



XEBEC®

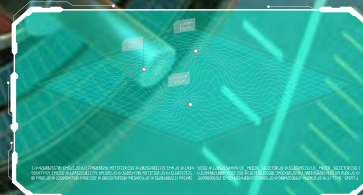
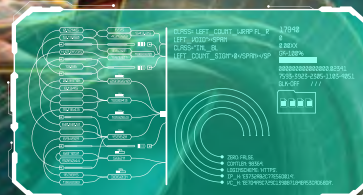
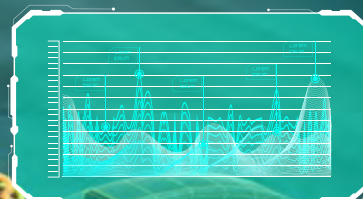
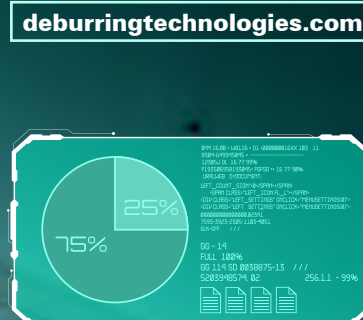
DEBURRING
TECHNOLOGIES

Advanced Manufacturing Solutions

Aerospace

DEBURRING & FINISHING

Cross Holes
Finishing & Polishing
Cutter Mark Removal
Edge Break



DEBURRING & FINISHING

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To the Moon and The Stars

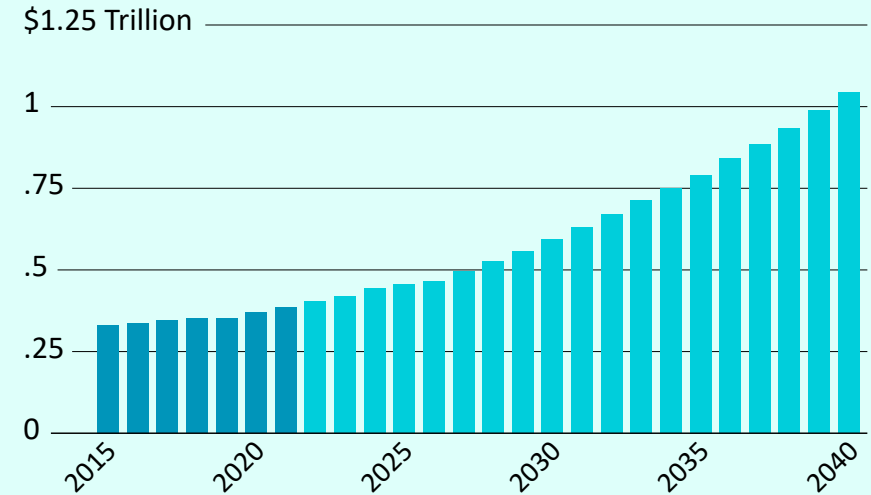
Demand for machined aerospace parts and components is skyrocketing. These parts will soon take us back to the moon. Then carry our brave men and women further out, to the surface of new planets, and bring those adventurers safely back home.



As man pushes the limits of aeronautics, space flight and communications, our brightest engineers are designing new processes to manufacture the parts and components that will build this future.

Projected Global Space Economy

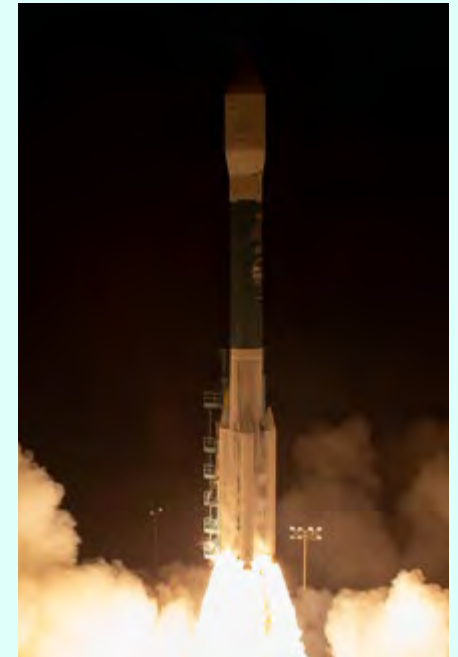
Through 2040 (Trillions, US Dollars)



SOURCE: Haver Analytics, Morgan Stanley Research forecasts

Trajectory of the Aerospace Manufacturing Industry

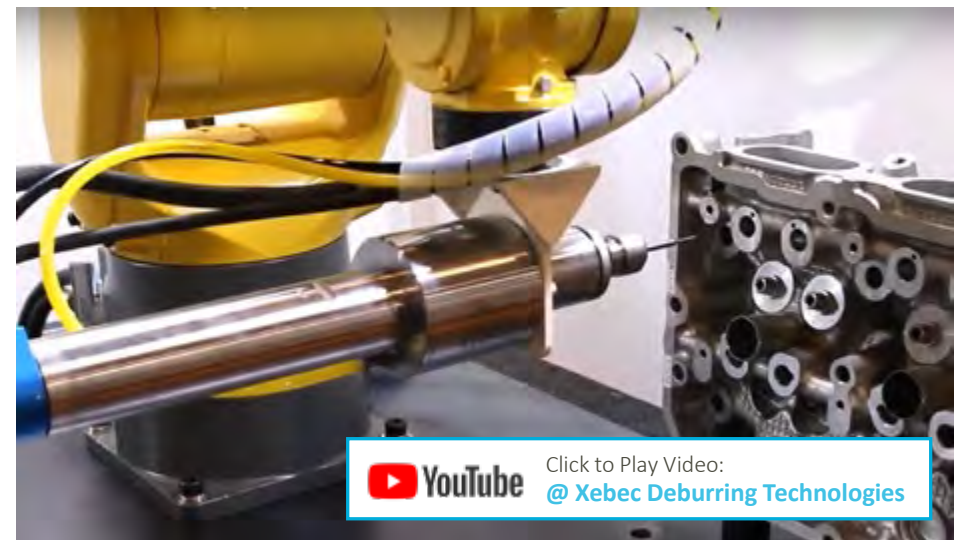
By reengineering processes and upgrading machinery many manufacturers are modernizing operations to equip themselves for the demands of tomorrow.





Are You Equipped to Meet Your Production Goals?

The current demand in aerospace manufacturing is accelerating, with no signs of letting up. It may feel like you can't produce parts fast enough. This can add increased pressure to process engineers to develop new systems that speed up production. So, how do you increase volume without sacrificing quality?



Click to Play Video:
[@ Xebec Deburring Technologies](#)



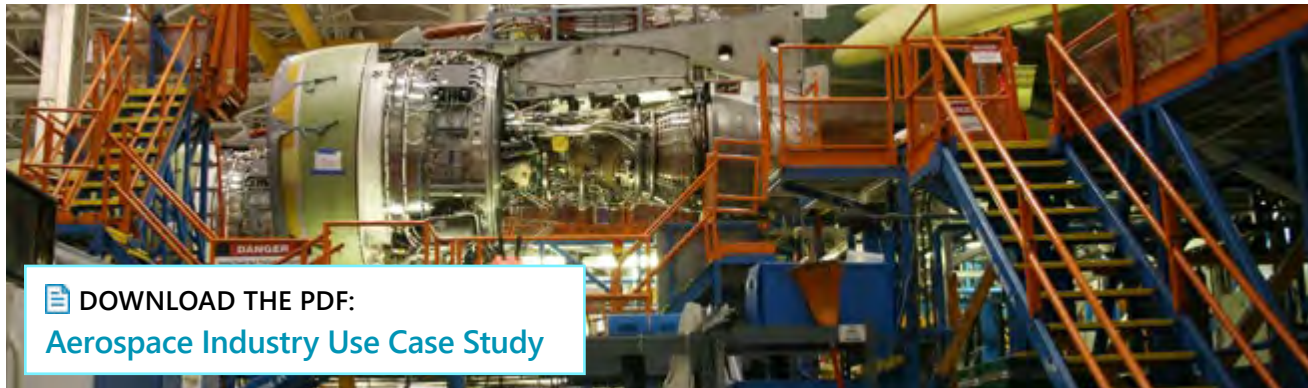
Quality Over Quantity. Do You Have to Choose?

Product quality is of particular concern in aerospace manufacturing. So, engineers are rightly cautious about introducing new or unfamiliar finishing processes. But, it is becoming increasingly obvious that the old-fashioned methods of manual deburring are a burden to production time.



There's a Lot Riding on Your Precision Parts

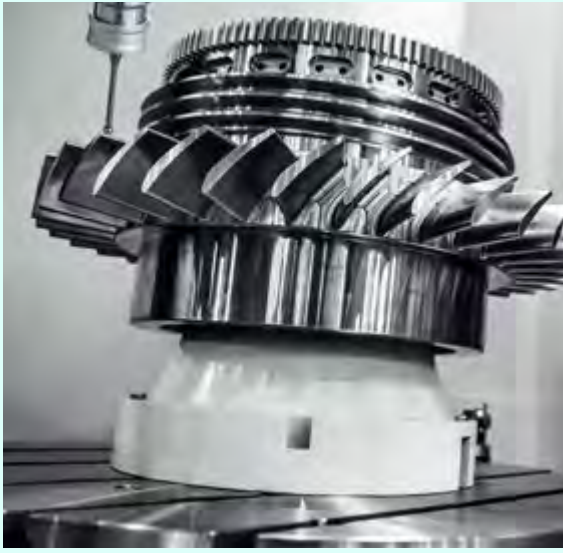
The manufacturing and finishing techniques of the future are automated. And many of the tolerances are too tight to be achieved by hand. Which means you can rise to meet the growing demand for your components by automating the finishing process - cutting production time, and ensuring consistent quality in your operations.



[DOWNLOAD THE PDF:](#)
[Aerospace Industry Use Case Study](#)



[Click to Play Video:](#)
[@Xebec Deburring Technologies](#)




Inconsistencies in Manual Deburring Can Result in Rework and Scrapped Parts

When working with complex and intricate products that require tight tolerances, precision is make-or-break. You can't afford to scrap a nearly completed part because a slip of the hand altered the edge break or a distracted laborer over-worked a radius.

In reality, a clean edge break simply can't be consistently achieved manually. Scrapping an expensive part in the deburring stage can cause backups across the board.



Eliminate Rework and Scrapped Parts by Modernizing Your Deburring Operation

 **READ THE FULL STORY ON OUR BLOG:**
The Benefits of Automation in Aerospace Manufacturing






Use Xebec Brush in a Robotic Arm for Fast, Consistent Finishing

Innovations in Automated Manufacturing Technologies.

New technologies for machining and deburring can provide incredible time savings, in the speed of production, and the elimination of rework or scrapped parts. These technologies also provide the security of quality consistency. Because sacrificing quality is not an option.

Modernization of your deburring operations can equal enormous savings and productivity gains. It is the most efficient way to help your team meet the most demanding of productivity goals.

 **READ THE FULL STORY ON OUR BLOG:**
[How Xebec Deburring Products Help Manufacturers Conquer Today's Challenges](#)



Click to Play Video:
[@ Xebec Deburring Technologies](#)

IMPROVING QUALITY



Xebec products safely achieve outstanding repeatable part quality to meet the most demanding industry standards.

INCREASING PRODUCTIVITY

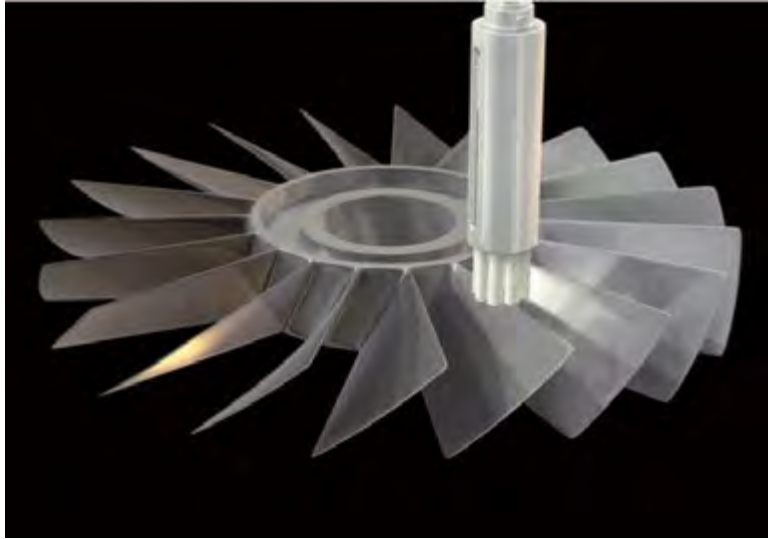


Innovative products for a wide range of manufacturing processes & products that decrease processing time and increase throughput.

REDUCING COSTS



Longer tool life, faster processes and lower scrap levels equals the greatest value, resulting in lowest cost per piece.



Workpiece information

Industry	Aerospace
Part name	Blisk
Material type	Inconel
Cutting process	Ball end mill processing

Processing conditions

Tool	XEBEC Brush Surface (A21-CB25M)
Processing detail	Deburring after ball-end milling process
Spindle Speed (min ⁻¹)	4,000
Table Feed (mm/min)	2,400
Depth of cut (mm)	0.5
Machining time (sec)	—

TOOL XEBEC Brush™ Surface


Available in Diameters:

6, 15, 25, 40, 60, 100 mm

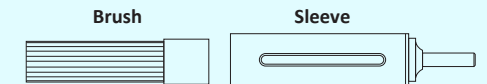
Available Colors (Aggressiveness):

Pink, Red, White, Blue

Aggressiveness indicated by Color:

Least ←  **Most**

Brush Requires Brush Sleeve to Operate:



XEBEC Brush™ Surface

Ideal for:

- Surface Deburring
- Cutter Mark Removal
- Edge Radius
- Surface Finishing
- Polishing

Deburring & finishing following face-milling, end-milling & drilling.



Before

Tool Grindstone

Problem It took time for deburring due to the complicated design of workpiece. Resulted in unstable edge quality.

After

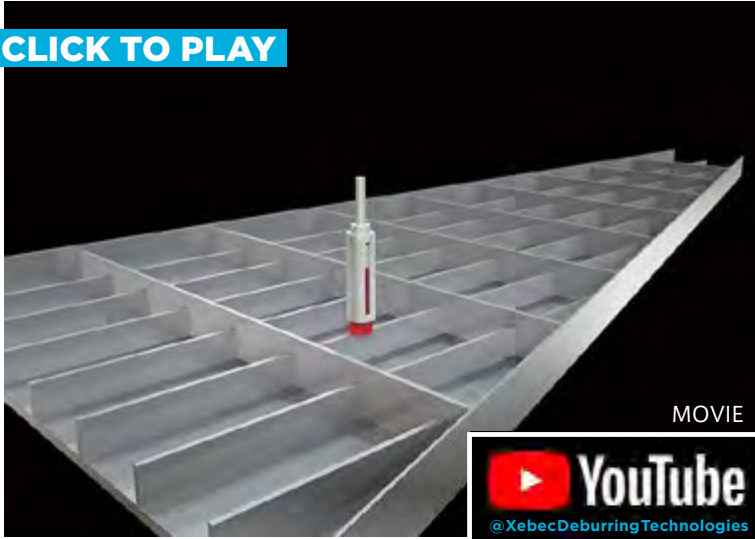
Tool XEBEC Brush Surface (A21-CB25M)

Result By the introduction of automated deburring, 1 operator can operate the multiple machining centers.

LEARN MORE ABOUT
XEBEC Brush™ Surface

Wing Rib

CLICK TO PLAY



Workpiece information

Industry	Aerospace
Part name	Wing rib
Material type	Aluminum
Cutting process	End mill processing

Processing conditions

Tool	XEBEC Brush Surface (A11-CB25M)
Processing detail	Deburring after end milling process
Spindle Speed (min ⁻¹)	4,000
Table Feed (mm/min)	800
Depth of cut (mm)	0.7
Machining time (sec)	—

TOOL XEBEC Brush™ Surface


Available in Diameters:

6, 15, 25, 40, 60, 100 mm

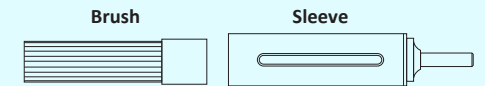
Available Colors (Aggressiveness):

Pink, Red, White, Blue

Aggressiveness indicated by Color:

Least ←  **Most**

Brush Requires Brush Sleeve to Operate:



XEBEC Brush™ Surface

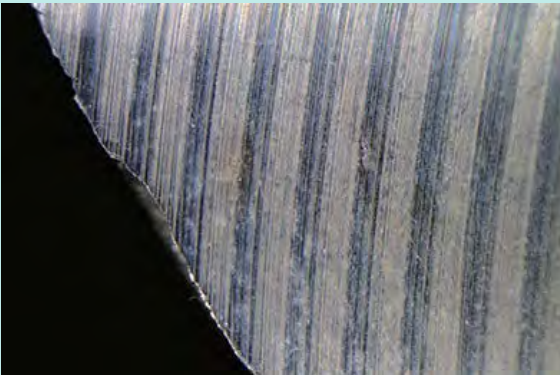
Ideal for:

- Surface Deburring
- Cutter Mark Removal
- Edge Radius
- Surface Finishing
- Polishing

Deburring & finishing following face-milling, end-milling & drilling.

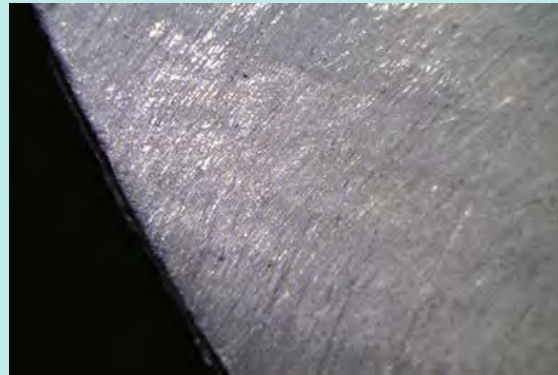


Before



Tool	Belt sander
Problem	It took time for deburring due to large workpiece.

After



Tool	XEBEC Brush Surface (A11-CB25M)
Result	By the introduction of automated deburring, stable quality realized in a shorter cycle time.

LEARN MORE ABOUT
XEBEC Brush™ Surface

Turbine Disk



Workpiece information

Industry	Aerospace
Part name	Turbine disk
Material type	Inconel
Cutting process	Others

Processing conditions

Tool	XEBEC Brush Surface (A11-CB40M)
Processing detail	Deburring after grinding process
Spindle Speed (min ⁻¹)	1,500
Table Feed (mm/min)	2,400
Depth of cut (mm)	0.5
Machining time (sec)	—

TOOL XEBEC Brush™ Surface





Available in Diameters:

6, 15, 25, 40, 60, 100 mm

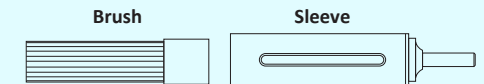
Available Colors (Aggressiveness):

Pink, Red, White, Blue

Aggressiveness indicated by Color:

Least ←     → **Most**

Brush Requires Brush Sleeve to Operate:



XEBEC Brush™ Surface

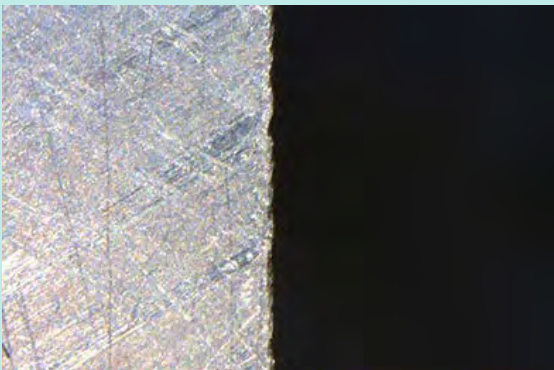
Ideal for:

- Surface Deburring
- Cutter Mark Removal
- Edge Radius
- Surface Finishing
- Polishing

Deburring & finishing following face-milling, end-milling & drilling.

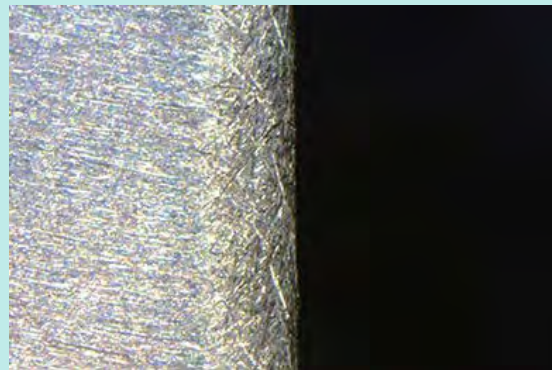


Before



Tool	Grindstone
Problem	Burrs remained and edge quality was inconsistent.

After



Tool	XEBEC Brush Surface (A11-CB40M)
Result	Achieved full automation with machining center. No burrs left and quality stabilized.

LEARN MORE ABOUT
XEBEC Brush™ Surface

Turbine Blade



Workpiece information

Industry	Aerospace
Part name	Turbine blade
Material type	SUS316
Cutting process	Ball end mill processing

Processing conditions

Tool	XEBEC Brush Surface (A11-CB25M)
Processing detail	Deburring after ball-end milling process
Spindle Speed (min ⁻¹)	1,000
Table Feed (mm/min)	1,000
Depth of cut (mm)	0.3
Machining time (sec)	—

TOOL XEBEC Brush™ Surface


Available in Diameters:

6, 15, 25, 40, 60, 100 mm

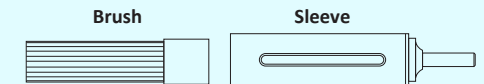
Available Colors (Aggressiveness):

Pink, Red, White, Blue

Aggressiveness indicated by Color:

Least ←  → Most

Brush Requires Brush Sleeve to Operate:



XEBEC Brush™ Surface

Ideal for:

- Surface Deburring
- Cutter Mark Removal
- Edge Radius
- Surface Finishing
- Polishing

Deburring & finishing following face-milling, end-milling & drilling.



Before

Tool	File
Problem	Deburring caused unstable edge quality. Recovering process was required.



After

Tool	XEBEC Brush Surface (A11-CB25M)
Result	By the introduction of automated deburring, stable quality with even edge shape realized.

LEARN MORE ABOUT
XEBEC Brush™ Surface

Landing Gear Part



Workpiece information

Industry	Aerospace
Part name	Landing gear parts
Material type	Aluminum
Cutting process	Front cutter processing

Processing conditions

Tool	XEBEC Brush Surface (A11-CB100M)
Processing detail	Deburring the edge face after milling process
Spindle Speed (min ⁻¹)	3,000
Table Feed (mm/min)	2,000
Depth of cut (mm)	0.7
Machining time (sec)	—

TOOL XEBEC Brush™ Surface

Available in Diameters:

6, 15, 25, 40, 60, 100 mm

Available Colors (Aggressiveness):

Pink, Red, White, Blue

Aggressiveness indicated by Color:

Least ←     → **Most**

Brush Requires Brush Sleeve to Operate:



XEBEC Brush™ Surface

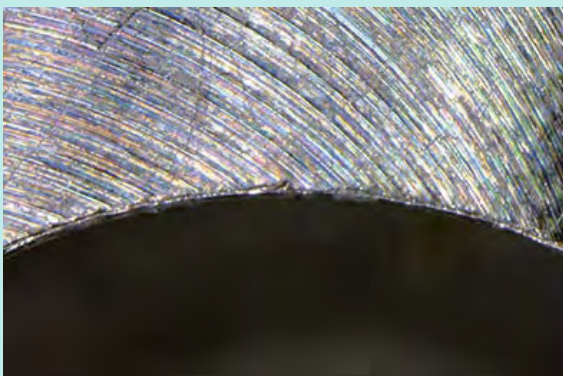
Ideal for:

- Surface Deburring
- Cutter Mark Removal
- Edge Radius
- Surface Finishing
- Polishing

Deburring & finishing following face-milling, end-milling & drilling.

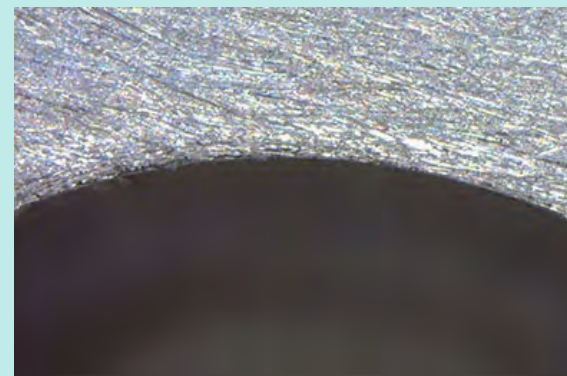


Before



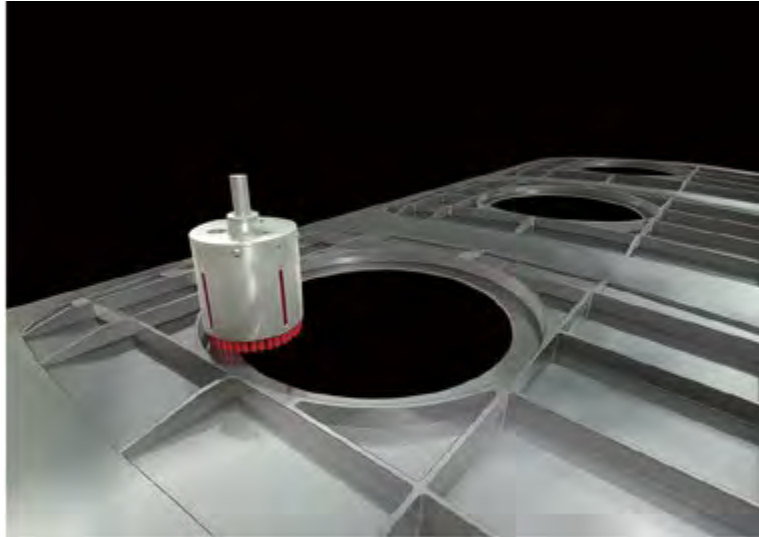
Tool	File
Problem	Manual deburring caused unstable quality and long processing time required.

After



Tool	XEBEC Brush Surface (A11-CB40M)
Result	Deburring is fully automated and consistent finish achieved.

LEARN MORE ABOUT
XEBEC Brush™ Surface



Workpiece information

Industry	Aerospace
Part name	Aircraft body
Material type	Aluminum alloy
Cutting process	Front cutter processing

Processing conditions

Tool	XEBEC Brush Surface (A11-CB100M)
Processing detail	Deburring the edge face after milling process
Spindle Speed (min ⁻¹)	960
Table Feed (mm/min)	500
Depth of cut (mm)	0.3
Machining time (sec)	—

TOOL XEBEC Brush™ Surface

Available in Diameters:

6, 15, 25, 40, 60, 100 mm

Available Colors (Aggressiveness):

Pink, Red, White, Blue

Aggressiveness indicated by Color:

Least ←  **Most**

Brush Requires Brush Sleeve to Operate:



XEBEC Brush™ Surface

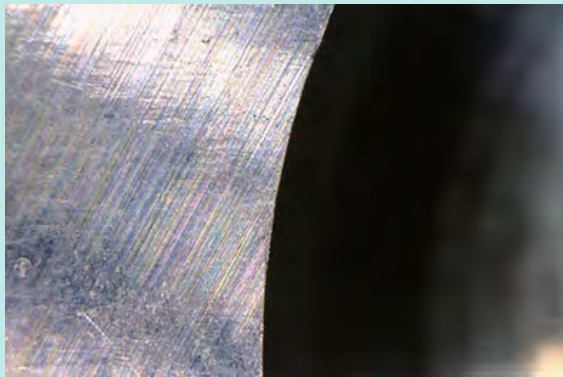
Ideal for:

- Surface Deburring
- Cutter Mark Removal
- Edge Radius
- Surface Finishing
- Polishing

Deburring & finishing following face-milling, end-milling & drilling.

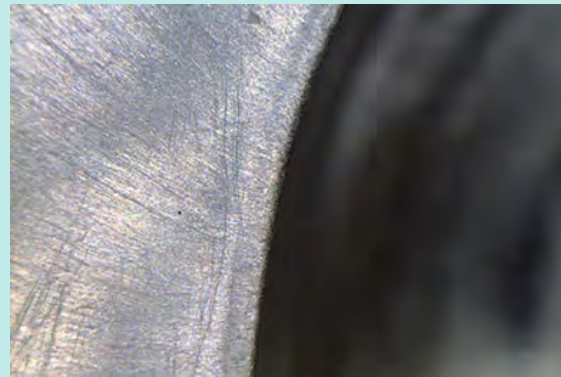


Before



Tool	Belt sander
Problem	It took time for deburring due to the large workpiece.

After



Tool	XEBEC Brush Surface (A11-CB100M)
Result	Deburring is fully automated. Consistent finish and cut-down of machining time achieved.

LEARN MORE ABOUT
XEBEC Brush™ Surface

Engine Shell



Workpiece information

Industry	Aerospace
Part name	Nozzle
Material type	Aluminum Alloy
Cutting process	Surface Finishing

Processing conditions

Tool	XEBEC™ Brush Surface Extra-Large (A32-CB200M)
Processing detail	Deburring and finishing of edges and large surface area
Spindle Speed	550 RPM
Feed Rate	100 IPM

TOOL XEBEC Brush™ Surface Extra-Large

Available in Diameters:

125, 165, 200 mm

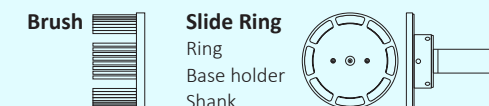
Available Colors (Aggressiveness):

Red, White, Blue

Aggressiveness indicated by Color:

Least ← (Red) — (White) — (Blue) → **Most**

Brush Requires Slide Ring to Operate:



XEBEC Brush™ Surface Extra-Large

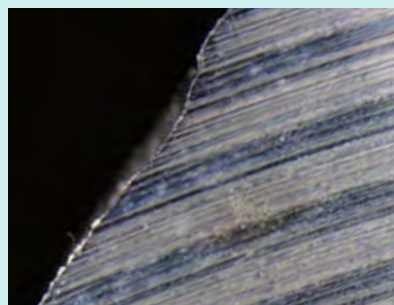
Ideal for:

- Surface Deburring
- Cutter Mark Removal
- Edge Radius
- Surface Finishing
- Polishing

For large parts with surface widths greater than 4 inches.
Deburring & finishing following face-milling, end-milling & drilling.



Before



After



LEARN MORE ABOUT
XEBEC Brush™ Surface Extra-Large

Engine Compressor Shaft



Workpiece information

Industry	Aerospace
Part name	Engine Compressor Shaft
Material type	Hastelloy
Cutting process	Surface Finishing

Processing conditions

Tool	XEBEC™ Brush End Type (A11-EB06M)
Processing detail	Deburring and finishing of curved surface features and radial edges..
Spindle Speed	550 RPM
Feed Rate	100 IPM

TOOL XEBEC Brush™ End Type

Available in Diameters:

1, 1.5, 2, 2.5, 3, 5 mm

Available Colors (Aggressiveness):

Pink, Red, White, Blue

Aggressiveness indicated by Color:

Least ←  → Most

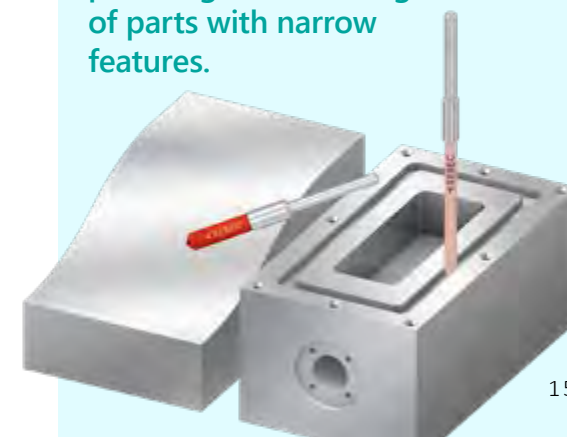
XEBEC Brush™ End Type

Ideal for:

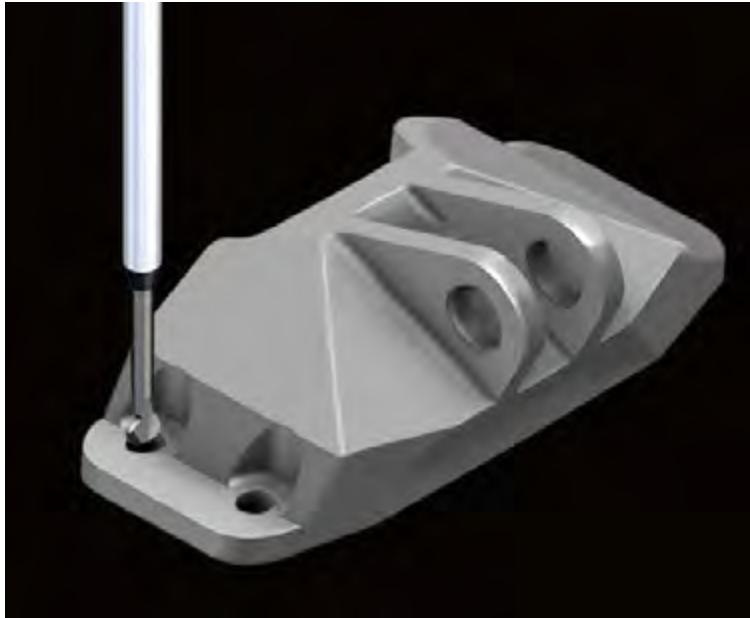
- Detailed, Intricate Parts
- Surface Deburring
- Cutter Mark Removal
- Polishing

LEARN MORE ABOUT
XEBEC Brush™ End Type

Cutter-mark removal,
polishing and finishing
of parts with narrow
features.



Engine Bracket



Workpiece information

Industry	Aerospace
Part name	Engine Bracket
Material type	Titanium Alloy
Cutting process	Crosshole Deburring

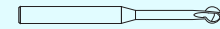
Processing conditions

Tool	XEBEC™ Back Burr Cutter (XC-98-A)
Processing detail	Deburring inside and outside edges of holes with chamfered edges.

TOOL

XEBEC™ Back Burr Cutter & Path

Spherical Cutting Tool



Custom Path Data



The tool can be mounted on machining center (XYZ-axis) or combined lathe (XZY or XZC-axis). 3-axis simultaneous control is required.



Machining Center



Combined Lathe

XEBEC™ Back Burr Cutter & Path

Ideal for:

- Deburring Difficult Holes
- Inner and Outer Diameters
- Irregular, Off-Center Holes

One Cutter size supports various edges in different sizes and shapes.



LEARN MORE ABOUT
XEBEC™ Back Burr Cutter & Path

CLICK TO PLAY



Workpiece information

Industry	Aerospace
Part name	Pipe parts for aircrafts (Cross hole)
Material type	SUS
Cutting process	Drilling

Processing conditions

Tool	XEBEC Stone Flexible Shaft Type (CH-PM-6B)
Processing detail	Cross hole deburring (back burr) after drilling process
Spindle Speed (min ⁻¹)	2,000
Table Feed (mm/min)	—
Depth of cut (mm)	—
Machining time (sec)	30sec/hole

TOOL

XEBEC Stone™ Flexible Shaft

Head Styles:



Cylinder



Sphere

Available in Diameters:

3, 4, 5, 6, 10 mm

Stone color and grit:



Blue
#800



Orange
#400



Gray
#220

XEBEC Stone™ Flexible Shaft

Ideal for:

- Deburring Cross Holes
 - Soft Contact
 - Suppresses Vibrations
- Available styles:
- Extended Flexible Shaft
 - Cylinder or Sphere Heads

Before

Tool Rubber grindstone in the rotating tool

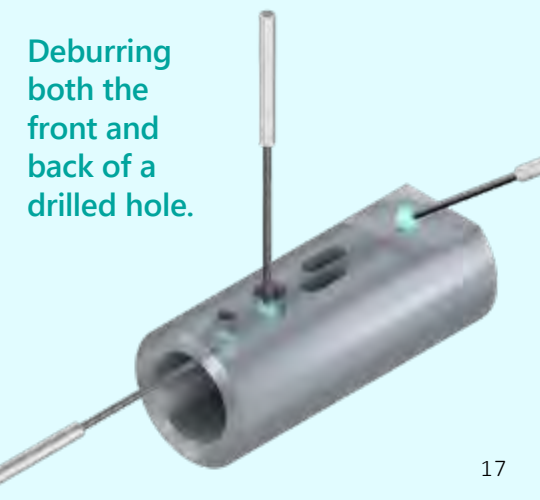
Problem Finish quality varied from the skill of workers. It took around 40 minutes to deburr 16 holes (150 seconds/hole).

After

Tool XEBEC Stone Flexible Shaft Type (CH-PM-6B)

Result Insert the spherical grinding stone with the cross hole and contour the edge while pulling the tool lightly. Stable quality with shorter cycle time realized.

LEARN MORE ABOUT
XEBEC Stone™ Flexible Shaft





Workpiece information

Industry	Aerospace
Part name	Pipe Fitting
Material type	Titanium Alloy
Cutting process	Crosshole Deburring

Processing conditions

Tool	XEBEC™ Brush Crosshole (CH-A33-7L)
Processing detail	Deburring and finishing inner wall diameter
Spindle Speed	8,000 RPM
Feed Rate	12 IPM

TOOL XEBEC Brush™ Crosshole

Available in Diameters:

1.5, 3, 5, 7, 11 mm

Available Colors (Aggressiveness):

Red, Blue

Aggressiveness indicated by Color:

Least ←   → **Most**

Length

Standard and Extended Lengths

XEBEC Brush™ Crosshole

Ideal for:

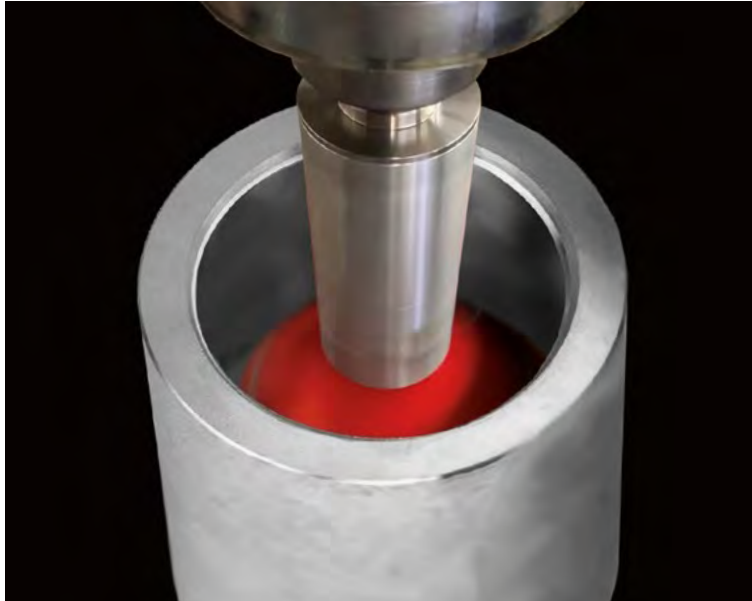
- Cross Hole Deburring
- Inner Walls of Cylinders

LEARN MORE ABOUT
XEBEC Brush™ Crosshole

Brush tip flares under centrifugal force to remove burrs along inner walls of the hole.



Large Inner Diameter



Workpiece information

Industry	Aerospace
Part name	Large Diameter Cross Hole
Material type	17-4 Stainless Steel
Cutting process	Deburring ID Hole

Processing conditions

Tool	XEBEC™ Brush Surface (A11-CB25M)
Processing detail	Deburring of large inner diameter of hole.
Spindle Speed	2,800 RPM
Brush Projection Specified for Inner Diameter Application	3.15"
Flared Target Diameter	4.5"

For large diameter cross holes, XEBEC™ Brush Surface and Sleeve can be used similarly to XEBEC™ Crosshole Brush.

Allow calculated brush projection amount to achieve optimal flare from centrifugal force to the target diameter.



For more information about this unique application, see page 29 of Xebec Deburring Technologies 2019 Catalog.



DISCUSS AN APPLICATION:
Contact Us

SPECIAL USE APPLICATION
OF THE TOOL:

XEBEC Brush™ Surface

Under centrifugal force the flexible tip-cutting fibers of the brush can flare to make contact with the inner wall surface at the appropriate angle. Contact must be made with brush tips and care should be taken not to contact the side of the brush.

TOOL XEBEC Brush™ Surface

Brush sizes that can be used for special large diameter cross hole applications:

15, 25, 40 mm

Color (Aggressiveness):
Red or White

Aggressiveness indicated by Color:

Least ←   → **Most**

Brush Requires Brush Sleeve to Operate:



Threaded Inner Diameter



Workpiece information

Industry	Aerospace
Part name	Threaded Diameter
Material type	Aluminum Alloy
Cutting process	Surface Finishing

Processing conditions

Tool	XEBEC™ Wheel Brush (W-A11-75)
Processing detail	Deburring and finishing of threaded diameter of inner wall.
Spindle Speed	1,900 RPM
Feed Rate	120 IPM

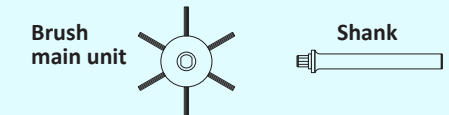
TOOL XEBEC™ Wheel Brush

Available in Diameters:

50, 75 mm

Requires reusable Shank to operate

70 or 150 mm Shank lengths



Available Colors (Aggressiveness):

Red

XEBEC™ Wheel Brush

Ideal for:

- Deburring and Polishing
- Side Surfaces
- Inner and Outer Diameters

Can be used in CNC and robotic machines.



LEARN MORE ABOUT
XEBEC™ Wheel Brush



Workpiece information

Industry	Aerospace
Part name	Floor panel
Material type	Titanium
Cutting process	Drilling, end-milling

Processing conditions

Tool	XEBEC Back Burr Cutter & Path (XC-58-A)
Processing detail	Deburring hole (front and back side) and edges after milling
Spindle Speed (min ⁻¹)	6,000
Table Feed (mm/min)	900
Depth of cut (mm)	—
Machining time (sec)	—

Before

Tool Chamfering cutter

Problem Due to the wide dimensional tolerance of the cutter, chamfering amount was unstable.

After

Tool XEBEC Back Burr Cutter & Path (XC-58-A)

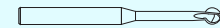
Result The edges after XEBEC Back Burr Cutter are stable and uniform. High-quality finish is achieved.

LEARN MORE ABOUT
XEBEC™ Back Burr Cutter & Path

TOOL

XEBEC™ Back Burr Cutter & Path

Spherical Cutting Tool



Custom Path Data



The tool can be mounted on machining center (XYZ-axis) or combined lathe (XZY or XZC-axis). 3-axis simultaneous control is required.



Machining Center



Combined Lathe

XEBEC™ Back Burr Cutter & Path

Ideal for:

- Deburring Difficult Holes
- Inner and Outer Diameters
- Irregular, Off-Center Holes

One Cutter size supports various edges in different sizes and shapes.





Workpiece information

Industry	Aerospace
Part name	Blade case
Material type	Titanium
Cutting process	Drilling

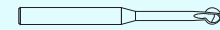
Processing conditions

Tool	XEBEC Back Burr Cutter & Path (XC-38-A/XC-58-A)
Processing detail	Deburring hole (front and back side) with angle head holder
Spindle Speed (min ⁻¹)	9,200/6,000
Table Feed (mm/min)	1,200/900
Depth of cut (mm)	—
Machining time (sec)	—

TOOL

XEBEC™ Back Burr Cutter & Path

Spherical Cutting Tool



Custom Path Data



The tool can be mounted on machining center (XYZ-axis) or combined lathe (XZY or XZC-axis). 3-axis simultaneous control is required.



Machining Center



Combined Lathe

XEBEC™ Back Burr Cutter & Path

Ideal for:

- Deburring Difficult Holes
- Inner and Outer Diameters
- Irregular, Off-Center Holes

One Cutter size supports various edges in different sizes and shapes.



LEARN MORE ABOUT
XEBEC™ Back Burr Cutter & Path

Bearing Cage



Workpiece information

Industry	Aerospace
Part name	Bearing cage
Material type	Alloy steel
Cutting process	Turning and drilling

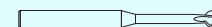
Processing conditions

Tool	XEBEC Back Burr Cutter & Path (XC-58-A)
Processing detail	Deburring hole (front and back side) and edges
Spindle Speed (min^{-1})	2,000
Table Feed (mm/min)	250
Depth of cut (mm)	—
Machining time (sec)	—

TOOL

XEBEC™ Back Burr Cutter & Path

Spherical Cutting Tool



Custom Path Data



The tool can be mounted on machining center (XYZ-axis) or combined lathe (XZY or XZC-axis). 3-axis simultaneous control is required.



Machining Center



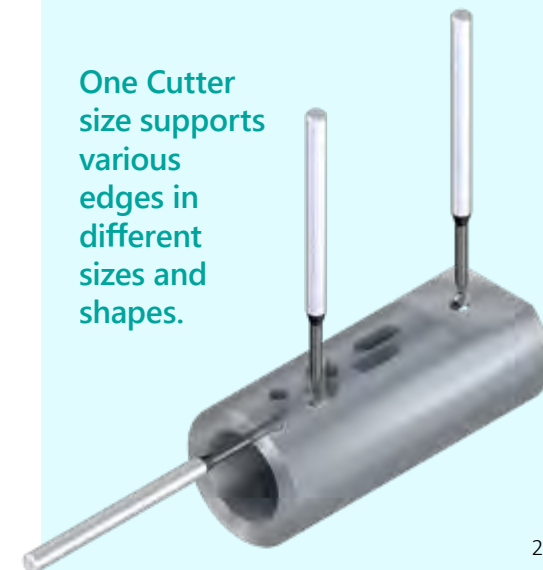
Combined Lathe

XEBEC™ Back Burr Cutter & Path

Ideal for:

- Deburring Difficult Holes
- Inner and Outer Diameters
- Irregular, Off-Center Holes

One Cutter size supports various edges in different sizes and shapes.



LEARN MORE ABOUT
XEBEC™ Back Burr Cutter & Path

Compressor Case



Workpiece information

Industry	Aerospace
Part name	Intermediate compressor case
Material type	Titanium
Cutting process	End-milling

Processing conditions

Tool	XEBEC Brush Surface (A11-CB06M)
Processing detail	Robot arm grips Brush and moves along the edges
Spindle Speed (min^{-1})	3,600
Table Feed (mm/min)	1,800
Depth of cut (mm)	0.5
Machining time (sec)	—

TOOL XEBEC Brush™ Surface



Available in Diameters:

6, 15, 25, 40, 60, 100 mm

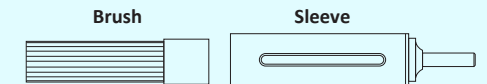
Available Colors (Aggressiveness):

Pink, Red, White, Blue

Aggressiveness indicated by Color:

Least ←     → Most

Brush Requires Brush Sleeve to Operate:



XEBEC Brush™ Surface

Ideal for:

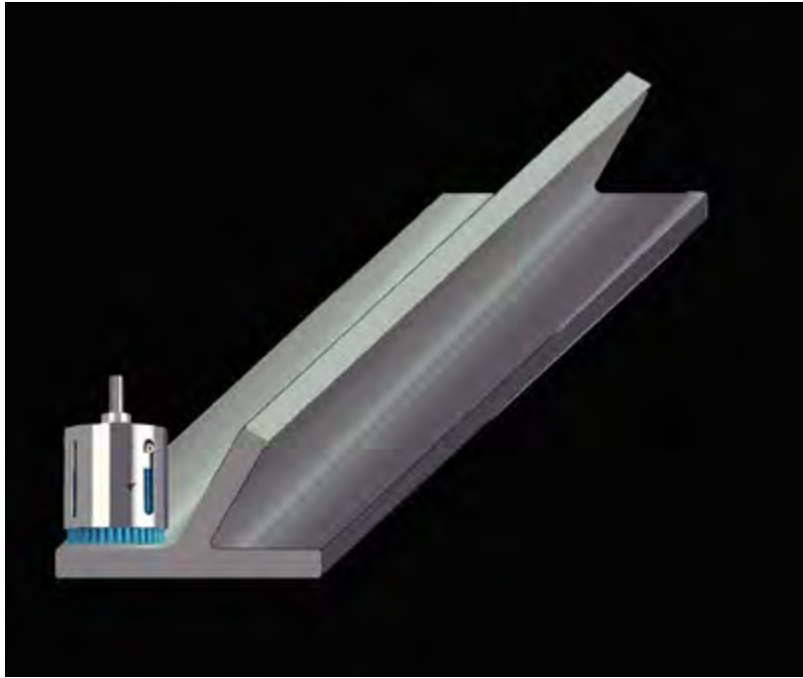
- Surface Deburring
- Cutter Mark Removal
- Edge Radius
- Surface Finishing
- Polishing

Deburring & finishing following face-milling, end-milling & drilling.



LEARN MORE ABOUT
XEBEC Brush™ Surface

Wing Component



Workpiece information

Industry	Aerospace
Part name	Component of wings
Material type	Aluminum
Cutting process	End-milling

Processing conditions

Tool	XEBEC Brush Surface (A32-CB60M/A32-CB100M)
Processing detail	Cutter mark removal and removal of mismatches
Spindle Speed (min ⁻¹)	2,000/1,200
Table Feed (mm/min)	850
Depth of cut (mm)	0.5
Machining time (sec)	—

Before

Tool Disc grinder

Problem It took an hour per part to remove tool marks and mismatches. Only the experienced worker handled the task. Due to his retirement, there was an urgent need to semi-automate the manual process.

After

Tool XEBEC Brush Surface (A32-CB60M/A32-CB100M)

Result Flat surfaces are now processed in CNC but some parts including R-shaped corner still require manual finishing but time for manual process is reduced by half.

LEARN MORE ABOUT
XEBEC Brush™ Surface

TOOL XEBEC Brush™ Surface


Available in Diameters:

6, 15, 25, 40, 60, 100 mm

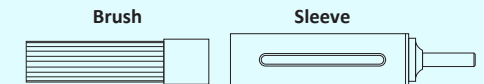
Available Colors (Aggressiveness):

Pink, Red, White, Blue

Aggressiveness indicated by Color:

Least ←  → Most

Brush Requires Brush Sleeve to Operate:



XEBEC Brush™ Surface

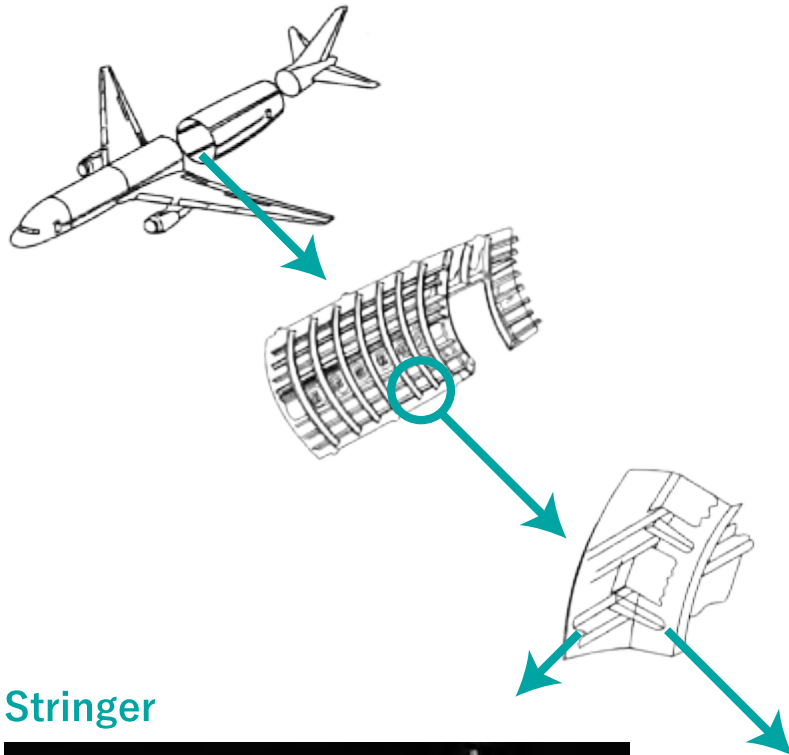
Ideal for:

- Surface Deburring
- Cutter Mark Removal
- Edge Radius
- Surface Finishing
- Polishing

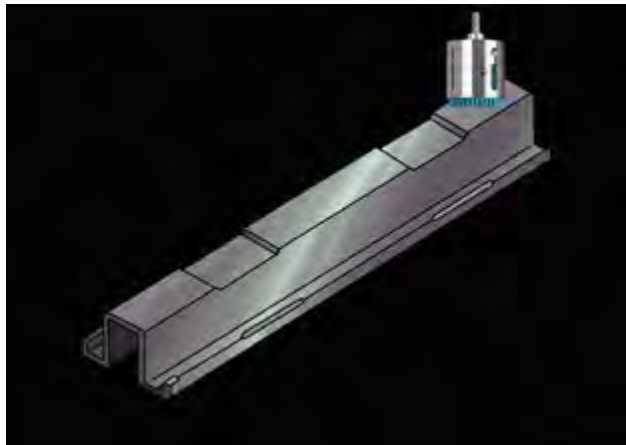
Deburring & finishing following face-milling, end-milling & drilling.



Stringer and Clip



Stringer



Workpiece information

Industry	Aerospace
Part name	Compressor case
Material type	Aluminum
Cutting process	End-milling

Processing conditions

Tool	XEBEC Brush Surface (A32-CB60M/ A21-CB25M)
Processing detail	Deburring after end milling and scratch removal
Spindle Speed (min ⁻¹)	1,600/4,000
Table Feed (mm/min)	1,800/2,500
Depth of cut (mm)	0.5
Machining time (sec)	—

Stringer clip



TOOL XEBEC Brush™ Surface


Available in Diameters:

6, 15, 25, 40, 60, 100 mm

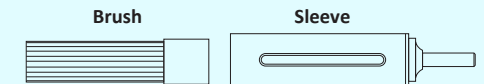
Available Colors (Aggressiveness):

Pink, Red, White, Blue

Aggressiveness indicated by Color:

Least ←  → Most

Brush Requires Brush Sleeve to Operate:



XEBEC Brush™ Surface

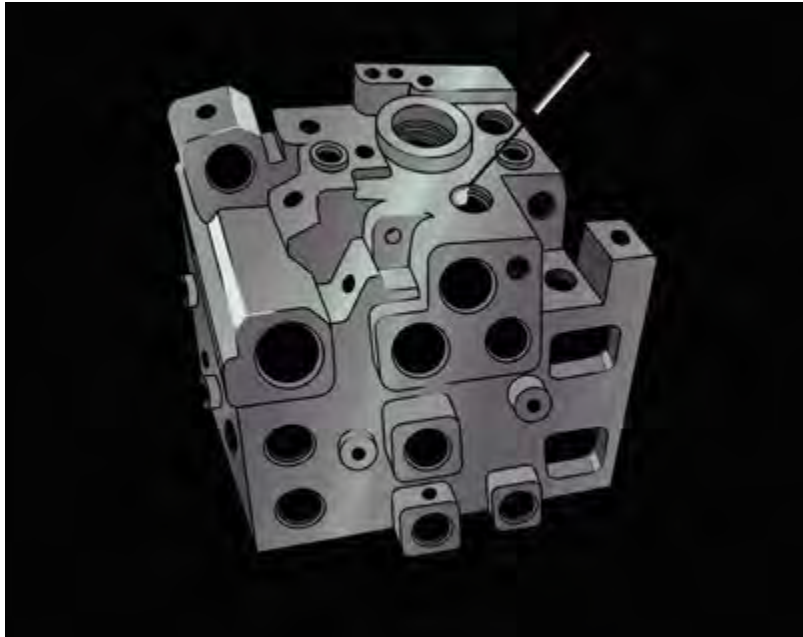
Ideal for:

- Surface Deburring
- Cutter Mark Removal
- Edge Radius
- Surface Finishing
- Polishing

Deburring & finishing following face-milling, end-milling & drilling.



LEARN MORE ABOUT
XEBEC Brush™ Surface



Workpiece information

Industry	Aerospace
Part name	Hydraulic parts
Material type	Aluminum
Cutting process	Drilling

Processing conditions

Tool	XEBEC Stone Flexible Shaft CH-PM-3B/4B/5B/6B/10B CH-PO-4B/5B/6B CH-PB-4B/5B/3R CH-PM-3B-L CH-PM-6B-L
Processing detail	Deburring after end milling and scratch removal

TOOL

XEBEC Stone™ Flexiblte Shaft

Head Styles:



Cylinder



Sphere

Available in Diameters:

3, 4, 5, 6, 10 mm

Stone color and grit:



Blue
#800



Orange
#400



Gray
#220

XEBEC Stone™ Flexible Shaft

Ideal for:

- Deburring Cross Holes
 - Soft Contact
 - Suppresses Vibrations
- Available styles:
- Extended Flexible Shaft
 - Cylinder or Sphere Heads

Before

Tool Cutting tool

Problem Manual deburring took 11 hours per workpiece. Due to roughness requirement, scratches by cutting tool were not allowed. The workers had to process it delicately and it was inefficient.

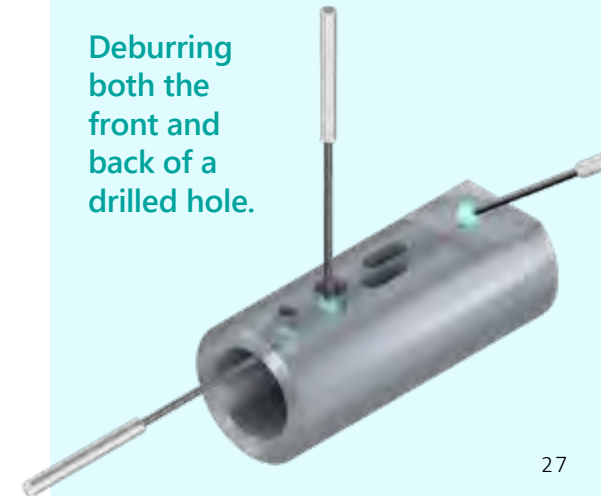
After

Tool XEBEC Stone Flexible Shaft

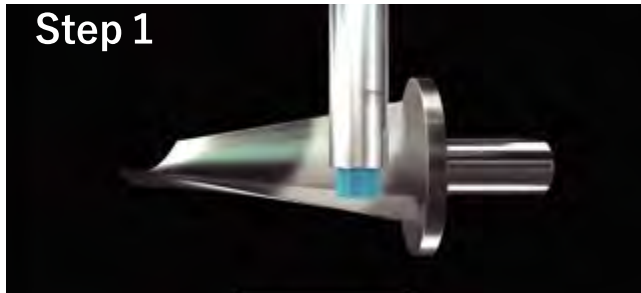
Result Secondary burrs are not generated. Efficiency is significantly improved.

LEARN MORE ABOUT
XEBEC Stone™ Flexible Shaft

Deburring
both the
front and
back of a
drilled hole.

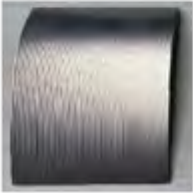






Turbine Blade Polishing



	Step 1	Step 2
Processing details	XEBEC Brush Surface (A32 Blue) Ra5.0 \Rightarrow Ra0.34	XEBEC Brush Surface (A11 Red) Ra0.34 \Rightarrow Ra0.16
Machining time	4.5min	

Effect

	After ball end milling	After semi finishing	After finishing
convex surface	Ra 4.912 Rz 21.181 	Ra 0.336 Rz 2.974 	Ra 0.159 Rz 1.557 
concave surface	Ra 5.024 Rz 20.763 	Ra 0.245 Rz 2.180 	Ra 0.100 Rz 0.856 

LEARN MORE ABOUT
XEBEC Brush™ Surface

TOOL XEBEC Brush™ Surface


Available in Diameters:

6, 15, 25, 40, 60, 100 mm

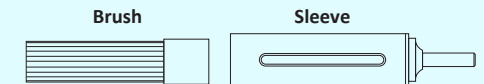
Available Colors (Aggressiveness):

Pink, Red, White, Blue

Aggressiveness indicated by Color:

Least  Most

Brush Requires Brush Sleeve to Operate:



XEBEC Brush™ Surface

Ideal for:

- Surface Deburring
- Cutter Mark Removal
- Edge Radius
- Surface Finishing
- Polishing

Deburring & finishing following face-milling, end-milling & drilling.



XEBEC® Success Stories

How Automated Deburring Saved Over \$275,000

A Real Example of Moving from a Manual Deburring Process to an Automated Process using Xebec Brush™ Surface

Wow, there we go again. At Xebec, we continue to help people with deburring problems become heroes in their own company. Check out this amazing cost savings example from the firearms industry.

Our customer was manually deburring the two parts shown in the calculations below. By switching to an automated process, utilizing a ceramic Xebec surface brush, they are looking at an estimated savings of over \$275k per year.

Labor Cost

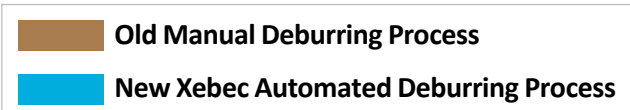
Manual

\$22/hr

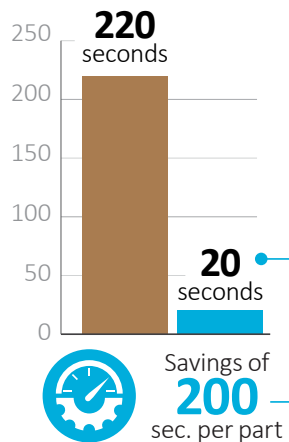
Machine

\$80/hr

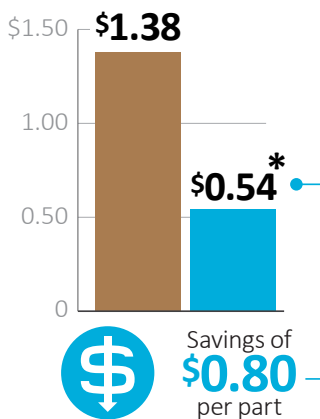
At first glance, manual deburring appears to cost less.



Cycle Time Per Part



Labor Cost Per Part



Example 1:

Estimated annual cost savings of \$96,058

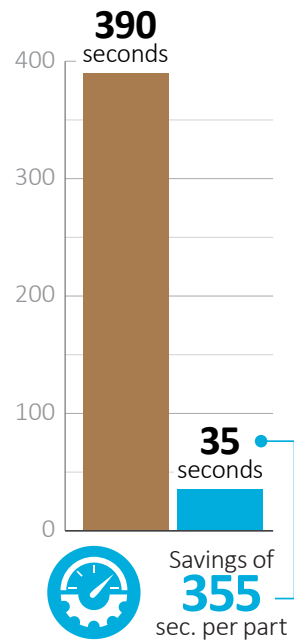
- Original manual deburring process had a cycle time of 220 seconds per part. With labor burden rates at \$22 per hour, that equates to \$1.34 in labor cost per part.
- New Xebec automated process has a cycle time of 20 seconds per part. With machine costs at \$80 per hour, that equates to just \$0.44 cost per piece. Add in the cost of the ceramic brush \$0.10 per piece (\$149.27 / 1500 pieces) and you have a total cost per piece of just \$0.54.
- Manual deburring \$1.34 per part – Xebec deburring \$0.54 per part = \$0.80 savings per part
- Customer is making 10,000 of these parts per month (120k per year).
- 120,000 pieces multiplied by \$0.80 per piece cost savings = \$96,058

*Cost includes all tool expenses.

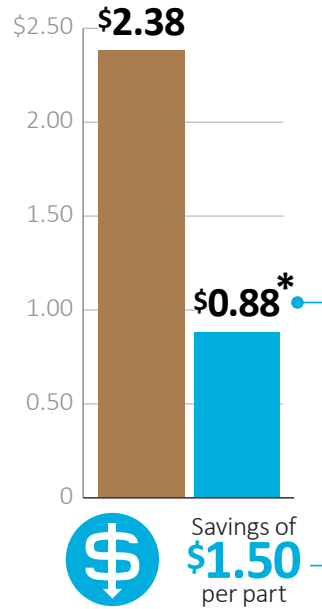
Xebec 15mm Surface Brush: \$149.27 each

Total Brush cost for 120,000 parts: \$11,941.60 or \$0.10/part

Cycle Time Per Part



Labor Cost Per Part



In addition to cost savings, part quality and consistency are greatly improved with the Xebec Brush.

Example 2:

Estimated annual cost savings of \$180,000

- Original manual deburring process had a cycle time of 390 seconds per part. With labor burden rates at \$22 per hour, that equates to \$2.38 in labor cost per part.
- New Xebec automated process has a cycle time of 35 seconds per part. With machine costs at \$80 per hour, that equates to just \$0.78 cost per piece. Add in the cost of the ceramic brush \$0.10 per piece (\$149.27 / 1500 pieces) and you have a total cost per piece of just \$0.88.
- Manual deburring \$2.38 per part – Xebec deburring \$0.88 per part = \$1.50 savings per part
- Customer is making 10,000 of these parts per month (120k per year).
- 120,000 pieces multiplied by \$1.50 per piece cost savings = \$180,000

Xebec cost savings initiatives also assist with resource management. This initiative alone created a platform to reduce a group equivalent of six full time employees. Not only does this offer cost savings, but also gives the end user an opportunity to redeploy those valuable resources elsewhere.

In addition to cost savings, our ceramic fibers are second to none and ensure a consistent and greatly improved finish to their product. We are very proud of our product and our company and would love to help you be a hero in your company as well as we continue to help the resurgence of American manufacturing, by redefining perfection.

Are you ready to modernize your deburring process?

LEARN MORE ABOUT
Cost Savings with XEBEC™

INNOVATIVE DEBURRING & FINISHING TOOLS

Surface Deburring & Finishing

 **YouTube** Click to Play Video:
@ Xebec Deburring Technologies

- Surface Deburring, Finishing and Polishing
- Deburring after machine processing and finishing of edges
- Precision parts such as receivers and bolt carriers that must be deburred while maintaining edge quality with out secondary burrs
- Grinding and finishing of flat or uneven surfaces
- CNC machine applications, following milling passes



Crosshole Deburring & Finishing

 **YouTube** Click to Play Video:
@ Xebec Deburring Technologies

- Crosshole deburring, polishing of inner wall surfaces of cylinders
- Effectively removes burrs generated around cross-holes under rotational/centrifugal force
- Soft contact abrasive for deburring crossholes and detailed finishing of parts
- Flexible tool shafts allow soft contact with work piece



Detailed Finishing

 **YouTube** Click to Play Video:
@ Xebec Deburring Technologies

- Wide variety of tool shapes and sizes for detailed and intricate part finishing
- Chamfers, edge breaks, burrs, blending, finishing, polishing, EDM scale removal and more
- Use by hand, with Xebec Micro Motor, ultrasonic polishers, robots or CNC machines.



Xebec® Ceramic Fiber

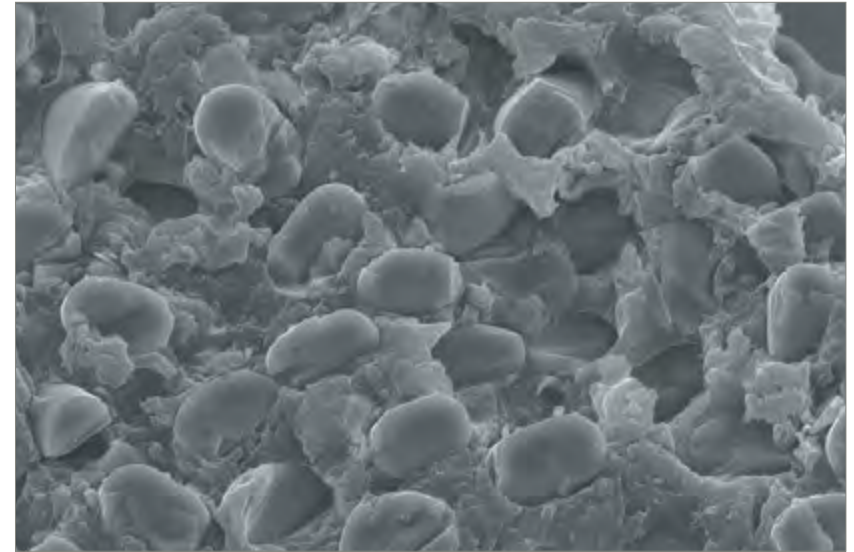
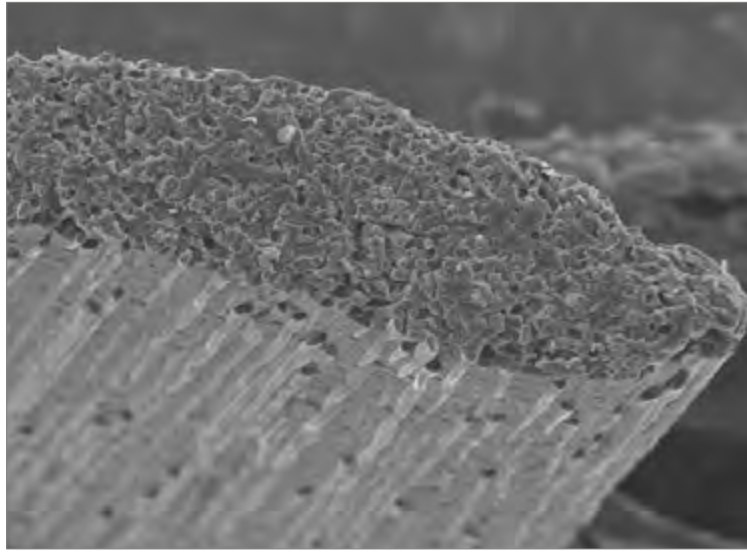
The ceramic fibers are woven to create self-sharpening filaments that maintain consistent cutting action on the tips. Unlike wire and abrasive impregnated nylon brush filaments, the unique design of the Xebec fiber rod maintains its shape with no deformation even after repeated use. This leads to consistent performance time after time.

More than a brush -
performs like a cutting tool.

FINE FINISHING

up to
3.937 Ra
 μ i microinches
(0.1 μ m micrometers)

Continuous Ceramic Fibers



Watch Xebec FAQ's: Your Questions Answered



Click to Play Video:
[@ Xebec Deburring Technologies](#)

CONTINUOUS CERAMIC FIBER DEBURRING & FINISHING TOOLS



FLEXIBLE BRISTLES **XEBEC Brush™**

Ceramic Fibers are formed into bristles to produce tip cutting Brushes

Cuts from the tip



SOLID **XEBEC Stone™**

Ceramic Fibers are formed into Stones capable of cutting on all sides

Cuts on all sides



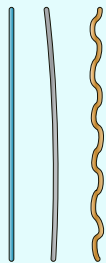
Click to Play Video:
[@ Xebec Deburring Technologies](#)

No Deformation

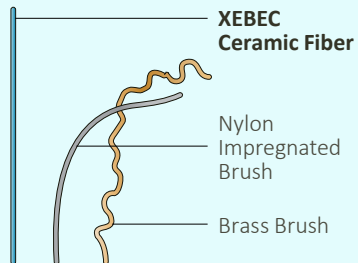
Bristles made from Xebec™ ceramic fiber filament maintain their shape even after repeated use. Which means the grinding power is not diminished over time and performance quality is consistently fine.

BEFORE

Individual bristles before and after repeated use

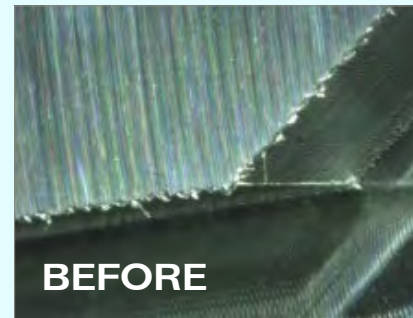


AFTER



Self-Sharpening Effect

New cutting edges are continuously exposed through tool use. Which means tool remains “sharp” and product performance is consistently high.

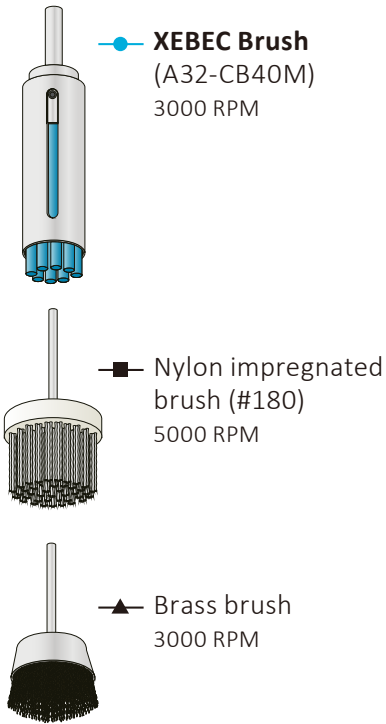


Flexibility and Grinding Power

All Xebec brushes are made from the same proprietary ceramic fibers manufactured into rods, or bristles, of different thicknesses. The greater the bristle thickness, the more aggressive the cutting action. Thicker bristles will remove more material, faster. Thinner bristles are more flexible and able to conform to the shape of the workpiece for finishing and polishing without altering part dimensions or features. Brush color indicates the relative thickness of the bristles.

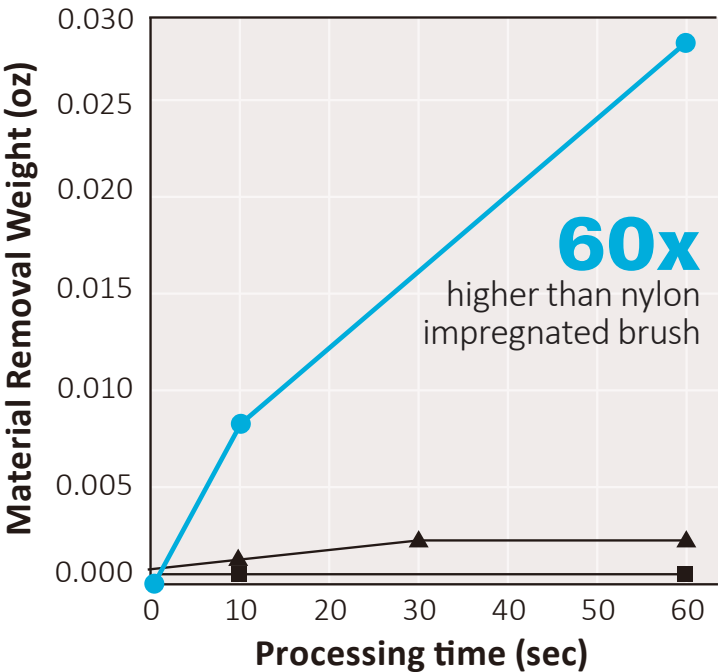
The Advantages of Ceramic Fiber

Xebec Ceramic Fiber brushes remove more material faster than nylon impregnated or brass finishing brushes.



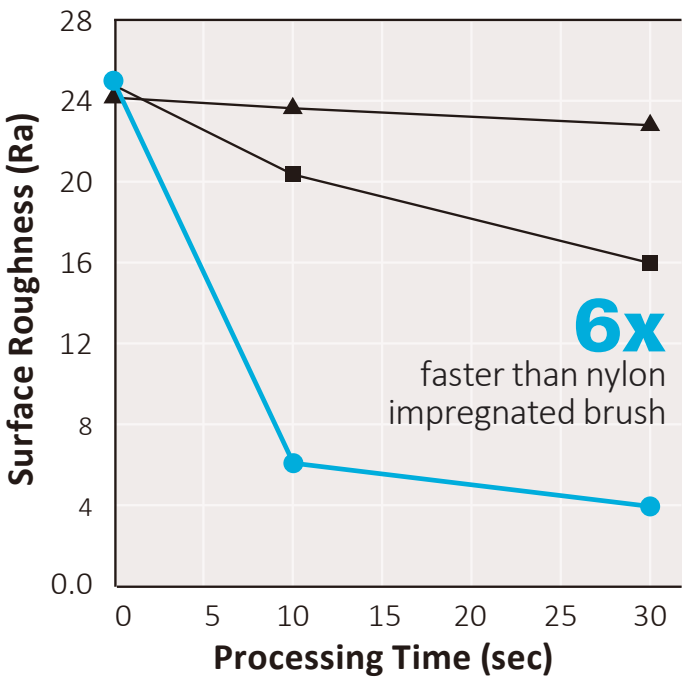
Grinding power

Material: Carbon Steel S45C



Polishing capacity

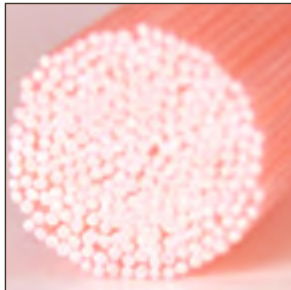


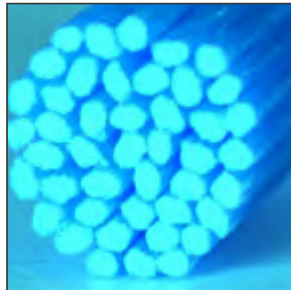
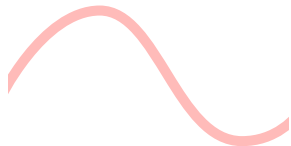



Material: Carbon Steel S45C



Xebec Blows Away Nylon Brushes

Click to Play Video:
@ Xebec Deburring Technologies

All Xebec brushes are made from the same proprietary ceramic fibers which are manufactured into rods, or bristles of different thicknesses. **The greater the bristle thickness, the more aggressive the cutting action.**

Brush Color Signifies the relative thickness of the bristles	 Will not change part dimensions or features	 Will conform to slight workpiece variations	 Able to run at higher speeds, extend tool life	 3-4 times more aggressive than white
Aggressiveness	← LEAST MOST →			
Flexibility Ability to conform to the work piece				
Target Material	← SOFTEST HARDEST →			
	Resins, Plastics	Aluminum, Copper, Brass, General Steel		Cast Metal, Stainless, Heat-Resistant Steel
Target Burr Size	Micro Fine		up to 0.008"	
		up to 0.004"		
Target Finish	4 Ra or better	Finish up to 4 Ra		

Surface Deburring & Finishing Brushes

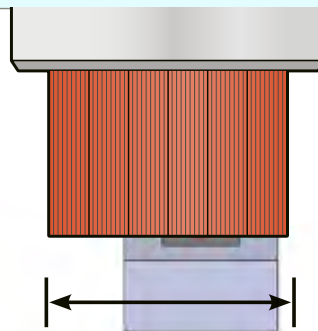


Click to Play Video:
@ Xebec Deburring Technologies

Choosing the Ideal Brush Size

Choose a brush 1.5 to 2 times wider than the width of the work piece surface.

1.5-2x larger than the surface width

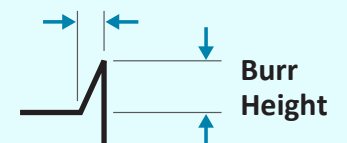


This allows the brush to engage the edge at 90° for optimal grinding power. Using a larger brush than the surface width will also require the fewest number of passes and minimize cycle time.

Target Burr Size

Burr Root Thickness of **0.008"** or less (Burrs are bent with a fingernail)

Burr Root Thickness



XEBEC™ Back Burr Cutter & Path

Spherical deburring Cutter with a custom-made tool Path. For CNC deburring of entry and exit holes in a single pass.

Spherical Cutting Tool



Custom Path Data



The tool can be mounted on machining center (XYZ-axis) or combined lathe (XZY or XZC-axis). 3-axis simultaneous control is required.



Machining Center



Combined Lathe

Xebec™ Back Burr Cutter

Micro-Grain Cemented Carbide

Spherical Cutter

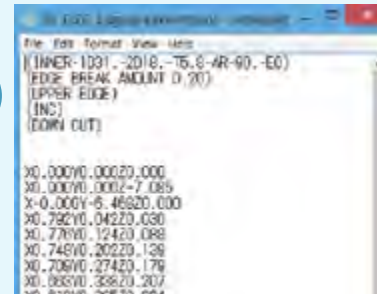
Helical Blade



Heat-resistant AlTiCrN coating

Performs well in all materials including Titanium and Inconel

Xebec™ Generated Custom Tool Path



Custom Point Group Data

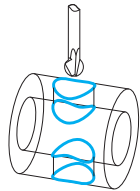
Up and Down Cutting Directions
Incremental and Absolute Modes
5 levels of Depth of Cut

Once approved, the Path Data is provided via email for immediate use on machine.

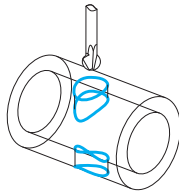
For a variety of edge shapes

One Cutter size supports various edges in different sizes and shapes.

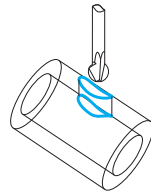
Orthogonal cross hole



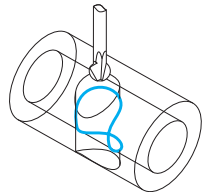
Off-center cross hole



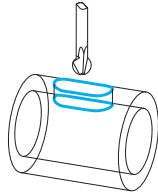
Angled cross hole



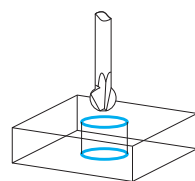
Broken cross hole



Slotted hole



Planar hole



Custom Path Data

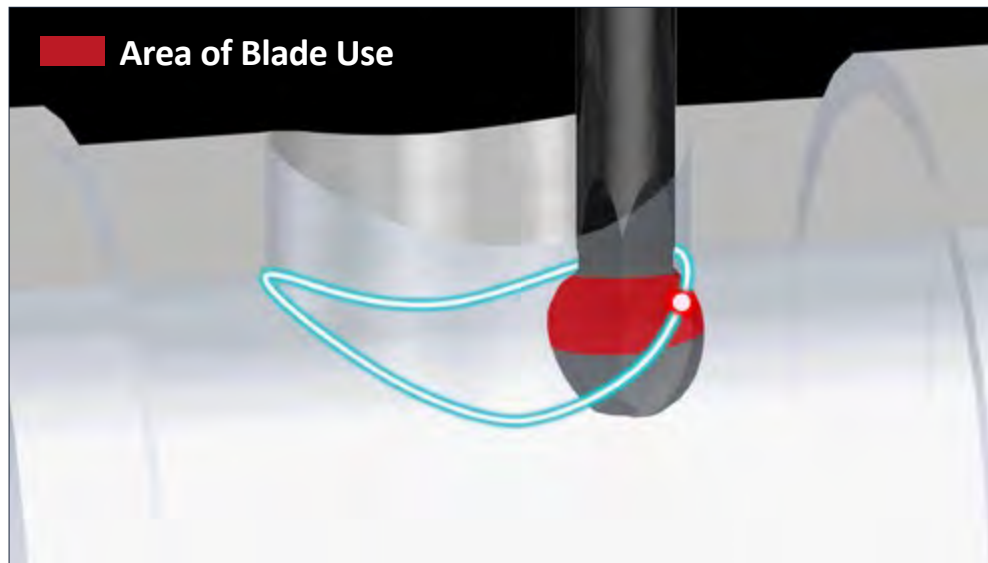
For complicated edge profiles



Click to Play Video:
[@ Xebec Deburring Technologies](#)

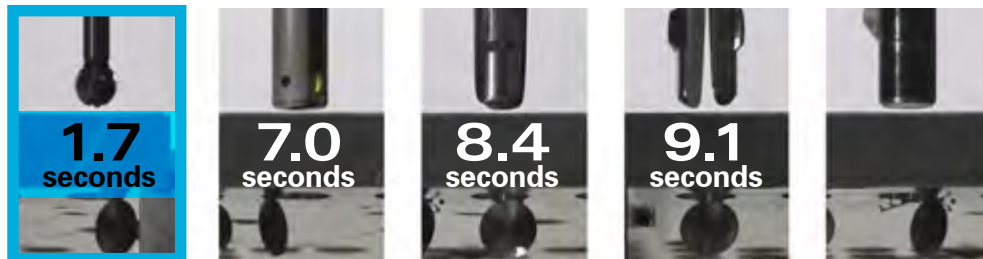
Longer Tool Life

Uses the entire cutting blade by constantly shifting the contact point



Click to Play Video:
@ Xebec Deburring Technologies

3 to 5 times Faster than Similar Tools



Back Burr
Cutter & Path

Tool A

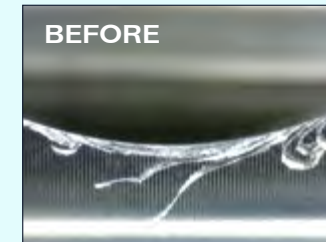
Tool B

Tool C

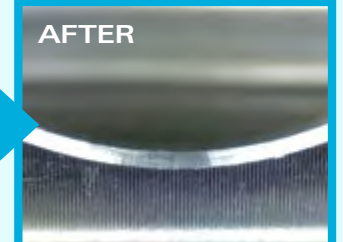


Click to Play Video:
@ Xebec Deburring Technologies

Stainless Steel



AFTER



Tapped Holes



AFTER



Uniform edge
shape by consistent
deburring amount

XEBEC Back Burr Cutter & Path Setup Guide

Glossary

■ XEBEC Back Burr Cutter (Cutter)

The spherical cutter specially designed for deburring

■ XEBEC Path (Path)

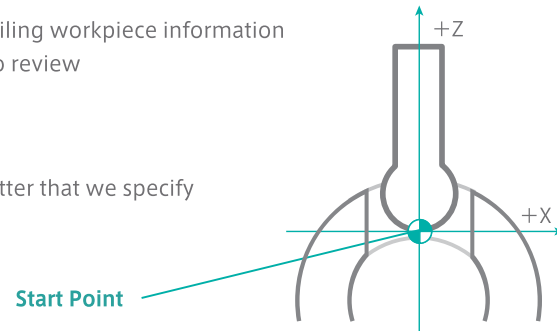
The custom-made NC data set (XYZ points' data) generated for optimal deburring

■ Path Code Sheet

The confirmation sheet detailing workpiece information and the Start Point for you to review

■ Start Point

The initial position of the Cutter that we specify



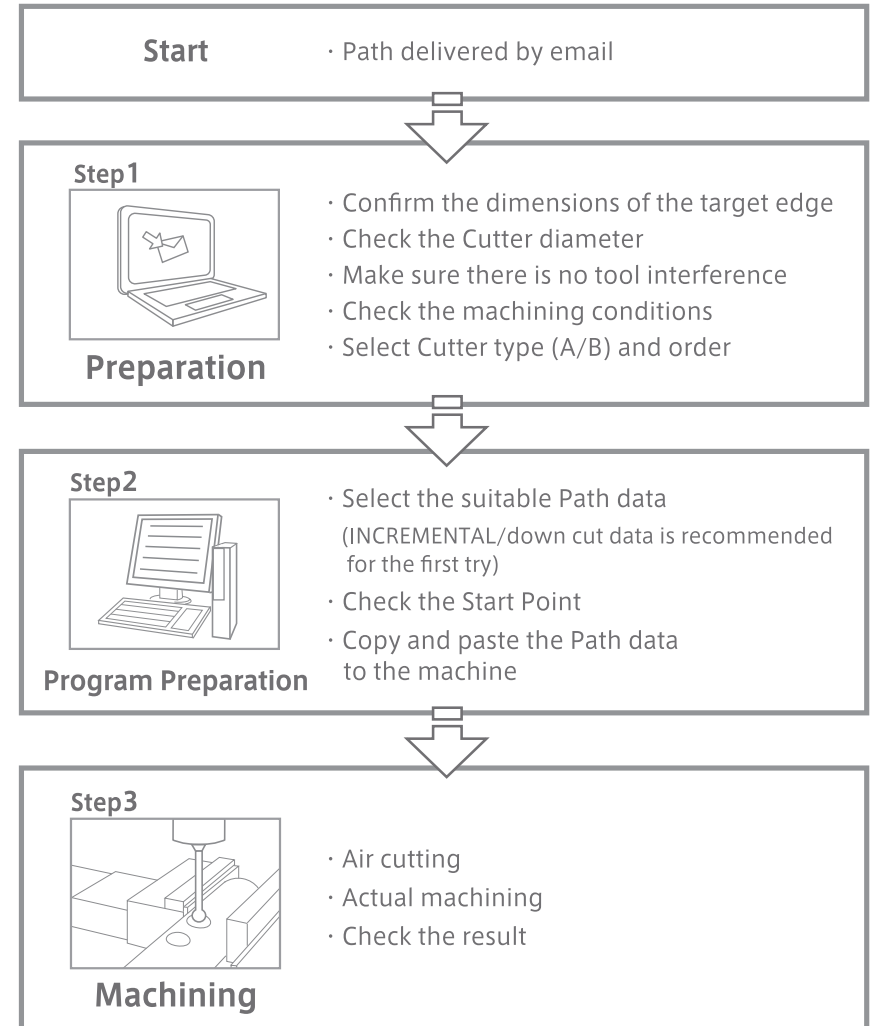
Product component

■ Path (delivered by email)

- Text data
- Instruction manual
- Path Code Sheet

■ Cutter (sold separately)

Steps



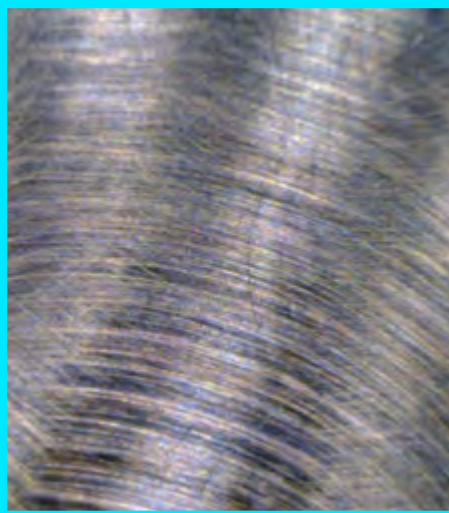
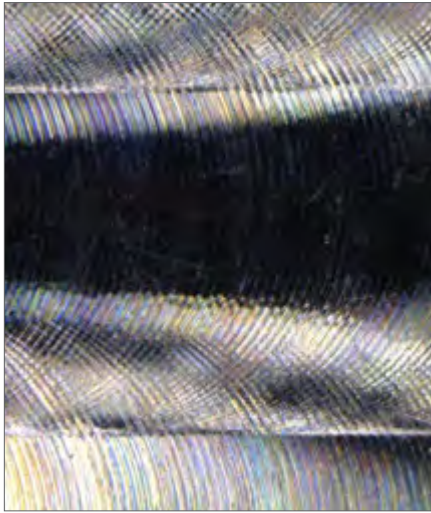
STAINLESS STEELS	300 Series 400 Series	PH Series
LOW ALLOY STEELS	Low Carbon Medium Carbon S45C	SCM
HEAT RESISTANT ALLOYS	Nickel Alloys Titanium Alloys	Inconel Tantalum
HIGH HARDNESS STEELS	High Carbon Tungsten Chromium	Molybdenum Cast Steel
NON-FERROUS ALLOYS	Aluminum Alloys Zinc Alloys Copper Alloys	Brass Bronze
POLYMERS	Plastics Resins	Composites
CAST IRON	Gray Cast Ductile Cast	Alloy Cast

FOR A RANGE
OF MATERIALS

up to
65 Rc

 **READ THE ARTICLE:**
Deburring Different Materials:
Metal, Plastic and Beyond

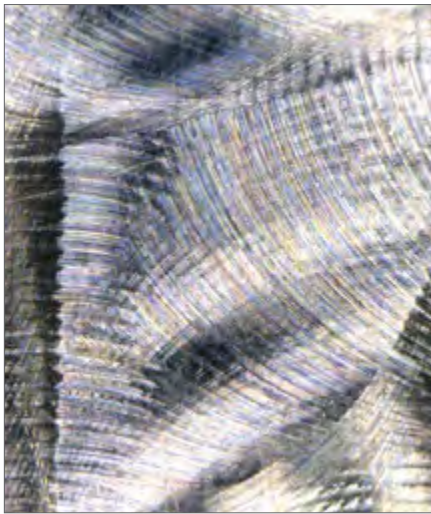
Deburring & Finishing Results



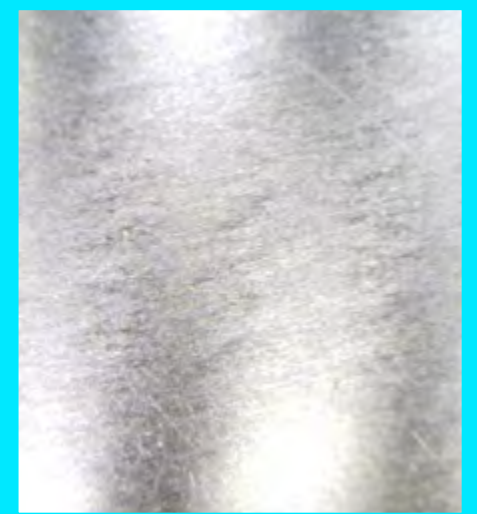
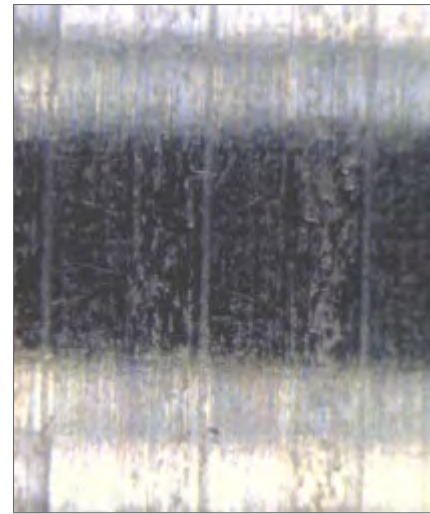
SURFACES ▶



SURFACE FEATURES ▶

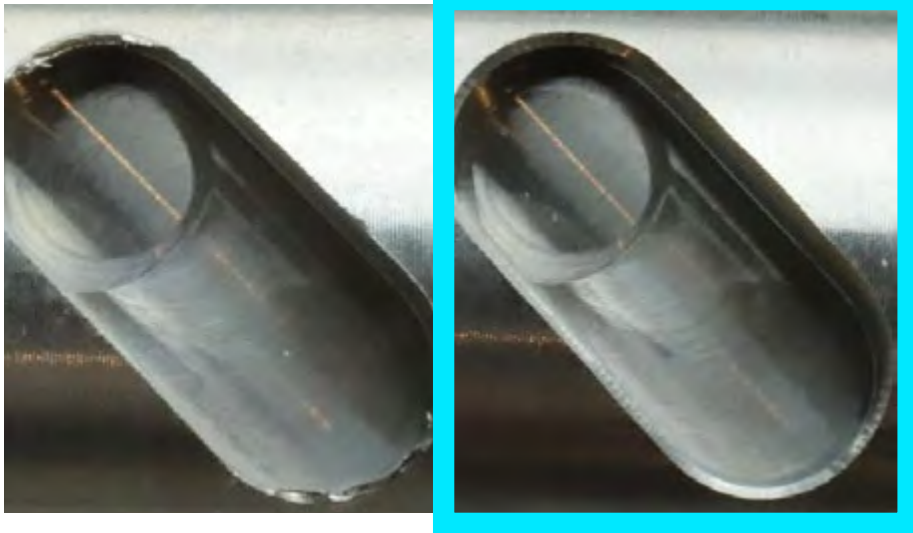


CUTTER MARK REMOVAL ▶

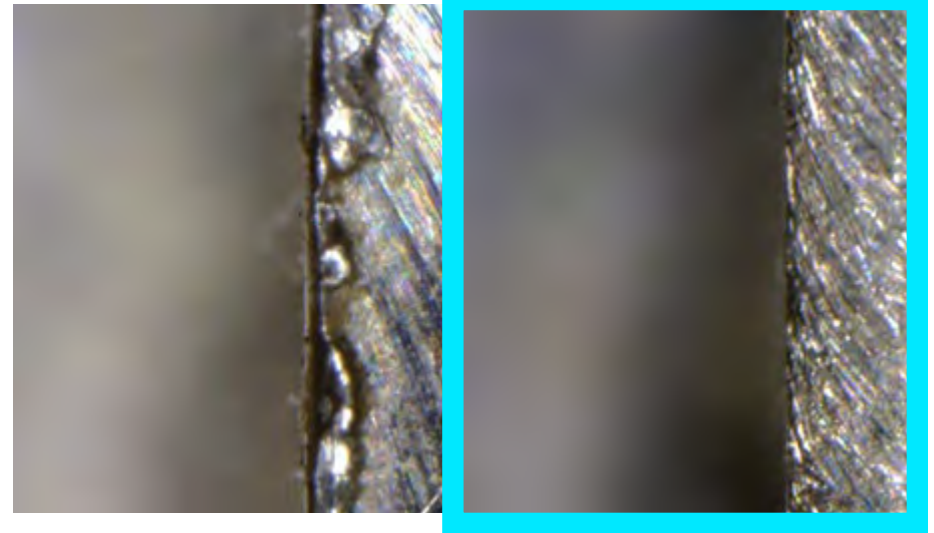


POLISHING ▶

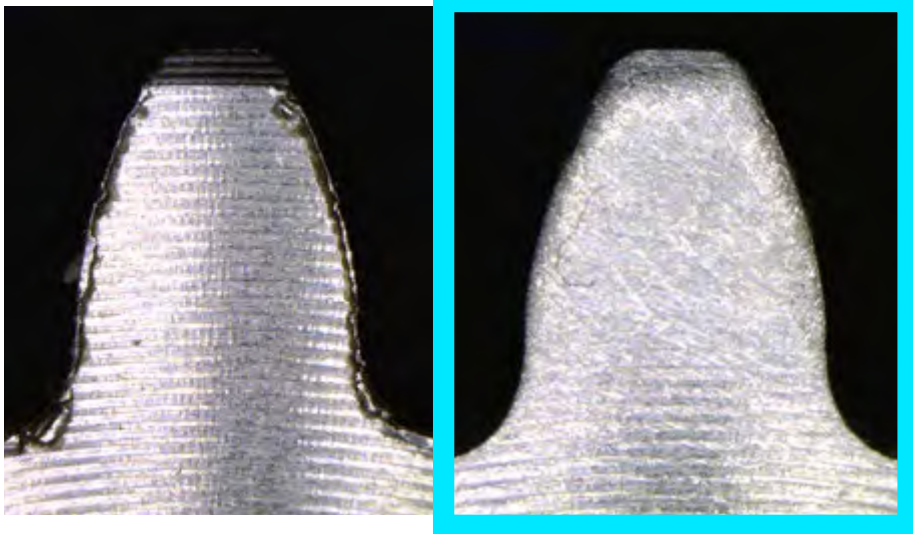
Deburring & Finishing Results



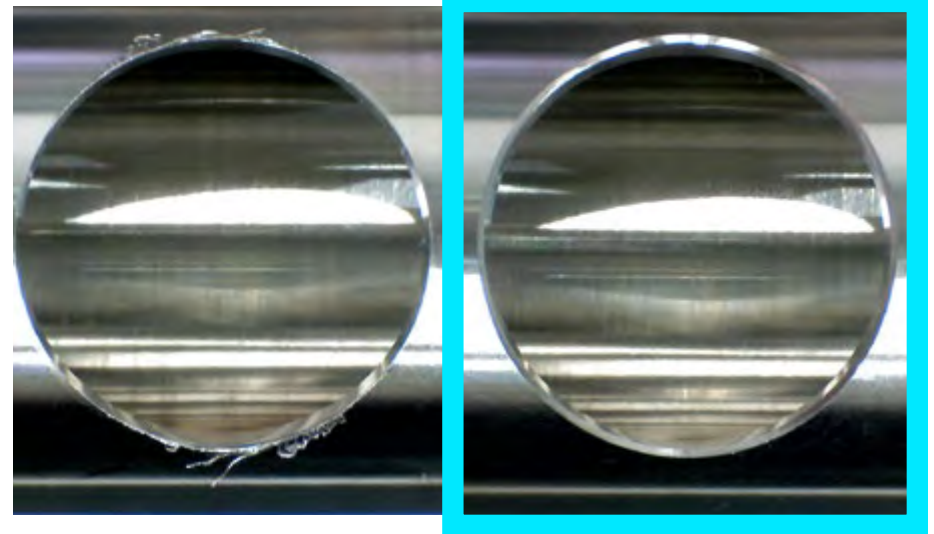
CHANNELED, BROKEN
SURFACES ▶



EDGES ▶

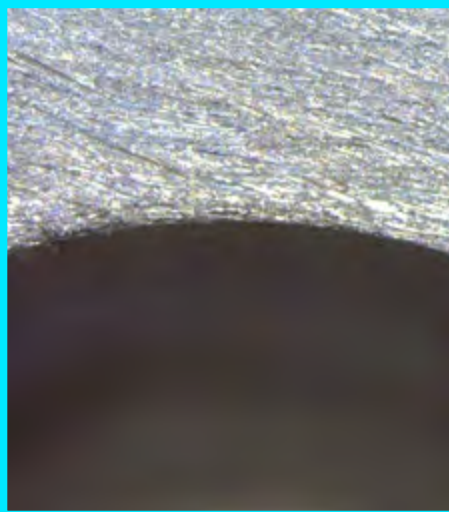
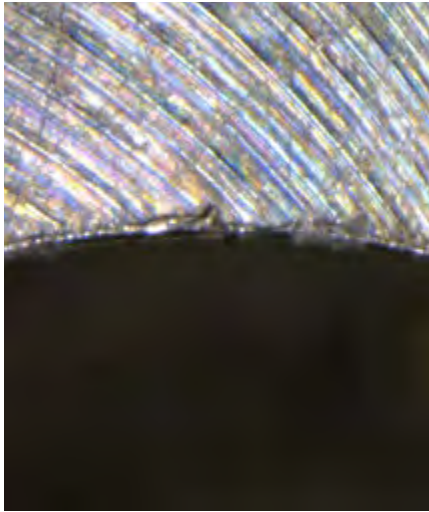


RADIUSED EDGE ▶

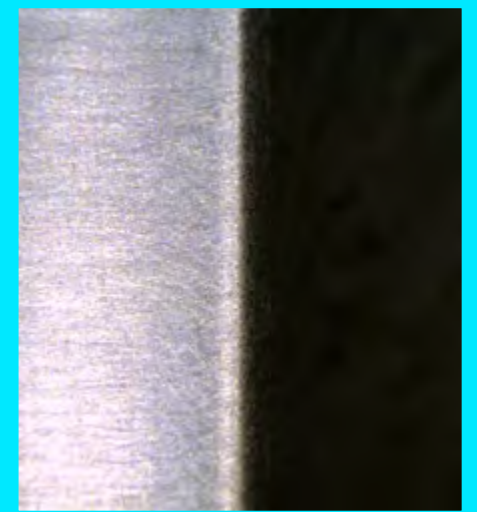


CHAMFERED EDGE ▶

Deburring & Finishing Results



INNER WALL
DIAMETERS



OUTER WALL
DIAMETER

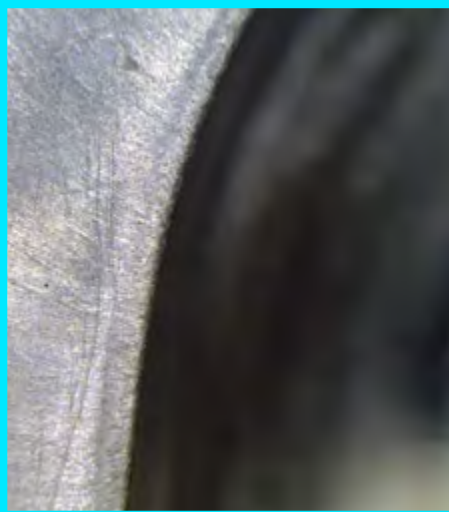


THREADED DIAMETERS



CROSS HOLES

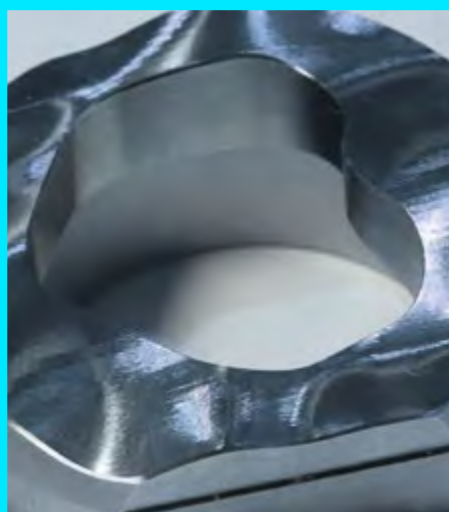
Deburring & Finishing Results



BORES ▶



ELLIPTICAL HOLES ▶

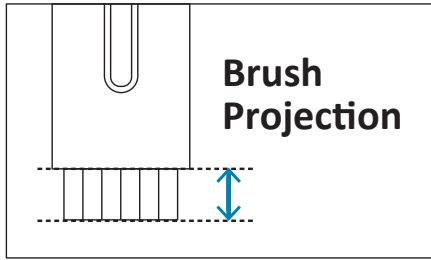


COMPLEX EDGE PROFILES ▶



THREADED HOLES ▶

Set Brush Projection



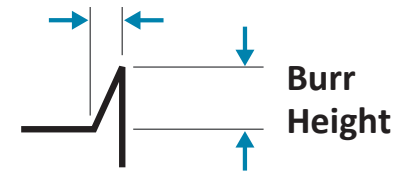
Brush Size Diameter	6 mm	15 mm	25 mm	40 mm	60 mm	100 mm
Brush Projection All Grades (in)	0.3125-0.375"	0.375-0.5625"	0.5-0.625"	0.5-0.625"	0.5-0.75"	0.5-0.75"

Brush projection below 0.2" increases grinding power and may affect finish

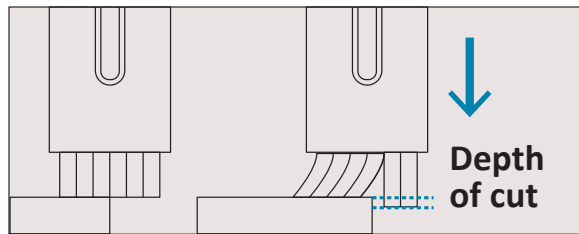
Target Burr Size

Burr Root Thickness of **0.008"** or less
(Burrs are bent with a fingernail)

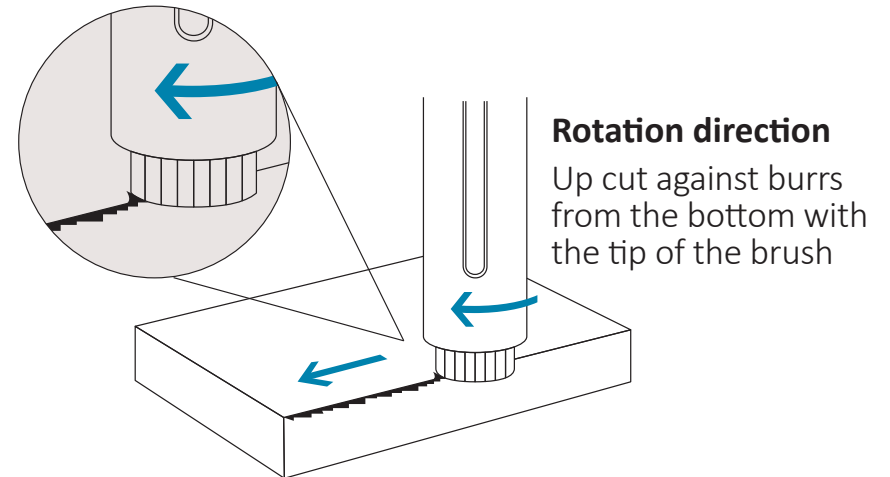
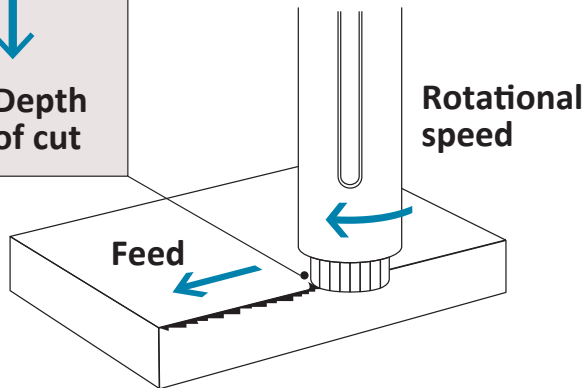
Burr Root Thickness



Workpiece Engagement



Engage part with the tip of the brush. Avoid contacting the side of the brush.



Depth of Cut

All Brush Grades
(Inches)

Polishing	Vertical Burr	Horizontal Burr	Heavy Burr
0.012"	0.020"	0.040"	0.060"

Tips for Maximizing Brush Performance

More than a brush -
performs like a cutting tool.

MAXIMIZING DEBURRING OPERATION

- 1 Increase RPM to the maximum allowed
- 2 Decrease feed rate in 10% increments
- 3 Do not change original parameters, but increase number of passes
- 4 Try a more aggressive brush that will increase grinding power

MAXIMIZING TOOL LIFE

- 1 Decrease RPM in 10% increments
- 2 Increase feed rate by 10% increments
- 3 Try another brush color A13 Pink, A21 White, A11 Red, A32 Blue with the same parameters

Use of Coolant/Oil will optimize results

- It will Extend Tool Life
- Improves Surface Finish

 **READ THE ARTICLE:**
[Control Burrs before Deburring
for Better, Faster Results](#)

 **DOWNLOADABLE GUIDE:**
[6 Pro Tips to Help Control Burr Size](#)

Are you ready to modernize your deburring operations?

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Problem Solving

Safety Data Sheets

Operating Parameters

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Advanced Manufacturing Solutions

Aerospace



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