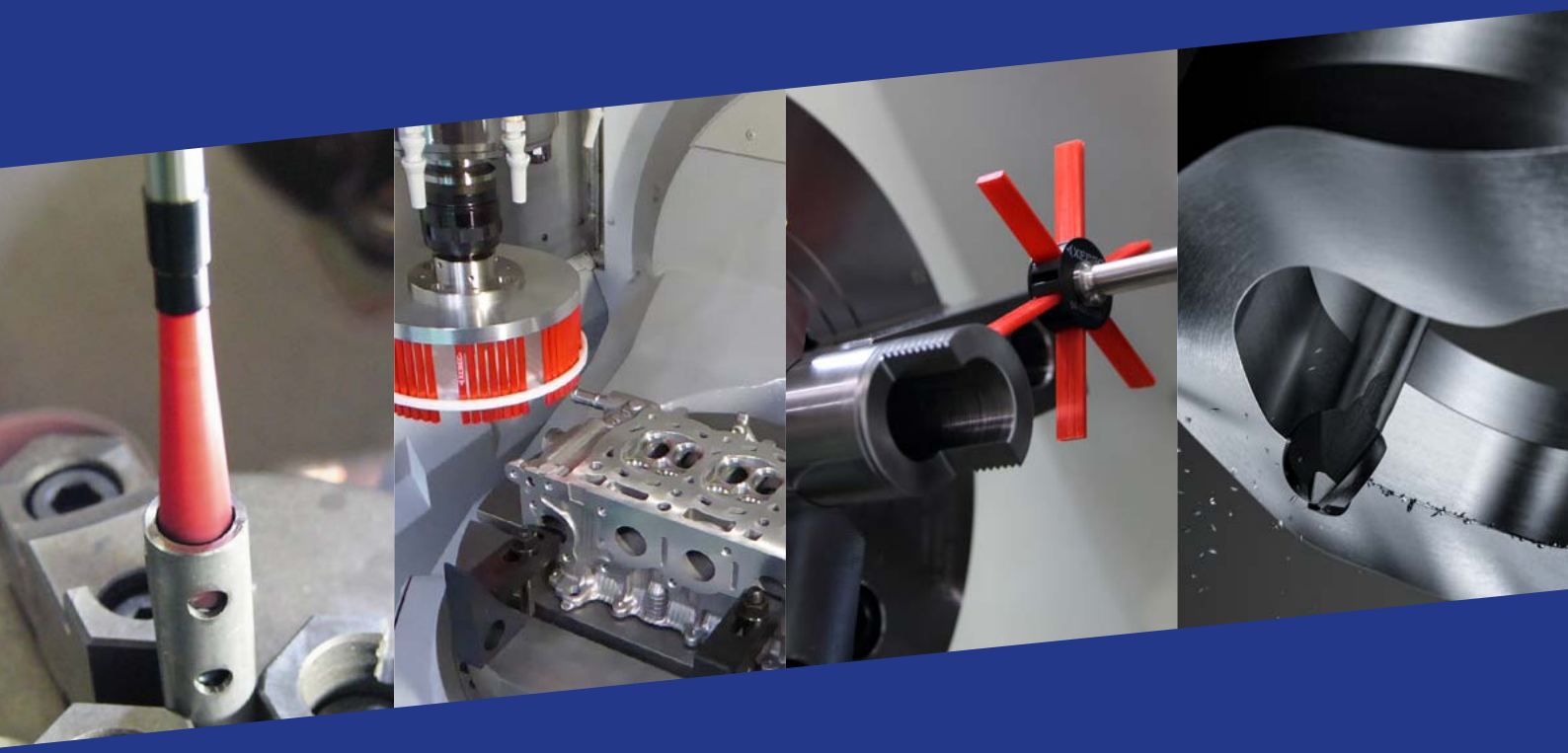
Kemet

Precision Lapping | Polishing | Cleaning | Materialography

DEBURRING & POLISHING TOOLS



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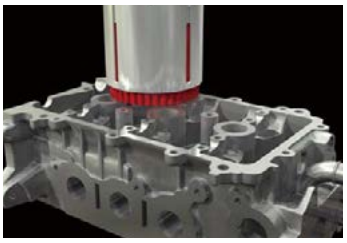
Automotive

CNC deburring of cylinder head



Material : ADC12
Previous process : Face milling
Tool : XEBEC Brush Surface
Page 2
A11-CB100M

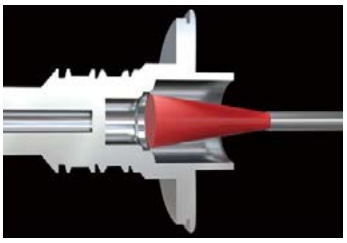
Video (YouTube)

CNC deburring of inverter case

Material : ADC12
Previous process : Face milling
Tool : XEBEC Brush Surface
Page 2
A32-CB25M

Video (YouTube)

CNC deburring of input shaft



Material : SCM
Previous process : Drilling
Tool : XEBEC Brush Crosshole
Page 8
CH-A12-7M-TL

Video (YouTube)

Manual polishing of tire mold

Material : Aluminum
Previous process : Ball end milling
Tool : XEBEC Brush Surface
Page 6
A11-EB06M

Video (YouTube)

CNC deburring of differential case

Material : FCD
Previous process: Drilling
Tool : XEBEC Back Burr Cutter
Page 19
XC-78-A

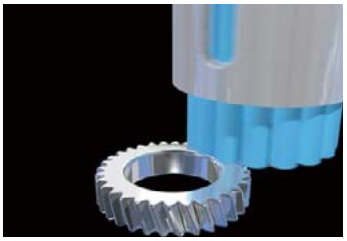
Video (YouTube)

CNC deburring of scroll compressor

Material : Aluminum
Previous process : Face milling
Tool : XEBEC Brush Surface
Page 2
A11-CB40M

Video (YouTube)

CNC deburring of pinion gear



Material : S45C
Previous process : Gear hobbing
Tool : XEBEC Brush Surface
Page 2
A32-CB40M

Video (YouTube)

CNC polishing of metal mold for car body panel

Material : SKD11
Previous process : End milling
Tool : XEBEC Brush Surface
Page 2
A32-CB25M A11-CB25M

Video (YouTube)

CNC deburring of yoke

Material : SCM
Previous process : Drilling
Tool : XEBEC Back Burr Cutter
Page 19
XC-58-A

Video (YouTube)

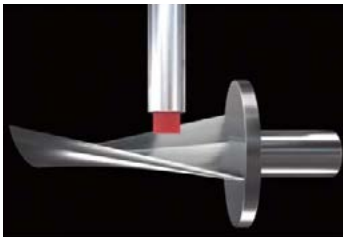
CNC deburring of camshaft

Material : FCD
Previous process : Drilling
Tool : XEBEC Back Burr Cutter
Page 19
XC-38-A

Video (YouTube)

Aerospace

CNC polishing of turbine blade



Material : SUS630
Previous process : Ball end milling
Tool : XEBEC Brush Surface
Page 2
A32-CB25M A11-CB25M

Video (YouTube)

Manual deburring of hydraulic manifold

Material : Aluminum
Previous process : Drilling
Tool : XEBEC Stone Flexible
Page 25
CH-PM-6B

Video (YouTube)

Manual deburring of shaft

Material : Aluminum
Previous process : Casting
Tool : XEBEC Stone Mounted
Page 27
AX-PM-6T

Video (YouTube)

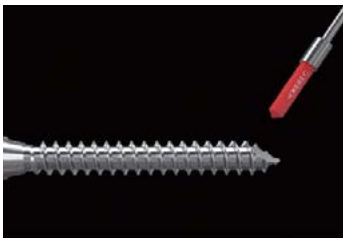
Orthopaedic Medical Devices

CNC polishing of artificial hip joint

Material : CoCrMo
Previous process : Turning
Tool : XEBEC Brush Surface
Page 2
A13-CB06M

Video (YouTube)

CNC deburring of osteosynthesis screw



Material : Titanium
Previous process : End milling
Tool : XEBEC Brush Surface
Page 6
A11-EB06M

Video (YouTube)

CNC deburring of spinal implant

Material : PEEK resin
Previous process : End milling
Tool : XEBEC Back Burr Cutter
Page 19
XC-18-A

Video (YouTube)

Industrial Machinery

CNC deburring of gearbox

Material : FC250
Previous process : Face milling
Tool : XEBEC Brush Surface
Page 2
A32-CB60M

Video (YouTube)

CNC deburring of slide cylinder

Material : Aluminum
Previous process : End milling
Tool : XEBEC Brush Surface
Page 2
A21-CB25M

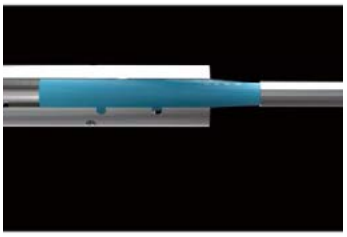
Video (YouTube)

CNC roughing of brake disc

Material : SPHC
Previous process : Turning
Tool : XEBEC Brush Surface
Page 2
A21-CB25M

Video (YouTube)

CNC deburring of pipe



Material : SUS
Previous process : Drilling
Tool : XEBEC Brush Crosshole
Page 8
CH-A33-7M

Video (YouTube)

CNC deburring of shaft

Material : SCM
Previous process : Threading
Tool : XEBEC Brush Wheel
Page 12
W-A11-50

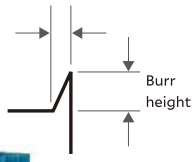
Video (YouTube)

XEBEC Brush™ Surface Patented

Ideal for deburring, cutter mark removal and surface polishing

Applicable burr size
Burr root thickness of 0.2 mm or less (burrs of this size can be removed with fingernails)

Burr root thickness



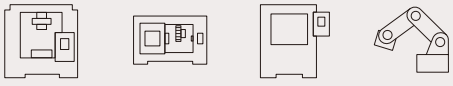
Video (YouTube)

Tool composition

Brush and Sleeve are sold separately.
Assemble Brush and Sleeve before use.

Applicable equipment

This tool can be mounted on equipment shown below:



Brush

Brush (Color)	Product code	Brush diameter (mm)	Bristle length ℓ (mm)	Matching Sleeve	Fig
A13 (Pink)	A13-CB06M	φ 6	30	S06M	1
	A13-CB15M	φ 15	50	S15M-P	1
A11 (Red)	A11-CB06M	φ 6	30	S06M	1
	A11-CB15M	φ 15	50	S15M-P	1
	A11-CB25M	φ 25	75	S25M	1
	A11-CB40M	φ 40	75	S40M-SD10	1
	A11-CB60M	φ 60	75	S60M	1
	A11-CB100M	φ 100	75	S100M	1
A21 (White)	A21-CB06M	φ 6	30	S06M	1
	A21-CB15M	φ 15	50	S15M-P	1
	A21-CB25M	φ 25	75	S25M	1
	A21-CB40M	φ 40	75	S40M-SD10	1
	A21-CB60M	φ 60	75	S60M	1
	A21-CB100M	φ 100	75	S100M	1
A32 (Blue)	A32-CB06M	φ 6	30	S06M	1
	A32-CB15M	φ 15	50	S15M-P	1
	A32-CB25M	φ 25	75	S25M	1
	A32-CB40M	φ 40	75	S40M-SD10	1
	A32-CB60M	φ 60	75	S60M	1
	A32-CB100M	φ 100	75	S100M	1

Fig1

* Bristle bundles are embedded in line on the periphery (except for the A13/A11/A21/A32-CB06M).
* The Brush size is approximate as the tip expands by rotating.
* Brushes with the diameter larger than φ100 are available by special orders.

Sleeve

Product code	Brush diameter (mm)	External diameter Dc (mm)	Shank diameter Ds (mm)	Overall length L (mm)	Shank length ℓs (mm)	Matching Brush	Fig
S06M	φ 6	φ 10	φ 6	70	29	A13/A11/A21/A32-CB06M	2
S15M-P	φ 15	φ 18.5	φ 6	90	29	A13/A11/A21/A32-CB15M	2
S25M	φ 25	φ 30	φ 8	140	30	A11/A21/A32-CB25M	2
S40M-SD10	φ 40	φ 45	φ 10	140	30	A11/A21/A32-CB40M	2
S60M	φ 60	φ 65	φ 12	150	35	A11/A21/A32-CB60M	2
S100M	φ 100	φ 110	φ 16	162	40	A11/A21/A32-CB100M	2

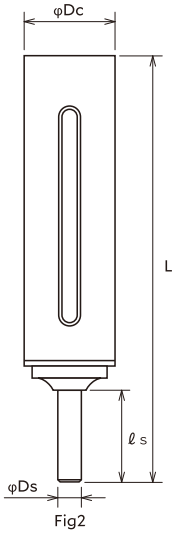
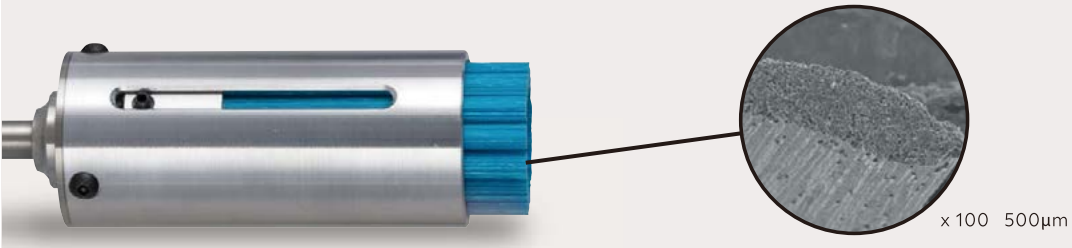


Fig2

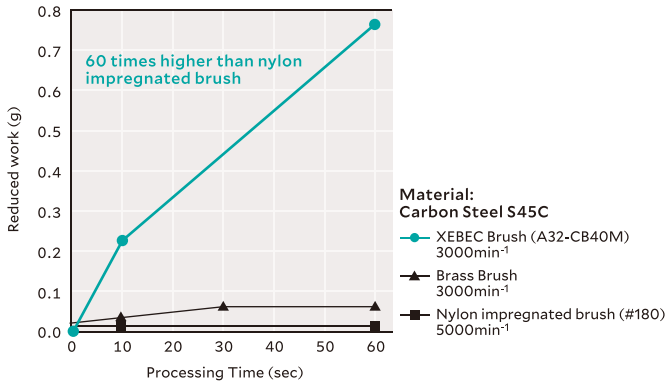
*When in use, the length of the brush projection is added to the overall length of a sleeve.
*The external cylinder of the S15M-P is made of Fiber-Reinforced Plastic (FRP).

XEBEC Brush uses unique abrasive ceramic fiber material instead of abrasive grain.
Each bristle consists of 1,000 ceramic fibers that work as cutting edges.
Overwhelming grinding power, Consistent cutting performance, No deformation.
Enables CNC deburring immediately after milling and machining operations inside the same machine tool.



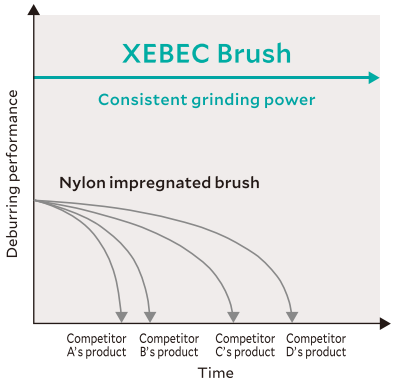
Grinding power

The content ratio of ceramic fiber is approximately 80%.
Cutting edges on the Brush tips offer excellent grinding power.



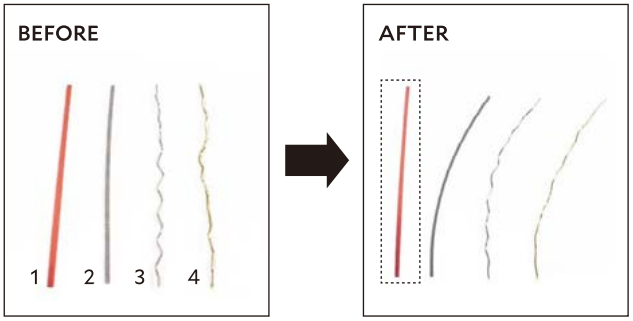
Consistent cutting performance

New cutting edges always exposed.
Consistent cutting performance to the end thanks to the structure of the continuous fiber.



No deformation

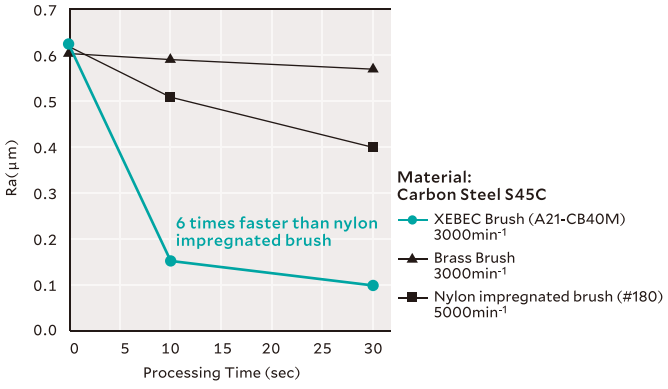
Maintains its straight shape and does not spread out like a toothbrush.
Easy to manage on mass production lines.



1. XEBEC Brush (A11 Red bristle)
2. Abrasive impregnated nylon brush
3. Steel wire brush
4. Brass wire brush

Optimal for polishing

Overwhelming grinding power of ceramic fibers makes this an optimal polishing tool. Achievable surface roughness Ra=0.1µm(Rz=0.4µm)



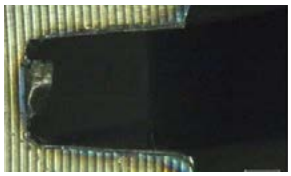
How to select the Brush color

Workpiece material	Resin	Copper, Brass		
		Aluminum		
		General steel		
				Stainless steel
				Heat- resistant steel
				Cast-iron
				Hard-to-cut material
Thickness of burrs	Micro fine burrs			
		Burr root thickness(~0.1mm)		
			Burr root thickness(0.1~0.2mm)	
Brush (Cilor)	A13(Pink)	A11(Red)	A21(White)	A32(Blue)
Grinding power				High

*Available Brush colors are different depending on the Brush size.

Deburring

Before



After

Polishing

Before

After

Applications

Deburring automation with high consistency

Cylinder Head

Material : Aluminum
Previous process : Face milling
Tool : A11-CB100M

Before

Abrasive impregnated nylon brush was used. It was time-consuming and not effective enough to remove all burrs.

After

All burrs are removed by high grinding power. Quality is stabilized. The cycle time is shortened by high feed rate.

Polishing Automation

Metal Mold

Material : Hard-to-cut material
Previous process : End milling
Tool : A11-CB25M

Before

40 minutes manual polishing per workpiece. Received complaints from customers for uneven quality.

After

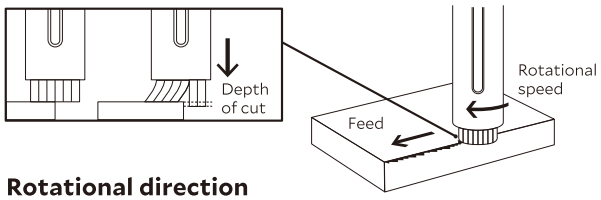
Shortened the polishing time to one minute per workpiece by automation. Improved and uniform polishing quality.

How to use

Processing conditions

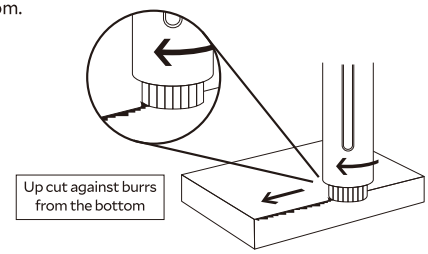
Rotational speed

Recommended parameters differ depending on the Brush size.
Refer to the chart below for the standard machining conditions of each Brush size.



Rotational direction

Set the rotational direction so that the Brush pushes upward against the burrs from the bottom.



Feed rate

Burr root thickness (removable with fingernails)	0.05mm (Can be bent easily)	4000mm/min
	0.1mm (Can be bent)	2500mm/min
Cutter mark removal, polishing		250 - 850mm/min

Depth of cut

Vertical burrs	Burrs that are formed while end milling and drilling. Vertical to the Brush tip.	0.5mm
Horizontal burrs	Burrs that are formed while face milling. Parallel to the Brush tip.	1.0mm
Cutter mark removal, polishing		0.3 - 0.5mm

Machining Parameters

Standard Machining Parameters

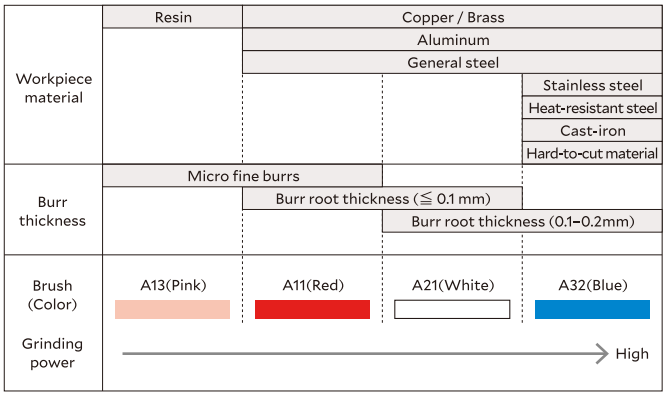
Product code	Rotational speed (min^{-1})			Depth of cut (mm)			Feed rate (mm/min)			Brush projection (mm)	
	Deburring	Cutter mark removal, polishing	Maximum	Vertical burrs	Horizontal burrs	Cutter mark removal, polishing	Burr root thickness 0.05mm	Burr root thickness 0.1mm	Cutter mark removal, Polishing	Deburring	Cutter mark removal, Polishing
A13-CB06M, A11-CB06M, A21-CB06M	8000	10000	10000	0.5	0.5	0.3	4000	2500	250	10	10
A32-CB06M	8000	10000	10000	0.3	0.3	0.3	4000	2500	250	10	10
A13-CB15M	4800	6000	6000	1.0	1.0	0.5	4000	2500	450	10	10
A11-CB15M, A21-CB15M, A32-CB15M	4800	6000	6000	0.5	1.0	0.5	4000	2500	450	10	10
A11-CB25M, A21-CB25M, A32-CB25M	4000	5000	5000	0.5	1.0	0.5	4000	2500	700	15	10
A11-CB40M, A21-CB40M, A32-CB40M	2400	3000	3000	0.5	1.0	0.5	4000	2500	800	15	10
A11-CB60M, A21-CB60M, A32-CB60M	1600	2000	2000	0.5	1.0	0.5	4000	2500	850	15	10
A11-CB100M, A21-CB100M, A32-CB100M	960	1200	1200	0.5	1.0	0.5	4000	2500	850	15	10

* Workpiece made of plastics may deform or discolor, depending on the material characteristics. If the workpiece deforms, reducing the rotational speed to approximately 10 % of the standard machining condition may solve the problem.

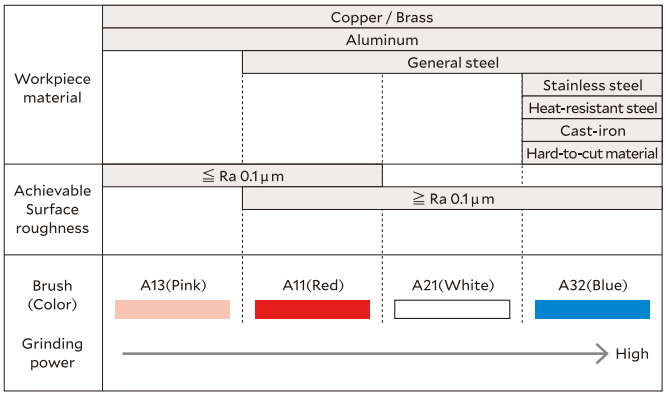
How to select

Refer to the charts below and select the brush color based on the workpiece material, burr root thickness and surface roughness.

Deburring



Cutter mark removal and polishing



If burrs remain

If burrs remain even when the Brush is used for burrs in applicable size with recommended depth of cut, please try the followings:

1. Increase rotational speed

Increase the rotational speed to the maximum.

Brush size (mm)	Product code	Standard rotational speed (min^{-1})	Maximum rotational speed (min^{-1})
φ 6	A13-CB06M, A11-CB06M, A21-CB06M, A32-CB06M	8000	10000
φ 15	A13-CB15M, A11-CB15M, A21-CB15M, A32-CB15M	4800	6000
φ 25	A11-CB25M, A21-CB25M, A32-CB25M	4000	5000
φ 40	A11-CB40M, A21-CB40M, A32-CB40M	2400	3000
φ 60	A11-CB60M, A21-CB60M, A32-CB60M	1600	2000
φ 100	A11-CB100M, A21-CB100M, A32-CB100M	960	1200
φ 125	A11-CB125M, A21-CB125M, A32-CB125M	800	1000
φ 165	A11-CB165M, A21-CB165M, A32-CB165M	600	750
φ 200	A11-CB200M, A21-CB200M, A32-CB200M	480	600

2. Check the rotational direction of the Brush

For horizontal burrs, up cut is recommended so that the brush tip pushes up the burrs.

3. Change the Brush color

Change the Brush with higher grinding power.
The grinding power of the Brush: Blue > White > Red > Pink
Make sure to select Brush color based on the workpiece material and burr root thickness.

If the edge is too rounded

Since the Brush rubs off the edge, it is not possible to remove burrs without rounding the edge (make a sharp edge).
To improve edge sharpness, please try the followings:

1. Increase feed rate

To make a sharp edge, increase the feed rate in 1,000 mm/min increments within the range where burrs can be removed.
Increasing the feed rate also helps to reduce the cycle time.

2. Decrease rotational speed

Decrease the rotational speed in 10 to 20% increments within the range where burrs can be removed.

3. Check the Brush color

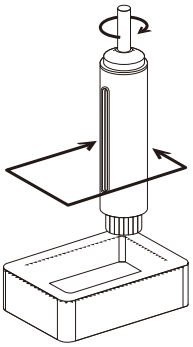
The grinding power of the Brush : Blue > White > Red > Pink
Select Brush color based on the workpiece material and burr toot thickness.

Reference data : Tool life

Materia : Aluminum die-casting
Previous process: Face milling
Burr root thickness : 0.1 mm
Traveling distance : 1000 mm/pcs

Tool: A11-CB25M
Rotational speed: 4000 min^{-1}
Feed rate: 2400 mm/min
Depth of cut: 1 mm
Used length: 50 mm out of 75 mm

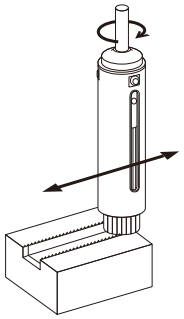
Tool life:
10 km
10,000 pcs (10 km/1000 mm)



Material : Carbon steel S45C
Previous process : End milling
Burr root thickness : 0.1 mm
Traveling distance : 200 mm/pcs

Tool : A21-CB25M
Rotational speed : 4000 min^{-1}
Feed rate : 2000 mm/min
Depth of cut : 0.5 mm
Used length : 50 mm out of 75 mm

Tool life:
3 km
15,000 pcs (3 km/200 mm)



* Tool life significantly varies depending on processing conditions, burr conditions (size and direction) and workpiece material.
The above data is not guaranteed. Please use as a guide.

If the surface roughness worsens

Select the appropriate Brush

Check the Brush color

The ability to improve surface roughness is inversely proportional to the grinding power, meaning that A13 (Pink) achieves the best surface roughness, followed by A11 (Red), A21 (White), and A32 (Blue).
Make sure to select the appropriate Brush color based on the workpiece material and the target surface roughness.

Reference data: Surface roughness after deburring

	A11 (Red)	A21 (White)	A32 (Blue)
A5052	Approx. Ra 0.6 µm, Rz 5.0 µm	—	—
S50C	—	Approx. Ra 0.2 µm, Rz 1.6 µm	—
SUS304	—	—	Approx. Ra 0.3 µm, Rz 2.4 µm

To improve surface roughness

Select the appropriate Brush

1. Check the Brush color

The ability to improve surface roughness is inversely proportional to the grinding power, meaning that A13 (Pink) achieves the best surface roughness, followed by A11 (Red), A21 (White), and A32 (Blue).
Make sure to select the appropriate Brush color based on the workpiece material and the target surface roughness.

2. Wet machining

The tool can be used for both dry and wet (oil-based and water-soluble) machining.
Wet machining may improve surface roughness and tool life.

3. Increase the number of passes

When comparing in the same cycle time, increasing the number of passes makes bigger difference than decreasing feed rate.

Example

Rotational speed :
4000 min^{-1}
Depth of cut : 0.5 mm
Feed rate : 600 mm/min
Number of pass : 1

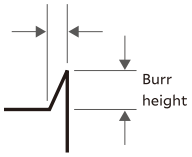
Rotational speed :
4000 min^{-1}
Depth of cut : 0.5 mm
Feed rate : 1200 mm/min
Number of passes : 2

XEBEC Brush™ Surface End Type

Ideal for polishing and removing cutter marks on inner diameters and sealing surface

Applicable burr size
Burr root thickness of 0.1 mm or less (burrs of this size can easily be removed with fingernails)

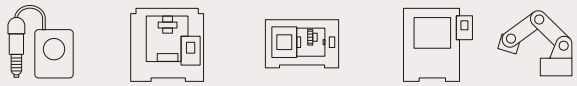
Burr root thickness



Video (YouTube)

Applicable equipment

This tool can be used with rotary tools and equipments that can control the rotational speed.



Rotary tool (electric) | Machining center | Lathe (with milling function) | Special machine | Robot

Brush

Brush (Color)	Product code	Brush diameter (mm)	Shank diameter Dc(mm)	Bristle length ℓ (mm)	Overall length L (mm)	Standard rotational speed (min⁻¹)	Maximum rotational speed (min⁻¹)	Fig
A13 (Pink)	A13-EB01S	φ 1	φ 3	15	52	7000 - 12000	15000	3
	A13-EB015S	φ 1.5	φ 3	15	52	7000 - 12000	15000	3
	A13-EB02S	φ 2	φ 3	15	52	7000 - 12000	15000	3
	A13-EB025S	φ 2.5	φ 3	15	52	7000 - 12000	15000	3
	A13-EB03M	φ 3	φ 3	30	67	4000	6000	3
A11 (Red)	A11-EB01S	φ 1	φ 3	15	52	7000 - 12000	15000	3
	A11-EB015S	φ 1.5	φ 3	15	52	7000 - 12000	15000	3
	A11-EB02S	φ 2	φ 3	15	52	7000 - 12000	15000	3
	A11-EB025S	φ 2.5	φ 3	15	52	7000 - 12000	15000	3
	A11-EB06M	φ 5	φ 3	20	57	7000	12000	4
A21 (White)	A21-EB06M	φ 5	φ 3	20	57	7000	12000	4
A32 (Blue)	A32-EB06M	φ 5	φ 3	20	57	7000	12000	4

*The Brush size is approximate as the tip expands by rotating.

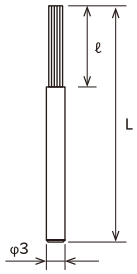


Fig3

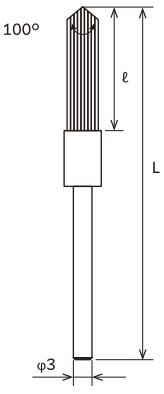


Fig4

(A11-EB06M
A21-EB06M
A32-EB06M)

Precautions for Use

The torque output of the rotary tool must be 2N or lower.

The Brush will break off if:

- used beyond the maximum rotational speed
- used beyond the maximum indentation load
- used with a pneumatic rotary tool

How to select

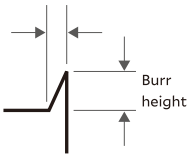
Workpiece material	Resin	Copper, brass		
		Aluminum		
		General steel		
				Stainless steel
				Heat-resistant steel
				Cast-iron
				Hard-to-cut material
Burr thickness	Micro fine burrs			
		Burr root thickness (≦ 0.1 mm)		
Achievable Surface roughness	≦ Ra 0.1μm			
		≧ Ra 0.1μm		
Brush (Color)	A13(Pink)	A11(Red)	A21(White)	A32(Blue)
Grinding power	→ High			

XEBEC Brush™ Surface Extra-Large Patented

Ideal for deburring, cutter mark removal and surface polishing with a width of 100 mm or more

Applicable burr size
Burr root thickness of 0.2 mm or less (burrs of this size can be removed with fingernails)

Burr root thickness



Video (YouTube)

Tool composition

The brush main unit and the slide ring are separate items.
Assemble the main unit and the slide ring before use.

Applicable equipment

This tool can be mounted on equipment shown below:

Machining center | Lathe (with milling function) | Special machine

Brush

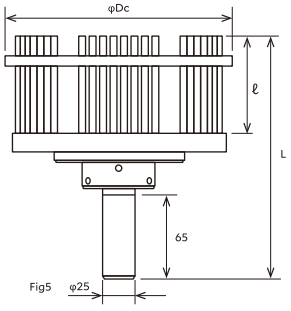
Brush (Color)	Product code	Brush diameter (mm)	Bristle length ℓ (mm)	Matching Slide Ring (Product code)	Fig
A11 (Red)	A11-CB125M	φ 125	75	SR125M	5
	A11-CB165M	φ 165	75	SR165M	5
	A11-CB200M	φ 200	75	SR200M	5
A21 (White)	A21-CB125M	φ 125	75	SR125M	5
	A21-CB165M	φ 165	75	SR165M	5
	A21-CB200M	φ 200	75	SR200M	5
A32 (Blue)	A32-CB125M	φ 125	75	SR125M	5
	A32-CB165M	φ 165	75	SR165M	5
	A32-CB200M	φ 200	75	SR200M	5

*The Brush size is approximate as the tip expands by rotating.

Slide Ring

Product code	Brush diameter (mm)	Outer diameter Dc (mm)	Shank diameter (mm)	Overall length L (mm)	Fig
SR125M	φ 125	φ 135	φ 25	187	5
SR165M	φ 165	φ 176	φ 25	187	5
SR200M	φ 200	φ 211	φ 25	187	5

*The Slide Ring consists of a ring, a base holder and a shank.
*Base holder and shank sizes are the same across all Brush diameter. Ring size varies by Brush diameter.
*The total weight of a Brush and a Slide Ring. φ125: 1920g, φ165: 2320g, φ200: 2750g



Machining Parameters

Standard Machining Parameters

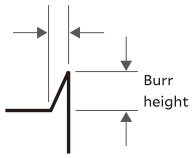
Product code	Rotational speed (min⁻¹)			Depth of cut (mm)			Feed rate (mm/min)			Brush projection (mm)	
	Deburring	Cutter mark removal, polishing	Maximum	Vertical burrs	Horizontal burrs	Cutter mark removal, polishing	Burr root thickness 0.05mm	Burr root thickness 0.1mm	Cutter mark removal, Polishing	Deburring	Cutter mark removal, Polishing
A11-CB125M, A21-CB125M, A32-CB125M	800	1000	1000	0.5	1.0	0.5	4000	2500	700	15	10
A11-CB165M, A21-CB165M, A32-CB165M	600	750	750	0.5	1.0	0.5	4000	2500	700	15	10
A11-CB200M, A21-CB200M, A32-CB200M	480	600	600	0.5	1.0	0.5	4000	2500	650	15	10

XEBEC Brush™ Crosshole

Ideal for deburring, polishing, and removing cutter marks on inner diameters and counterbores up to φ20

Applicable burr size
Burr root thickness of 0.1 mm or less (burrs of this size can easily be removed with fingernails)

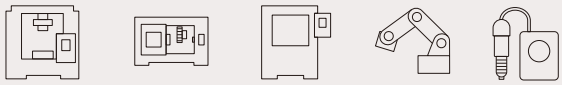
Burr root thickness



Video (YouTube)

Applicable equipment

This tool can be mounted on equipment which can control the rotational speed. The tool must be rotated over 6500 min^{-1}.



Brush (Color)	Product code	Brush diameter (mm)	Shank diameter Dc (mm)	Shank diameter Ds (mm)	Bristle length ℓ (mm)	Overall length L (mm)	Maximum rotational speed (min^{-1})	Target hole diameter (mm)	Fig
A12 (Red)	CH-A12-1.5M	φ 1.5	φ 2.5	φ 3	50	120	20000	φ 3.5 – 5	6
	CH-A12-3M-TL	φ 3	φ 4	φ 3	50	120	14000	φ 5 – 8	6
	CH-A12-3L-TL	φ 3	φ 4	φ 4	50	170	12000	φ 5 – 8	6
	CH-A12-5M-TL	φ 5	φ 6	φ 6	50	120	14000	φ 8 – 10	6
	CH-A12-5L-TL	φ 5	φ 6	φ 6	50	170	12000	φ 8 – 10	6
	CH-A12-7M-TL	φ 7	φ 8	φ 6	50	120	14000	φ 10 – 20	6
	CH-A12-7L-TL	φ 7	φ 8	φ 8	50	170	12000	φ 10 – 20	6
	CH-A12-11M	φ 11	φ 12	φ 12	50	120	14000	φ 14 – 20	6
	CH-A12-11L	φ 11	φ 12	φ 12	50	170	12000	φ 14 – 20	6
A33 (Blue)	CH-A33-3M	φ 3	φ 4	φ 3	60	130	14000	φ 5 – 8	6
	CH-A33-3L	φ 3	φ 4	φ 4	60	180	12000	φ 5 – 8	6
	CH-A33-5M	φ 5	φ 6	φ 6	60	130	14000	φ 8 – 10	6
	CH-A33-5L	φ 5	φ 6	φ 6	60	180	12000	φ 8 – 10	6
	CH-A33-7M	φ 7	φ 8	φ 6	60	130	14000	φ 10 – 14	6
	CH-A33-7L	φ 7	φ 8	φ 8	60	180	12000	φ 10 – 14	6
	CH-A33-11M	φ 11	φ 12	φ 12	60	130	14000	φ 14 – 20	6
	CH-A33-11L	φ 11	φ 12	φ 12	60	180	12000	φ 14 – 20	6

* The brush size is approximate as the tip expands by rotating.

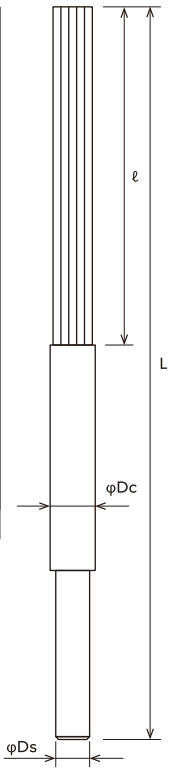


Fig6

Precautions for Use

The clamp length must be 30mm or more when attaching this tool on the machine, and make sure it is affixed rigidly.

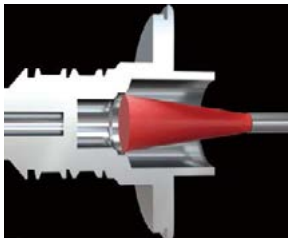
The Brush will break off if:
- machined beyond the maximum rotational speed
- used with a pneumatic tool
- rotated outside the cylinder (outside workpiece)
- used with the tip of this tool is less than 20mm inside the bore

In the following cases, the Brush may break off:
- Off-center cross hole and angled cross hole
- T-shaped hole: If the cross hole diameter is 100% of the main bore diameter or more.
- Cross-shaped hole: If the cross hole diameter is 70% of the main bore diameter or more.

Applications

Automation of cross hole deburring

Input Shaft



Material : SCM
Previous process : Drilling
Tool : CH-A12-7M-TL

Before

Deburring was done by manual work with abrasive impregnated nylon brush. Failed to remove all burrs with a low yield.

After

Realized automation of deburring with a special machine. All burrs are removed by high grinding power. Quality is stabilized.

Automation of cross hole deburring

Valve Case

Material : Resin
Previous process : Drilling
Tool : CH-A12-5M-TL

Before

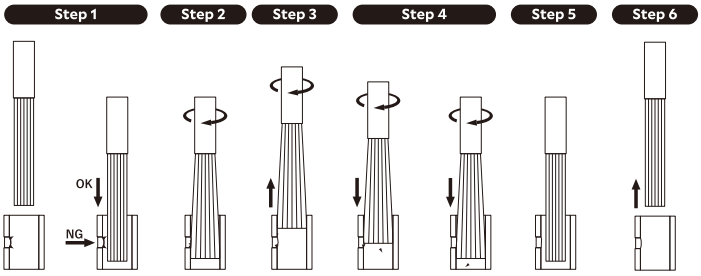
Manual deburring with a cutter was time-consuming. Finished inner surface was scratched with the cutter and resulted in low quality.

After

Automated deburring inside the machine shortened the cycle time significantly. No scratches on the inner surface. Improved deburring quality.

How to use

For effective use



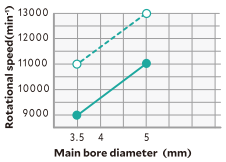
1. Insert the brush while not in motion.
*If you rotate the brush outside the cylinder, the bristles may be damaged or scattered and may cause injury to the operator.
2. Rotate the tool past the cross-hole
3. Process while pulling the brush back.
4. Process while pushing the brush forward.
5. Stop the brush rotation.
6. Remove the brush while it is at rest.

Machining Parameters

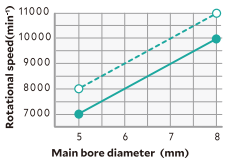
Adjusting the rotational speed

Optimize the performance of this Brush by adjusting the rotational speed depending on the Brush size, main bore diameter, and the Brush wear amount by referring to charts below. When the Brush is new, refer to the continuous line (——) . When the Brush is worn by 10mm, refer to the dotted line (----) .

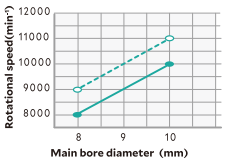
CH-A12-1.5M
Target hole diameter: φ3.5 – 5 mm



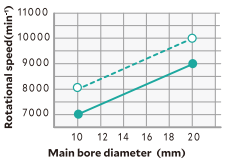
CH-A12-3M-TL/3L-TL
Target hole diameter: φ5 – 8 mm



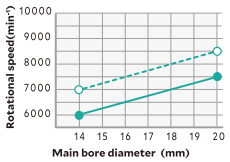
CH-A12-5M-TL/5L-TL
Target hole diameter:φ8 – 10 mm



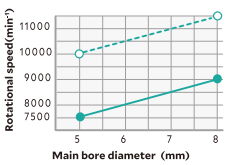
CH-A12-7M-TL/7L-TL
Target hole diameter: φ10 – 20 mm



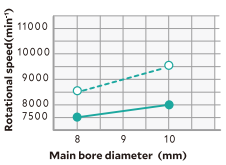
CH-A12-11M/11L
Target hole diameter: φ14 – 20 mm



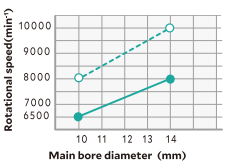
CH-A33-3M/3L
Target hole diameter: φ5 – 8 mm



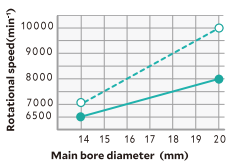
CH-A33-5M/5L
Target hole diameter: φ8 – 10 mm



CH-A33-7M/7L
Target hole diameter: φ10 – 14 mm



CH-A33-11M/11L
Target hole diameter: φ14 – 20 mm



Feed rate

300 mm/min

Rotational direction

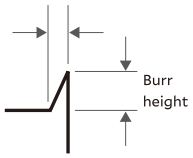
A uniform deburring and edge quality can be achieved by rotating the tool in both clockwise and counter-clockwise directions.

XEBEC Brush™ Crosshole Extra-Large

Ideal for deburring, polishing, and removing cutter marks on inner diameters and counterbores between φ20 and φ35

Applicable burr size
Burr root thickness of 0.1 mm or less (burrs of this size can easily be removed with fingernails)

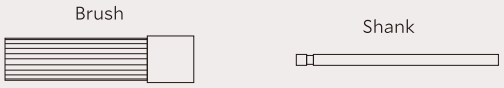
Burr root thickness



Video (YouTube)

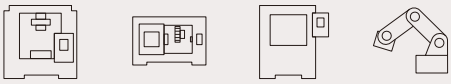
Tool composition

Brush and Shank are sold separately.
Assemble Brush and Shank before use.



Applicable equipment

This tool can be mounted on equipment which can control the rotational speed.
The tool must be rotated over 4000 min^{-1}.



Brush

Brush (Color)	Product code	Brush diameter (mm)	Bristle length (mm)	Depth of shank inserted (mm)	Maximum rotational speed (min^{-1})	Target hole diameter (mm)	Matching shank	Fig
A33 (Dark Blue)	CH-A34-15	φ 15	60	10	9000	φ20 – 25	CH-SH-6	7
	CH-A34-20	φ 20	60	16	9000	φ25 – 30	CH-SH-8	7
	CH-A34-25	φ 25	60	16	9000	φ30 – 35	CH-SH-8	7

*The Brush size is approximate as the tip expands by rotating.
*Overall length of the Brush with the shank attached is 150 mm.

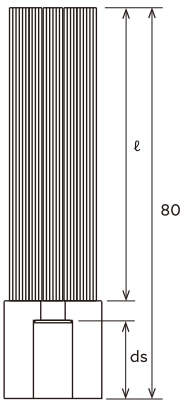


Fig7

Shank

Product code	Shaft diameter Ds (mm)	Shank length ℓ s (mm)	Applicable Brush	Fig
CH-SH-6	φ 6	80	CH-A34-15	8
CH-SH-8	φ 8	86	CH-A34-20, CH-A34-25	8

Precautions for Use

The clamp length must be 30mm or more when attaching this tool on the machine, and make sure it is affixed rigidly.

The Brush will break off if:

- machined beyond the maximum rotational speed
- used with a pneumatic tool
- rotated outside the cylinder (outside workpiece)
- the distance from the hole entrance to the target is 20 mm or less

The Brush may break off when:

- the crosshole diameter larger than φ12

*When using this product on a crosshole diameter larger than φ12, please contact us.

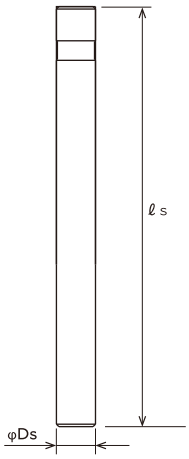


Fig8

Machining Parameters

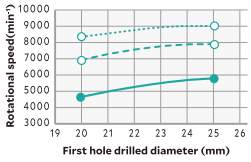
Standard Machining Parameters

Rotational speed: 7000 min^{-1} Feed rate: 300 mm/min

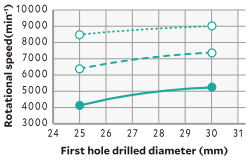
Adjusting the rotational speed

Optimize the performance of this Brush by adjusting the rotational speed depending on the Brush size, main bore diameter, and the Brush wear amount by referring to charts below. When the Brush is new, refer to the continuous line (——) . When the Brush is worn by 10mm, refer to the dotted line (- - -) . When the Brush is worn by 20mm, refer to the dotted line (·····)

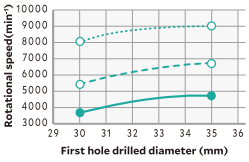
CH-A34-15
Target hole diameter: φ20 – 25 mm



CH-A34-20
Target hole diameter: φ25 – 30 mm



CH-A34-25
Target hole diameter: φ30 – 35 mm



Rotational direction

A uniform deburring and edge quality can be achieved by rotating the tool in both clockwise and counter-clockwise directions.

Applicable material

The Brush can be used for any materials such as plastics, nonferrous materials, steel and stainless steel.

XEBEC Brush™ Crosshole Extra-Long

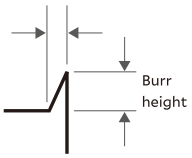
Patented

Ideal for deburring, polishing, and removing cutter marks on inner diameters and counterbores exceeding 150mm in depth

Special Order Item

Applicable burr size
Burr root thickness of 0.1mm or less (burrs of this size can easily be removed with fingernails)

Burr root thickness



Tool composition

Brush, Collar, and Shank are sold separately.

Applicable equipment

This tool can be mounted on full cover type of equipment which can control the rotational speed. The tool must be rotated over 6,500 min^{-1}.

Machining center | Lathe (with milling function) | Special machine

Brush (Color)	Product code	Brush diameter (mm)	Shank diameter Ds (mm)	Overall length L (mm)	Maximum rotational speed (min^{-1})
A12 (Red)	※	φ 3	φ 4	400	12000
	※	φ 5	φ 6	400	12000
	※	φ 7	φ 8	400	12000
	※	φ 11	φ 12	400	12000
A33 (Blue)	※	φ 3	φ 4	410	12000
	※	φ 5	φ 6	410	12000
	※	φ 7	φ 8	410	12000
	※	φ 11	φ 12	410	12000

※Please contact us for the details as it is a special order item.
※The Brush size is approximate as the tip expands by rotating.

How to select

Workpiece material	Resin	Copper, brass
	Copper, brass	Stainless steel
	Aluminum	
		Heat-resistant steel
		Cast-iron
		Hard-to-cut material
Burr thickness	Micro fine burrs	
	Burr root thickness (≦ 0.1 mm)	
Achievable Surface roughness	≦ Ra 0.1μm	
		≦ Ra 0.1μm
Brush (Color)	A12(Red)	A33(Blue)
		A34(Drak blue)
Grinding power	→ High	

Precautions for Use

The Brush will break off if:
- rotated beyond the maximum rotational speed
- used with a pneumatic tool
- rotated outside the cylinder (outside workpiece)

In the following cases, the Brush may break off:
- off -center cross hole and angled cross hole
- if the cross hole diameter is equal to or greater than the main bore diameter in case of T-shaped cross hole
- if the cross hole diameter is more than 70% of the main bore diameter in case of cross-shaped

If burrs remain

If burrs remain even when the Brush is used for burrs in applicable size with recommended rotational speed, please try the followings:

1. Check the Brush color.

2. Increase the rotational speed to the maximum.

3. Increase the number of pass.

4. Decrease the feed rate.

To extend tool life

If tool life is short even when the brush is used for burrs in applicable size, please try the followings:

1. Decrease the rotational speed.

2. Increase the feed rate.

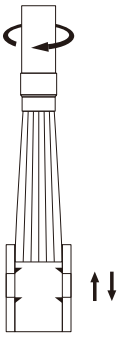
Reference data : Tool life

Material: Carbon steel S45C
Previous process: Drilling
Burr root thickness: 0.1 mm
Hole diameter:
Main bore Φ10 mm
Cross hole Φ5 mm

Tool: CH-A12-5M-TL
Rotational speed: 10000 min^{-1}
Feed rate: 300 mm/min
Depth of cut: 1 mm
Used length: 10 mm out of 50 mm

Tool life: 4500 holes

* Tool life significantly varies depending on workpiece material and processing conditions. The above data is not guaranteed. Please use as a guide.

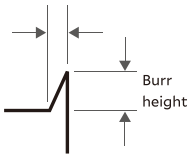


XEBEC Brush™ Wheel Type Patented

Ideal for deburring and polishing inner diameters, side walls, and thread outside diameters

Applicable burr size
Burr root thickness of 0.1 mm or less (burrs of this size can easily be removed with fingernails)

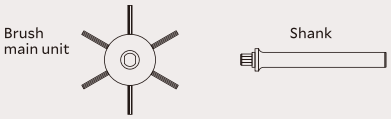
Burr root thickness



Video (YouTube)

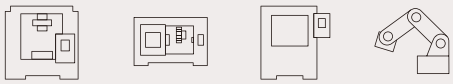
Tool composition

Brush and Shank are sold separately.
Assemble Brush and Shank before use.



Applicable equipment

This tool can be mounted on equipment shown below:



Brush main unit

Brush (Color)	Product code	Brush diameter (mm)	Number of bundles	Matching shank	Fig
A11 (Red)	W-A11-50	φ 50	6	W-SH-M/L	9
	W-A11-75	φ 75	6		

Shank

Product code	Shank diameter Ds (mm)	Shank length ℓs (mm)	Fig
W-SH-M	φ 8	70	10
W-SH-L	φ 12	150	10

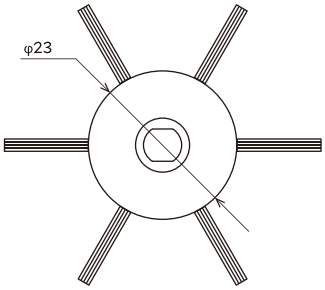


Fig9

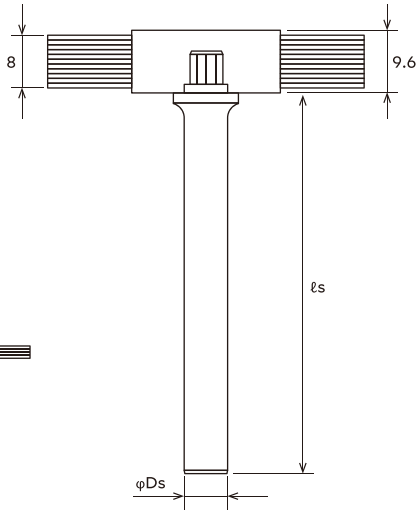


Fig10

Applications

Deburring automation

Thread Outside Diameter

Material : SCM
Previous process : Turning
Tool: W-A11-50

Before

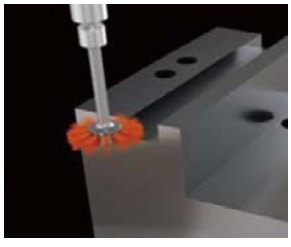
Deburring was done by filing but failed to remove all burrs. Quality was not stabilized.

After

All burrs are removed with the quality stabilized.

Deburring automation

Side Wall



Material : S50C
Previous process : End milling
Tool : W-A11-50

Before

Had a difficulty removing burrs formed on the side edge. Burrs were removed by manual work.

After

Burrs are removed in the machine. Manual work is eliminated.

How to use

As shown in Figure 1, the best approach to remove burrs formed on Surface A is to place a center of a Brush at the center angle to the edge.
In such a case, rotate the Brush in both clockwise and counter-clockwise directions.

If it is difficult to place the Brush as shown in Figure 1, it is also possible to place the Brush as shown in Figure 2.
Also in such a case, rotate the Brush in both clockwise and counter-clockwise directions.

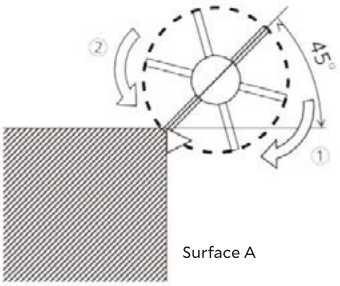


Figure 1

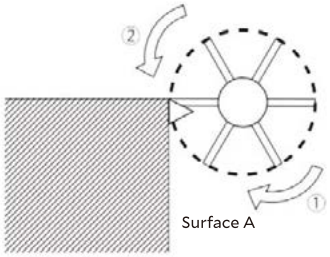


Figure 2

Machining Parameters

Standard Machining Parameters

Product code	Cutting speed (m/min)	Rotational speed (min^{-1})	Feed per bundle (mm/bundle)	Depth of cut (mm)	Feed (mm/min)
W-A11-50	250	1600	0.5	0.2	4800
W-A11-75	250	1000	0.5	0.2	3000

Maximums for machining conditions

Product code	Cutting speed (m/min)	Rotational speed (min^{-1})	Depth of cut (mm)	Feed (mm/min)
W-A11-50, W-A11-75	150 - 350	≦1.5	≦0.5	3000

*As bristles are worn out, bristle length becomes shorter and increases stiffness, causing bristles to be broken.
If bristles breakage occurs, decrease the depth of cut.

If burrs remain

If burrs remain even when the Brush is used for burrs in applicable size with recommended depth of cut, please try the following:

Increase the feed amount in 10 to 20% increments

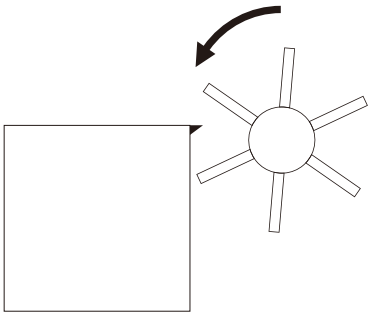
To extend tool life

If the tool life is short even when the Brush is used for burrs in applicable size with recommended depth of cut, please try the following:

Increase the feed rate in 10 to 20% increments

Reference data : Tool life

Material: Carbon steel S45C
Previous process: End milling
Burr root thickness: 0.1 mm
Traveling distance: 120 mm/pcs



Tool: W-A11-50
Cutting speed: 250 m/min
(Rotational speed: 1600 min^{-1})
Feed per bundle: 0.7 mm/bundle
(Feed rate: 7000 mm/min)
Depth of cut: 0.2 mm
Used length: 10 mm out of 13.5 mm

Tool life:
600 m
5000 pcs (600 m/120 mm)

* Tool life significantly varies depending on workpiece material and processing conditions.
The above data is not guaranteed. Please use as a guide.

XEBEC Optional Tools

Make it easier to adjust the Brush projection length, thereby achieving more consistent deburring and polishing.

With a Brush

XEBEC Floating Holder™

The built-in spring helps to maintain stable load, contributing to consistent edge quality and reduction of the frequency to adjust the depth of cut.

Product in Use

Video (YouTube)

With a Brush

XEBEC Self-Adjusting Sleeve™

Automatically adjusts the Brush projection length with the built-in gear mechanism. Helps prevent human errors and achieve consistent machining performance.

Product in Use

Video (YouTube)

XEBEC Brush Length Adjustment Tool™

Tool for quick in-machine brush length adjustment.

XEBEC Floating Holder™

Straight Shank Type
BT Shank Type

Patented

The built-in spring helps to maintain stable load, which enables consistent performance, while reducing the need to adjust the Brush projection length frequently.

Straight Shank Type compatible with XEBEC Brush Surface (ϕ6 – 100)

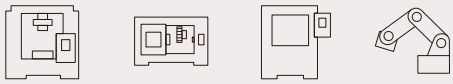
BT Shank Type compatible with XEBEC Brush Surface (φ6 – 25)




Video (YouTube)

Applicable equipment [Straight Shank Type]

This tool can be mounted on equipment shown below:



Machining center | Lathe (with milling function) | Special machine | Robot

Applicable equipment [BT Shank Type]

This tool can be used with machine tools that are compatible with BT30/40 shanks.

Straight Shank Type

Product code	Target brush diameter (mm)	Diameter for the sleeve shank (mm)	Maximum rotational speed (min^{-1})	Accessories	Fig
FH-ST12-SL10	φ 6	φ 6 (with the supplied bush 1)	10000	1. φ 6 bush 2. φ 8 bush 3. Low-pressure spring 4. Standard spring* 5. High-pressure spring * Installed when shipped	11
	φ 15	φ 6 (with the supplied bush 2)	6000		
	φ 25	φ 8 (with the supplied bush 3)	5000		
	φ 40	φ 10	3000		
FH-ST20-60	φ 60	φ 12	2000	φ 12 bush	12
FH-ST20-100	φ 100	φ 16	1200	φ 16 bush	12

*Optional Φ3 bush is available.

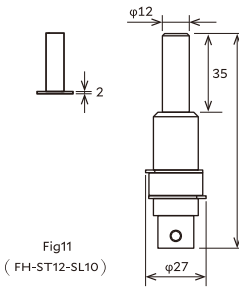


Fig11
(FH-ST12-SL10)

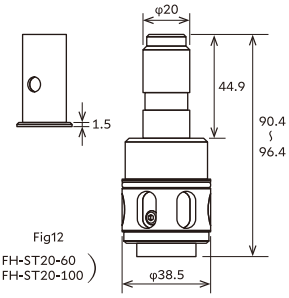


Fig12
FH-ST20-60
FH-ST20-100)

BT Shank Type

Product code	Target brush diameter (mm)	Diameter for the sleeve shank (mm)	Maximum rotational speed (min^{-1})	Length under gauge line (mm)	Fig
FH-BT30	φ 6	φ 6 (with φ 6 bush)	10000	75	13
	φ 15	φ 6 (with φ 6 bush)	6000		
	φ 25	φ 8	5000		
FH-BT40	φ 6	φ 6 (with φ 6 bush)	10000	60	14
	φ 15	φ 6 (with φ 6 bush)	6000		
	φ 25	φ 8	5000		

*φ6 bush is available separately.

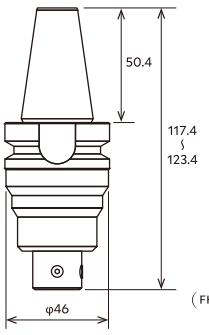


Fig13
(FH-BT30)

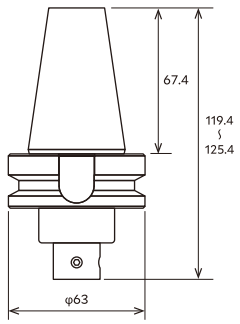


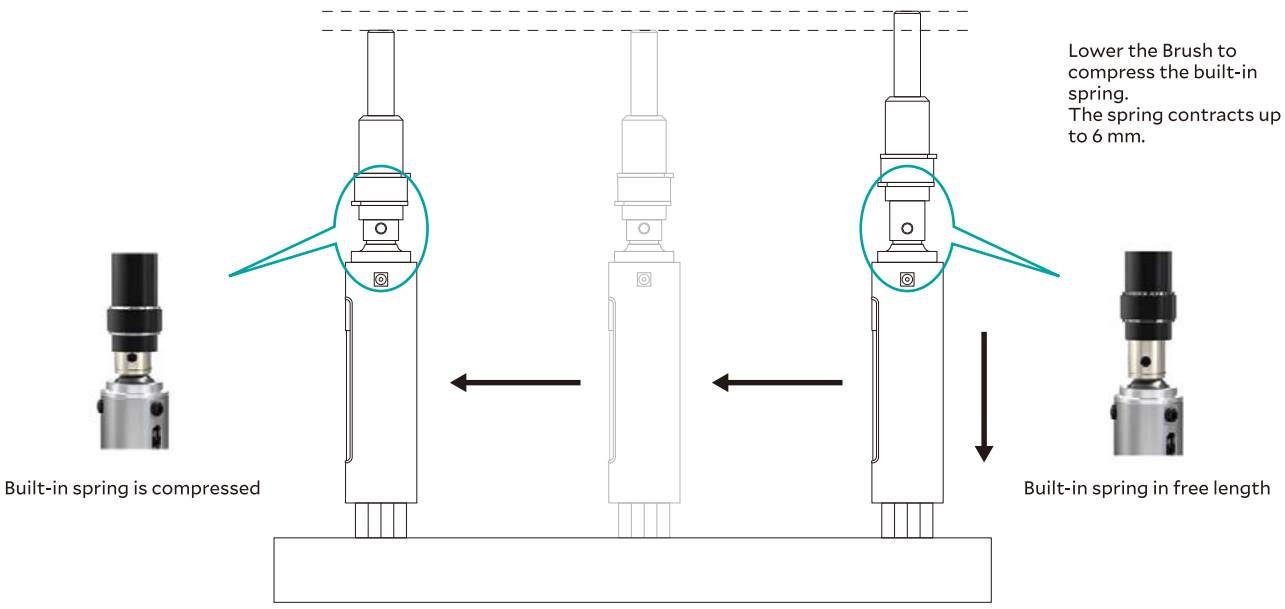
Fig14
(FH-BT40)

Precautions for Use

- Approach the tool vertically when making it engaged with workpiece.
- It can not be used if there are intermittent machining or protrusions.
- Using on horizontal machining center, it may not function when spring load is low.

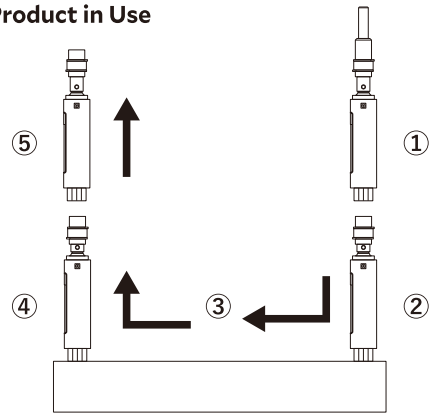
Mechanism

This tool has a built-in spring. Compress the spring after the Brush comes in contact with the workpiece surface.



How to use

Product in Use



The following describes effective use of the tool.

1. Approach the workpiece surface from above without rotating the Brush.
2. Set the depth of cut and compress the spring.
3. Rotate the Brush and start feeding with the spring compressed.
4. Stop rotation and feed.
5. Remove the Brush upward from the workpiece surface.

Non-applicable workpiece conditions

Avoid cavities and protrusions to ensure the floating function works properly.

FH-ST12-SL10

Spring type	Outer diameter (mm)	Spring constant (N/mm)	Overall length (mm)	Load by stroke (N)	
				0mm	6mm
Standard spring (Installed)	φ10	0.3	40	4.5	6.3
Low-pressure spring (Attachment)	φ10	0.3	30	1.5	3.3
High-pressure spring (Attachment)	φ10	0.55	39	7.2	10.5
Maximum load spring (Sold separagely)	φ10	3.03	30	15.2	33.4

FH-ST20-60/100 FH-BT30/40

Load adjustment	Load by stroke (N)		Adjustment Screw Position
	0mm	6mm	
Standard Float	2	6	When load adjustment screw 2 is at the end of the shaft.
Higher Float	6	10	When load adjustment screw 2 is at the back of the shaft.

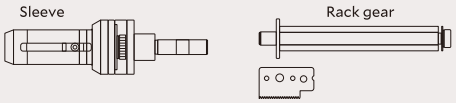
XEBEC Self-Adjusting Sleeve™ Patented

Automatically adjusts the Brush protrusion length with the built-in gear mechanism.
Helps prevent human errors and achieve consistent machining performance.

Compatible with
XEBEC Brush Surface (φ6 – 40)

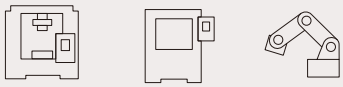
Tool composition

This tool consists of Sleeve and Rack gear.
Brush is available separately.



Applicable equipment

This tool can be used with a machine capable of precise control of the angular position of the Sleeve.



Product code	Target brush (Product code)	Sleeve outer diameter Dc (mm)	Outermost diameter Dc (mm)	Shank diameter Ds (mm)	Overall length L (mm)	Shank length ℓ s (mm)	Main body weight (g)	Maximum rotational speed(min-1)	Fig
XP-AUT06M	A13-CB06M	φ 14.2	φ 37	φ 10	124.1	35	220	10000	15
	A11-CB06M								
	A21-CB06M								
	A32-CB06M								
XP-AUT15M	A13-CB15M	φ 23.4	φ 37	φ 10	136.3	35	270	6000	15
	A11-CB15M								
	A21-CB15M								
	A32-CB15M								
XP-AUT25M	A11-CB25M	φ 34.6	φ 60	φ 16	189	41.5	795	5000	15
	A21-CB25M								
	A32-CB25M								
XP-AUT40M	A11-CB40M	φ 50	φ 60	φ 16	189	41.5	910	3000	15
	A21-CB40M								
	A32-CB40M								

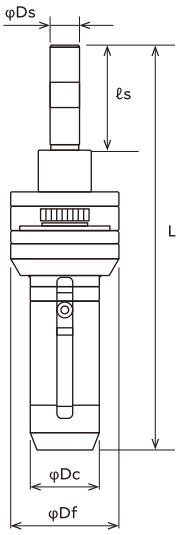


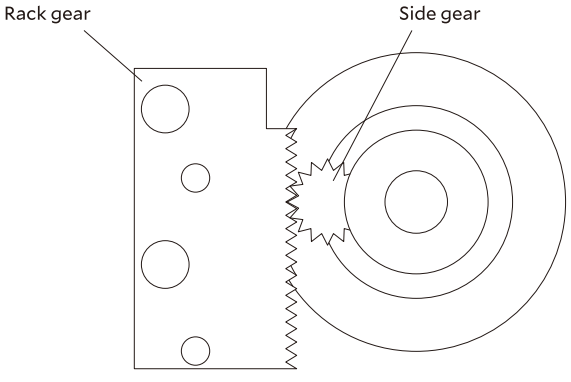
Fig15

Brush projection length

It is possible to adjust the Brush projection length in increments of 0.05mm. In one single pass, it is possible to make an adjustment of up to 1mm.
This allows adjustments be made at a predetermined interval corresponding to the tool wear.

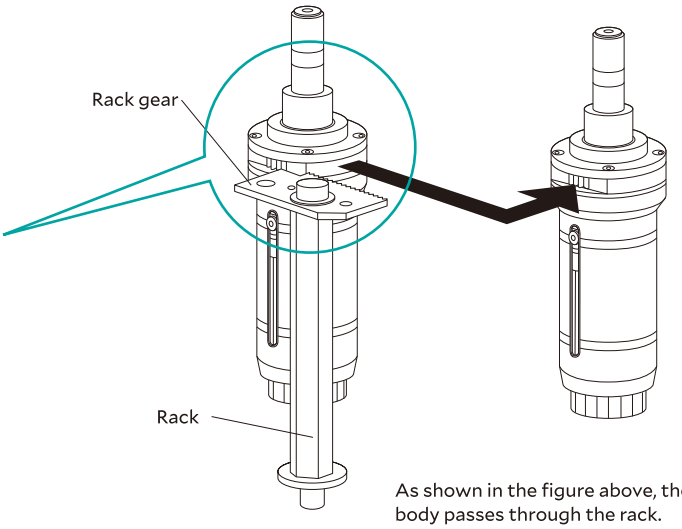
How to Use

Mount the Rack Gear inside the machine.
The Brush projection length is adjusted by rotating the Side gear built inside the Sleeve with the Rack gear.



The main body side gear and the rack gear are meshed.

[Function image]



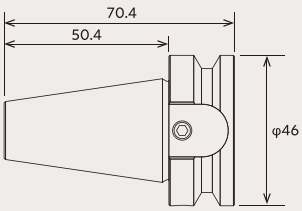
As shown in the figure above, the main body passes through the rack.

XEBEC Short BT Holder™

Compatible with
XEBEC Brush Surface
XEBEC Self-Adjusting Sleeve
XEBEC Floating Holder

Compact tool holder whose length under the gauge line is 23.5mm (including bush flange thickness 1.5mm).
Optimal when available space is limited.

Tool outline



Applicable equipment

This tool can be used with machine tools that are compatible with BT30 shanks.

Product code	Target shank diameter (mm)
SH-BT30	φ20

*For use with XEBEC tools only

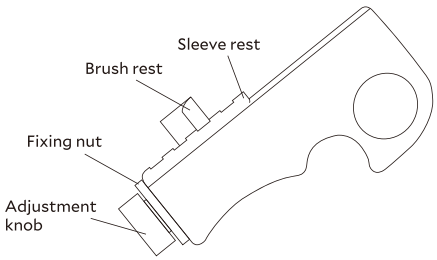
XEBEC Brush Length Adjustment Tool™

Tool to adjust Brush projection length easily.

Product code	Corresponding Brush diameter (mm)	Size of built-in hexagonal wrench (mm)
XP-EZ-001	φ15 / φ25 / φ40 / φ60 / φ100	1.5, 2.0

How to use

1. Move the brush rest using adjustment knob to set the amount of brush projection.
2. Tighten the fixing nut.
3. Hold the unit in one hand, and align the sleeve rest with sleeve tip.
4. Loosen the screws to allow the brush to drop to the brush rest.
5. Tighten the screws to secure the brush in place.



Compatible with
XEBEC Brush Surface (φ15 – 100)

Mobile Micromotor System

Battery-powered rotary tool that is useful at workstations where power supply is unavailable.
The handpiece is ultra-lightweight, ideal for manual operation without causing fatigue.

Product code	For use with	Maximum rotational speed (min^{-1})	Standard components
M2P33STX	φ3mm shank	30000	Handpiece with stand, controller ON/OFF foot switch, power cable for charging

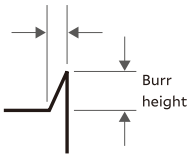
*Run length: about 5 hours by continuous use

XEBEC Back Burr Cutter™

Perfect for deburring both front and back of a drilled hole.

Applicable burr size
Burr root thickness of 0.2 mm or less (burrs of this size can be removed with fingernails)

Burr root thickness



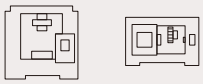
Video (YouTube)

Tool composition

Spherical deburring cutter and custom-made tool Path.
For information of custom-made Path machining program

Applicable equipment

This tool can be used on equipment with 3-axis simultaneous control.



Machining center | Lathe (with milling function)

AlTiCrN coated

Steel | Stainless steel | Cast iron | Heat resistant alloy | Nonferrous metals

	Product code	Cutter diameter Dc (mm)	Cutter radius R (mm)	Neck diameter dn (mm)	Neck Length L2 (mm)	Overall length L1 (mm)	Shank diameter Ds (mm)	Number of blades	Fig
3 blades short type	XC-08-AS-3F	φ0.8	0.4	φ0.48	3	60	φ 3	3	16
	XC-13-AS-3F	φ1.3	0.65	φ0.78	5	60	φ 3	3	16
	XC-18-AS-3F	φ1.8	0.9	φ1.1	6	60	φ 3	3	16
	XC-23-AS-3F	φ2.3	1.15	φ1.4	7.5	70	φ 3	3	16
	XC-28-AS-3F	φ2.8	1.4	φ1.7	9	70	φ 4	3	16
	XC-33-AS-3F	φ3.3	1.65	φ2.0	10.5	70	φ 4	3	16
	XC-38-AS-3F	φ3.8	1.9	φ2.4	12	70	φ 4	3	16
	XC-48-AS-3F	φ4.8	2.4	φ3.0	15	70	φ 6	3	16
	XC-58-AS-3F	φ5.8	2.9	φ3.5	18	70	φ 6	3	16
	XC-78-AS-3F	φ7.8	3.9	φ4.7	24	100	φ 8	3	16
	XC-98-AS-3F	φ9.8	4.9	φ5.9	30	120	φ10	3	16
Regular type	XC-08-A	φ0.8	0.4	φ0.48	5	60	φ 3	2	16
	XC-13-A	φ1.3	0.65	φ0.78	8	60	φ 3	2	16
	XC-18-A	φ1.8	0.9	φ1.1	10	60	φ 3	2	16
	XC-23-A	φ2.3	1.15	φ1.4	12.5	70	φ 3	2	16
	XC-28-A	φ2.8	1.4	φ1.7	15	70	φ 4	2	16
	XC-33-A	φ3.3	1.65	φ2.0	17.5	70	φ 4	2	16
	XC-38-A	φ3.8	1.9	φ2.4	20	70	φ 4	2	16
	XC-48-A	φ4.8	2.4	φ3.0	25	70	φ 6	2	16
	XC-58-A	φ5.8	2.9	φ3.5	30	70	φ 6	2	16
	XC-78-A	φ7.8	3.9	φ4.7	40	100	φ 8	3	16
	XC-98-A	φ9.8	4.9	φ5.9	50	120	φ10	3	16
Straight type	XC-18-B	φ1.8	0.9	φ1.1	—	50	φ1.1	2	17
	XC-23-B	φ2.3	1.15	φ1.4	—	60	φ1.4	2	17
	XC-28-B	φ2.8	1.4	φ1.7	—	70	φ1.7	2	17
	XC-33-B	φ3.3	1.65	φ2.0	—	80	φ2.0	2	17
	XC-38-B	φ3.8	1.9	φ2.4	—	85	φ2.4	2	17
	XC-48-B	φ4.8	2.4	φ3.0	—	105	φ3.0	2	17
	XC-58-B	φ5.8	2.9	φ3.5	—	120	φ3.5	2	17
	XC-78-B	φ7.8	3.9	φ4.7	—	150	φ4.7	3	17
	XC-98-B	φ9.8	4.9	φ5.9	—	180	φ5.9	3	17

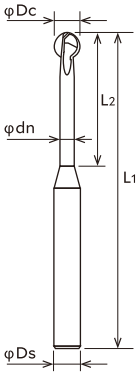


Fig16

Uncoated

Nonferrous metals | Resin

	Product code	Cutter diameter Dc (mm)	Cutter radius R (mm)	Neck diameter dn (mm)	Neck Length L2 (mm)	Overall length L1 (mm)	Shank diameter Ds (mm)	Number of blades	Fig
Regular type	XC-08-A-N	φ0.8	0.4	φ0.48	5	60	φ 3	2	16
	XC-13-A-N	φ1.3	0.65	φ0.78	8	60	φ 3	2	16
	XC-18-A-N	φ1.8	0.9	φ1.1	10	60	φ 3	2	16
	XC-23-A-N	φ2.3	1.15	φ1.4	12.5	70	φ 3	2	16
	XC-28-A-N	φ2.8	1.4	φ1.7	15	70	φ 4	2	16
	XC-33-A-N	φ3.3	1.65	φ2.0	17.5	70	φ 4	2	16
	XC-38-A-N	φ3.8	1.9	φ2.4	20	70	φ 4	2	16
	XC-48-A-N	φ4.8	2.4	φ3.0	25	70	φ 6	2	16
	XC-58-A-N	φ5.8	2.9	φ3.5	30	70	φ 6	2	16
	XC-78-A-N	φ7.8	3.9	φ4.7	40	100	φ 8	3	16
	XC-98-A-N	φ9.8	4.9	φ5.9	50	120	φ10	3	16

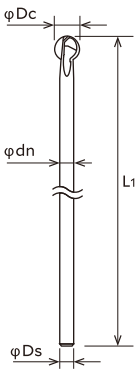


Fig17

Precautions for Use

- XEBEC Back Burr Cutter is designed for NC machines. Never use it as a hand tool.

Caution

- Turn on advanced preview control of the machine tool helps to reduce errors in contouring the edges to be deburred.
- The processing error of the hole position must be kept as small as possible.

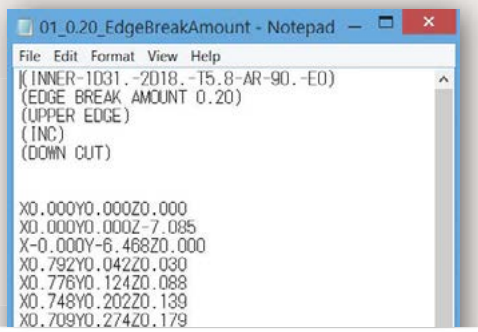
An innovative CNC crosshole deburring solution, which, in combination with the spherical deburring cutter and the custom-made Path (NC tool path), enables high-speed, high-precision deburring of complex 3D-curved edges, while maximizing tool life. The Path can be used right away after adding it to the NC program, greatly saving your time from having to create the optimal toolpath.

XEBEC Back Burr Cutter

Made of micro-grain cemented carbide and coated with AlTiCrN, the highly durable and heat-resistant tool features a blade design specially optimized for deburring that maximizes cutting performance, while inhibiting formation of secondary burrs. Capable of deburring workpieces made of a wide range of materials, from non-ferrous metals such as aluminum alloys to difficult-to-cut metals such as titanium.

XEBEC Path

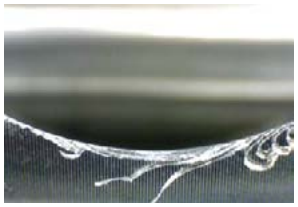
Custom-made NC tool path



High quality

Optimized tool path and ideal approach angle achieve uniform edge break lengths, while inhibiting formation of secondary burrs.

Before

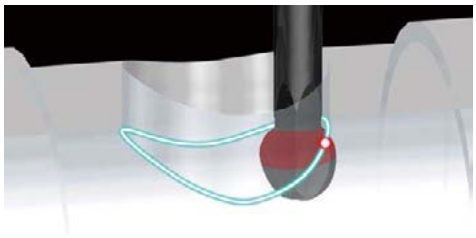


After

XEBEC Path includes a set of five toolpaths corresponding to five different edge break lengths.

Long tool life

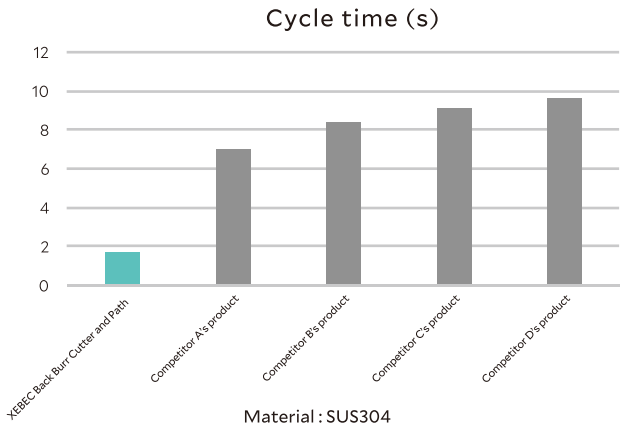
The continuous displacement of the contact point of the cutter during machining increases the tool life many times over compared to comparable tool solutions.



Range of contact point

Super high-speed machining

Directly approaches the edges that need to be deburred, thereby minimizing the cycle time (up to 10 times faster than conventional tools)



Material : SUS304
Planar hole : φ8×10t

Applications

CNC deburring of valve

Material : Free-cutting steel
Previous process : Drilling
Tool : XC-18-A

Before

Deburring was done with φ2 chamfering, nylon brush and φ3 chamfering. 3-step deburring with a different tool for each step, with a long cycle time.

After

Deburring is done with a single Cutter. Shortened the deburring time by 9 secs. per workpiece. Reduced the tool costs by reducing the number of tools.

CNC deburring of industrial component

Material : SUS304
Previous process : Tapping
Tool : XC-18-A

Before

Deburring by manual work, tapping and air blowing. There were two more processes necessary after time-consuming deburring. A long cycle time was a problem.

After

XEBEC Path for tap holes was introduced. Deburring time is shortened from 120 sec. to 40 sec. Manual work is no longer needed. Improved safety.

Machining Parameters

Standard Machining Parameters

AlTiCrN coated

Steel | Stainless steel | Cast iron | Heat resistant alloy | Nonferrous metals

	Product code	Cutter diameter φDc (mm)	Tool Projection Length (mm)	Number of blades	Steel, stainless steel, cast iron, heat resistant alloy: Rotational speed n (min⁻¹)	Steel, stainless steel, cast iron, heat resistant alloy: Feed rate Vf (mm/min)	Nonferrous metals: Rotational speed n (min⁻¹)	Nonferrous metals: Feed rate Vf (mm/min)
3 blades short type	XC-08-AS-3F	φ0.8	3Dc	3	20000	1080	20000	1170
	XC-13-AS-3F	φ1.3	3Dc	3	20000	1080	20000	1170
	XC-18-AS-3F	φ1.8	3Dc	3	20000	1080	20000	1170
	XC-23-AS-3F	φ2.3	3Dc	3	15000	1350	18000	1710
	XC-28-AS-3F	φ2.8	3Dc	3	12500	1800	15000	2520
	XC-33-AS-3F	φ3.3	3Dc	3	10600	1890	12700	2250
	XC-38-AS-3F	φ3.8	3Dc	3	9200	2160	11000	2880
	XC-48-AS-3F	φ4.8	3Dc	3	7200	1980	8500	2880
	XC-58-AS-3F	φ5.8	3Dc	3	6000	1620	7000	2160
	XC-78-AS-3F	φ7.8	3Dc	3	4500	1620	5400	1920
	XC-98-AS-3F	φ9.8	3Dc	3	3600	1320	4300	1560
Regular type	XC-08-A	φ0.8	5Dc	2	20000	600	20000	650
	XC-13-A	φ1.3	5Dc	2	20000	600	20000	650
	XC-18-A	φ1.8	5Dc	2	20000	600	20000	650
	XC-23-A	φ2.3	5Dc	2	15000	750	18000	950
	XC-28-A	φ2.8	5Dc	2	12500	1000	15000	1400
	XC-33-A	φ3.3	5Dc	2	10600	1050	12700	1250
	XC-38-A	φ3.8	5Dc	2	9200	1200	11000	1600
	XC-48-A	φ4.8	5Dc	2	7200	1100	8500	1600
	XC-58-A	φ5.8	5Dc	2	6000	900	7000	1200
	XC-78-A	φ7.8	5Dc	3	4500	1350	5400	1600
	XC-98-A	φ9.8	5Dc	3	3600	1100	4300	1300
Straight type	XC-18-B	φ1.8	10Dc	2	4400	220	4400	220
	XC-23-B	φ2.3	10Dc	2	3500	220	3500	220
	XC-28-B	φ2.8	10Dc	2	2800	220	2800	220
	XC-33-B	φ3.3	10Dc	2	2400	190	2400	190
	XC-38-B	φ3.8	10Dc	2	2000	160	2000	160
	XC-48-B	φ4.8	10Dc	2	1600	120	1600	120
	XC-58-B	φ5.8	10Dc	2	1300	100	1300	100
	XC-78-B	φ7.8	10Dc	3	650	70	650	70
	XC-98-B	φ9.8	10Dc	3	500	50	500	50

Uncoated

Nonferrous metals | Resin

	Product code	Cutter diameter φDc (mm)	Projection amount (mm)	Number of blades	Rotational speed n (min⁻¹)	Feed rate Vf (mm/min)
Regular type	XC-08-A-N	φ0.8	5Dc	2	20000	650
	XC-13-A-N	φ1.3	5Dc	2	20000	650
	XC-18-A-N	φ1.8	5Dc	2	20000	650
	XC-23-A-N	φ2.3	5Dc	2	18000	950
	XC-28-A-N	φ2.8	5Dc	2	15000	1400
	XC-33-A-N	φ3.3	5Dc	2	12700	1250
	XC-38-A-N	φ3.8	5Dc	2	11000	1600
	XC-48-A-N	φ4.8	5Dc	2	8500	1600
	XC-58-A-N	φ5.8	5Dc	2	7000	1200
	XC-78-A-N	φ7.8	5Dc	3	5400	1600
	XC-98-A-N	φ9.8	5Dc	3	4300	1300

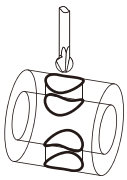
* Tool projection length is defined by multiples of Dc (Cutter Diameter)
* For the Straight type, the tool projection length may be varied, and optimal machining parameters for specified tool projection lengths can be found in the instruction manual
* Rotational speed and feed rates listed are to be referred to as a guide for initial machining. Adjust them as needed.
* In case vibration or abnormal noise is detected, lower the rotational speed and feed rate by the same rate.
* If the max rotational speed or feed rate of the machine is below the parameters listed above, lower them both at the same rate to be within the machine's capability.

XEBEC Path™ Patented

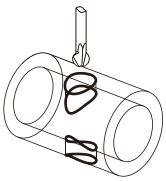
An integral component of this deburring solution, XEBEC Path is a custom-made NC tool path that ensures optimal performance of XEBEC Back Burr Cutter

Standard Path

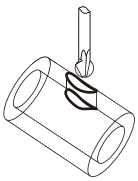
For predetermined set of commonly encountered cross hole configurations shown below, standardized Paths are readily available.



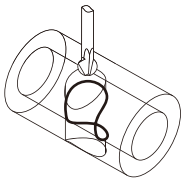
Orthogonal cross hole



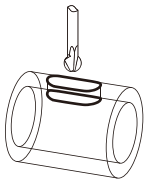
Off-center cross hole



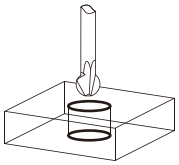
Angled cross hole



Broken cross hole



Slotted hole

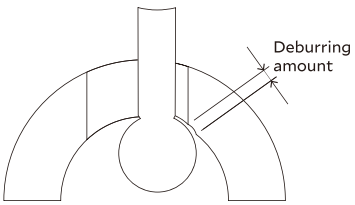


Planar hole

Deburring amount and allowable cumulative error

Product code	Cutter diameter Dc (mm)	Edge Break Length (mm)					Max Allowed Accumulated Variance (mm)
		①	②	③	④	⑤	
XC-08-AS-3F/A/A-N	φ 0.8	0.02	0.04	0.06	0.08	0.10	0.03
XC-13-AS-3F/A/A-N	φ 1.3	0.04	0.06	0.08	0.10	0.12	0.05
XC-18-AS-3F/A/B/A-N	φ 1.8	0.07	0.09	0.11	0.13	0.15	0.08
XC-23-AS-3F/A/B/A-N	φ 2.3	0.07	0.09	0.11	0.13	0.15	0.09
XC-28-AS-3F/A/B/A-N	φ 2.8	0.08	0.11	0.14	0.17	0.20	0.10
XC-33-AS-3F/A/B/A-N	φ 3.3	0.08	0.11	0.14	0.17	0.20	0.11
XC-38-AS-3F/A/B/A-N	φ 3.8	0.09	0.13	0.17	0.21	0.25	0.12
XC-48-AS-3F/A/B/A-N	φ 4.8	0.10	0.15	0.20	0.25	0.30	0.15
XC-58-AS-3F/A/B/A-N	φ 5.8	0.10	0.15	0.20	0.25	0.30	0.18
XC-78-AS-3F/A/B/A-N	φ 7.8	0.10	0.15	0.20	0.25	0.30	0.18
XC-98-AS-3F/A/B/A-N	φ 9.8	0.10	0.15	0.20	0.25	0.30	0.18

Deburring amount means “a width of an edge after deburring”.



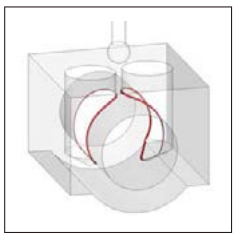
Standard Path for Tapped Holes

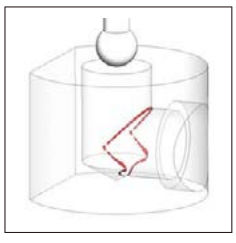
Standardized Paths are readily available for metric thread sizes ranging between M3 and M24.

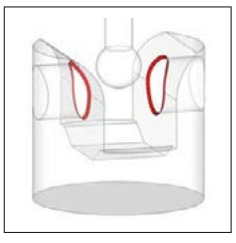
Tap size	Applicable Cutter Product code	Cutter diameter Dc (mm)	Deburring amount (mm)
M3	XC-23-AS-3F/A/B/A-N	φ 2.3	0.11
M4	XC-28-AS-3F/A/B/A-N	φ 2.8	0.14
M5	XC-33-AS-3F/A/B/A-N	φ 3.3	0.14
M6	XC-38-AS-3F/A/B/A-N	φ 3.8	0.17
M8	XC-48-AS-3F/A/B/A-N	φ 4.8	0.20
M10	XC-58-AS-3F/A/B/A-N	φ 5.8	0.20
M12	XC-78-AS-3F/A/B/A-N	φ 7.8	0.20
M16 - 24	XC-98-AS-3F/A/B/A-N	φ 9.8	0.20

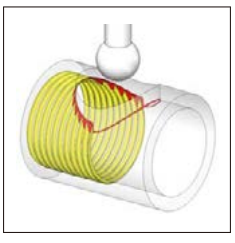
XEBEC Path All Edges

Tool Path customized for extremely complex edge profiles.









XEBEC Burrless Chamfering Cutter™

Burrlesschamfering with a patented, multi-blade, V-shaped design

A chamfering tool that does not generate burrs and therefore eliminates the need for another deburring process. This helps reduce the cycle time and tool costs.

Product	Applicable materials	Product code	Chamfering alignment diameter Dc (mm)	Shank diameter Dcon (mm)	Overall length LF (mm)	Neck length L1 (mm)	Maximum depth of cut APMX (mm)	Cutting angle KAPR (°)	Number of blades	Target chamfering size	Fig
AlTiCrN coated	Steel P, stainless steel M, cast iron K, heat resistant alloy S, nonferrous metal N	314110	ϕ2	ϕ6	50	5	1	45	3	C0.3 - C0.6	1
		314111	ϕ4	ϕ6	60	–	2	45	4	C0.7 - C1.5	2
Uncoated	Applicable materials: Nonferrous metal N, Plastic O	314112	ϕ2	ϕ6	50	5	1	45	3	C0.3 - C0.6	1
		314113	ϕ4	ϕ6	60	–	2	45	4	C0.7 - C1.5	2

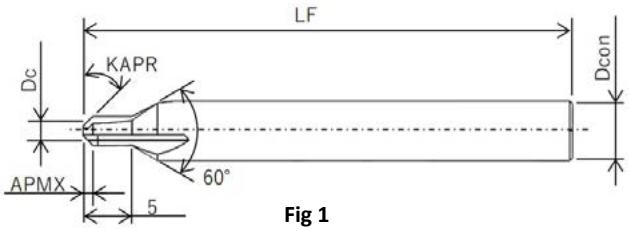


Fig 1

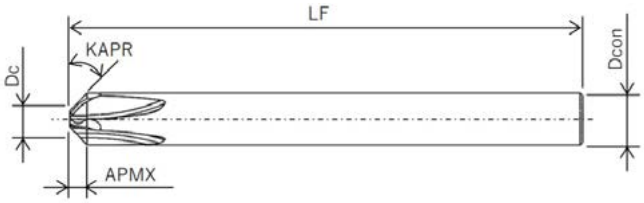


Fig 2

Features

Patented V-shaped blade design
Unique design cuts a finished chamfer without secondary burrs. This eliminates the need for another deburring process.

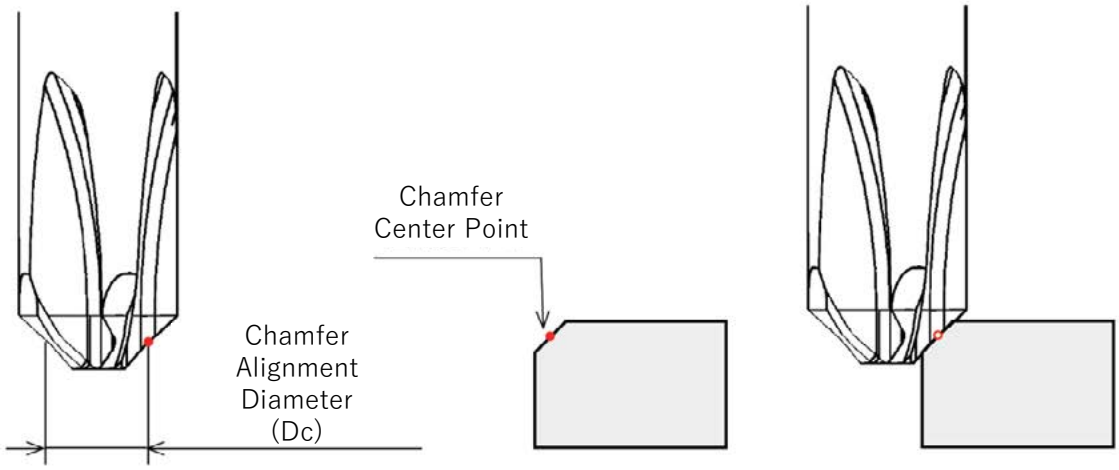
Twice longer tool life than a conventional chamfering cutter
Tests have shown that the tool life of this cutter is at least twice as long as that of a conventional chamfering cutter.

Multiple blades
Multi-blade design enables high feed rate. This reduces machining time for more efficient chamfering.

Flat tip
Ensures positional accuracy. The flat tip design prevents rounding and chipping that may cause tool length measurement errors.

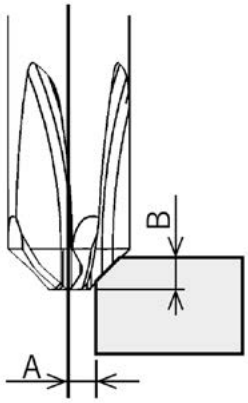
How to use

Position this tool so that Dc (Chamfering Alignment Diameter) is aligned with the Chamfer Center Point. Dc (Chamfer Alignment Diameter) is the center of the V-shape indicated by the red dot below.



Chamfer Size Adjustment Chart

Create the machining program by referring to Offsets A and B in the table below for desired chamfer size. This ensures Dc (Chamfer Alignment Diameter) and the Chamfer Center Point are aligned properly.



Chamfering Size	Offsets (mm)	
	A	B
C0.3	0.85	0.65
C0.4	0.8	0.7
C0.5	0.75	0.75
C0.6	0.7	0.8
C0.7	1.65	1.35
C0.8	1.60	1.40
C0.9	1.55	1.45
C1.0	1.50	1.50
C1.1	1.45	1.55
C1.2	1.40	1.60
C1.3	1.35	1.65
C1.4	1.30	1.70
C1.5	1.25	1.75

Formulas for calculating Offsets A and B

- A = (Dc-C) /2
- B = (APMX+C) /2

C = Chamfering size

Machining Parameters

1. Rotational speed and feed rate are a guide for initial use.
2. To improve the machining result, take steps such as adjusting the rotational speed and feed rate, or try smaller chamfer sizes and increase them gradually to obtain the desired chamfer size.
3. If vibration or abnormal noise is detected, lower the rotational speed and feed rate, or try smaller chamfer sizes and increase them gradually to obtain the desired chamfer size.
4. If burrs are generated when machining plastics, maintain the feed per tooth at 0.07(mm/tooth) and use the same rotational speed as the tool you normally work with..

Workpiece material		Steel	Stainless Steel	64 titanium	Inconel	Aluminum alloys	Plastics
Product code (coating)		314111(AlTiCrN)				314113 (Uncoated)	
Cutting speed (m/min)		60-100	40-80	45 -60	20 -30	200-300	60-100
Standard machining parameters for C1.0	Rotational speed (min-1)	6300	4800	4000	2000	20000	6300
	Feed rate (mm/min)	1260	960	800	400	4000	1760
	Feed per tooth (mm/t)	0.05	0.05	0.05	0.05	0.05	0.07

Workpiece material	Steel	Stainless Steel	64 titanium	Inconel	Aluminum alloys	Plastics
Product code (coating)	314110 (AlTiCrN)				314112 (Uncoated)	
Cutting speed (m/min)	60-100	40-80	45 -60	20 -30	200-300	60-100
Rotational speed (min-1)	12000	9000	8000	4000	40000	12000
Feed rate (mm/min)	1800	1350	1200	600	6000	1800
Feed per tooth (mm/t)	0.05	0.05	0.05	0.05	0.05	0.05

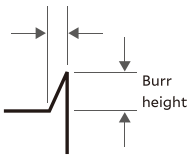
XEBEC Stone™ Flexible Shaft

Patented

Ideal for deburring and polishing front and back of cross holes, grooves and areas that are deep inside the workpiece. The spring steel flexible shaft absorbs vibrations which makes soft contact with the surface possible.

Applicable burr size
Burr root thickness of 0.2 mm or less (burrs of this size can be removed with fingernails)

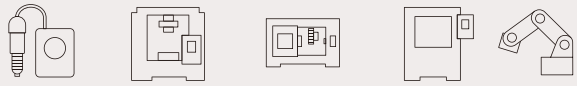
Burr root thickness



Video (YouTube)

Applicable equipment

This tool can be mounted on equipment which can control the rotational speed.



Rotary tool (electric) | Machining center | Lathe (with milling function) | Special machine | Robot

Ball type

Equivalent grit (Color)	Product code	Head size (mm)	Shaft diameter (mm)	Shank diameter (mm)	Overall length L (mm)	Standard rotational speed (min^{-1})	Maximum rotational speed (min^{-1})	Fig
#800 (Blue)	CH-PB-3B	φ 3	φ 1.5	φ 3	70	5000 - 8000	15000	18
	CH-PB-4B	φ 4	φ 1.5	φ 3	70	5000 - 8000	13000	18
	CH-PB-5B	φ 5	φ 1.5	φ 3	70	5000 - 8000	12000	18
	CH-PB-6B	φ 6	φ 1.5	φ 3	70	5000 - 8000	10000	18
#400 (Orange)	CH-PO-3B	φ 3	φ 1.5	φ 3	70	5000 - 8000	15000	18
	CH-PO-4B	φ 4	φ 1.5	φ 3	70	5000 - 8000	13000	18
	CH-PO-5B	φ 5	φ 1.5	φ 3	70	5000 - 8000	12000	18
	CH-PO-6B	φ 6	φ 1.5	φ 3	70	5000 - 8000	10000	18
#220 (Gray)	CH-PM-3B	φ 3	φ 1.5	φ 3	70	5000 - 8000	15000	18
	CH-PM-4B	φ 4	φ 1.5	φ 3	70	5000 - 8000	13000	18
	CH-PM-5B	φ 5	φ 1.5	φ 3	70	5000 - 8000	12000	18
	CH-PM-6B	φ 6	φ 1.5	φ 3	70	5000 - 8000	10000	18
	CH-PM-10B	φ 10	φ 1.5	φ 3	70	4000 - 5000	6000	18
	CH-PM-3B-L	φ 3	φ 1.5	φ 3	150	—	1000	18
	CH-PM-4B-L	φ 4	φ 2.3	φ 2.3	150	—	3000	19
	CH-PM-5B-L	φ 5	φ 2.3	φ 2.3	150	—	3000	19
	CH-PM-6B-L	φ 6	φ 2.3	φ 2.3	150	—	3000	19
	CH-PM-10B-L	φ 10	φ 2.3	φ 2.3	150	—	2000	19

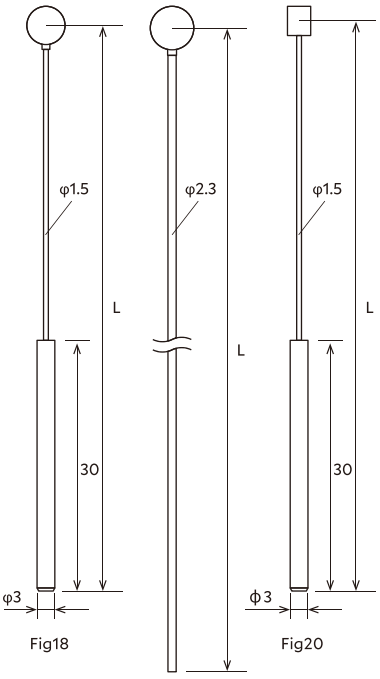


Fig18 | Fig19 | Fig20

(CH-PM-4B-L, CH-PM-5B-L, CH-PM-6B-L, CH-PM-10B-L)

Cylinder type

Equivalent grit (Color)	Product code	Head size (mm)	Shaft diameter (mm)	Shank diameter (mm)	Overall length L (mm)	Standard rotational speed (min^{-1})	Maximum rotational speed (min^{-1})	Fig
#800 (Blue)	CH-PB-3R	φ3×3	φ 1.5	φ 3	70	5000 - 8000	15000	20
	CH-PB-4R	φ4×4	φ 1.5	φ 3	70	5000 - 8000	13000	20
	CH-PB-5R	φ5×5	φ 1.5	φ 3	70	5000 - 8000	12000	20
#400 (Orange)	CH-PO-3R	φ3×3	φ 1.5	φ 3	70	5000 - 8000	15000	20
	CH-PO-4R	φ4×4	φ 1.5	φ 3	70	5000 - 8000	13000	20
	CH-PO-5R	φ5×5	φ 1.5	φ 3	70	5000 - 8000	12000	20
#220 (Gray)	CH-PM-3R	φ3×3	φ 1.5	φ 3	70	5000 - 8000	15000	20
	CH-PM-4R	φ4×4	φ 1.5	φ 3	70	5000 - 8000	13000	20
	CH-PM-5R	φ5×5	φ 1.5	φ 3	70	5000 - 8000	12000	20
	CH-PM-5R-C01	φ5x10	φ 1.5	φ 3	70	5000 - 8000	12000	20

Precautions for Use

The tool will be damaged when:
- processed beyond the maximum rotation speed
- used with a pneumatic tool

Disc type

Ceramic Stone

Equivalent grit (Color)	Product code	Head diameter x thickness (mm)	Maximum rotational speed (min^{-1})	Fig
#220(Gray)	CH-PM-14D	φ14×2	5000	21

Shaft

Product code	Shaft diameter (mm)	Overall length (mm)	Mounting screw	Maximum rotational speed (min^{-1})	Fig
CH-D-SH	φ2.3	78	M2×6	5000	22

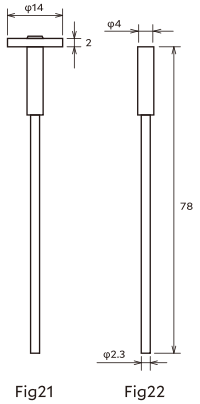


Fig21 | Fig22

Trial set

The set includes a disc type Stone and a shaft.

Product code
CHPM14D-SET

Φ2.3 to Φ3 Collet Adapter

Adapts the φ2.3 shaft to fit on a rotary tool that can hold φ3 shanks.

Product code
RMP3024X

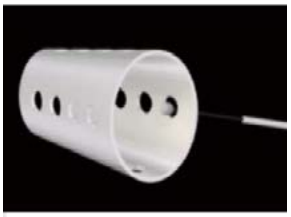
Precautions for Use

Use the disc type by normal rotation (clockwise). If it is used by reverse rotation, the screw will be loosened, and the Stone can be fallen off.

The tool will be damaged when:
- processed beyond the maximum rotation speed
- used with a pneumatic tool

Applications

Deburring of a pipe part for aircraft (cross hole)



Material : SUS
Previous process : Drilling
Tool : CH-PM-6B

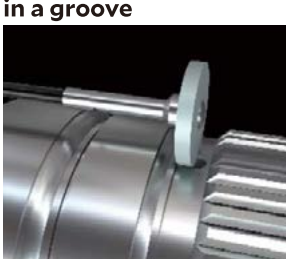
Before

Deburring with a rubber grinding stone on a rotary tool. Finish quality varied depending on the workers' skill. It took 40 min to remove burrs from 16 cross holes.

After

Remove burrs by contouring by inserting the Stone in the cross holes and pulling it out. Finish quality is uniformed, and deburring time is shortened.

Deburring of a hole in a groove



Material : SCM
Previous process : Drilling
Tool : CH-PM-145D

Before

Deburring with a disk-shaped grinding stone with a shaft. It was difficult to approach the spot with the shaft too short and the tool had a short life.

After

Easy to approach the groove with the disc type Stone with a long shaft. Compared with the grinding stone that was used before, the ceramic fiber Stone lasts longer and does not need to be replaced as frequently. Improved cost efficiency as only the stone need to be replaced.

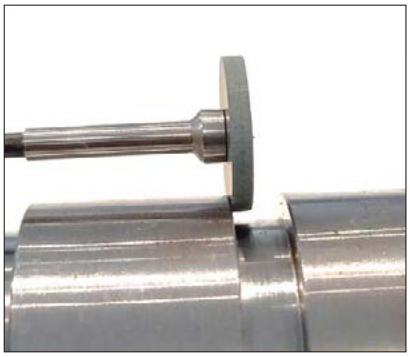
How to use

All surfaces of the ceramic stone is abrasive and all of them can be used for deburring and polishing.

Ball type

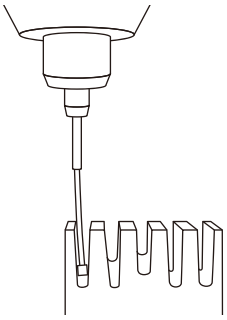
Cylinder type

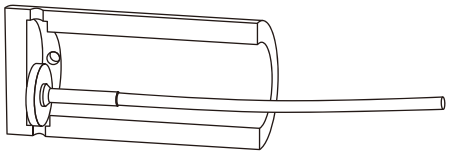
Disc type



Features

The spring steel flexible shaft absorbs vibrations which makes soft contact with the surface possible while preventing the Ceramic Stone to bounce around, thereby reducing the risk of scratching the workpiece.
These benefits make this an optimal tool for polishing and deburring areas that are deep inside the workpiece.





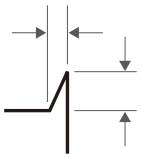
XEBEC Stone™ Mounted Point

Suitable for use with pneumatic tools at high rotational speed

Video (YouTube)

Applicable burr size
Burr root thickness of 0.2 mm or less (burrs of this size can be removed with fingernails)

Burr root thickness



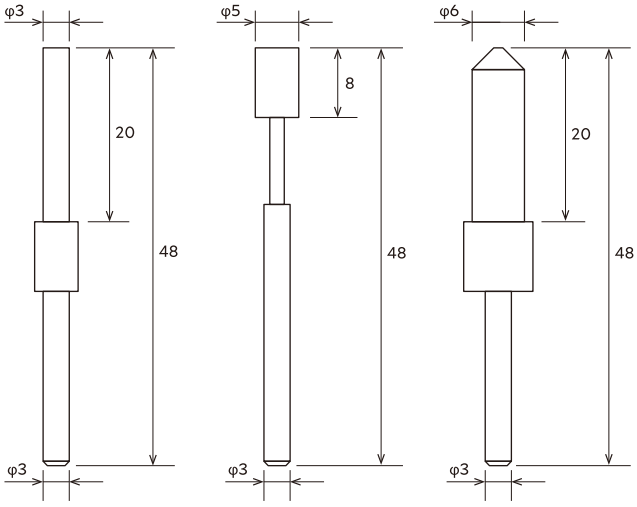


Fig23 (AX-PM-3R)

Fig24 (AX-PM-5RF)

Fig25 (AX-PM-6T)

Applicable equipment

This tool can be mounted on a rotary tool.

Rotary tool (electric)

Rotary tool (pneumatic)

Equivalent grit (Color)	Product code	Head Size (mm)	Shank diameter (mm)	Head length (mm)	Overall length (mm)	Maximum rotational speed (min^{-1})	Fig
#220 (Gray)	AX-PM-3R	φ 3	φ 3	20	48	60000	23
	AX-PM-5RF	φ 5	φ 3	8	48	30000	24
	AX-PM-6T	φ 6	φ 3	20	48	60000	25

Applications

Deburring of edges

Material : SUS
Tool : AX-PM-6T

Before

A file was used for deburring, but it caused secondary burrs and a quality problem.

After

Secondary burrs are not formed. Improved the edge quality.

Deburring of parting lines

Material : Aluminum
Tool : AX-PM-6T

Before

A rotary bar was used because the burrs are large, but there was a safety problem.

After

Safety improved thanks to the abrasive stone. Improved work efficiency with high grinding power.

How to use

All surfaces of the ceramic stone is abrasive and all of them can be used for deburring and polishing.
Capable of withstanding high speed, it can be used with pneumatic rotary tools in addition to power rotary tools.

Xebec Ceramic Stone™ Meister Finish

- Excellent for mould polishing and deburring
- Uniform finishing attained by uniform fibre diameter
- High strength, not easy to break or tear
- Simple removal of troublesome fine burrs
- Higher finishing efficiency due to crystal structure of alumina fibres
- No dropping of abrasive grain particles that could create linear scratches
- Highly efficient finishing of coarse electro-discharge machining surfaces

Profile	Size (mm)	Red Grit 1200	White Grit 1000	Blue Grit 800	Black Grit 600	Orange Grit 400	Light Brown Grit 300	Dark Brown Grit 220	Purple Grit 120
	0.3 x 4 x 100	312862	312757	312943	312758	313024	313064	313105	-
	0.4 x 4 x 100	312863	312903	312944	312984	313025	313065	313106	-
	0.5 x 4 x 100	312610	312611	312612	312613	312614	312615	312616	-
	0.5 x 4 x 150	312864	312904	312945	312985	313026	313066	313107	-
	0.5 x 6 x 100	312617	312618	312619	312620	312621	312622	312623	-
	0.5 x 6 x 150	312865	312905	312946	312986	313027	313067	313108	-
	0.5 x 10 x 100	312866	312906	312947	312987	313028	313068	313109	-
	0.5 x 10 x 150	312698	312699	312700	312701	312702	312703	312704	-
	0.8 x 4 x 100	312624	312625	312626	312627	312628	312629	312471	-
	0.8 x 4 x 150	312718	312719	312720	312721	312722	312723	312724	-
	0.8 x 6 x 100	312630	312631	312632	312633	312634	312635	312636	-
	0.8 x 6 x 150	312867	312907	312948	312988	313029	313069	313110	-
	0.8 x 10 x 100	312637	312638	312639	312640	312641	312642	312643	-
	0.8 x 10 x 150	312868	312908	312949	312989	313030	313070	313111	-
	1 x 1 x 100	312869	312909	312950	312990	313031	313071	313112	-
	1 x 2 x 100	312870	312910	312951	312991	313032	313072	313113	313142
	1 x 4 x 100	312644	312645	312646	312647	312455	312452	312449	312740
	1 x 4 x 150	312725	312726	312727	312728	312729	312730	312731	313143
	1 x 6 x 100	312648	312649	312650	312651	312456	312453	312450	312741
	1 x 6 x 150	312871	312911	312952	312992	313033	313073	312752	313144
	1 x 8 x 100	312652	312653	312654	312655	312656	312657	312658	312742
	1 x 8 x 150	312872	312912	312953	312993	313034	313074	313114	313145
	1 x 10 x 100	312659	312660	312661	312662	312663	312454	312451	312743
	1 x 10 x 150	312873	312913	312954	312994	313035	313075	312465	313146
	1.5 x 1.5 x 100	312874	312914	312955	312995	313036	313076	313115	-
	1.5 x 4 x 100	312875	312915	312956	312996	313037	313077	313116	313147
	1.5 x 4 x 150	312876	312916	312957	312997	313038	313078	313117	313148
	1.5 x 6 x 100	312877	312917	312958	312998	313039	313079	312755	313149
	1.5 x 6 x 150	312878	312918	312959	312999	313040	313080	312734	313150
	1.5 x 10 x 100	312879	312919	312960	313000	313041	313081	313118	313151
	1.5 x 10 x 150	312880	312920	312961	313001	313042	313082	313119	313152
	2 x 2 x 100	312881	312921	312962	313002	313043	313083	313120	-
	2 x 4 x 100	312882	312922	312963	313003	312464	313084	313121	313153
	2 x 4 x 150	312883	312923	312964	313004	313044	313085	313122	313154
	2 x 6 x 100	312884	312924	312965	313005	313045	313086	313123	313155
	2 x 6 x 150	312885	312925	312966	313006	313046	313087	312753	313156
	2 x 10 x 100	312886	312926	312967	313007	313047	313088	313124	313157
	2 x 10 x 150	312887	312927	312968	313008	313048	313089	313125	313158
	3 x 4 x 100	312888	312928	312969	313009	313049	313090	313126	313159
	3 x 4 x 150	312889	312929	312970	313010	313050	313091	313127	313160
	3 x 6 x 100	312890	312930	312971	313011	313051	313092	313128	313161
	3 x 6 x 150	312891	312931	312972	313012	313052	313093	312754	313162
	3 x 10 x 100	312892	312932	312973	313013	313053	313094	313129	313163
	3 x 10 x 150	312893	312933	312974	313014	313054	313095	313130	313164

Profile	Size (mm)	Pink Grit 3000	Cream Grit 2000	Yellow Grit 1500
	1 x 1 x 100	313165	313167	313169
	1 x 2 x 100	313166	313168	313170
	1 x 4 x 100	-	-	313175
	1 x 6 x 100	-	-	313176
	1 x 10 x 100	-	-	313173

Xebec Ceramic Stone™ Meister Finish continued

Profile	Size (mm)	Red Grit 1200	White Grit 1000	Blue Grit 800	Black Grit 600	Orange Grit 400	Light Brown Grit 300	Gray Grit 220
●	Ø 1 x 50	312894	312934	312975	313015	313055	313096	313131
	Ø 1 x 100	312895	312935	312976	313016	313056	313097	313132
	Ø 1.5 x 50	312896	312936	312977	313017	313057	313098	313133
	Ø 1.5 x 100	312897	312937	312978	313018	313058	313099	313134
	Ø 2 x 50	312898	312938	312979	313019	313059	313100	313135
	Ø 2 x 100	312899	312939	312980	313020	313060	313101	313136
	Ø 2.34 x 50	312900	312940	312981	313021	313061	313102	313137
	Ø 2.34 x 100	312901	312941	312982	313022	313062	313103	313138
	Ø 3 x 50	312466	312467	312474	312468	312473	312469	312470
	Ø 3 x 100	312664	312665	312666	312667	312668	312669	312670
	Ø 3 x 150	312902	312942	312983	313023	313063	313104	313139
	Ø 6 x 50	-	-	-	-	-	-	313140
	Ø 6 x 100	-	-	-	-	-	-	313141

Xebec Ceramic Stone™ Heat-Resistant

The Heat-Resistant range of Xebec Ceramic Stones offer resistance to temperatures up to 200°C. Having the same performance as the MEISTER range of ceramic stones and are most suitable for removing EDM scales. The Heat-Resistant range has been developed for prolonged use with Ultrasonic Machines.

- Same performance as Xebec Meister Finish ceramic stones (Doesn't break, doesn't crack, excellent sharpness)
- Heat resistant up to 200°C
- Ideal for prolonged use with ultrasonic tools
- Suitable for removing EDM scales
- Can lap deep slits for ribs

Profile	Size (mm)	Purple Grit 120	Brown Grit 220	Orange Grit 400	Blue Grit 800	Red Grit 1200
▬	1 x 4 x 100	312744	312673	312854	312672	312671
▬	1 x 6 x 100	312745	312676	312855	312675	312674
▬	1 x 10 x 100	312705	312717	312856	312716	312715
■	2 x 4 x 100	312746	312679	312857	312678	312677
■	2 x 6 x 100	312747	312682	312858	312681	312680
■	2 x 10 x 100	312756	312706	312707	312708	312709

Xebec Ceramic Stone™ Diamond

- Efficiently and cleanly polishes materials harder than HRC57 such as cemented carbide and hardened steel (SKD, DC, STAVAX, HPM, ASP etc)
- Suitable for removing EDM scales, polishing ribs and deburring from edges and corners
- Both the Stick and the Rod types can be used to polish with the tip or the sides of the tools
- More efficient than electroplated diamond files and hand lappers
- Can polish efficiently wet or dry
- Can be used even more efficiently when attached to tools (electric, air or ultrasonic)
- Can be processed into the desired shape, such as a thinner tip

Profile	Size (mm)	Purple Grit 200	Brown Grit 400	Blue Grit 800	Red Grit 1200
▬	1 x 4 x 100	312687	312686	312685	312859
▬	1 x 6 x 100	312690	312689	312688	312860
▬	1 x 10 x 100	312693	312692	312691	312861
●	3 x 50	-	312696	-	-
	3 x 100	-	312697	-	-

Xebec Ceramic Stone™ Soft

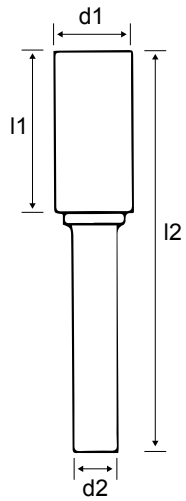
- Rubber binder allows soft contact and fits into a work-piece

Profile	Size (mm)	Grit 1200
■	2 x 6 x 100	312735
●	3 x 100	312750

Stone Holders

Holder Type		Description			Code
	Double Enders (Type B)	Will accommodate pencil stones as well as small round and square stones up to 6x6mm. Available in three colours (blue, black and red) that may be used to distinguish one grit or grade of stone from another. Set of three (Code: 311506) contains one of each colour. Measure 181mm overall length.			Blue - 311503
					Black - 311507
					Red - 311508
	Round Holder	For handheld work with ceramic stones. Available in 1, 2, 4, 6 and 10mm flat sizes, 3mm round or 0.5mm and 0.9mm square sizes. Measures approximately 336mm long.		3mm	311509
	Square Holder			0.5mm	311510
				0.9mm	311511
	Flat Holder 1-10mm			1mm	311512
				2mm	311513
				4mm	311514
				6mm	311515
				10mm	311516
	Super Stone Holder Kit		Set of 3 for Super Stones. 4, 6 and 10mm wide and from 0.8 - 2mm thick.		321511

Tungsten Carbide Rotary Burrs

Profile / Shape		Size (mm)				Type		Code	Set
		d1	l1	d2	l2				
		12.7	25.0	6.0	70.0	Brazed (Cut 5)		*	 Power Cut Burr Set 5pc (6mm Shank/Cut 5) Code: **321721**
		12.7	25.0	6.0	70.0			321726	
		12.7	25.0	6.0	70.0			321727	
		12.7	25.0	6.0	70.0			321728	
		12.7	32.0	6.0	77.0			321729	
		3.0	14.0	3.0	38.0		Solid (Cut 6)	321730	 Burr Set 10pc (3mm Shank/Cut 6) Code: **321722**
		3.0	14.0	3.0	38.0			321731	
		3.0	2.5	3.0	38.0			321732	
		3.0	6.0	3.0	38.0			321733	
		3.0	14.0	3.0	38.0			321734	
		3.0	14.0	3.0	38.0			321735	
		3.0	6.0	3.0	38.0			321736	
		3.0	14.0	3.0	38.0	Angle (8°)		321737	
		3.0	11.0	3.0	38.0	Angle (14°)		321738	
		3.0	4.0	3.0	38.0	Angle (10°)		321739	
		1.0	4.0	3.0	38.0			321740	 Micro Burr Set 10pc (3mm Shank/Cut 2 Micro) Code: **321723**
		1.5	4.0	3.0	38.0			321741	
		1.0	4.0	3.0	38.0			321742	
		1.5	4.0	3.0	38.0			321743	
		1.0	0.9	3.0	38.0		Solid (Cut 2)	321744	
		1.5	1.4	3.0	38.0			321745	
		1.5	4.0	3.0	38.0			321746	
		1.5	4.0	3.0	38.0	Angle (16°)		321749	

* Available in Power Cut Burr Set

Kemet

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