tool deburrs the edges with moveably mounted blades. It can be used through the main bore (Fig. 1, upper graphic) or through the cross hole (Fig. 1, lower graphic). It is used in clockwise and counterclockwise rotation to deburr both sides of the bore equally.

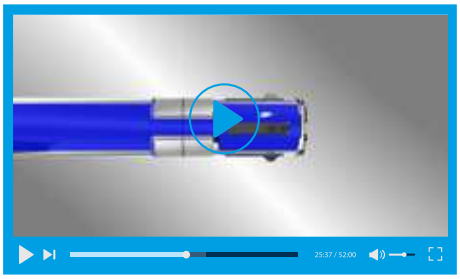
By using any medium through the shaft, pressure is applied to the cutting edges. No spring elements are used. Water, emulsions, oil or compressed air, also MQL (minimum quantity lubricant), are suitable. Due to the fast reaction time, coolant-activated cutting edges allow a much wider range of applications compared to deburring tools with spring-loaded cutting edges. The cutting force can be adjusted by the pressure.

Without pressure, the blades fold in without force (Fig. 2). When used with pressure, the blades are pressed in by the hole surface and fold out again at the edge of the cross hole, i.e. at the burr (lower figure). If no pressure medium is available, an elastomer tool can be used.

Fig. 2



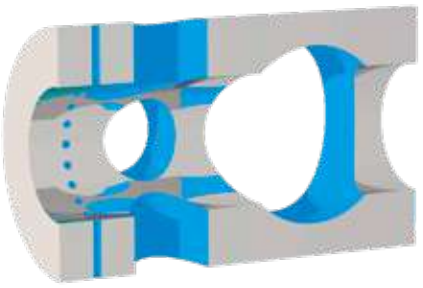
TOOL VIDEO LINK



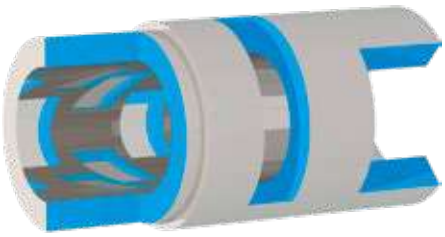
ANIMATION
Functionality of the HSD tool

ADVANTAGES

- When machining through the main bore (the larger bore), all cross holes can be deburred in one operation.
- The tool is individually designed. There are no radial displacement forces. Therefore, almost any working length can be realized.
- The direct control of the blades by air or coolant pressure results in a significantly extended application spectrum of the tools compared to spring-loaded deburring tools. Due to the inertia of the spring elements, these tools can only be used to a limited extent.
- The blades can be flexibly controlled, i.e. the blades can be "extended" exactly at the cross bore to remove the burr. In addition, the pressure on the cutting edges can be adjusted to the burr to be removed during machining.



Several cross holes are preferably machined through the main bore with one and the same deburring tool in one step. All intersecting bores, even different diameters, can be deburred.

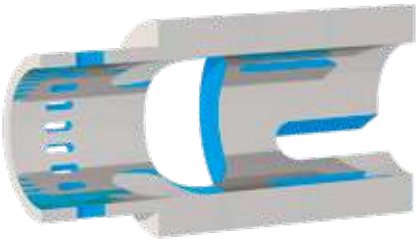


Machining of slots or slotted holes does not differ in principle from cross holes.

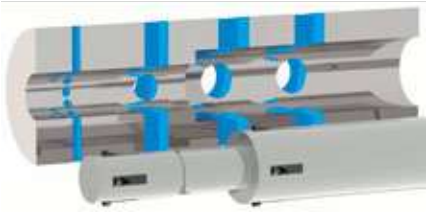
INFO

HSD special deburring tools are typically used for intersecting holes or cross holes, slots, grooves, ledges and steps. They are used for internal deburring but also as external deburring tools, for example for shafts. The technology is applicable for a wide range of main and cross bore diameters. The tools can be used through the main hole or through the cross hole.

The smallest diameter currently realized for an HSD tool is 2.8 mm. There is theoretically no upper limit for the diameter. The minimum cross hole diameter is 1 mm. Due to the cutting edge's shape and the control of the blade force via the pressure medium, surface quality within the bores is only marginally changed and influenced. The deburring result and the edge finish can be controlled via feed rate, pressure and speed.



For slotted shaft ends, the use of combined internal and external HSD tools is particularly effective.



For stepped bores with changing diameters, stepped tools can be used as special tools.

Right: Different cutting edge arrangements - the HSD tool is custom-made for each deburring task.

ENTRY MOVEMENT

In clockwise spindle rotation, the tool (with pressure-controlled blades) enters the main hole.

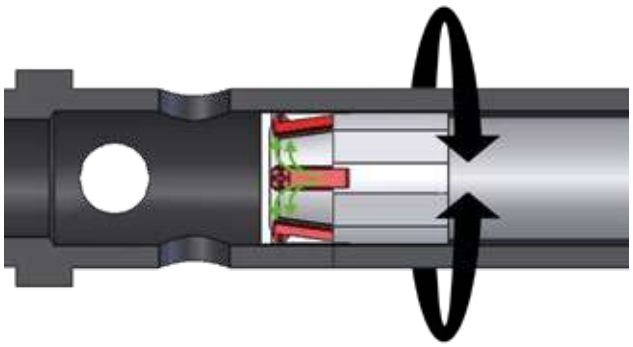
PASSING THROUGH THE HOLE

The tool moves to the end of the main bore at work feed rate and deburrs all cross holes. The tool can be moved between the cross holes at high feed rate.

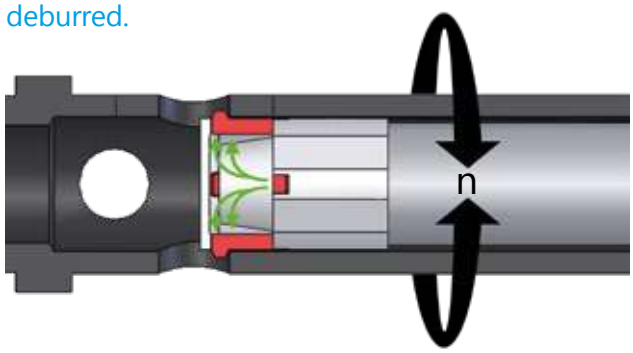
RETRACTING TO INITIAL POSITION

After reaching the last cross hole, feed stops and the spindle direction is changed to counterclockwise rotation. The tool retracts at working feed rate. This ensures 100% deburring.

When the tool enters the main hole, the blades are "folded" into the tool.



At the deburring position, blades are "folded out" by the pressure medium. The cross hole is being deburred.



CUTTING DATA

Speed rpm	Feed f_z
600 - 2,000	0.04 - 0.12 mm per cutting edge

Coolant pressure 4 - 10 bar
(if required, a throttle installation reduces the pressure)

ORDERING PROCESS FOR THE HSD TOOLS

All HSD deburring tools are special solutions that are individually designed and manufactured. For the design of the tool we need:

- Component drawing and description about the location of the burrs
- Type of coolant medium
- Pressure - can be regulated by the machine?
- Rotating tool or workpiece?

NOTE

In order to be able to replace the usually (very) small HSD cutting edges yourself, we offer the "HSD cutting edge replacement set" including tool holder (HSDREPKIT).

Please request the set separately!

MACHINING EXAMPLE

DEBURRING OF CROSS HOLES IN A VALVE BODY

The HSD tool is perfectly suited for deburring of cross holes in valve housings. The unique feature of this tooling solution is the control of the blades using a pressure medium, thus enabling precisely positioned deburring.

The HSD tool with a diameter of 11.30 mm is not only used for machining one component in this application example, but is also suitable for use on almost all valve housings produced on various machines due to the frequently used and standardized G ¼ inch threads.
For larger bore diameters, the same HSD tool is used to traverse the deburring area with a circular helical movement, and the burr is then also removed in a process-safe manner.

ON THE RIGHT: Close-up of one of the many cross holes: the bore coming from the rear and the second bore crossing vertically are clearly visible. The burrs on these intersecting edges have been removed without generating secondary burrs by the specially designed High-Speed Deburring tool (HSD).

C

CERAMIC FIBER DEBURRING TOOLS

TOOLS MADE FROM HIGH-PERFORMANCE CERAMICS MAKE THE DIFFERENCE

Deburring is based on a rotary movement of a ceramic grinding tool, whereby the feed and infeed movement can take place either on the tool side or on the workpiece side.
The ceramic fiber bristles of the brush machine the workpiece surface and grind off the projecting burr on the workpiece.

CERAMIC FIBER MATERIAL CHARACTERISTICS

Al_2O_3-High performance ceramics - for deburring and rounding workpiece edges as well as for grinding, polishing & cleaning workpiece surfaces

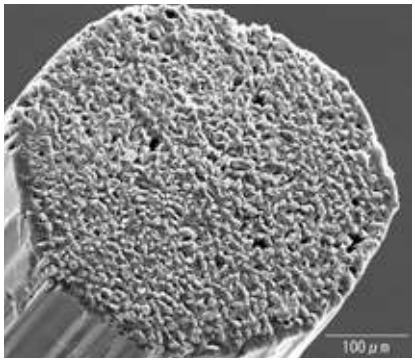
FEATURES

- Self-sharpening cutting edges enable constant grinding performance
- Excellent surface finishes and deburring results are achievable
- Can be used in many ways, e.g. on machining centers, special machines, drilling machines, robots and many more
- Deburring and surface finish in one operation
- The flexible fiber bristles gently adapt to the shape of the workpiece
- The geometric shape of the workpiece is not changed
- Long tool life for significantly higher productivity and lower costs

INFO

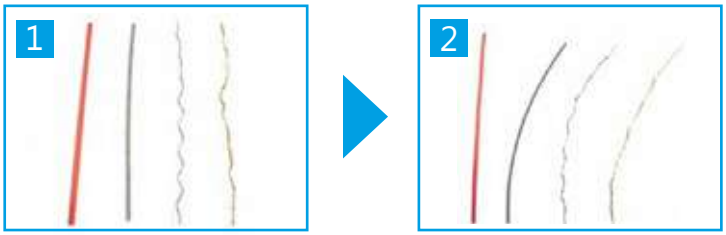
The ceramic fiber bristles consist of approx. 1,000 bonded ceramic fibers with a diameter of only a few µm. The tips of each ceramic fiber form the cutting edges, which are temperature resistant up to about 150°C. The cutting edges have the ability to resharpen themselves. This results in a uniform grinding effect which leads to constant and excellent polishing and grinding features.

(Image on the right: ceramic fiber rod)



ADVANTAGES COMPARED TO OTHER BRUSH SYSTEMS

Unlike wire brushes, XEBEC® ceramic fiber bristles always return to their original shape/position after processing. Despite the high hardness of ceramics, the fiber bristles design of the brushes is flexible enough to adapt to workpiece surfaces. Moreover, no secondary burr is produced during machining and no adhesion takes place due to the self-regeneration effect.



From left to right:
Xebec fiber brush, nylon brush covered with abrasive material, steel brush wire, brass brush wire.

1. Before processing with the various brushes.
2. After processing - only the ceramic fiber keeps the original shape.

CHOOSE THE RIGHT FIBER FOR YOUR APPLICATION

ABRASION
low

PINK **TYPE A13 - PINK CERAMIC** — A13 — Micro-burr

Flexible and particularly soft brush; for surface deburring of the smallest holes and for particularly gentle processing of sensitive surfaces.

RED **TYPE A11 - RED CERAMIC** — A11 — up to 0.1 mm

High elasticity and flexibility; suitable for fine deburring and for grinding and polishing metal surfaces.

WHITE **TYPE A21 - WHITE CERAMIC** — A21 — 0.1 mm

More rigid than type A11; higher grinding performance for more extensive deburring operations.

BLUE **TYPE A32 - BLUE CERAMIC** — A32 — 0.1 mm - 0.2 mm

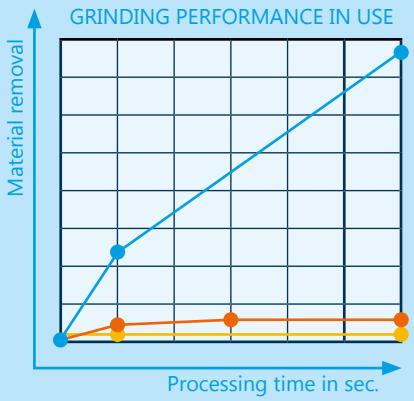
More rigid and therefore more abrasive than type A21; highest grinding performance for very extensive deburring operations.

BURR ROOT

high

GRINDING PERFORMANCE S45C

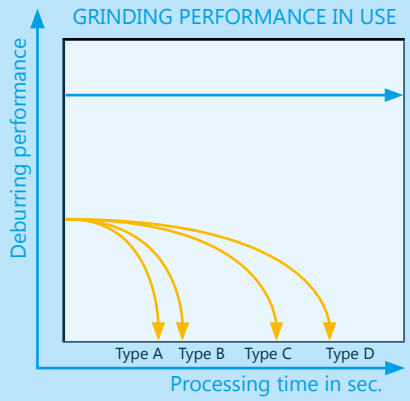
The ceramic fibers consist of 80% abrasive ceramic, promising unique grinding performance.



- Xebec brush (A32CB40M); 3,000 rpm
- Abrasive nylon brush (#180); 5,000 rpm
- Brass brush; 3,000 rpm

CONSISTENT GRINDING PERFORMANCE

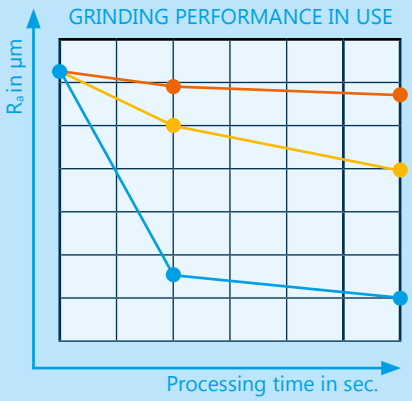
Since the ceramic fiber itself is the "abrasive", it never wears out. This results in consistent grinding performance right to the end.



- Xebec brush
- Abrasive nylon brush; div. competitive products

OPTIMAL FOR POLISHING

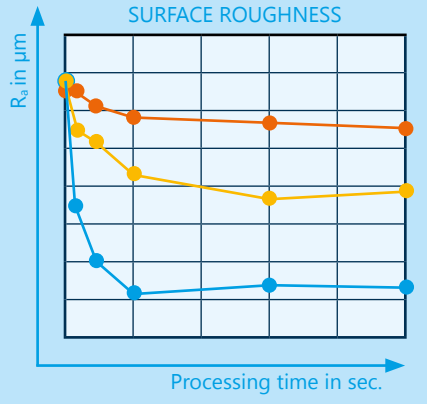
The outstanding grinding-performance of the ceramic fibers are ideally suited for polishing workpieces.
Surface values of R_a = 0.1 µm (R_z = 0.4 µm) can be achieved.



- Xebec brush (A21CB40M); 3,000 rpm
- Abrasive nylon brush (#180); 5,000 rpm
- Brass brush; 3,000 rpm

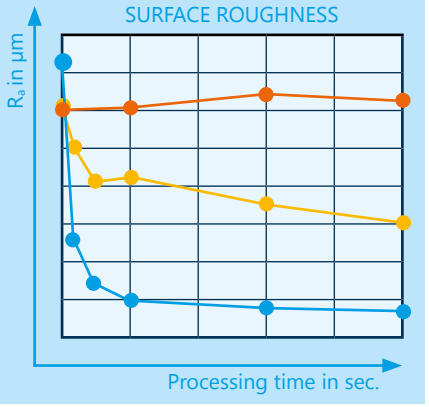
COMPARATIVE RESULTS TO ABRASIVE NYLON AND BRASS BRUSHES

GRINDING PERFORMANCE X12CRNIS18 8 (DRY)



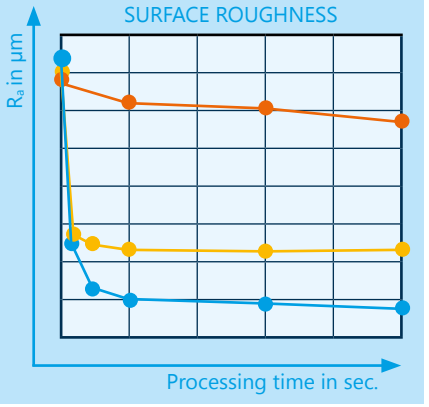
- Xebec brush (A21CB40M); a_p = 1.5 mm - 3,000 rpm
- Abrasive nylon brush (#180); a_p = 3 mm - 5,000 rpm
- Brass brush; a_p = 5.0 mm - 3,000 rpm

GRINDING PERFORMANCE CF53 (WET)



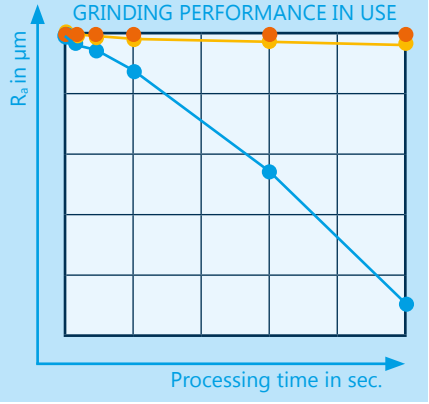
- Xebec brush (A11CB40M); a_p = 1.5 mm - 3,000 rpm
- Abrasive nylon brush (#180); a_p = 2.5 mm - 5,000 rpm
- Brass brush; a_p = 3.0 mm - 3,000 rpm

GRINDING PERFORMANCE ALUMINUM (WET)



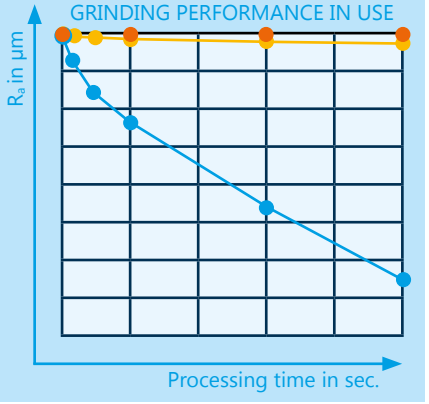
- Xebec brush (A21CB40M); a_p = 1.5 mm - 2,100 rpm
- Abrasive nylon brush (#180); a_p = 1.5 mm - 1,200 rpm
- Brass brush; a_p = 3.0 mm - 3,000 rpm

GRINDING PERFORMANCE X12CRNIS18 8 (DRY)



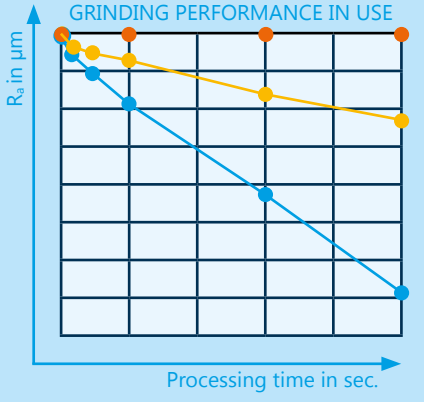
- Xebec brush (A21CB40M); a_p = 1.5 mm - 3,000 rpm
- Abrasive nylon brush (#180); a_p = 3 mm - 5,000 rpm
- Brass brush; a_p = 5.0 mm - 3,000 rpm

GRINDING PERFORMANCE CF53 (WET)



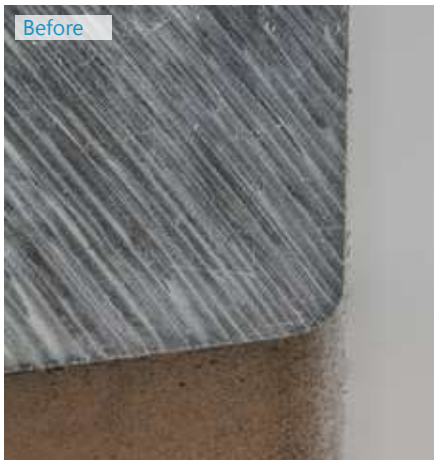
- Xebec brush (A11CB40M); a_p = 1.5 mm - 3,000 rpm
- Abrasive nylon brush (#180); a_p = 2.5 mm - 5,000 rpm
- Brass brush; a_p = 3.0 mm - 3,000 rpm

GRINDING PERFORMANCE ALUMINUM (WET)



- Xebec brush (A21CB40M); a_p = 1.5 mm - 2,100 rpm
- Abrasive nylon brush (#180); a_p = 1.5 mm - 1,200 rpm
- Brass brush; a_p = 3.0 mm - 3,000 rpm

NOTE: Abrasive nylon brush means a monofilament made of plastics covered with abrasive grains. The illustrations show depth of cut (mm) and revolutions (rpm). The material removal rate/abrasive reduction can be controlled by the machining conditions (depth of cut and revolutions).



EXAMPLE:
Deburring and polishing the surface and edges of a hydraulic component made from a pressed aluminum die.
The ceramic fiber surface brush BÜA11CB40M was used here.

XEBEC CERAMIC FIBERS CLOSE-UP

Even if the individual filaments wear out, the abrasive effect always remains the same. In contrast to many competitor products, the fibers are not covered by abrasive material only, but consist homogeneously of 80 % ceramic and only 20 % binding material. This "high-performance ceramic" has excellent characteristics - e.g. up to 60 times greater grinding performance and up to 6 times of the processing speed of nylon brushes.

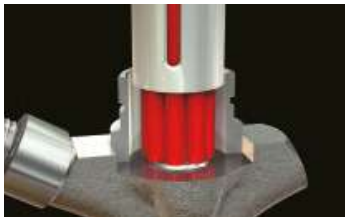
SUCCESSFUL APPLICATIONS

High performance ceramics meet high-performance parts

Wherever workpieces require a special surface finish, the XEBEC® ceramic fiber tools are used. This is where high-performance ceramics meet parts that have to perform at peak performance.

AUTOMOTIVE

INJECTOR PARTS



Material: Steel
Tool: Ceramic Fiber Brush Surface BÜA11CB25M

EXHAUST MANIFOLD

Material: Aluminum alloy
Tool: Ceramic Fiber Brush Surface BÜA21CB60M

COMPRESSOR PART

Material: Aluminum
Tool: Ceramic Fiber Brush Surface BÜA11CB40M

INVERTER HOUSING

Material: ADC12
Tool: Ceramic Fiber Brush Surface BÜA32CB25M

TIRE INJECTION MOLD

Material: Aluminum
Tool: Ceramic Fiber Brush Surface End Type BÜA11EB06M

DRIVE SHAFT

Material: SCM
Tool: Ceramic Fiber Cross-Hole Brush BÜCHA127M

CONNECTING ROD

Material: Steel
Tool: Ceramic Fiber Brush Surface BÜA32CB60M or BÜA32CB40M

HOUSING-PART

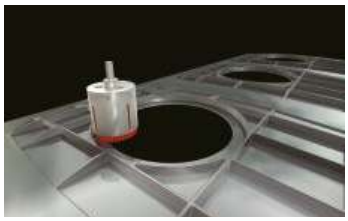
Material: Sintered metal
Tool: Ceramic Fiber Brush Surface BÜA11CB60M

AEROSPACE

TURBINE DISKS

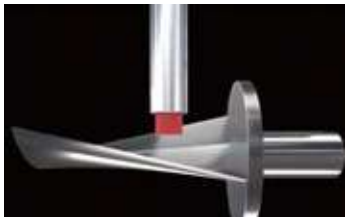
Material: Inconel
Tool: Ceramic Fiber Brush
Surface BÜA32CB40M

OUTER SHELL



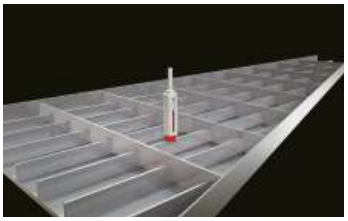
Material: Inconel
Tool: Ceramic Fiber Brush
Surface BÜA11CB100M

TURBINE BLADE



Material: SUS630
Tool: Ceramic Fiber Brush
Surface BÜA11CB25M

SUPPORTING STRUCTURE



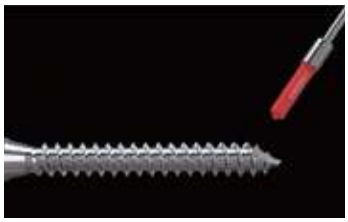
Material: Aluminum alloy
Tool: Ceramic Fiber Brush
Surface BÜA11CB25M

MEDICAL

ARTIFICIAL HIP JOINT

Material: CoCrMo
Tool: Ceramic Fiber Brush
Surface BÜA13CB06M

BONE SCREW



Material: Titanium
Tool: Ceramic Fiber Brush
Surface End Type BÜA11EB06M

C
1.1

CERAMIC FIBER BRUSH SURFACE Ø 6.0 mm to Ø 100.0 mm

for economical deburring & polishing of surfaces

COMPONENT PARTS AVAILABLE!

- FLOATING HOLDER
- SELF-ADJUSTING SLEEVE
- BRUSH LENGTH ADJUSTMENT TOOL

Brushes are available in the following colors:

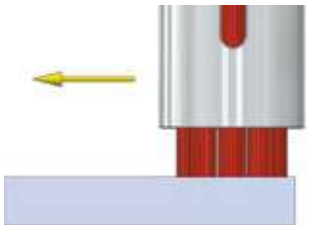
PINK
RED
WHITE
BLUE

PLEASE NOTE

Please order the matching sleeve for the brush. This is NOT part of the brush and must be ordered separately.

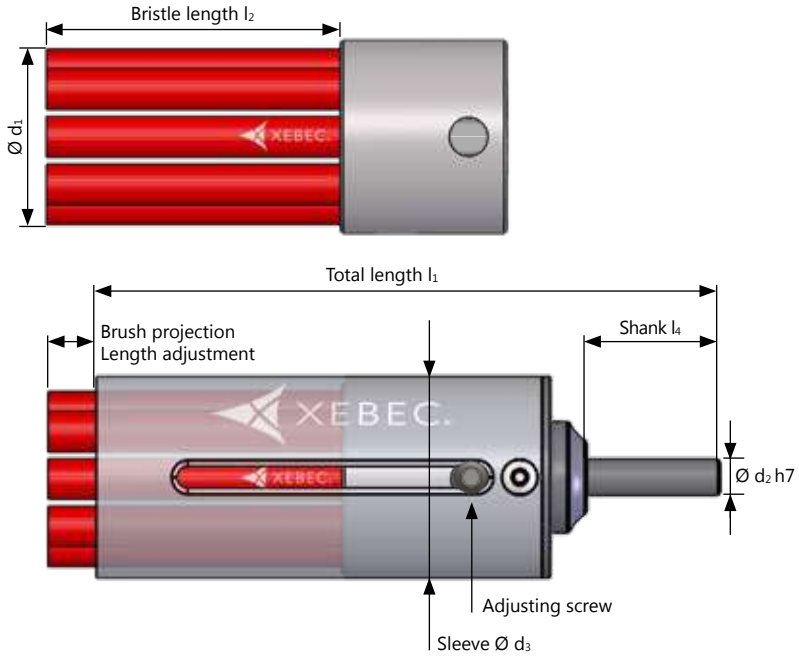
APPLICATION EXAMPLES

Ceramic fiber brushes are particularly suitable for deburring and polishing workpiece surfaces and edges.



Bottom left image: The entire edges of an aluminum component are completely deburred by machine in just a few seconds.

Picture below right: The surface and edges of a steel closure for pressure vessels are polished and deburred after milling with the ceramicfiber brush.



TOOL VIDEO LINK

ANIMATION/VIDEO
Machining of engine components

ANIMATION
Deburring of a gear wheel

• BRUSH

Brush Ø d_1 (mm)	Bristle length l_2 (mm)	Color code	Item No.	EUR/ Piece
6	30	A11 (red)	BÜA11CB06M	
6	30	A13 (pink)	BÜA13CB06M	
6	30	A21 (white)	BÜA21CB06M	
6*	30	A32 (blue)	BÜA32CB06M	
15	50	A11 (red)	BÜA11CB15M	
15	50	A13 (pink)	BÜA13CB15M	
15	50	A21 (white)	BÜA21CB15M	
15	50	A32 (blue)	BÜA32CB15M	
25	75	A11 (red)	BÜA11CB25M	
25	75	A21 (white)	BÜA21CB25M	
25	75	A32 (blue)	BÜA32CB25M	
40	75	A11 (red)	BÜA11CB40M	
40	75	A21 (white)	BÜA21CB40M	
40	75	A32 (blue)	BÜA32CB40M	
60	75	A11 (red)	BÜA11CB60M	
60	75	A21 (white)	BÜA21CB60M	
60	75	A32 (blue)	BÜA32CB60M	
100	75	A11 (red)	BÜA11CB100M	
100	75	A21 (white)	BÜA21CB100M	
100	75	A32 (blue)	BÜA32CB100M	

• SLEEVE

Shank Ø d_2 h7 (mm)	Shank length l_4 (mm)	Sleeve Ø d_3 (mm)	Total length l_1 (mm)	Material	Item No.	EUR/ Piece
6	29	10	70	Alu	BÜS06M	
6	29	18.5	90	Plastic	BÜS15MP	
8	30	30	140	Alu	BÜS25M	
10	30	45	140	Alu	BÜS40M10	
12	35	65	150	Alu	BÜS60M	
16	40	110	162	Alu	BÜS100M	

CUTTING DATA
Pages 140/141

C
1.2

CERAMIC FIBER BRUSH SURFACE XL Ø 125.0 mm to Ø 200.0 mm

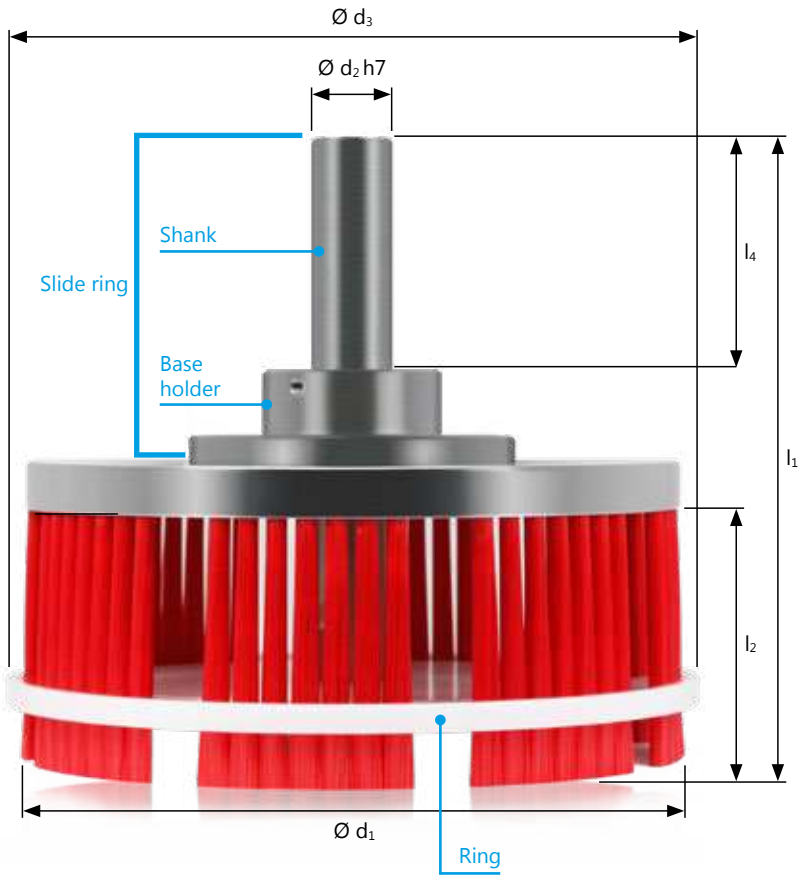
for economical deburring & polishing of surfaces

Brushes are available in the following colors:

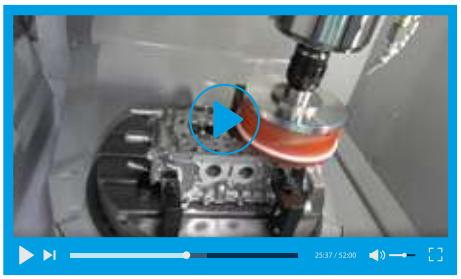
- RED
- WHITE
- BLUE

PLEASE NOTE

Please order the matching sleeve for the brush . This is NOT part of the brush and must be ordered separately.



TOOL VIDEO LINK



VIDEO
Deburring & surface finishing

ANIMATION
Deburring of a plane surface

• BRUSH

Brush Ø d_1 (mm)	Bristle length l_2 (mm)	Color code	Item No.	EUR/Piece
125	75	A11 (red)	BÜA11CB125M	
125	75	A21 (white)	BÜA21CB125M	
125	75	A32 (blue)	BÜA32CB125M	
165	75	A11 (red)	BÜA11CB165M	
165	75	A21 (white)	BÜA21CB165M	
165	75	A32 (blue)	BÜA32CB165M	
200	75	A11 (red)	BÜA11CB200M	
200	75	A21 (white)	BÜA21CB200M	
200	75	A32 (blue)	BÜA32CB200M	

• SLIDE RING

Shank- Ø d_2 h7 (mm)	Shank length l_2 (mm)	Sleeve- Ø d_3 (mm)	Total length l_1 (mm)	Item No.	EUR/Piece
25	75	135	187	BÜSR125M	
25	75	176	187	BÜSR165M	
25	75	211	187	BÜSR200M	

CUTTING DATA
Pages 140/141

TOOL SELECTION

applicable for the ceramic fiber brushes on pages 136 to 138.

SELECTING THE RIGHT CERAMIC FIBER

Several factors influence which ceramic fiber is best suited for an application. The material of the workpiece is just one of many factors and only provides a rough guide.

	TYPE A13 PINK CERAMIC	TYPE A11 RED CERAMIC	TYPE A21 WHITE CERAMIC	TYPE A32 BLUE CERAMIC
Color code Ceramic fiber				
Grinding performance/ removal	lowest			highest
Flexibility	highest			lowest
Material	for soft materials			for hard materials
Maximum burr root thickness	fine micro-burrs	max. burr root thickness approx. 0.1 mm	max. burr root thickness approx. 0.15 mm	max. burr root thickness approx. 0.2 mm

Fiber protrusion / length adjustment:
The fiber protrusion can be adjusted via the sleeve. This allows fine adjustment of flexibility and adaptability to the workpiece. A longer protrusion increases flexibility, while a shorter protrusion reduces it. Machining with too much protrusion can damage the brush, and the overall length of the fiber rods decreases after a longer period of use.

A long operating time reduces the total length of the fiber rods and thus also the flexibility. Please regulate this by correcting the length setting or by reducing the speed and immersion depth.

Dry/wet processing:
Ceramic fiber brushes can be used for dry and wet processing. An extraction system should be used for dry processing.

Burrs not satisfactorily removed:
- Increase the speed
- Reduce the feed rate
- Increase the number of machining operations on the same edge

Burrs removed, but edges too rounded:
- Reduce the speed
- Increase the feed rate

Insufficient service life:
- Reduce the speed
- Reduce the infeed a_p

PLEASE NOTE THE GENERAL WORK SAFETY ON PAGE 147.

C
1.3

RECOMMENDATIONS & CUTTING DATA FOR CERAMIC FIBER BRUSH SURFACE

applicable for the ceramic fiber brushes on pages 136 to 138.

START PARAMETERS FOR DEBURRING

Material ISO	Tensile strength/ Si content	Material examples	Brush Ø	6	15	25	40
			Brush projection (mm)	8-10	12-15	12-15	12-15
			Depth of cut [a_p] in mm	0.3-0.5	0.5-1.0	0.5-1.0	0.5-1.0
			Max. speed n [rpm]	10,000	6,000	5,000	3,000
			Recommended ceramic fiber	v_c (m/min)	v_c (m/min)	v_c (m/min)	v_c (m/min)
	<700 N/mm²	St37, C15, C45		180	180	180	180
	<1,200 N/mm²	16MnCr5, Cf70		170	170	170	170
	<1,500 N/mm²	42CrMoS4, 100Cr6		150	150	150	150
STAIN-LESS	<700 N/mm²	1.4301, 1.4571		175	175	175	175
STAIN-LESS	<1,000 N/mm²	Duplex, Alloy2304		165	165	165	165
GG		GG-25		140	140	140	140
GGG		GGG40, ADI800		120	120	120	120
AL	≤7% Si	AlMg2.5		190	220	220	220
AL	≥7% Si	AlSi7		190	250	250	250
CuZn	<1,200 N/mm²	CuZN33, CuAl9Mn2		190	180	180	180
Ti		TiAl6V4		60	60	60	60
S		Inconel, Hasteloy		60	60	60	60
THERMO PLAST		Plastics		180	180	180	180

Recommendations for use	
• Use of ceramic fiber type A21 (white) recommended • Use of ceramic fiber type A32 (blue) possible[1]	• Use of ceramic fiber type A11 (red) recommended • Use of ceramic fiber type A21 (white) possible[1]
• Use of ceramic fiber type A32 (blue) recommended • Use of ceramic fiber type A21 (white) possible[1]	• Use of ceramic fiber type A13 (pink) recommended • Use of ceramic fiber type A11 (red) possible[2]

[1] Depending on burr size and component-shape; [2] Depending on material and component shape

The speeds and feeds listed below are recommended operating parameters for the materials and brush sizes listed. Speeds and/or feeds can be adjusted depending on material hardness, burr size, desired cycle time and tool life.

START PARAMETERS FOR POLISHING[3]

	60	100	125	165	200	Feed v_f (mm/min)	
	12-20	12-20	12-20	12-20	12-20		
	0.5-1.0	0.5-1.0	0.5-1.0	0.5-1.0	0.5-1.0		
	2,000	1,200	1,000	750	600	Burr root thickness 0.05 mm	Burr root thickness 0.1 mm
	v_c (m/min)	v_c (m/min)	v_c (m/min)	v_c (m/min)	v_c (m/min)		
	180	180	180	180	180	4,000	2,500
	170	170	170	170	170	4,000	2,500
	150	150	150	150	150	4,000	2,500
	175	175	175	175	175	4,000	2,500
	165	165	165	165	165	4,000	2,500
	140	140	140	140	140	4,000	2,500
	120	120	120	120	120	4,000	2,500
	220	220	220	220	220	4,000	2,500
	250	250	250	250	250	4,000	2,500
	180	180	180	180	180	4,000	2,500
	60	60	60	60	60	4,000	2,500
	60	60	60	60	60	4,000	2,500
	180	180	180	180	180	4,000	2,500

Brush Ø (mm)		6-200	Feed[4] v_f (mm/min)
Brush projection (mm)		12	
Depth of cut [a_p] in mm		0.3	
Max. speed n [rpm]		Dep. on Ø	
Recommended ceramic fiber		v_c (m/min)	
Pre-polish	Finishing	180	300
Pre-polish	Finishing	170	300
Pre-polish	Finishing	150	300
Pre-polish	Finishing	175	300
Pre-polish	Finishing	165	300
Pre-polish	Finishing	140	300
Pre-polish	Finishing	120	300
Pre-polish	Finishing	220	300
Pre-polish	Finishing	250	300
Pre-polish	Finishing	180	300
Pre-polish	Finishing	60	300
Pre-polish	Finishing	60	300
–	–	–	–

Recommendations for use	
Use of ceramic fiber type A13 (pink) recommended	Use of ceramic fiber type A21 (white) recommended
Use of ceramic fiber type A11 (red) recommended	Use of ceramic fiber type A32 (blue) recommended

[3] When coolant is used, the polishing results tend to be better.
[4] Recommendation: By using a high feed rate machining strategy (e.g. v_f = 3,000 mm/min) with multiple traversing (e.g. 5x) and slightly reduced depth of cut a_p, tool wear can be reduced.

C
1.4

FLOATING HOLDER

for constant machining results, longer tool life & more productive series processing (optional component)

COMPONENT SUITABLE FOR

- CERAMIC FIBER BRUSHES Ø 6 mm to Ø 100 mm

FEATURES

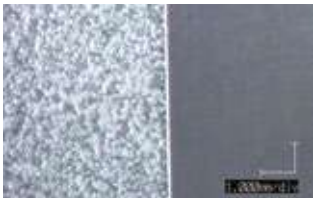
- The FLOATING HOLDER is axially controlled by a compression spring and ensures a constant contact pressure of the brush. This ensures stable and consistent workpiece machining
- Consistent edge processing through automatic adjustment of cutting pressure
- The cutting force (the cutting pressure) can be adjusted to the desired machining quality (machining result) by changing the spring. Three different pressure springs (spring forces) are available for selection
- The axial compensation movement results in less adjustment effort (in case of tool wear, length adjustment of the bristels in the sleeve is not required)
- Reduces tool wear and thus stabilizes the machining conditions
- Can be used on machining centers, CNC lathes, drilling machines, special machines as well as other machine tools

TOOL VIDEO LINK

ANIMATION
Working principle of the Floating Holder

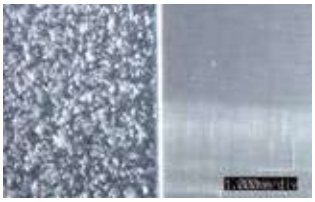
WITH FLOATING HOLDER
The different cutting depths are compensated by the axial tool movement. Even with large differences in cutting depth, uniform machining is ensured.

Cutting depth: 0.5 mm

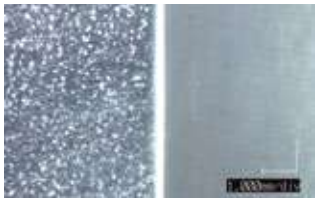


Cutting depth: 5.0 mm

WITHOUT FLOATING HOLDER
The different cutting depths are directly reflected on the machined surface after machining.

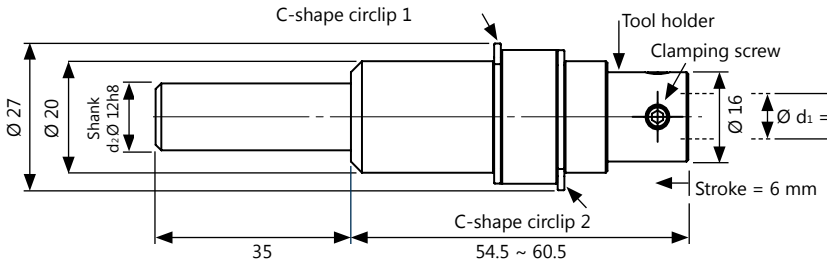


Cutting depth: 0.5 mm

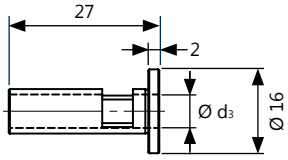


Cutting depth: 1.5 mm

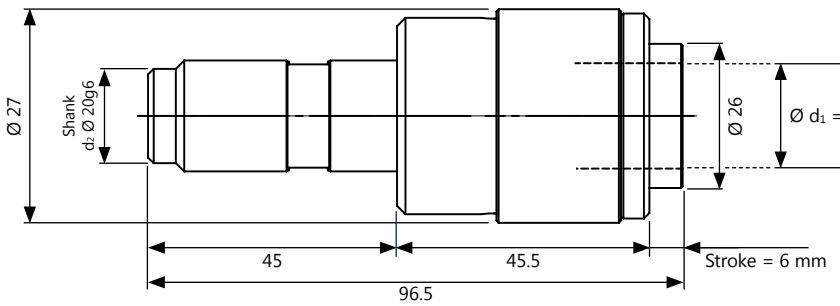
FLOATING HOLDER BÜFHST12



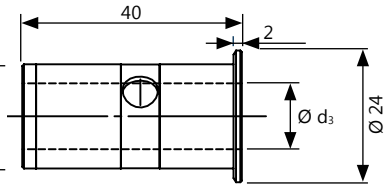
REDUCING BUSH FOR BÜFHST12



FLOATING HOLDER BÜFHST20 (60 & 100)



REDUCING BUSH FOR BÜFHST20 (60 & 100)



• FLOATING HOLDER

Tool-holder Ø d_1 (mm)	Shank Ø d_2 (mm)	included reducing bush with Ø d_3 (mm)	For sleeve	Item No.	EUR/ Piece
10	12	6 and 8	BÜS06M BÜS15MP BÜS25M BÜS40M	BÜFHST12	
19	20	12	BÜS60M	BÜFHST2060	
19	20	16	BÜS100M	BÜFHST20100	

• REDUCING BUSH

FOR CERAMIC FIBER BRUSH SURFACE END TYPE

Tool-holder Ø d_1 (mm)	Ø d_3 (mm)	Item No.	EUR/ Piece
10	3	BÜFHXBCREDU3	

CUTTING DATA

Item No.	Spring	Spring pressure with standard spring		Compensating stroke (mm)	max. speed rpm
		with 0 mm stroke	with 6 mm stroke		
BÜFHST12	Standard*	4.5	6.3	6	10,000
BÜFHST12	Soft*	1.5	3.3	6	10,000
BÜFHST12	Hard*	7.2	10.5	6	10,000
BÜFHST2060	Adjustable	2-6	6-10	6	5,000
BÜFHST20100	Adjustable	2-6	6-10	6	5,000

*Included in the scope of delivery

APPLICATION NOTES FOR FLOATING HOLDER

Check before use

The Floating Holder should be firmly clamped in the collet with the entire shank length. The fiber brush should also be inserted into the tool holder as far as it will go and firmly clamped.

Before the actual start-up, a test run of at least 1 minute, or 3 minutes in the case of a tool change, should be performed to check for abnormalities such as tool vibration or loose clamping.
Even if no abnormalities are noticed during the test run, you should stop the tool immediately if anything unusual, such as vibration, occurs.
Shank displacement, deformation or tool breakage could result.

Fitting with reducing bush

Insert the reducing bush and the fiber brush into the tool holder as far as they will go and align the two notches of the reducing bush with the clamping screws. Clamp the fiber brush through the recess in the reducing bush with the clamping screws.

Immersion depth / compensation stroke

The tool weight itself has an effect on the cutting pressure, depending on the tool position. The compensation stroke is maximum 6 mm.

Replacing the spring

If you change the spring of the floating holder, please proceed carefully according to the operating instructions.
Use exactly the spring specified by KEMPF, otherwise the tool may break or not work correctly.

PLEASE NOTE THE GENERAL WORK SAFETY ON PAGE 147.

C
1.5

SELF-ADJUSTING SLEEVE

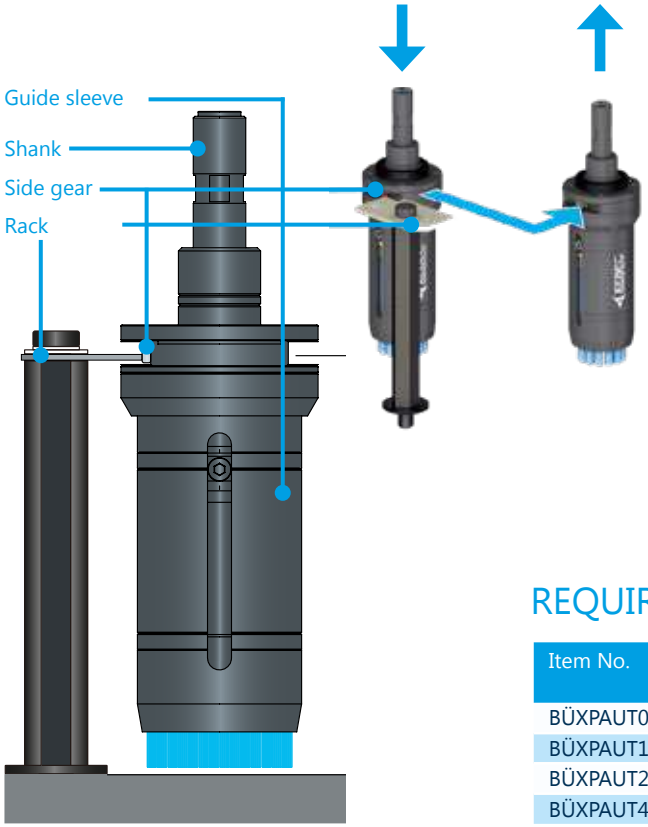
for automatically adjusting the brush projection length (optional component)

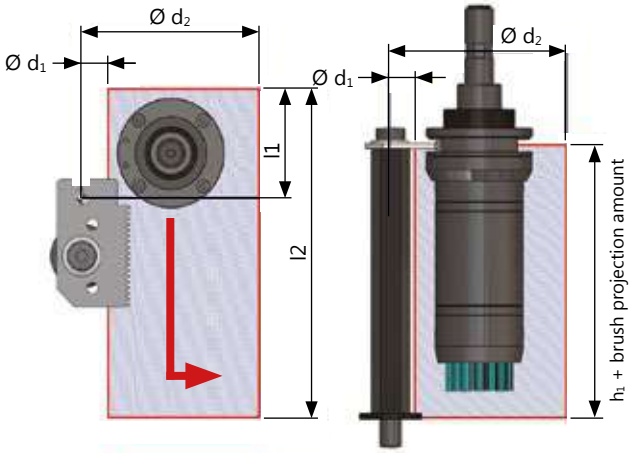
COMPONENT SUITABLE FOR

- CERAMIC FIBER BRUSHES Ø 6 mm to Ø 40 mm

FEATURES

- With a rack mounted on the machine table, the side gear embedded in the self-adjusting sleeve can be rotated without having to remove the brush from the sleeve
- The infeed is in 0.05 mm increments and is dependent on wear
- An infeed of 0.05 mm - 1.0 mm takes place with one rotation of the side gear wheel
- Can be used on machining centers, robots, special machines as well as other machine tools

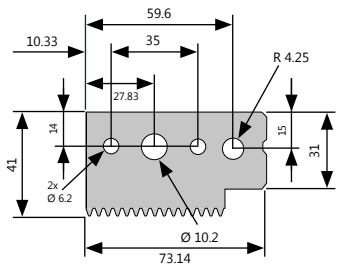




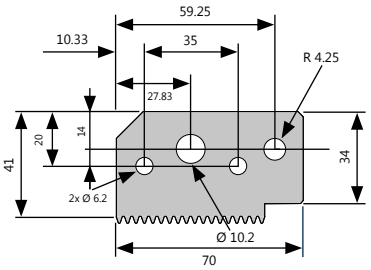
REQUIRED WORKSPACE

Item No.	Ø d_1 (mm)	Ø d_2 (mm)	l_1 (mm)	l_2 (mm)	h_1 (mm)
BÜXPAUT06M	10	75	50	155	85
BÜXPAUT15M	10	75	50	155	95
BÜXPAUT25M	15	100	60	180	130
BÜXPAUT40M	15	100	60	180	130

GEAR RACK FOR BÜXPAUT06M BÜXPAUT15M



GEAR RACK FOR BÜXPAUT25M BÜXPAUT40M

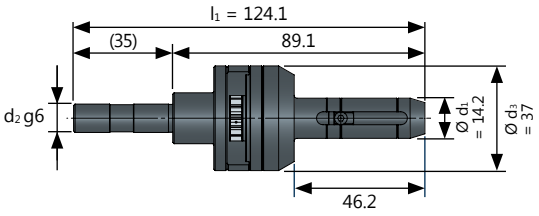


TOOL VIDEO LINK

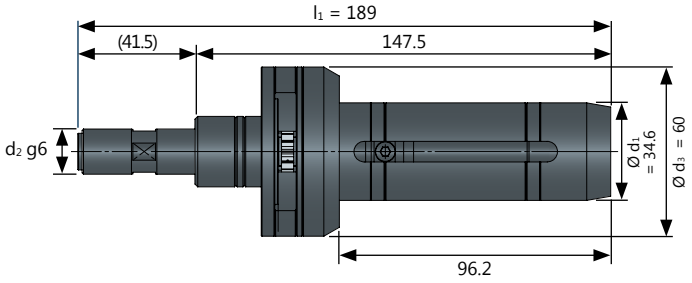
ANIMATION
Working principle of the Self-Adjusting Sleeve

VIDEO
Face deburring and self-adjustment

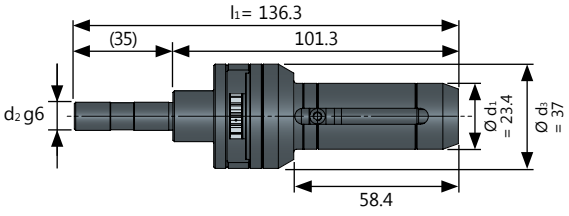
BÜXPAUT06M



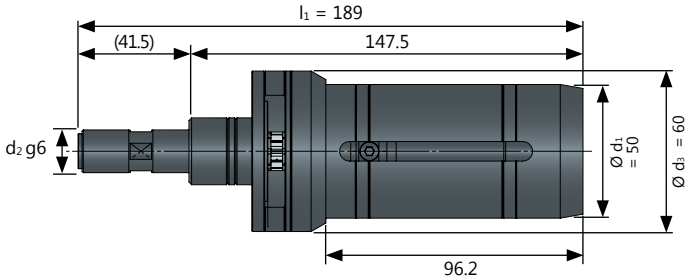
BÜXPAUT25M



BÜXPAUT15M



BÜXPAUT40M



SELF-ADJUSTING SLEEVES

Total length l_1 (mm)	Sleeve Ø d_1 (mm)	Shank Ø d_2 (mm)	Outer-Ø d_3 (mm)	For brush	max. speed rpm	Item No.	EUR/ Piece
124.1	14.2	10	37	BÜA..CB06M	10,000	BÜXPAUT06M	
136.3	23.4	10	37	BÜA..CB15M	6,000	BÜXPAUT15M	
189	34.6	16	60	BÜA..CB25M	5,000	BÜXPAUT25M	
189	50	16	60	BÜA..CB40M	3,000	BÜXPAUT40M	

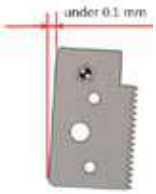
APPLICATION NOTES FOR SELF-ADJUSTING SLEEVE

Mounting the gear rack

The rack should be mounted where there is sufficient space and no other fixtures are disturbed.

Fasten the Torx screw on the sliding table (maximum torque 40 Nm) and on the rack (maximum torque 15 Nm).

There is a risk of damaging the tool or the machine, if the alignment of the rack is not correct or the inclination is more than 0.1 mm.



Before operation

It must always be checked whether the teeth fit together.

The position and height of the side gear and rack must be adjusted to each other.

Inserting the brush

Insert the brush into the brush holder as far as it will go and tighten the fastening screws (M4) with an Allen key (3 N). Make sure that there is no gap between the brush and the interior of the brush holder so that the brush cannot come loose.

To replace the brush, loosen the two fastening screws and pull the brush out of the brush holder.

PLEASE NOTE THE GENERAL WORK SAFETY ON PAGE 147.

C
1.6

BRUSH LENGTH ADJUSTMENT TOOL

for quick adjustment of the bristle projection (optional component)

COMPONENT SUITABLE FOR

- CERAMIC FIBER BRUSHES Ø 15 mm to Ø 100 mm

Integrated Allen key

FEATURES

- Simple handling
- Setting within the shortest time
- Adjustment possible in clamped state
- Suitable for ceramic fiber brushes Ø 15 mm to Ø 100 mm
- Bristle projection does not have to be measured separately
- Integrated Allen key for the most common ceramic fiber brushes (Ø 15 mm, Ø 25 mm, Ø 40 mm)

1. Move the brush rest using adjustment knob to set the amount of brush projection.

2. Tighten the locking screw.

3. Loosen the locking screw of the brush. Hold the unit in one hand and align the sleeve rest with sleeve tip.

4. Tighten the locking screws to secure brush in place.

SCOPE OF DELIVERY

- Adjusting device
- Allen key 1.5
- Allen key 2.0

Item No.	EUR/ Piece
BÜXPEZ001	

GENERAL WORK SAFETY

PLEASE NOTE THE FOLLOWING SAFETY INSTRUCTIONS



Always wear safety goggles, gloves and a mouth guard when working.

In addition, outerwear should be long-sleeved with closed cuffs and hems to protect your skin.

Grinding dust and particles can be vaporized in the working area while the brush is rotating. This area should therefore be closed to prevent other people from entering it. Anyone entering this area should be protected accordingly. Also keep a distance from this area yourself, as parts of the fiber rods can get stuck in the skin.

ADD-ON FOR FLOATING HOLDER AND SELF-ADJUSTING SLEEVE:

Please always follow the instructions on the respective product pages to use the tool safely. Failure to follow these instructions may result in tool breakage, deformation of the shank, or derailment of the tool. Also, carefully read the operating instructions before using the tool.

C
2

CERAMIC FIBER WHEEL BRUSH "WHEEL TYPE"

The innovative CNC deburring & polishing solution for lateral surfaces and edges

Brushes are available in the following colors:

RED

PLEASE NOTE

Please order the suitable shank for the wheel brush. This is NOT part of the brush.

INFO

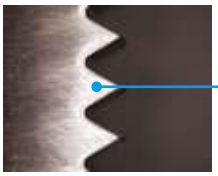
Brushes and shanks are interchangeable and available separately.

APPLICATIONS

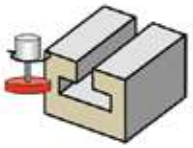
Surface on thread

Before

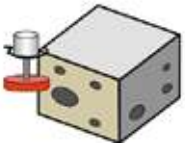
After



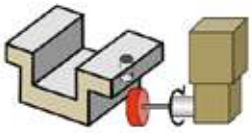
Lateral surfaces after milling



Lateral surfaces after drilling

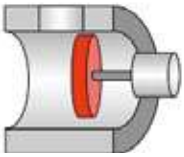


Back deburring

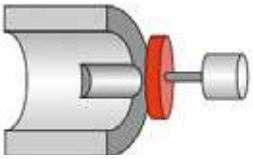


Thread

Internal machining from Ø 50 mm



Notches



TOOL VIDEO LINK

ANIMATION
Deburring of internal groove edges

VIDEO
Deburring of a thread

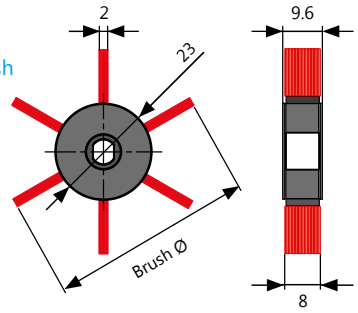
• WHEEL BRUSH

Brush-Ø (mm)	Fiber bundle	Fiber type	Dimension	Item No.	EUR/Piece
50	6	A11 (red)	see sketch 1	BÜWA1150	
75	6			BÜWA1175	

• SHANK (with 1x clamping screw; Item-No. BÜWM4)

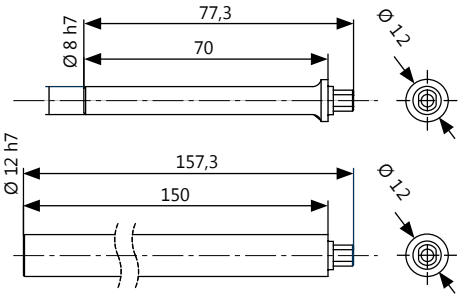
Shank-Ø (mm) h7	Clamping screw	Shank-length (mm)	Dimension	Item no.	EUR/piece
8	M4	70	see sketch 2	BÜWSHM	
12		150	see sketch 3	BÜWSHL	

Sketch 1
Round brush



Sketch 2
Type M (short)

Sketch 3
Type L (long)



CUTTING DATA

RECOMMENDED CUTTING DATA FOR FIRST USE

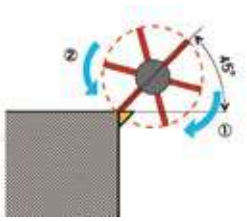
Item No.	Cutting speed v_c (m/min)	Rotation speed n (min^{-1})	Feed rate/bundle (mm/fiber bundle)	Feed rate f (mm/min)	Depth of cut ap (mm)
BÜWA1150	250	1,600	0.5	4,800	0.2
BÜWA1175	235	1,000	0.5	3,000	0.2

RECOMMENDED CUTTING DATA RANGE

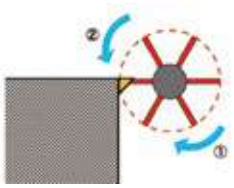
Item No.	Cutting speed v_c (m/min)	Feed rate/bundle (mm/fiber bundle)	Depth of cut ap (mm)	Max. Speed n (min^{-1})
BÜWA1150 / BÜWA1175	150 - 350	0.2 - 0.5	0.1 - 0.5	3,000

NOTE: The fiber bundles decrease in diameter due to normal wear and thus become stiffer. If breakage of the fibers should occur, please reduce the cutting depth ap.

- The recommended cutting data must be adapted to the workpiece depending on the burr size
- If burrs remain, increase the number of passes



Optimal engagement of the brush:
Angle of attack to the edge. Rotation in clockwise direction against the ridge and then counterclockwise.



Alternative setting:
Clockwise rotation against the ridge and then counterclockwise.

TOOL WEAR COMPENSATION

The cutting depth ap of these brushes must be kept small. The brush wear must therefore be corrected in the radial direction manually or by programmed offsets.

MACHINE REQUIREMENT

It is necessary to control spindle speed and depth of cut.

CNC lathes
Milling chuck or collet chuck as driven tool

Machining centers
Use in milling chuck or collet chuck

CERAMIC FIBER CROSS-HOLE BRUSH STANDARD for hole Ø 3.5 mm to 20 mm

For deburring of cross holes as well as polishing or descaling of inner wall surfaces

Brushes are available in the following colors:

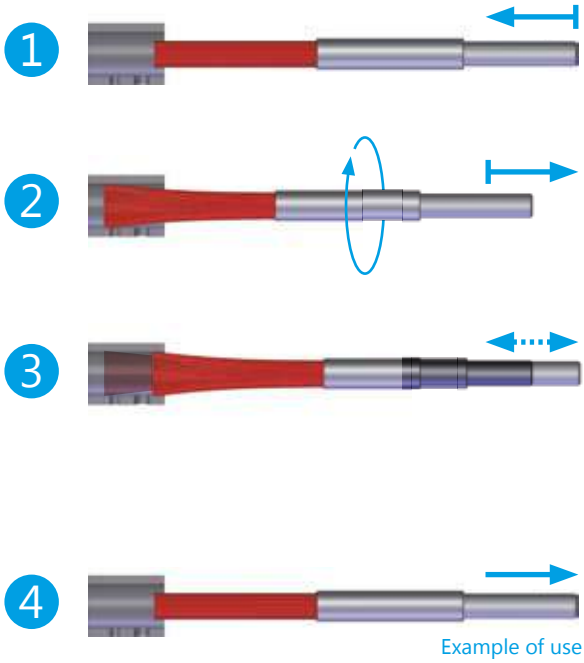
RED

BLUE

PLEASE NOTE

Please order the correct brush length for your application.

WORKING PRINCIPLE



Example of use

RUN-IN

Insert the tool into the bore while the spindle is stopped.

ROTATE

Start the spindle in clockwise rotation within the hole right behind the cross hole.

BACK AND FORWARD MOVEMENT

Process while pulling the brush back and pushing forward. In the forward movement, we additionally recommend changing the spindle direction for difficult deburring tasks.

RETRACT

Before the tool exits the hole, spindle rotation must be stopped.

INFO

The centrifugal force created by the rotation, steers the ceramic fibers to the cross holes. The tips efficiently remove fine burrs up to 0.1 mm burr root thickness.
Since the ceramic fibers are abrasive only at the tips and not around the circumference, the bore is not damaged.

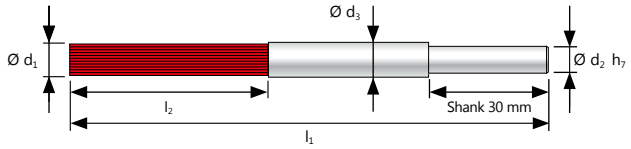
The CROSS-HOLE BRUSH can be used, for example, on machining centers, special machines, drilling machines, robots and much more.

TOOL VIDEO LINK

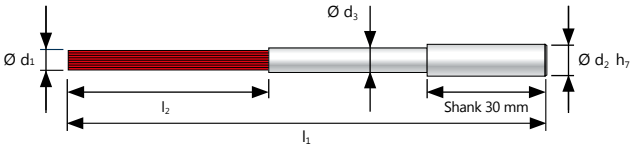
ANIMATION/VIDEO
Deburring of a cross hole

ANIMATION
Deburring of multiple cross holes

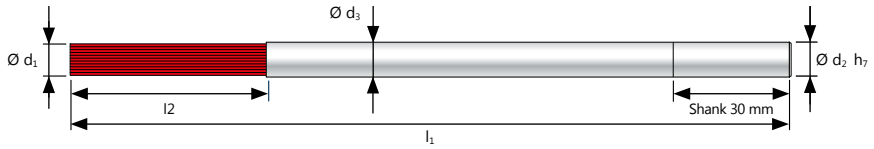
RED TYPE 120 mm LENGTH (EXCEPT BÜCHA1215M)



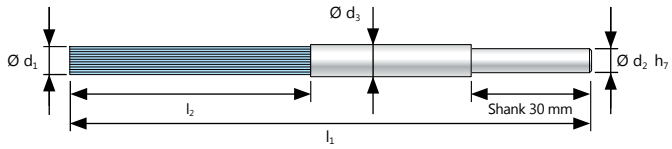
BÜCHA1215M



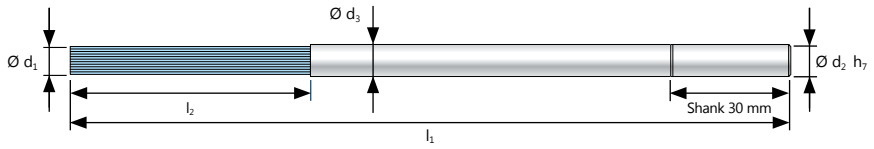
RED TYPE 170 mm LENGTH



BLUE TYPE 130 mm LENGTH



BLUE TYPE 180 mm LENGTH



BRUSH

For hole-Ø (mm)	Bristle-Ø d_1 (mm)	Shank-Ø d_2 (mm)	Neck-Ø d_3 (mm)	Bristle length l_2 (mm)	Total length l_1 (mm)	Color code	Item No.	EUR/Piece
Ø 3.5 to Ø 5	1.5	3	2.5	50	120	A12 (red)	BÜCHA1215M	
Ø 5 to Ø 8	3	3	4	50	120	A12 (red)	BÜCHA123M	
		4			170	A12 (red)	BÜCHA123L	
Ø 5 to Ø 8	3	3	4	60	130	A33 (blue)	BÜCHA333M	
		4			180	A33 (blue)	BÜCHA333L	
Ø 8 to Ø 10	5	6	6	50	120	A12 (red)	BÜCHA125M	
					170	A12 (red)	BÜCHA125L	
Ø 8 to Ø 10	5	6	6	60	130	A33 (blue)	BÜCHA335M	
					180	A33 (blue)	BÜCHA335L	
Ø 10 to Ø 14	7	6	8	50	120	A12 (red)	BÜCHA127M	
		8			170	A12 (red)	BÜCHA127L	
Ø 10 to Ø 14	7	6	8	60	130	A33 (blue)	BÜCHA337M	
		8			180	A33 (blue)	BÜCHA337L	
Ø 14 to Ø 20	11	12	12	50	120	A12 (red)	BÜCHA1211M	
					170	A12 (red)	BÜCHA1211L	
Ø 14 to Ø 20	11	12	12	60	130	A33 (blue)	BÜCHA3311M	
					180	A33 (blue)	BÜCHA3311L	

CUTTING DATA A12 (RED)

Item No. Brush	Speeds rpm		Feed rate v_f (mm/min)
	Recommended	Maximum	
BÜCHA1215M	9,000 - 11,000	20,000	300
BÜCHA123M	7,000 - 10,000	14,000	
BÜCHA123L	7,000 - 10,000	12,000	
BÜCHA125M	8,000 - 10,000	14,000	
BÜCHA125L	8,000 - 10,000	12,000	
BÜCHA127M	7,000 - 9,000	14,000	
BÜCHA127L	7,000 - 9,000	12,000	
BÜCHA1211M	6,000 - 7,500	14,000	
BÜCHA1211L	6,000 - 7,500	12,000	

CUTTING DATA A33 (BLUE)

Item No. Brush	Speeds rpm		Feed rate v_f (mm/min)
	Recommended	Maximum	
BÜCHA333M	7,500 - 9,000	14,000	300
BÜCHA333L	7,500 - 9,000	12,000	
BÜCHA335M	7,500 - 8,000	14,000	
BÜCHA335L	7,500 - 8,000	12,000	
BÜCHA337M	6,500 - 8,000	14,000	
BÜCHA337L	6,500 - 8,000	12,000	
BÜCHA3311M	6,500 - 8,000	14,000	
BÜCHA3311L	6,500 - 8,000	12,000	

PLEASE NOTE: The feed rate can be used to "adjust" the deburring effect of the ceramic fibers. A higher speed than the maximum permissible can lead to breakage of the tool!

C
3.1

CERAMIC FIBER CROSS-HOLE BRUSH EXTRA LARGE for hole-Ø 20 mm to 35 mm

For deburring of cross holes as well as polishing of inner wall surfaces

Brushes are available in the following colors:

DARK BLUE

PLEASE NOTE

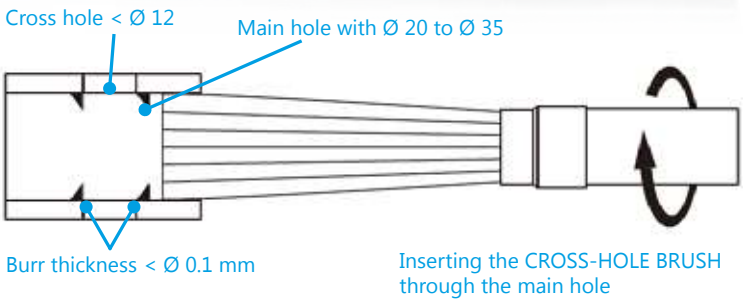
Please order the suitable shank separately. This is NOT part of the brush.

INFO

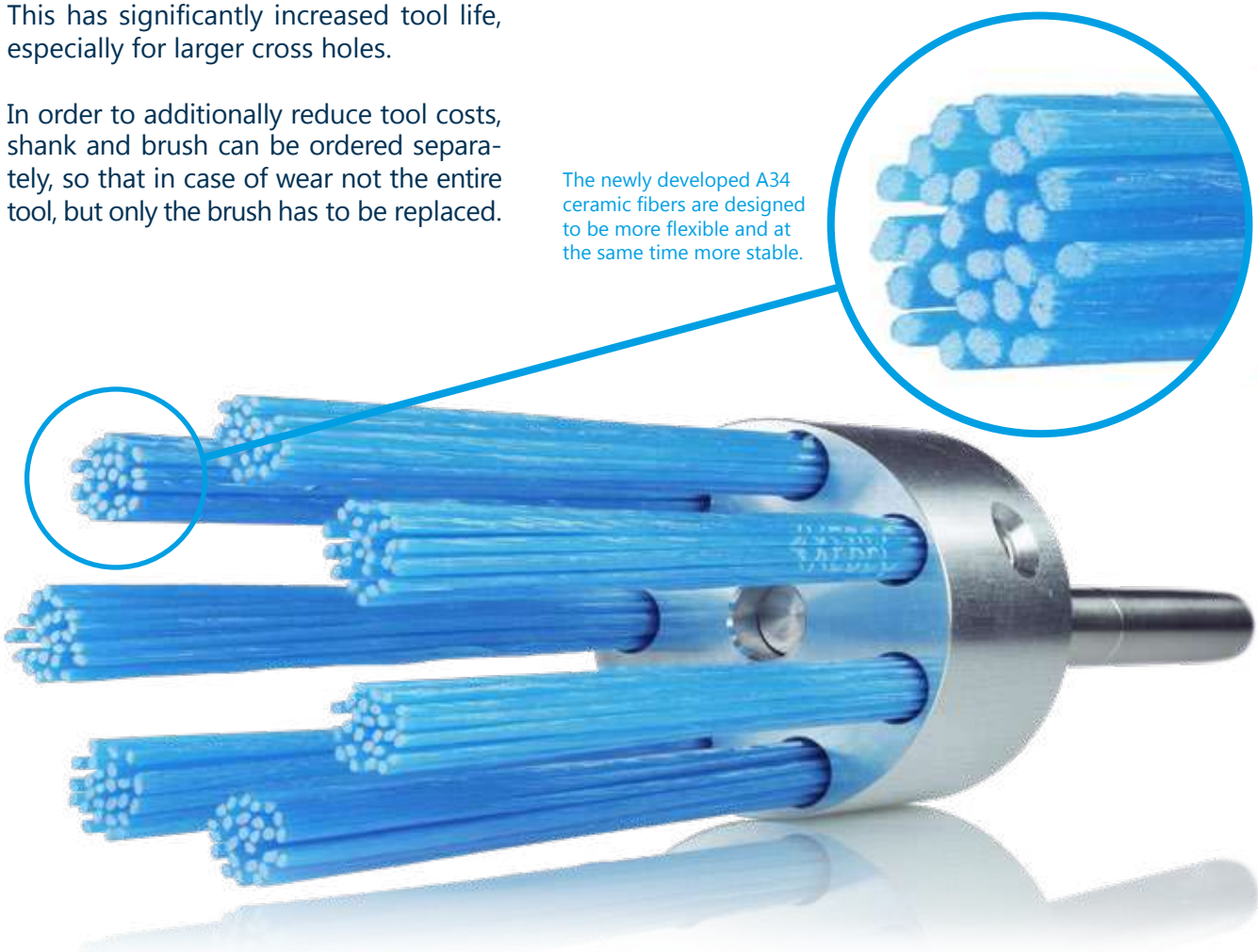
In contrast to standard CROSS-HOLE BRUSH (STANDARD), these brushes are designed for larger bore diameters.

To optimize performance, a special ceramic fiber material (A34 = dark blue) with a new contour was developed for the CROSS-HOLE BRUSH EXTRA LARGE. This has significantly increased tool life, especially for larger cross holes.

In order to additionally reduce tool costs, shank and brush can be ordered separately, so that in case of wear not the entire tool, but only the brush has to be replaced.



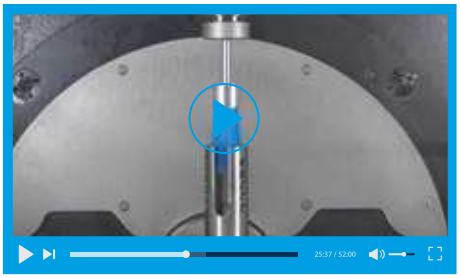
The newly developed A34 ceramic fibers are designed to be more flexible and at the same time more stable.



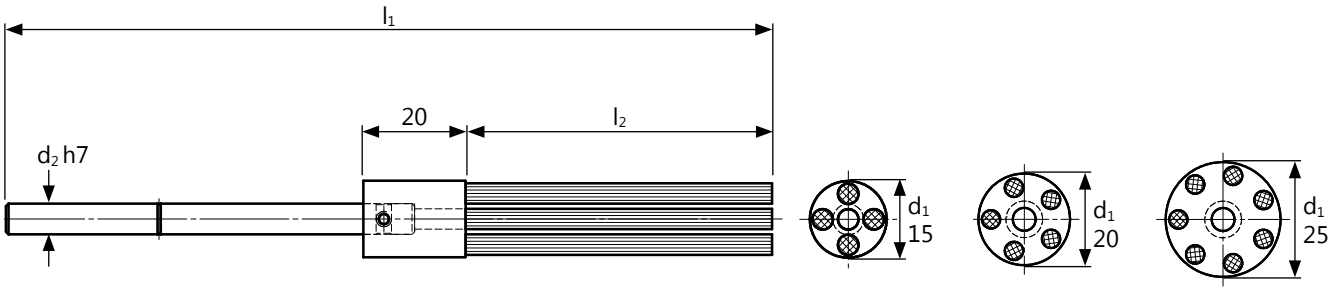
FEATURES

- Improved grinding performance and wear resistance
- Longer tool life due to the new ceramic fiber A34, which is better able to expand and conform to the bore wall
- Uneven tool wear is prevented

TOOL VIDEO LINK



VIDEO
Deburring several cross holes



• BRUSH

For hole-Ø (mm)	Bristle-Ø d_1 (mm)	Shank-Ø d_2 (mm)	Bristle length l_2 (mm)	Total length l_1 (mm)	Color code	Item No.	EUR/Piece
Ø 20 to Ø 25	15	6	60	150	A34 (dark blue)	BÜCHA3415	
Ø 25 to Ø 30	20	8	60	150	A34 (dark blue)	BÜCHA3420	
Ø 30 to Ø 35	25	8	60	150	A34 (dark blue)	BÜCHA3425	

• SHANK

Shank Ø d_2 h7 (mm)	Shank-Length (mm)	suitable for brush with Ø d_1 (mm)	Item No.	EUR/Piece
6	80	15	BÜCHSH6	
8	86	20 and 25	BÜCHSH8	

CUTTING DATA

Item No. Brush	Speeds rpm		Feed rate v_f (mm/min)
	Recommended	Maximum	
BÜCHA3415	5,000	9,000	300
BÜCHA3420	4,500	9,000	
BÜCHA3425	4,000	9,000	

INSTRUCTIONS FOR USE:

- If deburring/edge rounding is too strong: Reduce speed
- For even deburring of cross-holes: Use the tool in clockwise and counter-clockwise rotation
- Pulling processing protects the fibers and increases the life of the brush
- Do not use the CROSS-HOLE BRUSH EXTRA LARGE outside the workpiece, as the ceramic fibers may otherwise break. Also observe the maximum speed of 9,000 rpm. This must not be exceeded.

C
3.2

CERAMIC FIBER CROSS-HOLE BRUSH EXTRA LONG

For gentle deburring of cross holes as well as polishing of inner wall surfaces in deep-hole bores

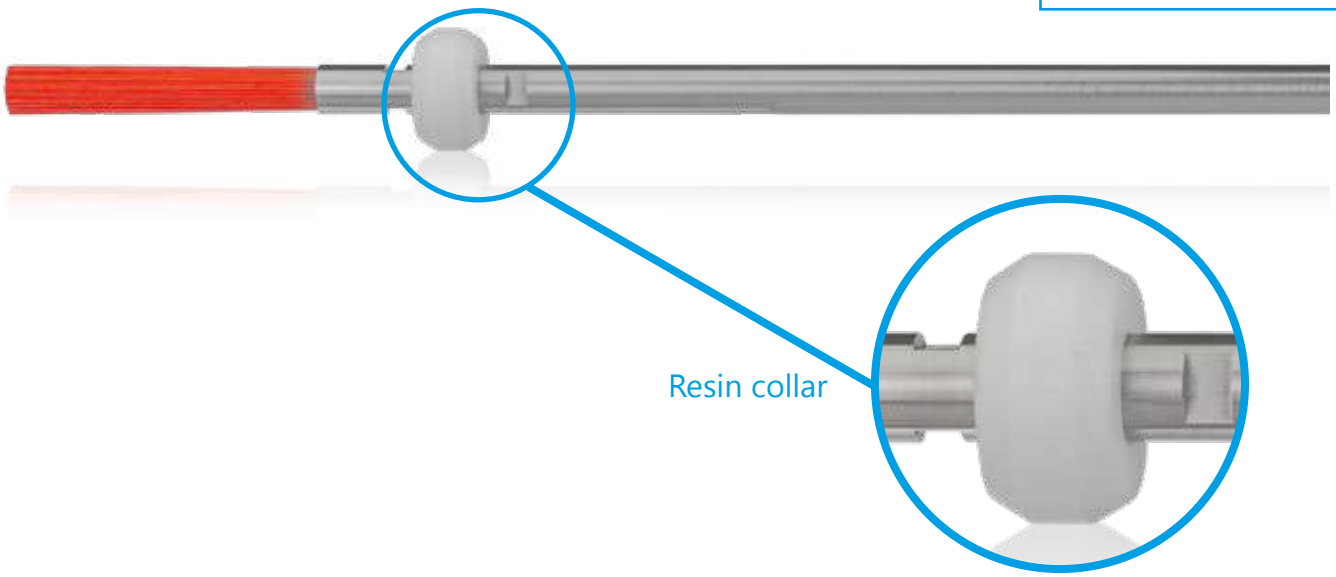
Brushes are available in the following colors:

RED

BLUE

PLEASE NOTE

Please order the appropriate shank separately.



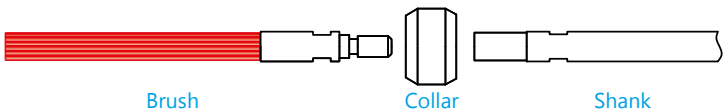
FEATURES

A special characteristic that distinguishes the CROSS-HOLE BRUSH EXTRA LONG from the STANDARD CROSS HOLE BRUSH is a plastic collar located below the brush head. This collar stabilizes the brush and prevents the tool from wobbling. Therefore, please specify the main bore diameter of the workpiece.

INFO

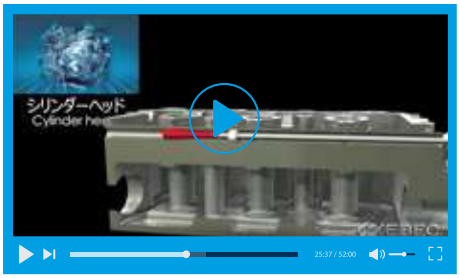
The principle of operation corresponds to that of the STANDARD CROSS-HOLE BRUSH.

The CROSS-HOLE BRUSH EXTRA LONG are designed for drilling depths from 140 mm to a maximum of 370 mm. Since the collar must be adapted exactly to the main bore diameter, the entire tool is composed of three separate parts (brush, collar and shank), which must be ordered individually.



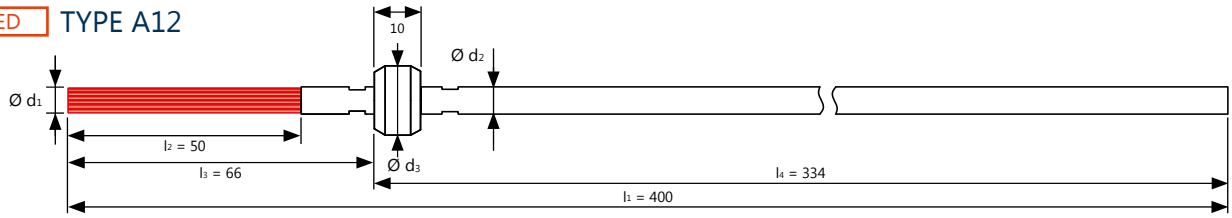
The brushes are suitable for dry, as well as for wet processing. The brush is replaceable and can be easily unscrewed. The shank is reusable.

TOOL VIDEO LINK

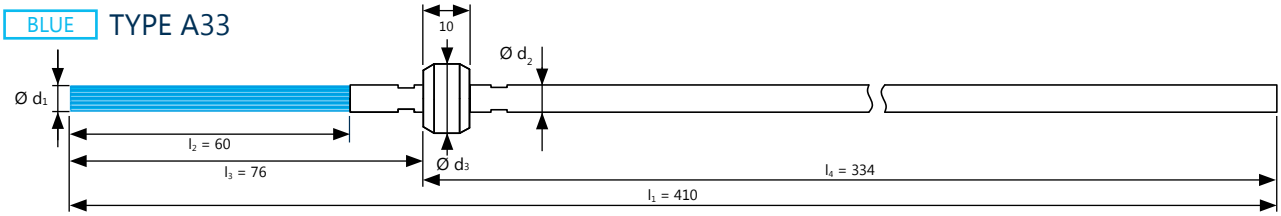


ANIMATION
Deburring of a deep bore hole

RED TYPE A12



BLUE TYPE A33



**PLEASE NOTE: For brush Ø 11 mm, l_3 for type A12 is 70 mm and for type A33 80 mm; l_4 = 330 mm.

• BRUSH

For hole-Ø (mm)	Brush-Ø d_1 (mm)	Color code	Item No.	EUR/ Piece
5 - 8	3	A12 (red)	BÜCHA123F	
5 - 8	3	A33 (blue)	BÜCHA333F	
8 - 10	5	A12 (red)	BÜCHA125F	
8 - 10	5	A33 (blue)	BÜCHA335F	
10 - 14	7	A12 (red)	BÜCHA127F	
10 - 14	7	A33 (blue)	BÜCHA337F	
14 - 20	11**	A12 (red)	BÜCHA1211F	
14 - 20	11**	A33 (blue)	BÜCHA3311F	

• SHANK

Shank-Ø d_2 (mm)	Shank l_4 (mm)	Item No.	EUR/ Piece
4	334	BÜCHA333FS	
6	334	BÜCHA335FS	
8	334	BÜCHA337FS	
12	330	BÜCHA3311FS	

• COLLAR

CUSTOMIZED

Collar-Ø d_3 (mm)	Item No.	EUR/ Piece
4.8 - 7.8	BÜCL3	
7.8 - 9.8	BÜCL5	
9.8 - 19.8	BÜCL7	
13.8 - 19.8	BÜCL11	

BLANK

Collar-Ø d_3 (mm)	Item No.	EUR/ Piece
7.8	BÜCL3R	
9.8	BÜCL5R	
19.8	BÜCL7R	
19.8	BÜCL11R	

CUTTING DATA A12 (RED)

Item No.	Speeds rpm		Feed rate f (mm/min)
	Recommended	Maximum	
BÜCHA123F	7,000 - 10,000	12,000	300
BÜCHA125F	8,000 - 10,000	12,000	
BÜCHA127F	7,000 - 9,000	12,000	
BÜCHA1211F	6,000 - 7,500	12,000	

CUTTING DATA A33 (BLUE)

Item No.	Speeds rpm		Feed rate f (mm/min)
	Recommended	Maximum	
BÜCHAA333F	7,500 - 9,000	14,000	300
BÜCHA335F	7,500 - 8,000	12,000	
BÜCHA337F	6,500 - 8,000	14,000	
BÜCHA3311F	6,500 - 8,000	12,000	

PLEASE NOTE: Higher speed than the maximum permissible can lead to breakage of the tool!

EXAMPLE:

APPLICATION NOTES FOR CROSS-HOLE BRUSH

Tool size and important user information

Select a tool size that corresponds to the target hole diameter. Selecting the wrong brush diameter poses a risk of breakage as well as deformation and damage of the bristles and shank.

Insert the tool into the workpiece while the spindle is at standstill, otherwise the fiber rods may be damaged or dangerously scattered. Do not rotate outside a hole (risk of injury).

Check before use

If the tool is used on a machine, insert the tool shank into the chuck as far as as possible and clamp it.
If you notice anything unusual during the test run, such as vibration, stop the rotation immediately. Dangerous breakage or damage to the fiber rods and/or the shaft can otherwise be the result.

Size of the burrs to be removed

This tool is designed for removing fine burrs where the burr root is below or at 0.1 mm after machining.

PLEASE NOTE THE GENERAL WORK SAFETY ON PAGE 147.

C
4

CERAMIC FIBER BRUSH SURFACE END TYPE

For cutter-mark removal, polishing and finishing of parts with small or narrow features

COMPONENT PARTS AVAILABLE!

Usable with the MOBILE MICROMOTOR SYSTEM

Brushes are available in the following colors:

- PINK
- RED
- WHITE
- BLUE

PLEASE NOTE

Please observe the rotational-speed range of the fibers in use.

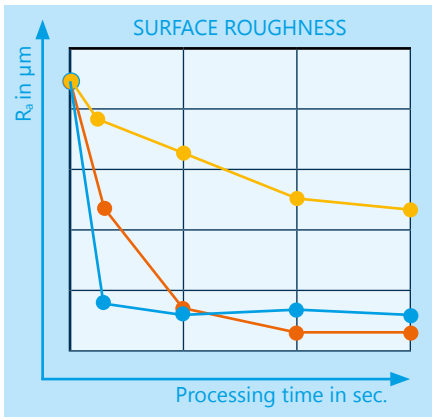
FEATURES

The very easy handling ensures a significant improvement of the surface finish and deburring quality in a very short time as well as a smooth and vibration-free operation.
The CERAMIC FIBER BRUSH SURFACE END TYPE is suitable for use on CNC machines and for working with the Mobile Micromotor System (page 164).

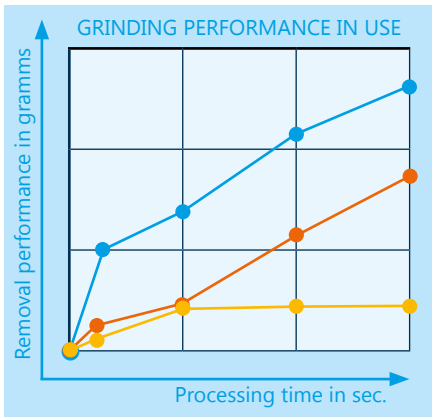
Metals such as steel, stainless steel, copper, aluminum and magnesium alloys up to a hardness of 55 HRC can be machined.

COMPARISON TO ABRASIVE NYLON BRUSHES WITH DIAMOND IMPREGNATION

Grinding performance comparison (wet) with material NAK80 (HRC40 - eroded surface)

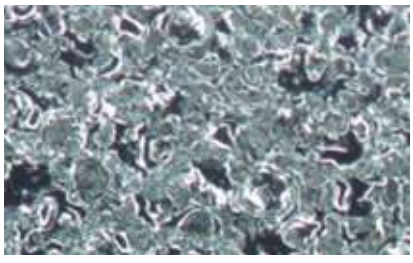


- Xebec brush (A21EB06M); 12,000 rpm
- Xebec brush (A11EB06M); 12,000 rpm
- Abrasive nylon brush (diamond #400); 12,000 rpm

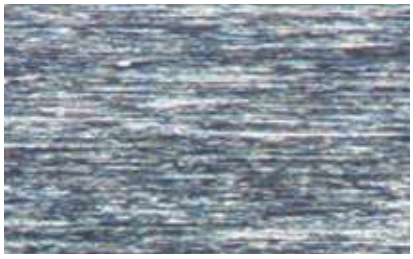


- Xebec brush (A21EB06M); 12,000 rpm
- Xebec brush (A11EB06M); 12,000 rpm
- Abrasive nylon brush (diamond #400); 12,000 rpm

Before finishing

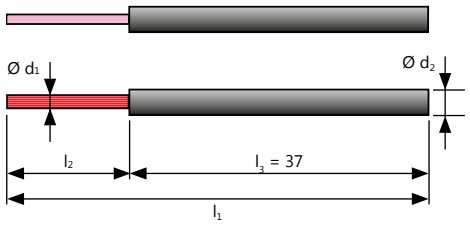


After finishing



TYPE
BÜA13EB01S

TYPE
BÜA11EB015S



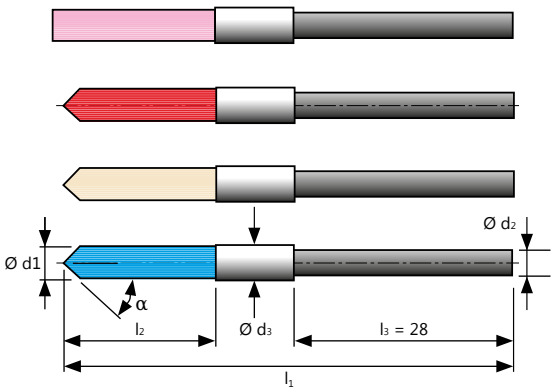
*PLEASE NOTE: The CERAMIC BRUSH END TYPE can also be used with the axial compensation holder. For this purpose, an additional reducing sleeve from Ø 10 mm to shank Ø 3 mm is required (see page 143).

TYPE
BÜA13EB03M

TYPE
BÜA11EB06M

TYPE
BÜA21EB06M

TYPE
BÜA32EB06M



BRUSH

CUTTING DATA

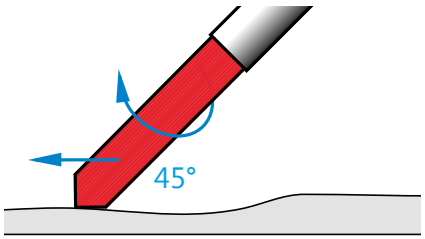
Brush- Ø d_1 (mm)	Shank- Ø d_2 (mm)	Collar- Ø d_3 (mm)	Total length l_1 (mm)	Bristle lenght l_2 (mm)	Angle α	Color code	Item No.	EUR/ Piece	Speeds rpm	
									Recomm.	Maximum
1.0	3	-	52.0	15	-	A13 (pink)	BÜA13EB01S		7,000 - 12,000	15,000
1.5					-	A13 (pink)	BÜA13EB015S			
2.0					-	A13 (pink)	BÜA13EB02S			
2.5					-	A13 (pink)	BÜA13EB025S			
3.0	3	4	67.0	30	-	A13 (pink)	BÜA13EB03M		4,000	6,000
1.0	3	-	52.0	15	-	A11 (red)	BÜA11EB01S		7,000 - 12,000	15,000
1.5					-	A11 (red)	BÜA11EB015S			
2.0					-	A11 (red)	BÜA11EB02S			
2.5					-	A11 (red)	BÜA11EB025S			
5.0	3	6	57.5	20	~50°	A11 (red)	BÜA11EB06M		7,000	12,000
5.0	3	6	57.5	20	~50°	A21 (white)	BÜA21EB06M		7,000	12,000
5.0	3	6	57.5	20	~50°	A32 (blue)	BÜA32EB06M		7,000	12,000

Shank tolerance: 0/-0.050

APPLICATION NOTES FOR CERAMIC FIBER BRUSH SURFACE END TYPE

Surface polishing

Clamp the brush in a hand tool and place it against the work surface at a 45° angle (see illustration).
The grinding pressure must be applied evenly from the brush to the workpiece and the depth of cut should be kept to a minimum (less than 1 mm).



Polishing of edges and deburring of uneven surfaces

Please work with significantly lower speeds (general speed max. 12,000 rpm) and less pressure. Also make sure that you do not exert excessive pressure on the workpiece edges with the sides of the brush.

Fitting / Dressing

Press the tip of the rotating brush against an abrasive or sandpaper fixed on a flat surface to adjust the shape of the brush.

Dry / wet processing

The ceramic grinding fiber can be used for dry and wet machining. In the case of dry processing, an extraction system should be used.

Check before use

Conduct a 1-minute test run before the actual operation and 3 minutes after changing the brushes to check for deviations such as vibrations or looseness of the brush holder. Even if you do not notice any deviations during the test run, you should stop the operation immediately if anything unusual, such as vibration, occurs during use. Otherwise, breakage, deformation or damage to the fiber bristles and the holder may result.

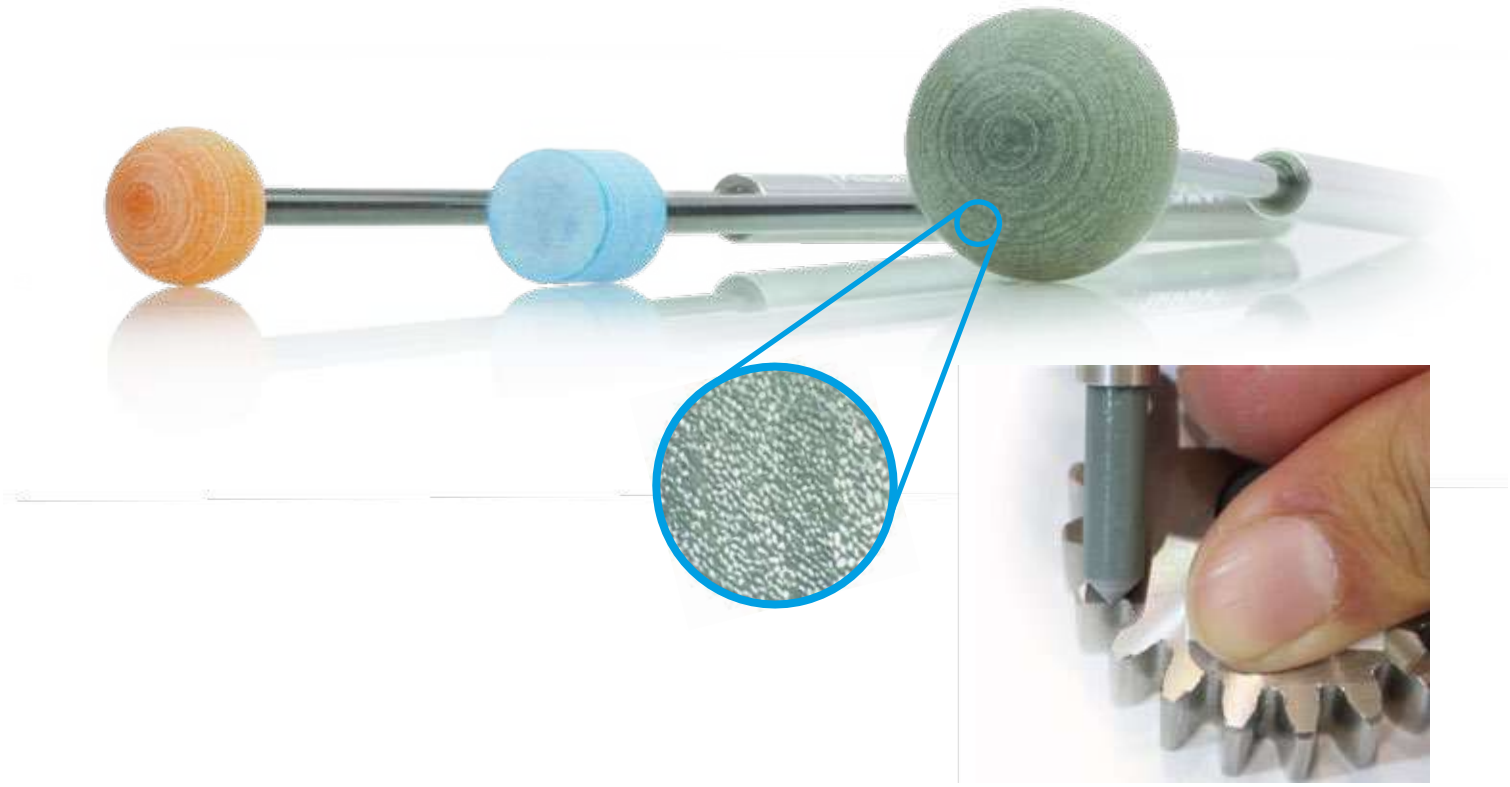
Cutting depth or contact pressure, grinding stress

When used with excessive cutting depths or grinding stress, not only may optimal results not be achieved, but it may also lead to breakage and scattering of the fine ceramic bristles. These are particularly susceptible when machining edges and uneven surfaces.

PLEASE NOTE THE GENERAL WORK SAFETY ON PAGE 147.

CERAMIC FIBER STONE MATERIAL FEATURES

Patented abrasive stone made of abrasive ceramic fiber material - perfect for deburring as well as polishing



FEATURES

- The tool head is made of our special Al_2O_3-ceramic fiber material instead of abrasive grain
- Ideal for precisely processing during manual or machine fine deburring
- Burrs are carefully removed without damaging the boreholes or edges
- The self-sharpening characteristic of the cutting edges at the fiber ends ensures very high grinding capability. The constantly working cutting edges ensure stable and continuous grinding performance
- Extreme dimensional stability ensure long tool life and enable increasing productivity and lower costs
- Efficient removal of fine burrs when burr thickness after machining is 0.2 mm or less
- Versatile use, e.g. on machining centers, special machines, drilling machines, robots and many more

CHOOSE THE RIGHT MOUNTED POINT FOR YOUR APPLICATION

BLUE BLUE CERAMIC
equivalent to grit #800 (fine)

ORANGE ORANGE CERAMIC
equivalent to grit #400 (medium)

GRAY GRAY CERAMICS
equivalent to grit #220 (rough)

CERAMIC FIBER STONE MOUNTED POINT

WITH SOLID CERAMIC BODY for high speed spindles

COMPONENT PARTS AVAILABLE!

Usable with the MOBILE MICROMOTOR SYSTEM

Ceramic fiber stones are available in the following colors:

GRAY

FEATURES

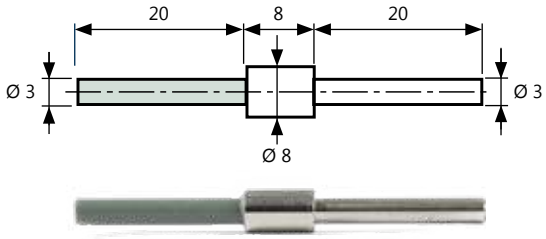
- This tool prevents clogs and scratches to the surface, because it does not contain abrasive grains
- Perfect for use with pneumatic tools at high rotational speed
- Ideal for improving the surface texture
- Suitable for any material, also for aluminum and hardened steels
- Efficient removal of fine burrs with a burr root below 0.2 mm after machining

INFO

The CERAMIC STONE MOUNTED POINT can be taken into an electric rotating tool as well as into a pneumatic tool.

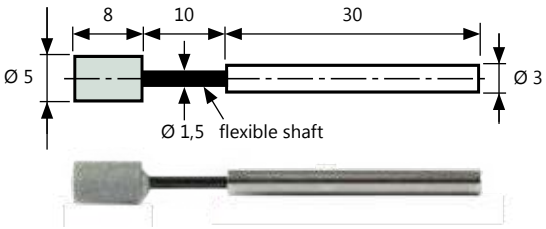
BÜAXPM3R

Suitable for deburring and polishing of narrow parts



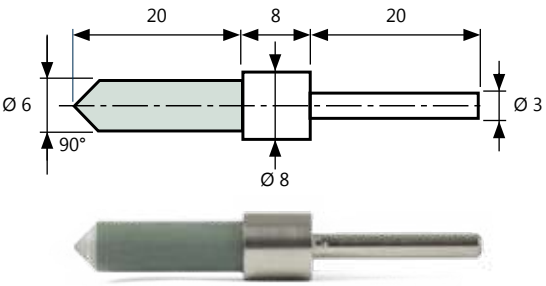
BÜAXPM5RF

Uses flexible shaft, which allows soft contact



BÜAXPM6T

Suitable for deburring and polishing larger parts



CERAMIC STONE MOUNTED POINT

Stone-Ø (mm)	Stone length (mm)	Equivalent Grit size	Shank-Ø (mm)	max. speed RPM	Item No.	EUR/ Piece
3	20	#220	3 (0/-0.050)	80,000	BÜAXPM3R	
5	8			30,000	BÜAXPM5RF	
6	20			60,000	BÜAXPM6T	

CUTTING DATA
Page 165

C
5.2

CERAMIC FIBER STONE FLEXIBLE SHAFT

For deburring cross holes and detailed finishing of parts

COMPONENT PARTS AVAILABLE!

Usable with the MOBILE MICROMOTOR SYSTEM

Ceramic fiber stones are available in the following colors:

BLUE
ORANGE
GRAY

PLEASE NOTE

Please note the maximum bending range of 2 mm.

ADVANTAGES COMPARED TO DEBURRING WITH BURRS

- High and durable deburring quality without secondary burr formation
- The flexible shaft ensures gentle and flexible contact with the workpiece, counteracts a possible risk of breakage and allows sensitive deburring without chipping when used manually
- Automated processing on CNC machines possible

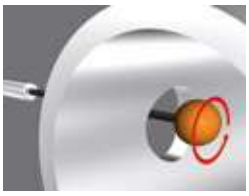
TOOL VIDEO LINK

ANIMATION
Sequential deburring of cross holes

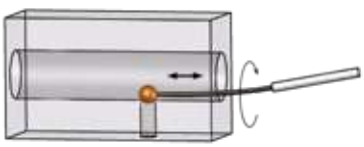
APPLICATIONS

Application example of automated deburring on a CNC machine (contour machining through the bore):

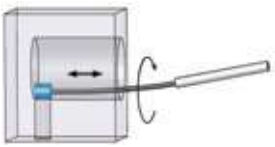
Workpiece / Material	Tool	Application	Operational data
Hydraulic component/ stainless steel	BÜCHPM5B Insert through the cross hole	Ø 5.3 deburring after the drilling process.	• Speed 5,000 rpm • Infeed 0.5mm • Feed rate 300mm/min.
Main hole Ø 20mm/ cross hole Ø 5.3mm			
previous machining process: drilling			



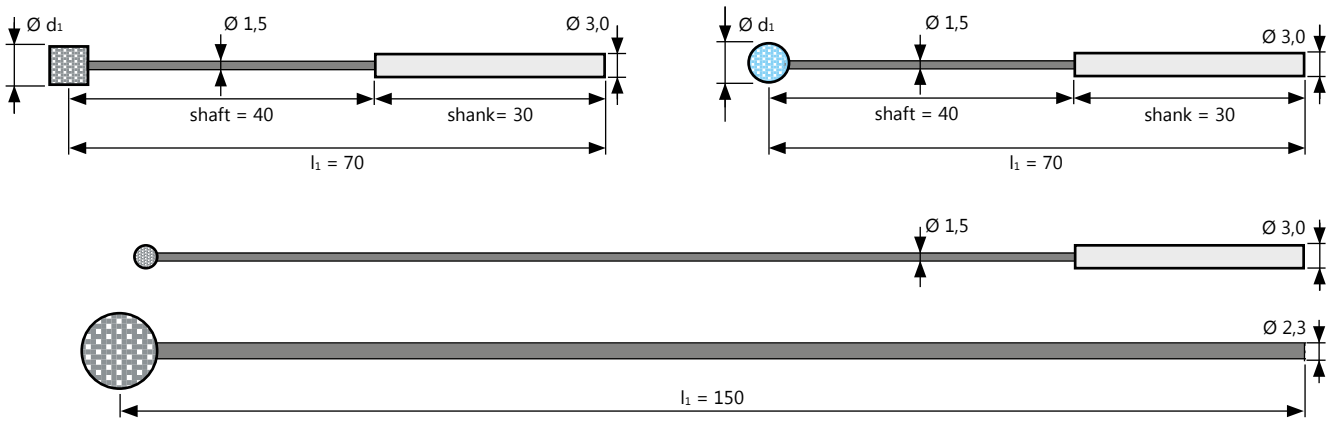
PROBING THE CROSS HOLE EXIT THROUGH THE MAIN BORE



Ball type shape: Removes only the burrs of the cross hole without damaging the bore wall.



Cylinder type shape: Suitable for burr removal of cross holes in a blind hole.



CERAMIC FIBER STONE

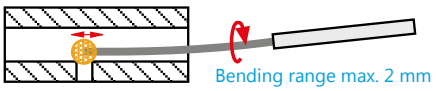
For hole-Ø (mm)	Stone Ø d_1 (mm)	Stone shape	Length l_1 (mm)	Shank-Ø (mm)	ROUGH (gray) equivalent to grit #220		MEDIUM (orange) equivalent to grit #400		FINE (blue) equivalent to grit #800	
					Item No.	EUR/Piece	Item No.	EUR/Piece	Item No.	EUR/Piece
> Ø 3	Ø 3	Ball	70	3.0	BÜCHPM3B		BÜCHPO3B		BÜCHPB3B	
> Ø 4	Ø 4				BÜCHPM4B		BÜCHPO4B		BÜCHPB4B	
> Ø 5	Ø 5				BÜCHPM5B		BÜCHPO5B		BÜCHPB5B	
> Ø 6	Ø 6				BÜCHPM6B		BÜCHPO6B		BÜCHPB6B	
> Ø 10	Ø 10				BÜCHPM10B					
> Ø 3	Ø 3 x 3	Cylinder	70	3.0	BÜCHPM3R		BÜCHPO3R		BÜCHPB3R	
> Ø 4	Ø 4 x 4				BÜCHPM4R		BÜCHPO4R		BÜCHPB4R	
> Ø 5	Ø 5 x 5				BÜCHPM5R		BÜCHPO5R		BÜCHPB5R	
> Ø 5	Ø 5 x 10				BÜCHPM5RC01					
> Ø 3	Ø 3	Ball	150	3.0	BÜCHPM3BL					
> Ø 4	Ø 4	Ball	150	2.3*	BÜCHPM4BL					
> Ø 5	Ø 5				BÜCHPM5BL					
> Ø 6	Ø 6				BÜCHPM6BL					
> Ø 10	Ø 10				BÜCHPM10BL					

Shank tolerance: 0/-0.050

*PLEASE NOTE: For use with the Mobile Micromotor System, order the reducing sleeve Ø 3 mm to Ø 2.3 mm (see page 164).

CUTTING DATA
Page 165

APPLICATION NOTES FOR CERAMIC FIBER STONE



Size of the burrs
This tool is designed for removing fine burrs where the burr width is less than or equal to 0.2 mm after the machining processing.

Check before use
When mounting on a powered tool, insert the end of the holder into the chuck as far as it will go and clamp it firmly.
Conduct a test run for at least 1 minute before starting machining and for at least 3 minutes after a tool change to check for abnormalities such as tool vibration or loose clamping.

Even if no abnormalities are noticed during the test run, you should stop the tool immediately if anything unusual occurs, such as vibration. Breakage at the head or shank, deformation or tool breakage may result.

Fitting / truing
If the tool head deforms during use, straighten its shape by lightly profiling it with a truing diamond.

Selection of head size
Select a head size that is slightly larger than the diameter of the cross hole. If you select a smaller head, it may enter the cross hole. This can lead to breakage of the head and the shaft.

Infeed or contact pressure
Use a contact pressure of 5 N or less, or a bending range of 2 mm or less. Using too high contact pressure can cause breakage or damage to the shank.

PLEASE NOTE THE GENERAL WORK SAFETY ON PAGE 147.

C
5.3

CERAMIC FIBER STONE DISK FLEXIBLE SHAFT

For deburring, polishing & chamfering of cross holes

COMPONENT PARTS AVAILABLE!

Usable with the MOBILE MICROMOTOR SYSTEM

The abrasive fibers are available in the following colors:

GRAY

PLEASE NOTE

Please note the maximum bending range of 2 mm.

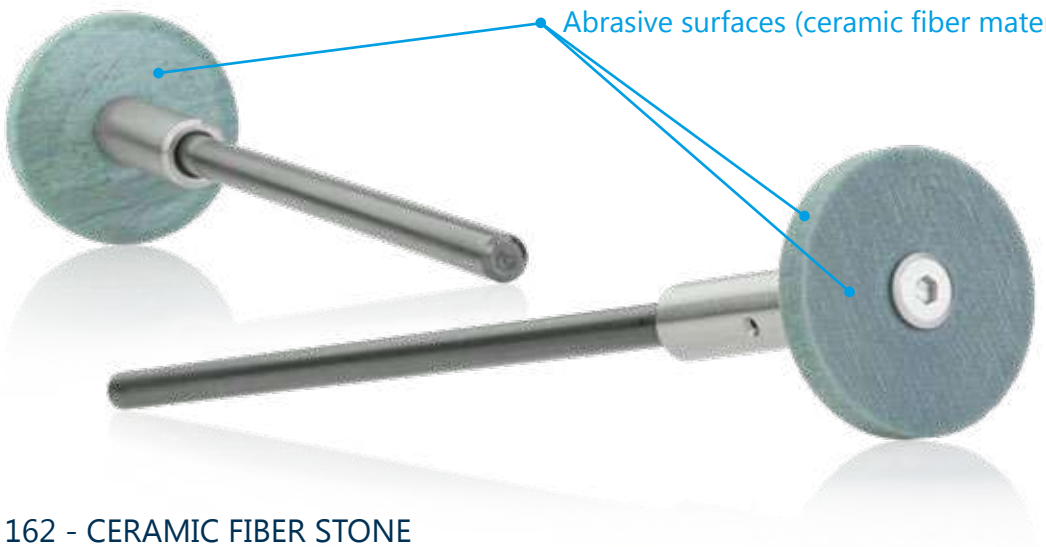
INFO

The CERAMIC FIBER STONE DISK is designed for applications that require deburring of internal contours that previous tooling solutions cannot reach.

The CERAMIC FIBER STONE DISK is abrasive on all sides. This allows front/back and side deburring, which is particularly suitable for use in grooves. Due to the long shaft, deeper areas of the workpiece can also be reached.

FEATURES

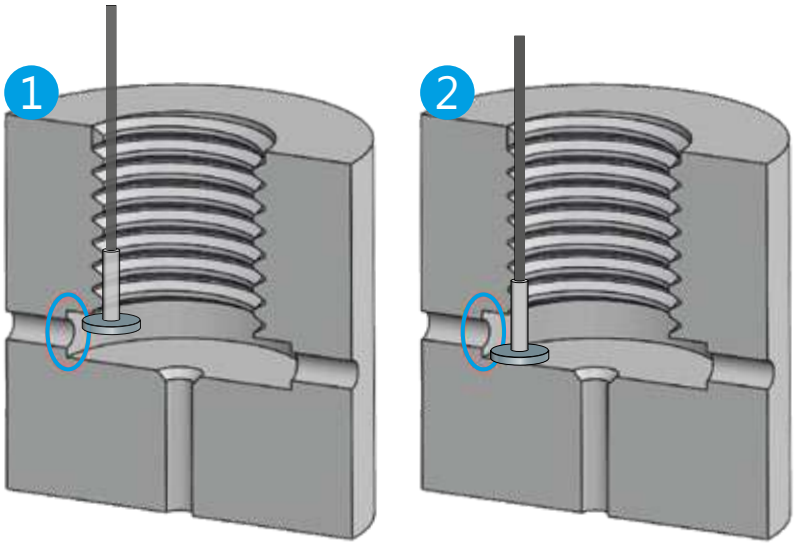
- SMALL DIAMETER, LONG FLEXIBLE SHAFT
  The narrow shaft with a diameter of only 2.3 mm and a length of 78 mm makes it possible to reach and remove burrs in deep holes.
- LONG TOOL LIFE
  Improved tool life, as the grinding wheel is made of Al_2O_3 ceramic fibers instead of abrasive grains. In contrast to competitive products with abrasive grain, the CERAMIC FIBER STONE DISKS last approx. 3-5 times longer with the same grinding performance.
- STABLE QUALITY
  The flexible shaft enables gentle contact with the workpieces and suppresses even the smallest vibrations.
  Likewise, there is less risk of scratches on the workpiece because the CERAMIC FIBER STONE DISK does not bounce off the surface.



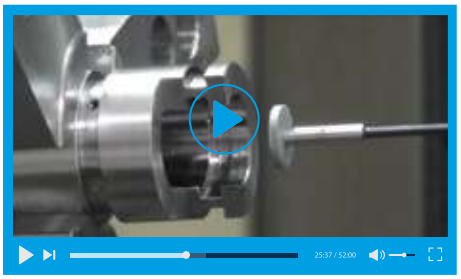
Due to the use of the Al_2O_3-ceramic fiber material, the CERAMIC FIBER STONE DISK is abrasive on all surfaces and can therefore be used universally.

APPLICATIONS

The long shaft of the tool allows even deep-lying contours to be reached. The flexibility of the shaft also enables gentle contact (without vibrations) with the workpiece and thus avoids damage. Unlike conventional ball mounted points, the "Fiber Stone Disk" does not touch the flat surface during machining, so that no damage occurs around the area to be machined.



TOOL VIDEO LINK

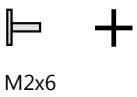


VIDEO
Deburring a groove with the Ceramic Fiber Stone Disk

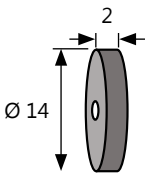
1 The CERAMIC FIBER STONE DISK is ideal for deburring deep internal grooves.

2 By using a ball mounted point, the plane surface would be "damaged" and the edges could not be reached.

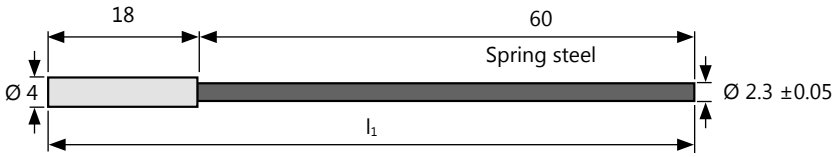
SCREW



CERAMIC FIBER-DISK



SHAFT



CERAMIC FIBER DISK

Stone-Ø x thickness (mm)	Equivalent grit size	max. speed rpm	Item No.	EUR/ Piece
14 x 2	#220	5,000	BÜCHPM14D	

SHAFT

Shank-Ø d_2 js12 (mm)	Length l_1 (mm)	Fixing screw	Item No.	EUR/ Piece
2.3	78	M2 x 6	BÜCHDSH	

*PLEASE NOTE: For use with the Mobile Micromotor System, order the reducing sleeve Ø 3 mm to Ø 2.3 mm (see page 164).

CUTTING DATA
Page 165

C
5.4

MOBILE MICROMOTOR SYSTEM

For easy and safe operation of the respective tools

COMPONENT SUITABLE FOR

- CERAMIC BRUSH END TYPE
- CERAMIC FIBER STONE with shank Ø 3 mm

*PLEASE NOTE
To operate ceramic mounted points with shank Ø 2.3 mm, a reducing sleeve must also be ordered.

FEATURES

The portable Xebec MOBILE MICROMOTOR SYSTEM can be used for...

- CERAMIC FIBER BRUSH SURFACE END TYPE
- CERAMIC FIBER STONE MOUNTED POINT
- CERAMIC FIBER STONE FLEXIBLE SHAFT*

The control unit allows precise speed adjustment to be set precisely, which can be read on the digital display.

- Compact system with rechargeable control unit
- On/Off foot switch
- Power cable for use during charging
- Lightweight handpiece incl. stand
- Stepless adjustment of speed with the help of an adjusting wheel, easy reading due to digital display

SCOPE OF DELIVERY (SET)

- Control unit MPC50X
- Handpiece MPH33-W-30X
- Foot switch
- Power supply unit

Item No.	EUR/Piece
BÜCM2P33STX	

OPTIONAL ACCESSORIES

Description	Item No.	EUR/Piece
Reducing sleeve Ø 3.0 mm to Ø 2.3 mm	BÜRMP3024X	

RECOMMENDATIONS FOR USE & CUTTING DATA FOR CERAMIC FIBER STONE

applicable for the Ceramic Fiber Stone tools on pages 158 to 163.

Material ISO	Tensile strength/ Si content	Material examples	Recommended fiber type & speed n [rpm]					
			Ø 3 mm	Ø 4 mm	Ø 5 mm	Ø 6 mm	Ø 10 mm	Ø 14 mm Disc
	< 700 N/mm²	St37, C15, C45	13,500	10,200	7,800	6,800	4,700	3,900
	< 1,200 N/mm²	16MnCr5, Cf70	13,700	10,300	8,000	7,000	4,800	4,000
	< 1,500 N/mm²	42CrMoS4, 100Cr6	13,900	10,400	8,200	7,200	4,800	4,000
STAIN-LESS	< 700 N/mm²	1.4301, 1.4571	13,500	10,200	8,000	7,000	4,700	3,900
STAIN-LESS	< 1,000 N/mm²	Duplex, Alloy2304	12,200	9,300	7,200	6,200	4,300	3,600
GG		GG-25	13,200	9,900	7,600	6,600	4,600	3,800
GGG		GGG40, ADI800	14,500	11,000	8,700	7,600	5,100	4,200
AL	≤ 7% Si	AlMg2.5	12,000	9,100	7,000	6,100	4,200	3,500
AL	≥ 7% Si	AlSi7	13,000	9,900	7,600	6,600	4,600	3,800
CuZn	< 1,200 N/mm²	CuZN33, CuAl9Mn2	12,000	9,100	7,000	6,100	4,200	3,500
Ti		TiAl6V4	14,000	10,500	8,200	7,300	4,800	4,000
S		Inconel, Hasteloy	14,500	11,000	8,700	7,600	5,100	4,200

Recommendations for use	
Use of blue fiber recommended (equivalent grit #800, fine)	Use of gray fiber recommended (equivalent #220 grit, rough)
Use of orange fiber recommended (equivalent grit #400, medium)	

Maximum speed (rpm)						
Standard length tool	15,000	13,000	12,000	10,000	6,000	5,000
Overlong tools l_1 = 150	1,000	3,000	3,000	3,000	2,000	
Maximum permissible shaft bending (mm)	2	2	2	2	2	2

Application: Deburring of a cross hole						
Maximum diameter of the cross hole (mm)	2.4	3.2	4	4.8	8	

D

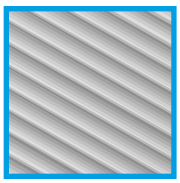
HANDHELD DEBURRING TOOLS

DEBURRING COMPONENTS MANUALLY

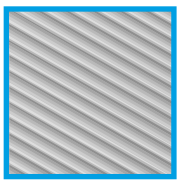
#burrfree components straight out of the machine are our goal. But there are exceptions that justify manual deburring. Handheld deburring tools are used for the smallest batch sizes, single-part production or when machine-side restrictions make deburring on the machine impossible.

CARBIDE BURRS

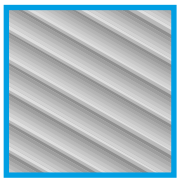
Carbide Burrs are particularly suitable for use on robots and for manual use in pneumatic or electric grinders.
All carbide burrs are available in different toothing variants. Only the common variants Z1 and Z4 are listed in the overviews. If other variants are required, simply state the item No. + toothing variant when ordering.



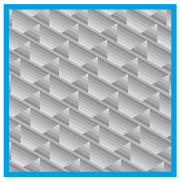
Z1
General purpose toothing for machining cast iron, steel, ferrous materials, as well as copper and brass. It achieves very good material removal and surface finishes. Second most used type after Dura-Cut.



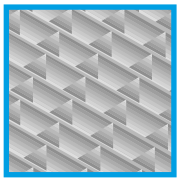
Z2
This type improves finishes of hardened and stainless steel and cast iron. The operator control is improved. However, the excellent finish comes with reduced material rates.



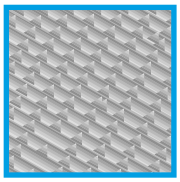
Z3
For machining soft materials, e.g. copper, brass, aluminum, plastics and rubber, where chip loadig is a problem.



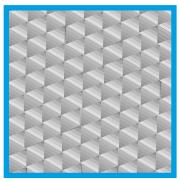
Z4
Provides fast chip removal for harder materials. Additional left-hand flutes reduce the pulling action allowing better operating control. Chip size is reduced and thus also reduced cutting speeds can be run.



Z5
For fast material removal on soft materials with higher operator control than Z3 toothing. The addition of a fluted design also reduces chip size.



Z6
Very effective on heat treated and tough alloy steels. This type reduces chip size and provides excellent operator control and surface finish.



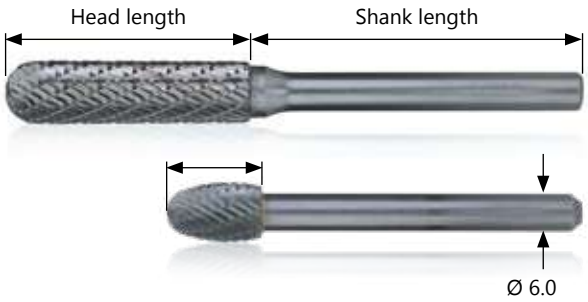
Z8
This type is very effective in heat treated and tough alloy steels, making extremely small, powder-like chips. Operator control and material removal rate are excellent, surface finish and tool life characteristics are slightly lower.

All burrs are also available with a coating on request.

CARBIDE BURRS SERIES 40 TO 45

FORM HA

- Carbide Burrs up to and including head-Ø 6.0 mm consist entirely of solid carbide, having a total length of 51 mm and a 6.0 mm shank.
- Carbide Burrs from head-Ø 8.0 mm consist of a 51 mm long 6.0 mm steel shank and a brazed carbide head.



SB-Series 40
Cylindrical shape with end cut

Head-Ø (mm)	Head length (mm)	Item No.	EUR/ Piece Type Z1	EUR/ Piece Type Z4
3.0	16.0	S40SB12...		
5.0	16.0	S40SB14...		
6.0	16.0	S40SB1...		
6.0	25.0	S40SB1A...		
8.0	19.0	S40SB2...		
10.0	19.0	S40SB3...		
10.0	25.0	S40SB3A...		
10.0	38.0	S40SB3B...		
11.0	25.0	S40SB4...		
12.0	25.0	S40SB5...		
16.0	25.0	S40SB6...		
19.0	19.0	S40SB16...		
19.0	25.0	S40SB7...		
25.0	25.0	S40SB9...		

SA-Series 41
Cylindrical shape

Head-Ø (mm)	Head length (mm)	Item No.	EUR/ Piece Type Z1	EUR/ Piece Type Z4
3.0	16.0	S41SA12...		
5.0	16.0	S41SA14...		
6.0	16.0	S41SA1...		
6.0	25.0	S41SA1A...		
8.0	19.0	S41SA2...		
8.0	25.0	S41SA2A...		
10.0	19.0	S41SA3...		
10.0	25.0	S41SA3A...		
10.0	38.0	S41SA3B...		
11.0	25.0	S41SA4...		
12.0	25.0	S41SA5...		
16.0	25.0	S41SA6...		
19.0	19.0	S41SA16...		
19.0	25.0	S41SA7...		
25.0	25.0	S41SA9...		

SC-Series 42
Cylindrical ball nose shape

Head-Ø (mm)	Head length (mm)	Item No.	EUR/ Piece Type Z1	EUR/ Piece Type Z4
3.0	16.0	S42SC12...		
5.0	16.0	S42SC14...		
6.0	16.0	S42SC1...		
6.0	25.0	S42SC1A...		
8.0	19.0	S42SC2...		
8.0	25.0	S42SC2A...		
10.0	19.0	S42SC3...		
10.0	25.0	S42SC3A...		
10.0	38.0	S42SC3B...		
11.0	25.0	S42SC4...		
12.0	25.0	S42SC5...		
16.0	25.0	S42SC6...		
19.0	25.0	S42SC7...		

ORDER EXAMPLE
S40SB12...+ type Z1 = Item No.: S40SB12Z1

SD-Series 43
Ball shape

Head-Ø (mm)	Head length (mm)	Item No.	EUR/ Piece Type Z1	EUR/ Piece Type Z4
3.0	3.0	S43SD12...		
5.0	5.0	S43SD14...		
6.0	6.0	S43SD1...		
8.0	8.0	S43SD2...		
10.0	10.0	S43SD3...		
11.0	11.0	S43SD4...		
12.0	12.0	S43SD5...		
16.0	16.0	S43SD6...		
19.0	19.0	S43SD7...		
25.0	25.0	S43SD9...		

SE-Series 44
Egg shape

Head-Ø (mm)	Head length (mm)	Item No.	EUR/ Piece Type Z1	EUR/ Piece Type Z4
5.0	8.0	S44SE11...		
6.0	10.0	S44SE1...		
10.0	16.0	S44SE3...		
12.0	22.0	S44SE5...		
16.0	25.0	S44SE6...		
19.0	25.0	S44SE7...		

SF-Series 45
Round tree shape

Head-Ø (mm)	Head length (mm)	Item No.	EUR/ Piece Type Z1	EUR/ Piece Type Z4
6.0	16.0	S45SF1...		
10.0	19.0	S45SF3...		
12.0	19.0	S45SF13...		
12.0	25.0	S45SF5...		
16.0	25.0	S45SF6...		
19.0	25.0	S45SF7...		
19.0	31.0	S45SF14...		
19.0	38.0	S45SF15...		

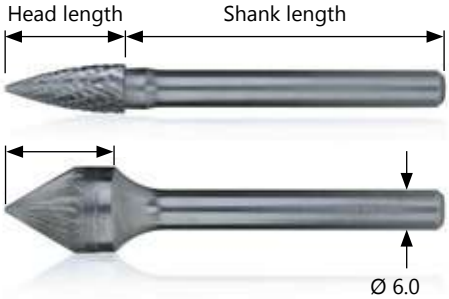
ORDER EXAMPLE
S43SD12...+ type Z4 = Item No.: S43SD12Z4
Further toothing variants on request

D
1.2

CARBIDE BURRS SERIES 46 TO 51

FORM HA

- Carbide Burrs up to and including head-Ø 6.0 mm consist entirely of solid carbide, having a total length of 51 mm and a 6.0 mm shank.
- Carbide Burrs from head-Ø 8.0 mm consist of a 51 mm long 6.0 mm steel shank and a brazed carbide head.



SG-Series 46
Pointed free shape

Head-Ø (mm)	Head length (mm)	Item No.	EUR/ Piece Type Z1	EUR/ Piece Type Z4
6.0	16.0	S46SG1...		
8.0	19.0	S46SG2...		
10.0	19.0	S46SG3...		
12.0	19.0	S46SG13...		
12.0	25.0	S46SG5...		
16.0	25.0	S46SG6...		
19.0	25.0	S46SG7...		
19.0	38.0	S46SG15...		

SM-Series 47
Cone shape

Head-Ø (mm)	Head length (mm)	Item No.	EUR/ Piece Type Z1	EUR/ Piece Type Z4
6.0	12.0	S47SM1...		
6.0	19.0	S47SM2...		
6.0	25.0	S47SM3...		
6.0	19.0	S47SM3A...		
10.0	16.0	S47SM4...		
12.0	22.0	S47SM5...		
16.0	25.0	S47SM6...		

SL-Series 48
14° Included angle shape

Head-Ø (mm)	Head length (mm)	Item No.	EUR/ Piece Type Z1	EUR/ Piece Type Z4
6.0	16.0	S48SL1...		
8.0	22.0	S48SL2...		
10.0	27.0	S48SL3...		
12.0	28.0	S48SL4...		
16.0	33.0	S48SL6...		
19.0	38.0	S48SL7...		

ORDER EXAMPLE
S46SG1...+ type Z1 = Item No.: S46SG1Z1

SH-Series 49
Flame shape

Head-Ø (mm)	Head length (mm)	Item no.	EUR/ piece Type Z1	EUR/ piece Type Z4
8.0	19.0	S49SH2...		
12.0	32.0	S49SH5...		
16.0	36.0	S49SH6...		
19.0	41.0	S49SH7...		

SK-Series 50
Cone shape 90°

Head-Ø (mm)	Head length (mm)	Item no.	EUR/ piece Type Z1	EUR/ piece Type Z4
6.0	3.0	S50SK1...		
8.0	4.0	S50SK2...		
10.0	5.0	S50SK3...		
12.0	6.0	S50SK5...		
16.0	8.0	S50SK6...		
19.0	9.5	S50SK7...		
22.0	11.0	S50SK8...		
25.0	12.5	S50SK9...		

SJ-Series 51
Cone shape 60°

Head-Ø (mm)	Head length (mm)	Item no.	EUR/ piece Type Z1	EUR/ piece Type Z4
6.0	5.0	S51SJ1...		
8.0	6.0	S51SJ2...		
10.0	6.0	S51SJ3...		
12.0	11.0	S51SJ5...		
16,0	12.0	S51SJ6...		
19.0	16.0	S51SJ7...		
22.0	19.0	S51SJ8...		
25.0	19.0	S51SJ9...		

ORDER EXAMPLE
S49SH2...+ type Z1 = Item No.: S49SH2Z1
Further toothing variants on request

CARBIDE BURRS SERIES 59

FORM HA

- All MINI-Carbide Burrs have a 3.0 mm cylindrical shank, are made of solid carbide and have a total length of 38 mm.

Head-Ø (mm)	Head length (mm)	Item No.	EUR/ Piece Type Z1	EUR/ Piece Type Z4
1.5	6.0	S59SA41...		
2.0	11.0	S59SA42...		
3.0	14.0	S59SA43...		
3.0	6.0	S59SG41...		
3.0	10.0	S59SG43...		
3.0	12.0	S59SG44...		
3.0	10.0	S59SL41...		
3.0	12.0	S59SL42...		
3.0	-	S59SB41...		
2.0	14.0	S59SC41...		
3.0	11.0	S59SC42...		
3.0	6.0	S59SH41...		

Head-Ø (mm)	Head length (mm)	Item No.	EUR/ Piece Type Z1	EUR/ Piece Type Z4
3.0	6.0	S59SF41...		
3.0	12.0	S59SF42...		
2.0	3.0	S59SN41...		
3.0	5.0	S59SN42...		
2.0	-	S59SD41...		
3.0	-	S59SD42...		
3.0	6.0	S59SE41...		
3.0	9.0	S59SM41...		
3.0	11.0	S59SM42...		
3.0	16.0	S59SM43...		
3.0	-	S59SJ42...		
3.0	-	S59SK42...		

ORDER EXAMPLE
S59SA41...+ Type Z1 = Item No.: S49SA41Z1

D
2

SHAVIV HAND DEBURRING

for manual deburring of components

HANDLES

CLASSIC A HANDLE

MANGO II HANDLE

ALUMINUM HANDLE

HOLDER

HOLDER B

HOLDER C

HOLDER D

HOLDER E

HOLDER F

INSERTS/BLADES

B10


B10D


B10P


B12


B20


B30


B50C


B60


B70


C40


C42


D80C


D82C


E100


E110


E120


E200


E300


E350


E600


E601


F12


F20


F30


TOOL SETS (EXAMPLES)

SET B
Very proven set for deburring bores, grooves and edges. Accommodates all B blades. The blades can be clamped axially or radially as required.

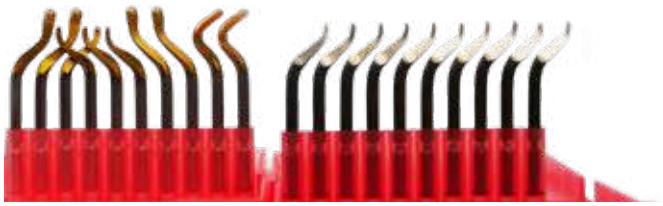
SET C
Multifunctional tool for a wide range of applications and materials. The C42 blade is equipped with three durable deburring edges. With the extendable blade holder, even hard-to-access areas can be reached. Also included is a key for easy and safe replacement of the blades.

SET D
With the sheet metal deburrer, depending on the clamping type of the blade, sheets up to 3 mm can be deburred on both sides or a surface can be trimmed in just one pass.

SET E
Robust deburring set for heavy-duty use for deburring holes, grooves and edges.

SET F
Powerful tool that is very suitable for deburring and countersinking. Suitable for bores up to 20 mm.

Other blades/countersinks, blade holders, handles and tool sets are available on request. (Example illustrations)



PRICE LIST

BLADES / COUNTERSINKS

Item	Characteristics	Application: Straight edge	Internal processing front side	Internal processing on both sides	Internal processing back side	Interior surfaces	Plane surface	Outer edges on both sides	Material: Steel	Aluminum	Copper	Brass	Gray cast iron	Stainless steel	Hardened steel	Plastic	Carbide and glass	Item No.	EUR/ Piece
Blade B10	HSS, for long-chipping materials	•	•						•	•	•							B10	
Blade B10D	Blade B10 with diamond coating	•	•														•	B10D	
Blade B10P	Blade B10, TIN coated for high wear resistance	•	•						•	•	•			•		•		B10P	
Blade B12	HSS, with short cutting edge	•	•						•	•	•					•		B12	
Blade B20	HSS, can be used clockwise and counterclockwise	•	•									•	•			•		B20	
Blade B30	Deburring for wall thicknesses up to 4mm			•					•	•	•					•		B30	
Blade B50C	Scriber with carbide tip, regrindable						•		•	•	•	•	•	•	•	•		B50C	
Blade B60	Deburring of bores up to 20mm deep				•				•	•	•					•		B60	
Blade B70	Carbide tip, deburrs sheets up to 3.5mm thick							•	•	•	•	•	•	•	•	•		B70	
Blade C40	Small, 4mm, HSS triangular scraper for precision work				•	•	•		•	•	•	•	•	•		•		C40	
Blade C42	Standard size, 8mm, HSS triangular scraper				•	•	•		•	•	•	•	•	•		•		C42	
Blade D80C	solid carbide with 6 cutting edges for sheets up to 3mm						•	•	•	•	•	•	•	•	•	•		D80C	
Blade D82C	solid carbide, double-sided blade for sheets up to 9mm							•	•	•	•	•	•	•	•	•		D82C	
Blade E100	HSS, for heavy duty use in long chipping material	•	•						•	•	•					•		E100	
Blade E110	E-shank, B10 cutting edge for bores from Ø 2mm	•	•						•	•	•					•		E110	
Blade E111	HSS, narrow cutting edge for holes from Ø 1.5mm	•	•						•	•	•					•		E111	
Blade E111P	E111 blade, TIN coated for high wear resistance	•	•						•	•	•			•		•		E111P	
Blade E120	E-shank, B20 cutting edge for short-chipping materials	•	•									•	•			•		E120	
Blade E200	HSS, for short-chipping materials	•	•									•	•			•		E200	
Blade E300	HSS, for long-chipping materials, for wall thickness up to			•					•	•	•					•		E300	
Blade E350	HSS, for short-chipping materials	•	•									•	•			•		E350	
Blade E600	HSS, for bore holes up to 20mm deep				•				•	•	•					•		E600	
Blade E601	HSS, extra long, for bore holes up to 40mm deep				•				•	•	•					•		E601	
Countersink	Countersink for bore holes up to Ø 12mm		•						•	•	•	•	•	•		•		F12	
Countersink	Countersink for bore holes up to Ø 20mm		•						•	•	•	•	•	•		•		F20	
Countersink	Countersink for bore holes up to Ø 30mm		•						•	•	•	•	•	•		•		F30	

HOLDERS

Holder B	For all B blades, blades can be used axially or radially	HALTERB	
Holder C	For C40 and C42 blades	HALTERC	
Holder D	For D80C and D82C blades	HALTERD	
Holder E	For all E blades	HALTERS	
Holder F	For all F blades	HALTERF	

HANDLES

Classic A	Handle Classic A - universal handle for all SHAVIV blade holders, with storage possibility for blades in the shaft		
Mango II	Handle Mango II - universal handle for all SHAVIV blade holders for special comfortable handling		
Aluminum	Aluminum handle - universal handle for all SHAVIV blade holders, suitable for heavy use		

TOOL SETS

Set B	Handle Classic A, Holder B, Blade B10 and B20 (also available with handle MANGO II or aluminum)	SATZB	
Set C	Classic A handle, C holder and C42 blade (also available with MANGO II handle or aluminum)	SATZC	
Set D	Classic A handle, D holder and D80C blade (also available with MANGO II handle or aluminum)	SATZD	
Set E	Handle Classic A, Holder E, Blade E100, E200 and E300 (also available with handle MANGO II or aluminum)	SETS	
Set F	Classic A handle, F holder and F20 countersink (also available with MANGO II handle or aluminum)	SATZF	
GF Set B	Aluminum handle, 2 blades each B10P, B11P, B12P, B20P, B30P (all TIN coated)	GFSETB	
GF Set E	Aluminum handle, 2 blades each E100P, E110P, E111P, E200P, E300P (all TIN coated)	GFSETE	

6 STEPS FOR A #BURRFREE COMPONENT

TRY IT!

DEBURRING TOOLS ARE OUR WORLD

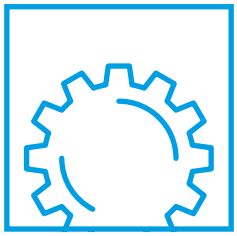
With an exceptionally large portfolio for a wide variety of processing cases, we can offer an appropriate solution for almost any deburring problem.

WHICH TOOLS ARE SUITABLE FOR WHICH APPLICATION?

In order to shed some light on this recurring question, we have developed a "tool" that guides you in 6 steps from material selection, machining, the workpiece to the actual "deburring problem" and then shows you a narrow selection of tool solutions suitable for it. This way you can be sure to always use the right deburring tool for your application.

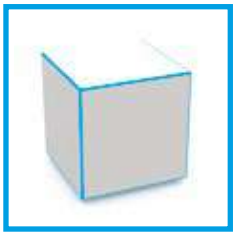
DEBURRING GUIDE

1 MATERIAL SELECTION

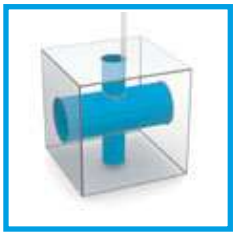


2 MACHINE TYPE SELECTION

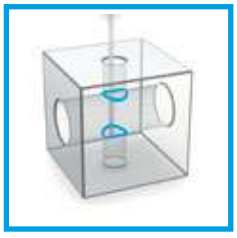
3 COMPONENT SELECTION



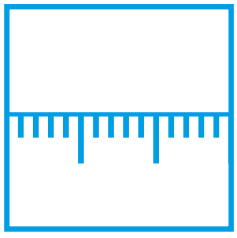
4 CONTOUR ACCESSIBILITY



5 CONTOUR FORM



6 CONTOUR DIMENSIONS



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