



Aerospace Solutions  
**Composite**

D-STAD DIA-BNC DIA-HBC DIA-MFC DIA-REC HBC60 PFB



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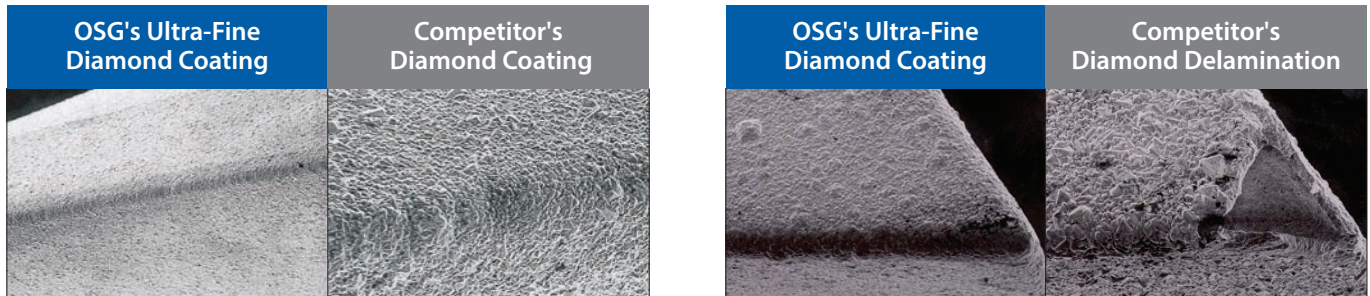
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# OSG'S ULTRA-FINE DIAMOND COATED

## Patented Ultra-Fine Grain Size

OSG's patented ultra-fine diamond coating has a maximum diamond grain size diameter of 2µm. This strictly controlled diameter allows our coating to be super smooth and extremely sharp, which visually is easily distinguishable from our competition.



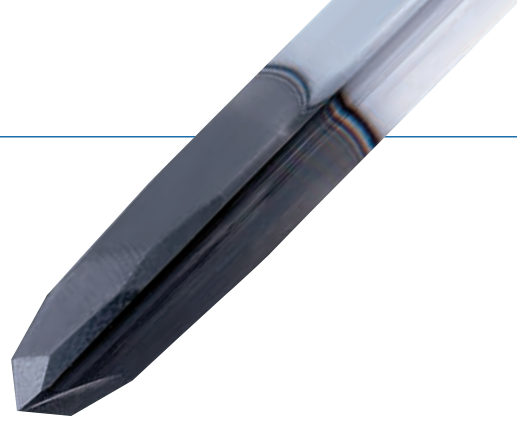
## Elimination of Diamond Delamination

OSG manufactures all diamond products in-house with absolute control. We produce our carbide, design our tools and develop our coatings. The end result is a diamond coated product with consistent tool life, rather than having to endure unpredictable delamination issues like ost of our competition.



# KEY FEATURES D-STAD

## Diamond Coated Straight Flute Triple Angle Drill



**Triple Angle Geometry (PAT.)**  
Reduces fiber breakout and push-out delamination at hole exit.

**Straight Flute**  
Eliminates pull-up delamination at hole entrance.

**OSG Diamond Coating (PAT.)**  
Provides superior wear resistance and anti-welding properties.

Drilling | Solid carbide

Key Features

## Conditions

CFRP			
Vc	50 ~ 100 m/min		
Ø	RPM	F (mm/rev.)	
4	4.000 ~ 8.000	0,03 ~ 0,05	
6	2.600 ~ 5.300	0,04 ~ 0,075	
6,35	2.500 ~ 5.000	0,04 ~ 0,075	
8	2.000 ~ 4.000	0,05 ~ 0,08	



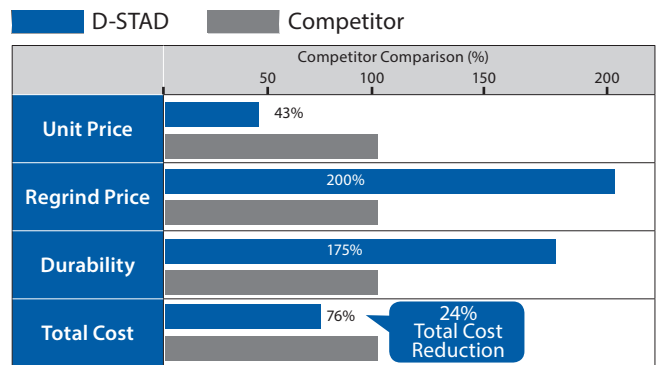
# MACHINING DATA

## OSG's diamond coated drill vs. a competitor's PCD twist drill

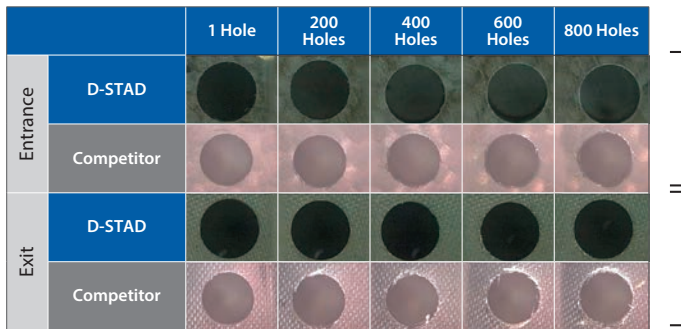
Patented triple angle geometry to reduce push-out exit delamination.  
Straight-fluted to eliminate pull-up entrance delamination.

Tool	D-STAD	Competitor's PCD Twist Drill
Size	6.375mm	
Work Material	CFRP	
Drilling Speed	100m/min (4,996min <sup>-1</sup> )	
Feed	300mm/min (0.06mm/rev)	
Depth of Hole	19mm (Through)	
Coolant	Water Soluble	

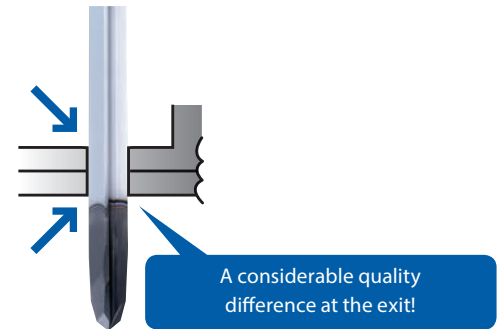
### D-STAD vs. competitor's PCD twist drill



## Hole quality comparison



Tool life determinant: Delamination

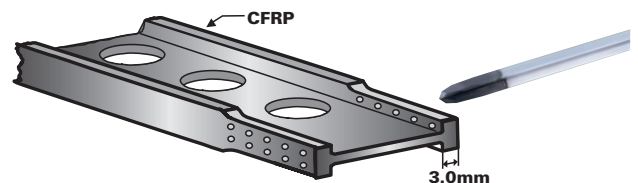
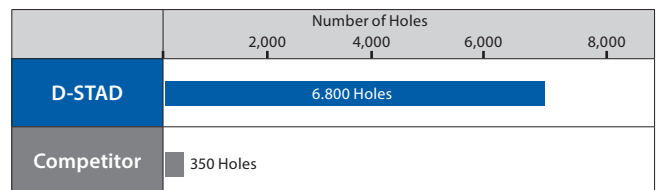


## OSG's diamond coated drill vs. a competitor's diamond coated drill

D-STAD demonstrated 19 times greater tool life versus the competitor's diamond coated tool.

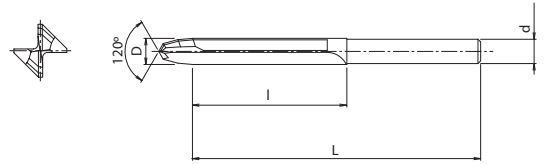
Tool	D-STAD	Competitor's Diamond Coated Drill
Size	6.375mm	
Work Material	CFRP	
Drilling Speed	120m/min (600min <sup>-1</sup> )	
Feed	152mm/min (0.025mm/rev)	
Depth of Cut	3mm	
Coolant	Dry	

### Comparison in number of drilled holes



# D-STAD

Drilling | Solid carbide | 3xD



- Triple angle carbide drill with diamond coating
- Up to 3xD
- For CFRP
- 4 sizes



CARBIDE	<span style="background-color: yellow; border: 1px solid black; padding: 2px;">DIA</span>	SHRINK FIT	0~-0.02
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Drilling | Solid carbide

3xD

EDP	D	L	l	d
48154001	4	80	30	4
48154002	6	90	40	6
48154004	6,35	88	38	6,35
48154003	8	100	50	8

EDP	D	L	l	d

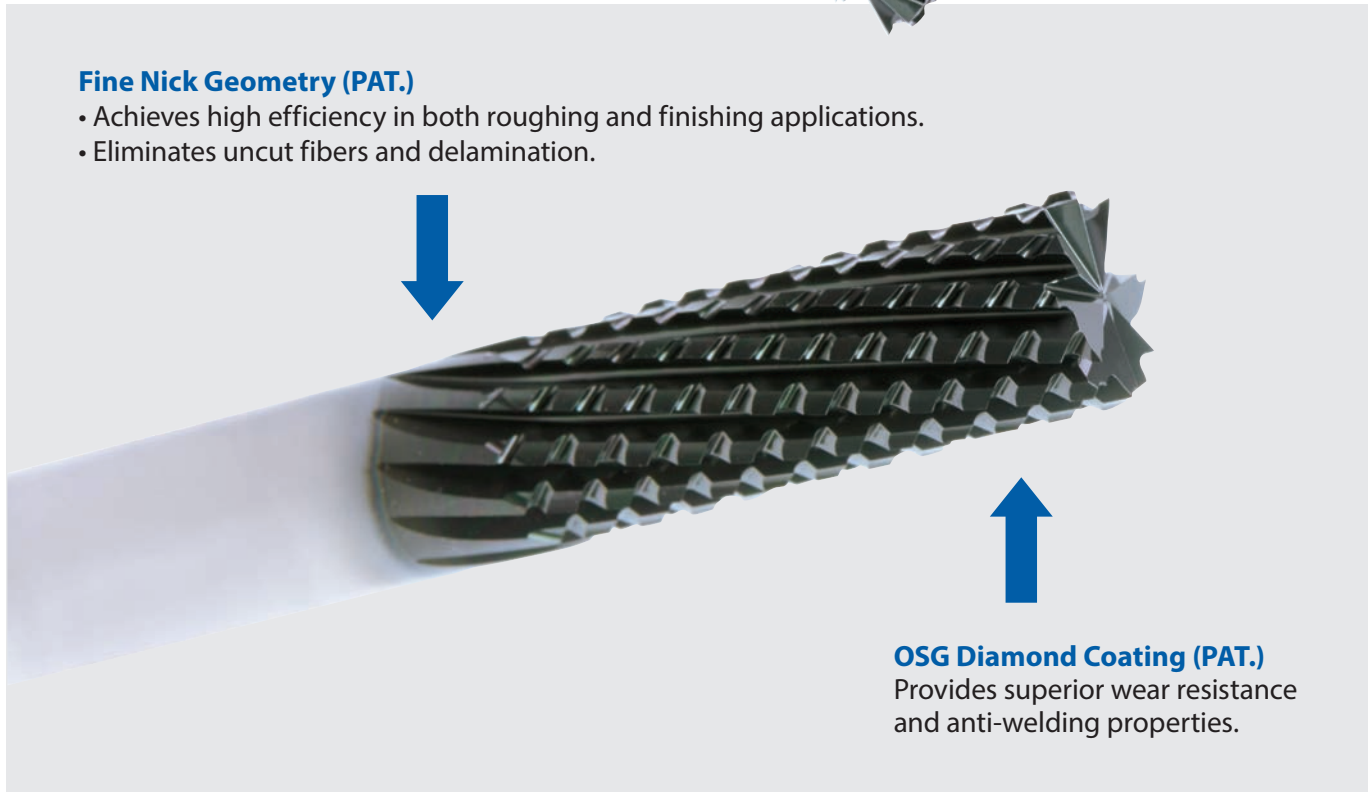
# KEY FEATURES DIA-BNC

## Diamond Coated Router for Multi-Purpose Milling



### Fine Nick Geometry (PAT.)

- Achieves high efficiency in both roughing and finishing applications.
- Eliminates uncut fibers and delamination.

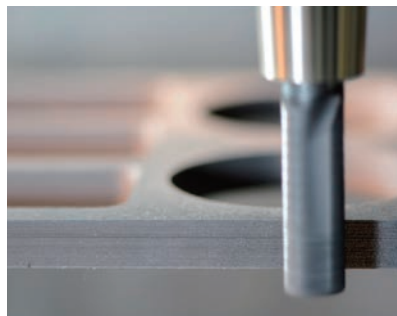


### OSG Diamond Coating (PAT.)

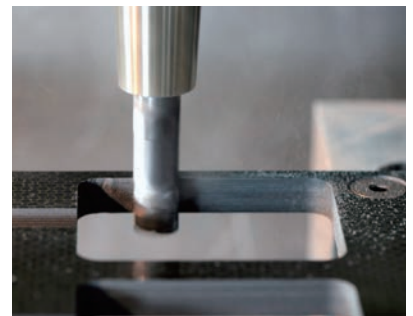
Provides superior wear resistance and anti-welding properties.



Slotting



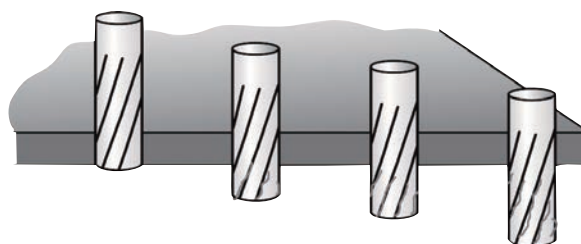
Routing



Pocketing, Plunging & Ramping

Longer tool life can be achieved through flute management(see below).

### Flute Management



Longer tool life can be achieved by changing milling position of the flute.

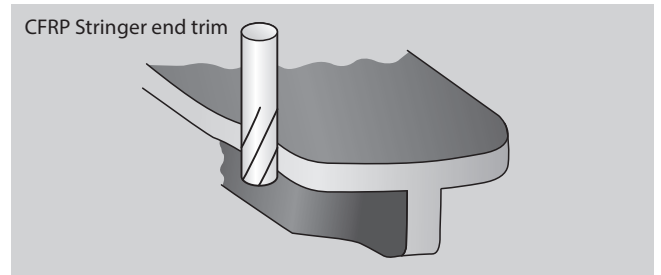
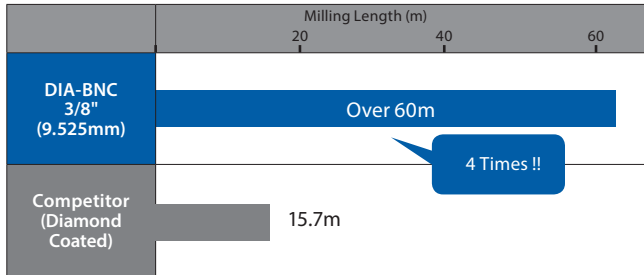


# MACHINING DATA

## Stringer and trimming

DIA-BNC was able to achieve four times the durability versus the competitor.

### Comparison of Durability



## Conditions

### Trimming & plunging operation

Vc	Side Milling ap: <1,5D / ae: <1D		Slotting ap: 1D	
	120 (m/min)	240 (m/min)	90 (m/min)	180 (m/min)
∅	F (mm/min)	F (mm/min)	F (mm/min)	F (mm/min)
6	770	1.600	380	750
8	900	1.800	450	900
10	1.000	2.000	510	1.000
12	1.300	2.600	630	1.300

Milling | Solid carbide

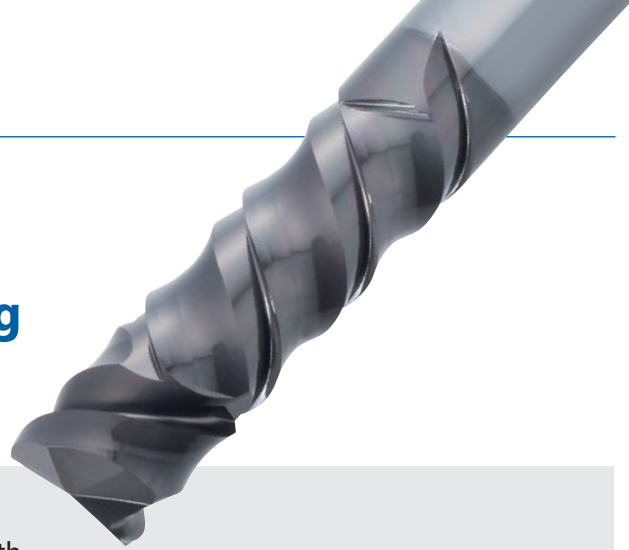
Machining Data





# KEY FEATURES DIA-HBC

## Diamond Coated Router for High Feed Routing and Finishing in Thick Laminates



**Compression Cutting Mechanism**  
Reduces delamination and uncut fibers on both top and bottom laminate surface.

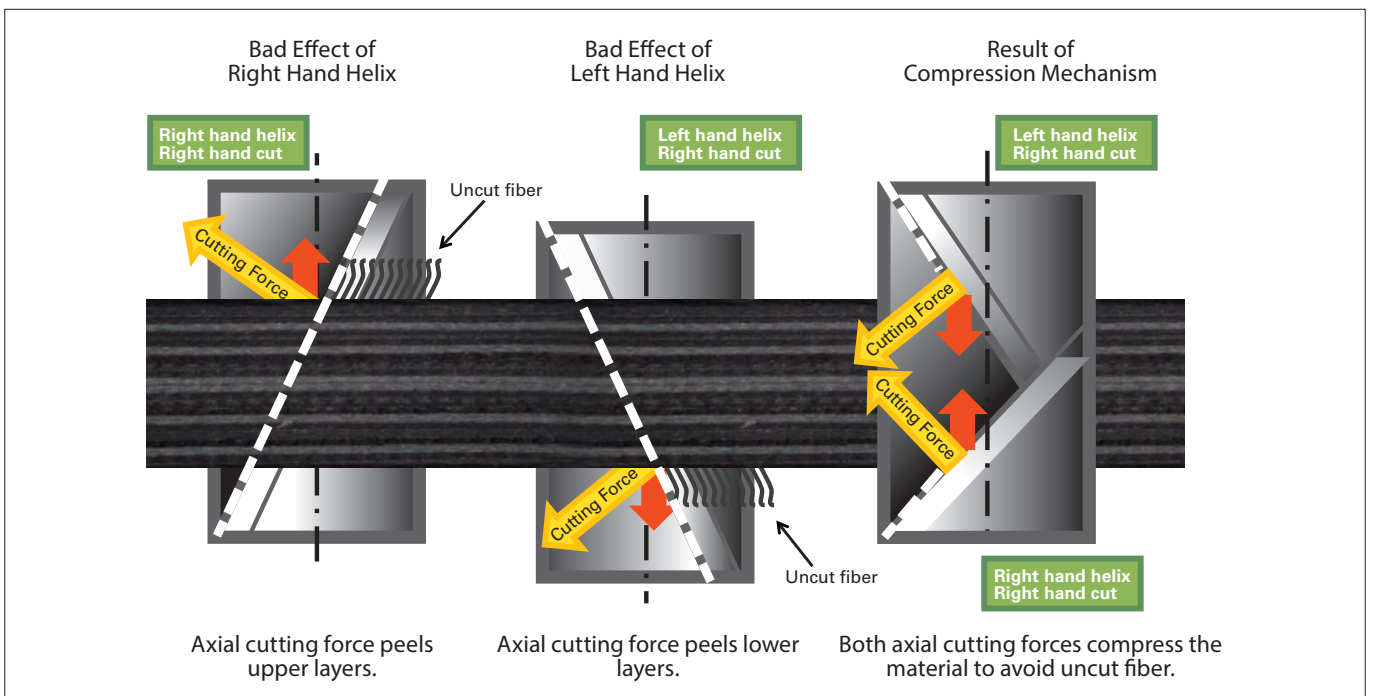
**4-Flute Geometry**  
For optimal overlap and chip evacuation.

**OSG Diamond Coating (PAT.)**  
Provides superior wear resistance and anti-welding properties.

**Left Hand Helix (Shank Side)**  
Directs cutting force downward.

**Right Hand Helix (End Cut Side)**  
Directs cutting force upward.

## Compression Mechanism



Milling | Solid carbide

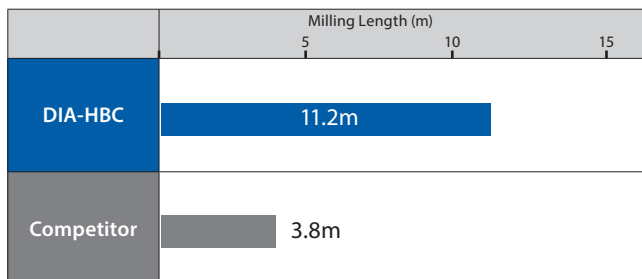
Key Features

# MACHINING DATA

## Herringbone end mill for CFRP routing

With a herringbone flute design, the DIA-HBC is capable of finishing CFRP without delamination. OSG's patented diamond coating contributes to long tool life and excellent surface finish.

Tool	DIA-HBC (Special)
Size	9.525mm
Work Material	CFRP
Milling Method	Routing
Milling Speed	96m/min (3,200min <sup>-1</sup> )
Feed	348mm/min (0.1mm/rev)
Coolant	Dry
Machine	Vertical Machining Center
Tool Life	Resin Welding



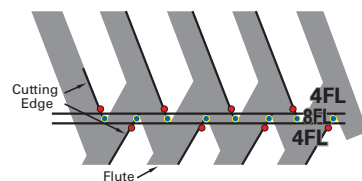
## High Feed Milling

DIA-HBC4 demonstrated excellent performance and surface finish at high feed rates. This 4-flute herringbone design was able to mill up to 480 IPM without leaving streak marks on the material.

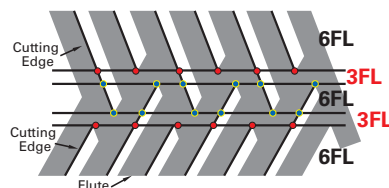
Tool	Herringbone Router - Diamond Coated	
	DIA-HBC4	Competitor
Size	.500"	
Number of Flutes	4	6
Work Material	CFRP	
Milling Method	Side Milling	
Milling Speed	6,000 RPM	
Feed	Various (24 to 480 IPM)	
Depth of Cut	$a_a = .250"$ $a_r = .125"$	
Coolant	Dry	
Machine	Vertical Machining Center	

### Performance highlights

DIA-HBC4  
Clean milling at  
480 IPM



Competitor  
Streaking and  
Torn/Uncut Fibers



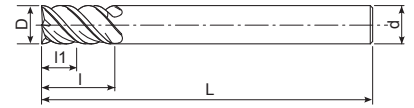
Milling | Solid carbide



Machining Data

# DIA-HBC

Milling | Solid carbide



- Carbide end mills with diamond coating
- For CFRP milling
- 4 flutes, left-hand / right-hand flute to suppress delamination



CARBIDE **DIA** SHRINK FIT

EDP	Z	D	L	I	I1	d
48109001	4	6	65	15	7,5	6
48109002	4	8	70	20	10	8
48109003	4	10	75	25	12,5	10
48109004	4	12	100	30	15	12

Milling | Solid carbide

## Conditions

Vc	Side Milling ap: <1,5D / ae: <1D		Slotting ap: 1D	
	120 (m/min)	240 (m/min)	90 (m/min)	180 (m/min)
Ø	F (mm/min)	F (mm/min)	F (mm/min)	F (mm/min)
6	770	1.600	380	750
8	900	1.800	450	900
10	1.000	2.000	510	1.000
12	1.300	2.600	630	1.300

Note: This table's parameters are based on common material thickness of approximately 0.250" under excellent workholding conditions and less than 20% x D depth of cut (side milling). Please adjust your parameters properly for your application or call OSG for assistance. Conventional milling is recommended for better surface finishes. Higher feed rates are possible but quality of part and surface should be considered.

Feed reduction by thickness of part: Recommended feed adjustments based on thickness of part. (Above table is based on approximately 1xD thickness.)

≤0,5D	x 150%
0,5D-1D	x 120%
1D-2D	x 80%
3D-4D	x 50%



[www.osgeurope.com](http://www.osgeurope.com)





# KEY FEATURES HBC60

## Bright Router for AFRP, GFRP & Honeycombs



### Compression Cutting Mechanism

Reduces delamination on both top and bottom laminate with its 60° helix angle.


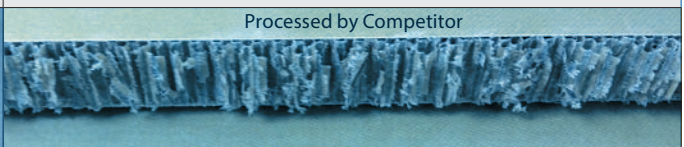





# MACHINING DATA

## HBC60

Surface processed by the HBC60 was much smoother than conventional tool / competitor.

HBC60 vs. conventional tool / competitor

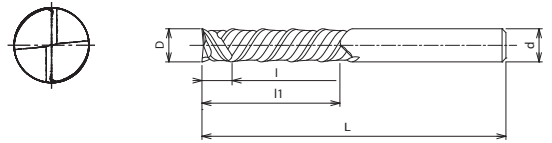
		Work Material	
		CFRP / Aluminum Honeycomb	AFRP / Nomex Honeycomb
			 Processed by Competitor
		 Processed by → Conventional Tool	 Processed by HBC60
			GFRP / Nomex Honeycomb
			

Milling | Solid carbide

Key Features

# HBC60

Milling | Solid carbide



- Carbide end mills, bright finish
- For honeycomb composite materials
- 2 flutes, left-hand / right-hand flute



EDP	Z	D	L	l	l1	d
8809181	2	6	68	4,5	18	6
8809183	2	8	74	6	24	8
8809185	2	10	80	7,5	30	10
8809187	2	12	86	9	36	12

## Conditions

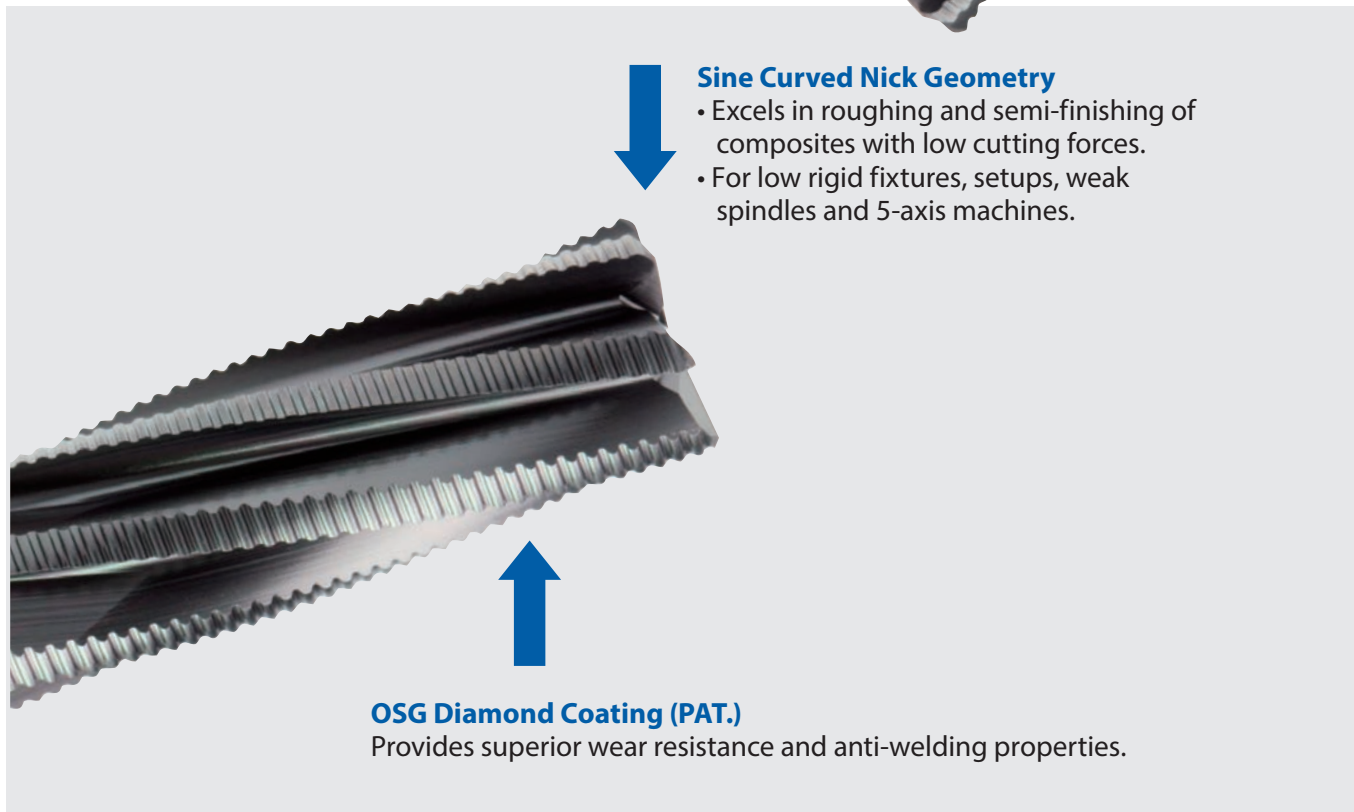
	S (min <sup>-1</sup> )	Feed rate		<table border="1"> <tr> <td>≤0,25D</td> <td>x 80%</td> </tr> <tr> <td>0,25D-0,5D</td> <td>x 150%</td> </tr> <tr> <td>0,5D-1D</td> <td>x 120%</td> </tr> <tr> <td>1D-2D</td> <td>x 80%</td> </tr> <tr> <td>2D-3D</td> <td>x 50%</td> </tr> </table>	≤0,25D	x 80%	0,25D-0,5D	x 150%	0,5D-1D	x 120%	1D-2D	x 80%	2D-3D	x 50%
		≤0,25D	x 80%											
0,25D-0,5D	x 150%													
0,5D-1D	x 120%													
1D-2D	x 80%													
2D-3D	x 50%													
Vc		(mm/rev)	IPR											
		300~600 (m/min)												
6	20.000 ~ 30.000	0,02 ~ 0,06	0,001 ~ 0,002											
8	15.000 ~ 24.000	0,02 ~ 0,06	0,001 ~ 0,002											
10	12.000 ~ 19.000	0,02 ~ 0,07	0,001 ~ 0,003											
12	10.000 ~ 16.000	0,02 ~ 0,1	0,001 ~ 0,004											

Milling | Solid carbide



# KEY FEATURES DIA-REC

## Diamond Coated Roughing Router



**Sine Curved Nick Geometry**

- Excels in roughing and semi-finishing of composites with low cutting forces.
- For low rigid fixtures, setups, weak spindles and 5-axis machines.



**OSG Diamond Coating (PAT.)**  
Provides superior wear resistance and anti-welding properties.

Milling | Solid carbide

## Conditions

Vc	S (min <sup>-1</sup> )	Feed rate	
		(mm/rev)	IPR
		100~180 (m/min)	
6	5.300 ~ 9.500	0,1 ~ 0,12	0,004 ~ 0,005
8	4.000 ~ 7.200	0,16 ~ 0,25	0,006 ~ 0,01
10	3.200 ~ 5.700	0,24 ~ 0,3	0,009 ~ 0,012

≤0,25D	x 80%
0,25D-0,5D	x 150%
0,5D-1D	x 120%
1D-2D	x 80%
2D-3D	x 50%

Key Features

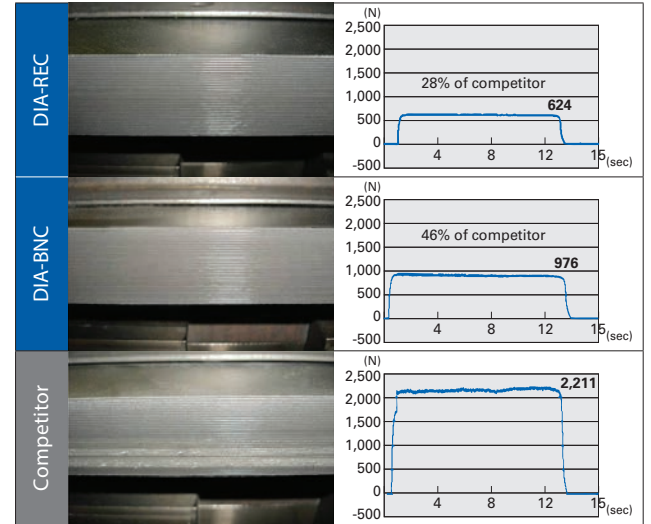
# MACHINING DATA

## Highly efficient roughing with low cutting force

Due to the roughing nick profile DIA-REC can reduce cutting force over competitor herringbone 6-flute and our DIA-BNC.

Tool	DIA-REC	DIA-BNC	Competitor Herringbone (6-Flute)
Size		.3937"	
Work Material		CFRP	
Milling Speed		656 SFM	
Feed		15.7 IPM	
Depth of Cut		ap=1" ae=.3937"	
Coolant		Dry	

Comparison of surface finish and cutting force



## Long tool life in CFRP panel milling

DIA-REC can complete 6 parts per cutter and shows 3 times longer tool life than competitor.

Tool	DIA-REC	Competitor
Size		3/8"
Work Material		CFRP (Panel)
Milling Speed		6,500 RPM
Feed		60 IPM
Depth of Cut		aa=.375" ar=.250"
Coolant		Dry
Machine		5-axis Machine

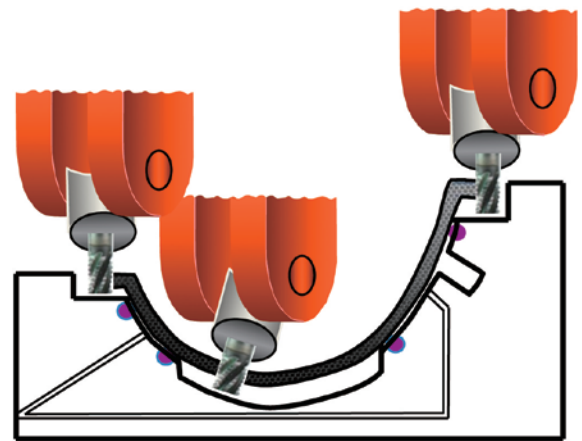
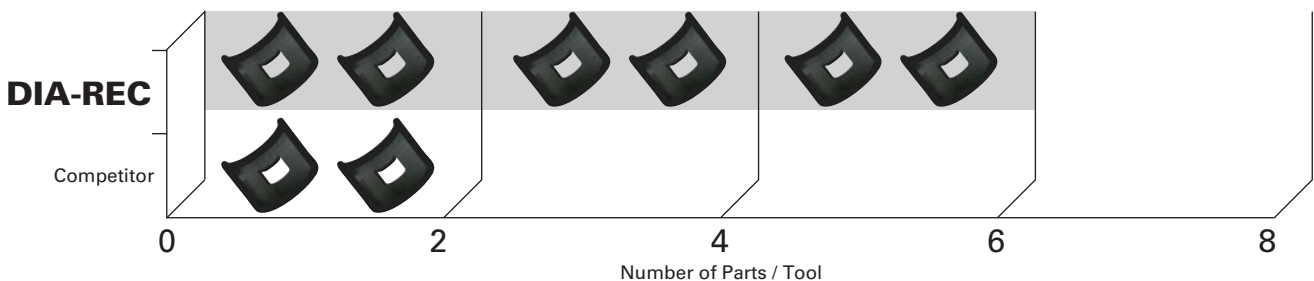


Image of Jig

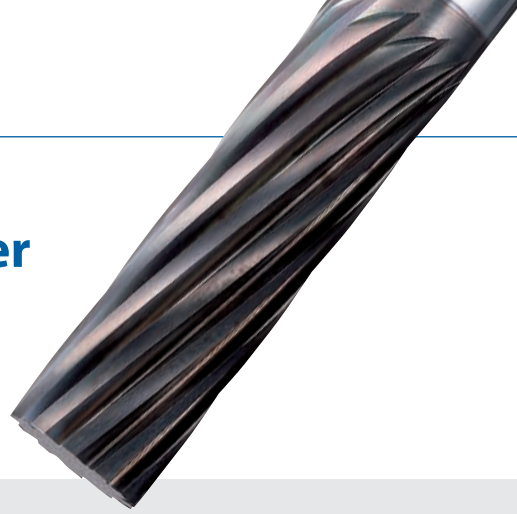






# KEY FEATURES DIA-MFC

## Diamond Coated Finishing Router



**Low Helix**  
Provides higher rake angles than straight flutes to minimize vibration.

**Multiple Flutes**  
For excellent surface finish and high efficiency.

**OSG Diamond Coating (PAT.)**  
Provides superior wear resistance and anti-welding properties.

**Large Core**  
Enables greater rigidity.

## MACHINING DATA

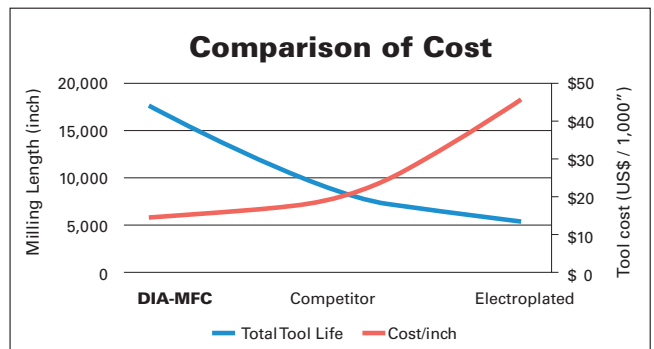
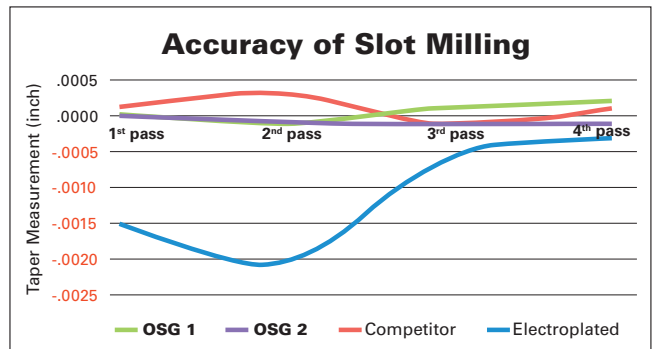
### Excellent for tight tolerance

The DIA-MFC showed the best accuracy versus a competitor diamond coated finishing router as well as other electroplated products.

Tool	DIA-MFC	Competitor	Electroplated
Work Material	Carbon / Carbon Composite		
Size	5/16"		
Milling Method	Slotting		
Milling Speed	2,700 RPM		9,795 RPM
Feed	50 IPM		
Depth of Cut	ap=.400"		
Coolant	Dry		



DIA-MFC showed 3.2 times longer tool life and 66% lower tool cost than a diamond electroplated router.

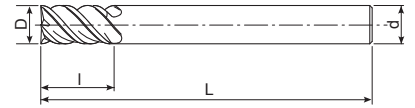


Milling | Solid carbide

Key Features

# DIA-MFC

Milling | Solid carbide



- Carbide end mills with diamond coating
- For CFRP milling
- Multi flute, for excellent surface finishing



**CARBIDE** **DIA** **SHRINK FIT**



EDP	Z	D	L	l	d
8809171	8	6	80	18	6
8809173	10	8	90	24	8
8809175	12	10	100	30	10

Milling | Solid carbide

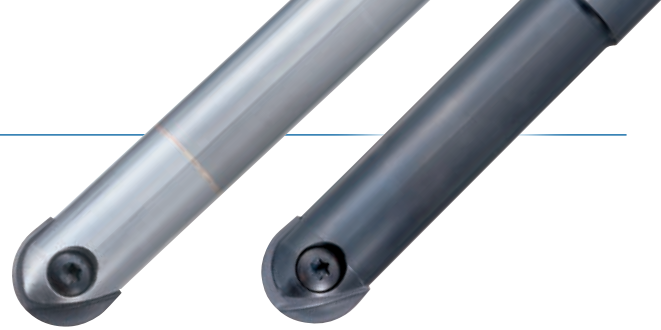
## Conditions

Vc	S (min <sup>-1</sup> )	Feed rate	
		(mm/rev)	IPR
6	5.300 ~ 9.500	0,16 ~ 0,24	0,006 ~ 0,009
8	4.000 ~ 7.000	0,3 ~ 1	0,012 ~ 0,039
10	3.200 ~ 5.700	0,48 ~ 1,2	0,019 ~ 0,047

≤0,25D	x 80%
0,25D-0,5D	x 150%
0,5D-1D	x 120%
1D-2D	x 80%
2D-3D	x 50%

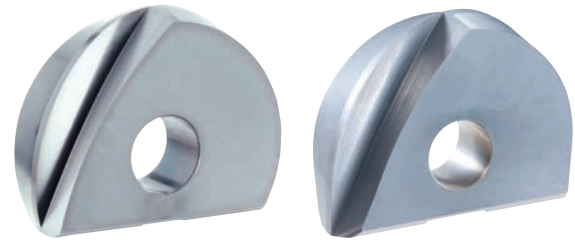
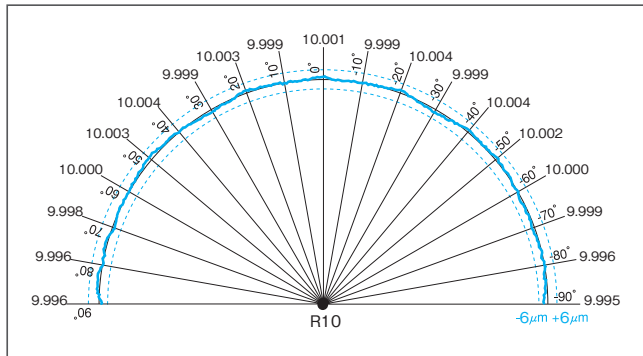
# KEY FEATURES PFB

## Finishing ball end mill



## Feature of insert

- High Radius precision
- Spiral cutting edge with excellent sharpness

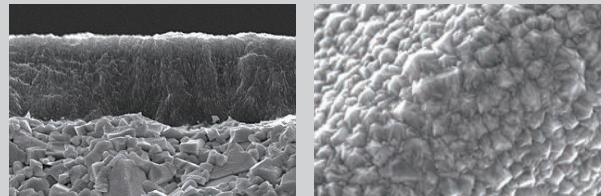


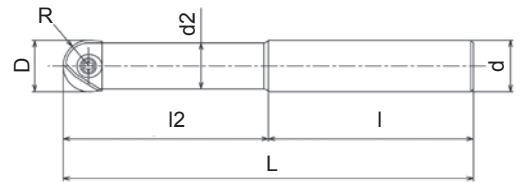
### PFB-D

- Sharp cutting edge specialized for milling graphite
- Highly adhesive carbide material for diamond coating

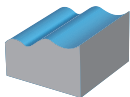
### XC4505 Grade

- For milling nonferrous material
- Optimal diamond coating for milling graphite





- Finishing ball nose cutter
- Excellent sharpness
- Cylindrical type
- 6 - 32 mm



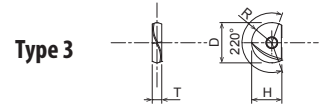
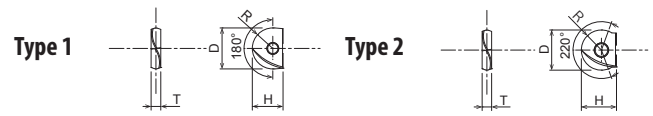
EDP	Body size	Designation	Z	D	R	I2	I2/D	I	L	d2	d	Specification
7801429	①	PFB-R060SS06-S80CS	2	6	3	15	2,5	65	80	5,4	6	Carbide
7801439	①	PFB-R060SS06-L100CS	2	6	3	30	5	70	100	5,4	6	Carbide
7801419	①	PFB-R060SS06-LL120CS	2	6	3	42	7	78	120	5,4	6	Carbide
7801430	②	PFB-R080SS08-S100CS	2	8	4	20	2,5	80	100	7	8	Carbide
7801440	②	PFB-R080SS08-L120CS	2	8	4	40	5	80	120	7	8	Carbide
7801420	②	PFB-R080SS08-LL140CS	2	8	4	56	7	84	140	7	8	Carbide
7801431	③	PFB-R100SS10-S100CS	2	10	5	25	2,5	75	100	9	10	Carbide
7801441	③	PFB-R100SS10-L130CS	2	10	5	50	5	80	130	9	10	Carbide
7801421	③	PFB-R100SS10-LL150CS	2	10	5	70	7	80	150	9	10	Carbide
7801432	④	PFB-R120SS12-S110CS	2	12	6	30	2,5	80	110	11	12	Carbide
7801442	④	PFB-R120SS12-L140CS	2	12	6	60	5	80	140	11	12	Carbide
7801422	④	PFB-R120SS12-LL160CS	2	12	6	84	7	76	160	11	12	Carbide
7801433	⑤	PFB-R160SS16-S140CS	2	16	8	40	2,5	100	140	14	16	Carbide
7801443	⑤	PFB-R160SS16-L160CS	2	16	8	72	4,5	88	160	14	16	Carbide
7801423	⑤	PFB-R160SS16-LL200CS	2	16	8	96	6	104	200	14	16	Carbide
7801434	⑥	PFB-R200SS20-S160CS	2	20	10	50	2,5	110	160	18	20	Carbide
7801444	⑥	PFB-R200SS20-L180CS	2	20	10	90	4,5	90	180	18	20	Carbide
7801424	⑥	PFB-R200SS20-LL240CS	2	20	10	120	6	120	240	18	20	Carbide
7801435	⑦	PFB-R250SS25-S160CS	2	25	12,5	62,5	2,5	97,5	160	22	25	Carbide
7801445	⑦	PFB-R250SS25-L200CS	2	25	12,5	100	4	100	200	22	25	Carbide
7801425	⑦	PFB-R250SS25-LL260CS	2	25	12,5	137,5	5,5	122,5	260	22	25	Carbide
7801436	⑧	PFB-R300SS32-S170CS	2	30	15	75	2,5	95	170	27	32	Carbide
7801446	⑧	PFB-R300SS32-L220CS	2	30	15	120	4	100	220	27	32	Carbide
7801426	⑧	PFB-R300SS32-LL290CS	2	30	15	165	5,5	125	290	27	32	Carbide
7801437	⑨	PFB-R320SS32-S180CS	2	32	16	80	2,5	100	180	29	32	Carbide
7801447	⑨	PFB-R320SS32-L230CS	2	32	16	128	4	102	230	29	32	Carbide
7801427	⑨	PFB-R320SS32-LL300CS	2	32	16	176	5,5	124	300	29	32	Carbide
7801400	②	PFB-R080SS08-S120	2	8	4	36	4,5	84	120	7	8	Steel
7801401	③	PFB-R100SS10-S130	2	10	5	45	4,5	85	130	9	10	Steel
7801402	④	PFB-R120SS12-S130	2	12	6	54	4,5	76	130	11	12	Steel
7801403	⑤	PFB-R160SS16-S140	2	16	8	64	4	76	140	14	16	Steel
7801404	⑥	PFB-R200SS20-S160	2	20	10	80	4	80	160	18	20	Steel
7801405	⑦	PFB-R250SS25-S160	2	25	12,5	75	3	85	160	22	25	Steel
7801406	⑧	PFB-R300SS32-S170	2	30	15	90	3	80	170	27	32	Steel
7801407	⑨	PFB-R320SS32-S180	2	32	16	96	3	84	180	29	32	Steel

### Accessories & spare parts

Applicable cutter Ø	Tightening torque (recommended)	Clamping screw		Wrench	
		Clamping screw	Wrench	Clamping screw	Wrench
Ø 6	0,8Nm	7808124	FS20652RB	7808203	T6-D
Ø 8	1Nm	7808123	FS25669RB	7808204	T7-D
Ø 10	1,2Nm	7808117	FS30686RB	7808205	T8-D
Ø 12	2Nm	7808118	FS35610RB	7808207	T10-D
Ø 16	3Nm	7808119	FS40613RB	7808208	T15-D
Ø 20	5Nm	7808120	FS50615RB	7808209	T20-D
Ø 25	5Nm	7808121	FS60620RB	7808209	T20-D
Ø 30,32	6Nm	7808122	FS80624RB	7808212	T30-T

# PFB INSERTS

Milling | Indexables



- Finishing ball nose cutter
- Excellent sharpness
- 6 - 32 mm

C.801

Type	EDP	Designation	Z	Range degree	Dc	R	T	H	Grade	P		M		K		N		S		H		Body size
										dry	⊖	dry	⊖	GG	GGG	dry	⊖	dry	⊖	dry	⊖	
1	7820030	PFB080-SP	2	180°	8	4	2,4	7	XP3225	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	②
1	7820031	PFB100-SP	2	180°	10	5	2,6	8,5	XP3225	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	③
1	7820032	PFB120-SP	2	180°	12	6	3	10	XP3225	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	④
1	7820033	PFB160-SP	2	180°	16	8	4	12	XP3225	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	⑤
1	7820034	PFB200-SP	2	180°	20	10	5	15	XP3225	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	⑥
1	7820035	PFB250-SP	2	180°	25	12,5	6	18,5	XP3225	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	⑦
1	7820036	PFB300-SP	2	180°	30	15	7	22,5	XP3225	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	⑧
1	7820010	PFB080-SP	2	180°	8	4	2,4	7	XP3320	○	⊖	○	⊖	○	⊖	○	⊖	○	⊖	○	○	②
1	7820011	PFB100-SP	2	180°	10	5	2,6	8,5	XP3320	○	⊖	○	⊖	○	⊖	○	⊖	○	⊖	○	○	③
1	7820012	PFB120-SP	2	180°	12	6	3	10	XP3320	○	⊖	○	⊖	○	⊖	○	⊖	○	⊖	○	○	④
1	7820013	PFB160-SP	2	180°	16	8	4	12	XP3320	○	⊖	○	⊖	○	⊖	○	⊖	○	⊖	○	○	⑤
1	7820014	PFB200-SP	2	180°	20	10	5	15	XP3320	○	⊖	○	⊖	○	⊖	○	⊖	○	⊖	○	○	⑥
1	7820015	PFB250-SP	2	180°	25	12,5	6	18,5	XP3320	○	⊖	○	⊖	○	⊖	○	⊖	○	⊖	○	○	⑦
1	7820016	PFB300-SP	2	180°	30	15	7	22,5	XP3320	○	⊖	○	⊖	○	⊖	○	⊖	○	⊖	○	○	⑧
2	7820039	PFB060-SH	2	220°	6	3	2	5	XP3310					●	⊖					●	⊖	①
1	7820040	PFB080-SH	2	180°	8	4	2,4	7	XP3310					●	⊖					●	⊖	②
1	7820041	PFB100-SH	2	180°	10	5	2,6	8,5	XP3310					●	⊖					●	⊖	③
1	7820042	PFB120-SH	2	180°	12	6	3	10	XP3310					●	⊖					●	⊖	④
1	7820043	PFB160-SH	2	180°	16	8	4	12	XP3310					●	⊖					●	⊖	⑤
1	7820044	PFB200-SH	2	180°	20	10	5	15	XP3310					●	⊖					●	⊖	⑥
1	7820045	PFB250-SH	2	180°	25	12,5	6	18,5	XP3310					●	⊖					●	⊖	⑦
1	7820046	PFB300-SH	2	180°	30	15	7	22,5	XP3310					●	⊖					●	⊖	⑧
1	7820047	PFB320-SH	2	180°	32	16	7	23,5	XP3310					●	⊖					●	⊖	⑨
2	7820018	PFB060-D	2	220°	6	3	2	5	XC4505					●	⊖					●	⊖	①
2	7820019	PFB070-D	2	220°	7	3,5	2	5,5	XC4505					●	⊖					●	⊖	①
1	7820020	PFB080-D	2	180°	8	4	2,4	7	XC4505					●	⊖					●	⊖	②
1	7820021	PFB100-D	2	180°	10	5	2,6	8,5	XC4505					●	⊖					●	⊖	③
1	7820022	PFB120-D	2	180°	12	6	3	10	XC4505					●	⊖					●	⊖	④
1	7820023	PFB160-D	2	180°	16	8	4	12	XC4505					●	⊖					●	⊖	⑤
1	7820024	PFB200-D	2	180°	20	10	5	15	XC4505					●	⊖					●	⊖	⑥
1	7820025	PFB250-D	2	180°	25	12,5	6	18,5	XC4505					●	⊖					●	⊖	⑦
1	7820026	PFB300-D	2	180°	30	15	7	22,5	XC4505					●	⊖					●	⊖	⑧
2	7820048	PFB060-Q	2	220°	6	3	2	5	XP3225	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	①
2	7820049	PFB070-Q	2	220°	7	3,5	2	5,5	XP3225	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	①
2	7820050	PFB080-Q	2	220°	8	4	2,4	7	XP3225	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	②
2	7820051	PFB100-Q	2	220°	10	5	2,6	8,5	XP3225	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	③
2	7820052	PFB120-Q	2	220°	12	6	3	10	XP3225	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	④
3	7820053	PFB160-Q	2	220°	16	8	4	12	XP3225	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	⑤
3	7820054	PFB200-Q	2	220°	20	10	5	15	XP3225	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	⑥
3	7820055	PFB250-Q	2	220°	25	12,5	6	18,5	XP3225	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	⑦
3	7820056	PFB300-Q	2	220°	30	15	7	22,5	XP3225	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	●	⊖	⑧

Milling | Indexables  
Inserts





# CUTTING CONDITIONS

Milling | Indexables | Cutting conditions

## PFB-SP, PFB-SH, PFB-Q

Finishing ball nose cutter

	Work Material	Tensile Strength / Hardness	Milling Speed Vc (m/min)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t)			
					D			
					Ø 6,8	Ø 10,12	Ø 16,20	Ø 25-30-32
<b>P</b>	Mild Steel-Carbon Steel (SS400-S10C)	~180HB	300 (200~ 400)	0,02 D	0,1	0,12	0,14	0,18
	Carbon Steel-Alloy Steel (S50C-SCM440)	~280HB	300 (200~ 400)	0,02 D	0,07	0,1	0,12	0,14
	Die Steel (SKD11-SKD61)	~280HB	250 (150 ~ 350)	0,02 D	0,07	0,1	0,12	0,14
<b>M</b>	Stainless Steel (Dry) (SUS304-SUS420)	~250HB	250 (150 ~ 350)	0,02 D	0,07	0,12	0,14	0,17
<b>K</b>	Cast Iron (FC250)	~300N/mm <sup>2</sup>	400 (300~ 500)	0,02 D	0,12	0,14	0,18	0,22
	Ductile Cast Iron (FCD400)	~600N/mm <sup>2</sup>	300 (200~ 400)	0,02 D	0,1	0,12	0,14	0,18
<b>N</b>	Aluminium Alloy	~13% Si	500 (400~ 600)	0,03 D	0,12	0,14	0,18	0,22
	Copper Alloy (C1100)	-	300 (200 ~ 400)	0,03 D	0,11	0,13	0,17	0,22
<b>S</b>	Heat Resistant Alloys (Wet) (Inconel 718)	-	50 (25~ 80)	0,015 D	0,04	0,05	0,06	0,06
	Titanium Alloy (Wet) (Ti-Al-4V)	-	90 (40~120)	0,02 D	0,06	0,08	0,11	0,13
<b>H</b>	Pre-hardened Steel (NAK80, STAVAX)	40~43HRC	200 (100~ 300)	0,015 D	0,06	0,07	0,08	0,1
	Steel for Die Casting (DAC55-DH31)	43~48HRC	180 (90 ~ 200)	0,015 D	0,05	0,06	0,07	0,07
	Hardened Steel (SKD11)	50~60HRC	150 (100 ~ 250)	0,01 D	0,05	0,06	0,07	0,07

## PFB-D

Finishing ball nose cutter

	Work Material	Tensile Strength / Hardness	Milling Speed Vc (m/min)	Depth of Cut ap (mm)	Feed per Tooth fz (mm/t)			
					D			
					Ø 6,8	Ø 10,12	Ø 16,20	Ø 25-30-32
<b>N</b>	Graphite	-	500 (400~ 600)	0,03 D	0,14	0,17	0,21	0,25
	CFRP Carbon Fiber Reinforced Plastic	-	300 (300 ~ 500)	0,03 D	0,11	0,13	0,17	0,20



# CUTTING CONDITIONS

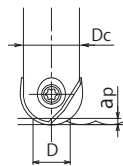
Milling | Indexables | Cutting conditions

## PFB

Chart of cutting depth and actual cutting diameter

Depth of cut		Actual cutting diameter															
D	R	0,1	0,2	0,3	0,4	0,5	0,8	1	1,5	2	2,5	3	3,5	4	4,5	5	
6	3	1,5	2,2	2,6	3	3,3	4,1	-	-	-	-	-	-	-	-	-	
7	3,5	1,6	2,3	2,8	3,3	3,6	4,5	-	-	-	-	-	-	-	-	-	
8	4	1,8	2,5	3	3,5	3,9	4,8	-	-	-	-	-	-	-	-	-	
10	5	2	2,8	3,4	3,9	4,4	5,4	6	7,1	-	-	-	-	-	-	-	
12	6	2,2	3,1	3,7	4,3	4,8	6	6,6	7,9	8,9	-	-	-	-	-	-	
16	8	2,5	3,6	4,3	5	5,6	7	7,7	9,3	10,6	11,6	-	-	-	-	-	
20	10	2,8	4	4,9	5,6	6,2	7,8	8,7	10,5	12	13,2	14,3	15,2	-	-	-	
25	12,5	3,2	4,5	5,4	6,3	7	8,8	9,8	11,9	13,6	15	16,2	17,3	18,3	-	-	
30	15	3,5	4,9	6	6,9	7,7	9,7	10,8	13,1	15	16,6	18	19,3	20,4	21,4	22,4	
32	16	3,6	5	6,2	7,1	7,9	10	11,1	13,5	15,5	17,2	18,7	20	21,2	22,2	23,2	

How to determine actual cutting diameter D

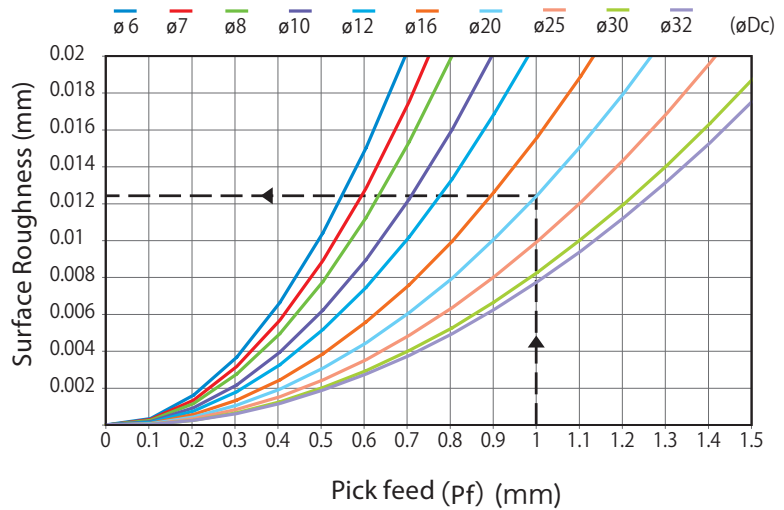
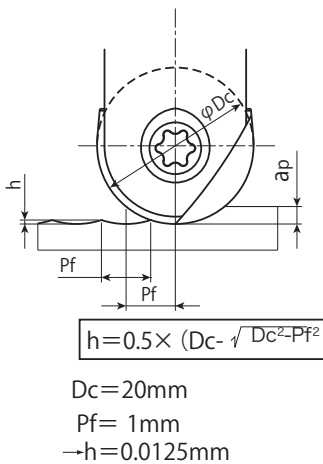


$$D = 2 \sqrt{ap(Dc - ap)}$$

### Recommended pick feed and milling surface roughness

	Unit: mm									
Pf	0,4	0,45	0,5	0,6	0,7	0,8	1	1,2	1,3	1,4
h	0,007	0,007	0,008	0,009	0,01	0,01	0,012	0,014	0,014	0,015

### Theoretical milling surface roughness



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*shaping your dreams*

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