Tooling News No.513

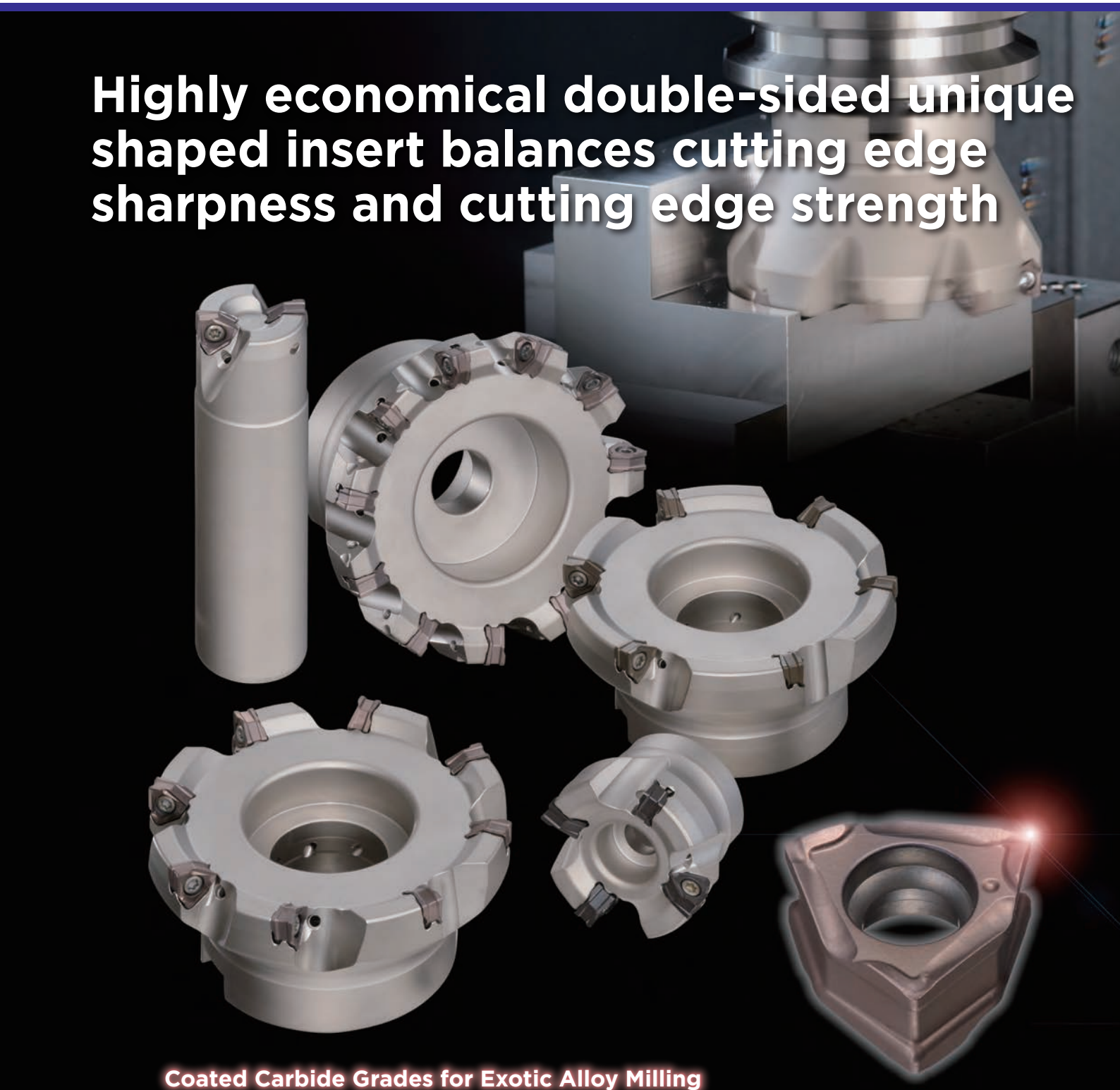
SUMITOMO
CARBIDE - CBN - DIAMOND
Global Support, Global Solutions.

Milling Cutter for High-Efficiency General-purpose and Shoulder Milling

SEC-Sumi Dual Mill DFC series

Rev. 9

Highly economical double-sided unique shaped insert balances cutting edge sharpness and cutting edge strength



Coated Carbide Grades for Exotic Alloy Milling

Expansion

ACS2500/ACS3000 added to the DFC series lineup

P M K N S H

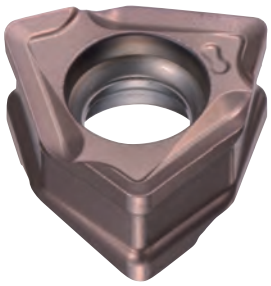
SUMITOMO ELECTRIC GROUP

VIDEO OF CUTTING

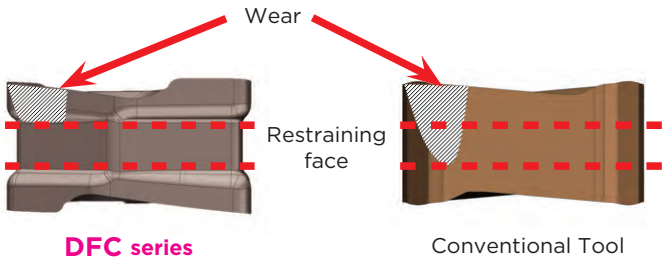
General Features

- The high-efficiency general-purpose/shoulder milling
  SEC-Sumi Dual Mill DFC series cutter has a unique insert shape with both excellent sharpness and cutting edge strength, enabling it to be used for a wider range of applications from high-efficiency machining through to finishing.
  Further expansion of the shoulder milling GS type chipbreaker, suitable for a wide range of applications.
- Applicable to various work materials
  In addition to the general-purpose grade ACU2500, the lineup has been expanded with the exotic alloy grades ACS2500 and ACS3000, supporting a wide range of work materials including steel, stainless steel, cast iron, and exotic alloys.

Features



Unique insert shape provides both sharpness and cutting edge strength



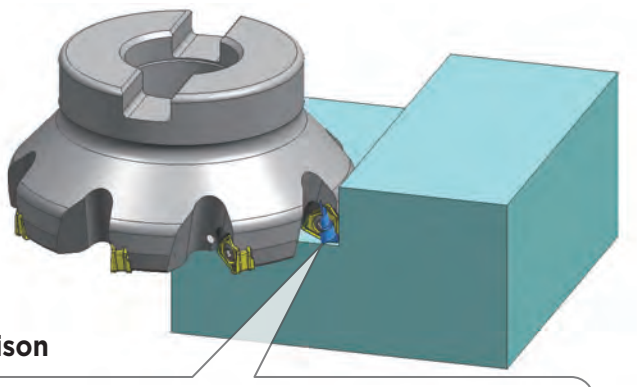
Flank wear of inserts for DFC series does not reach the restraining face and thus mounting accuracy does not suffer

The 90° cutting angle is suitable for both face milling and shoulder milling

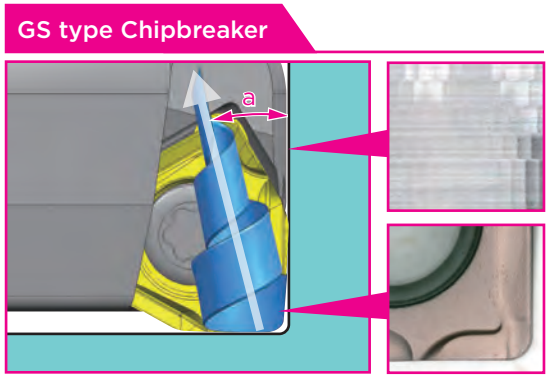
GS type Chipbreaker for Shoulder Milling

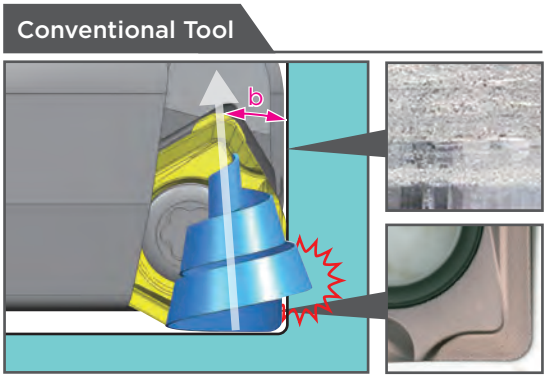
· Excellent chip control
· Suppresses machined surface deterioration due to chip biting

Work Material: S50C Tool: ø100mm
Cutting Conditions: vc = 200m/min, fz = 0.2mm/t, ae = 50mm, ap = 3mm x 6 Passes, Dry



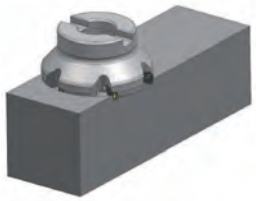
Chip generation image and machined surface comparison





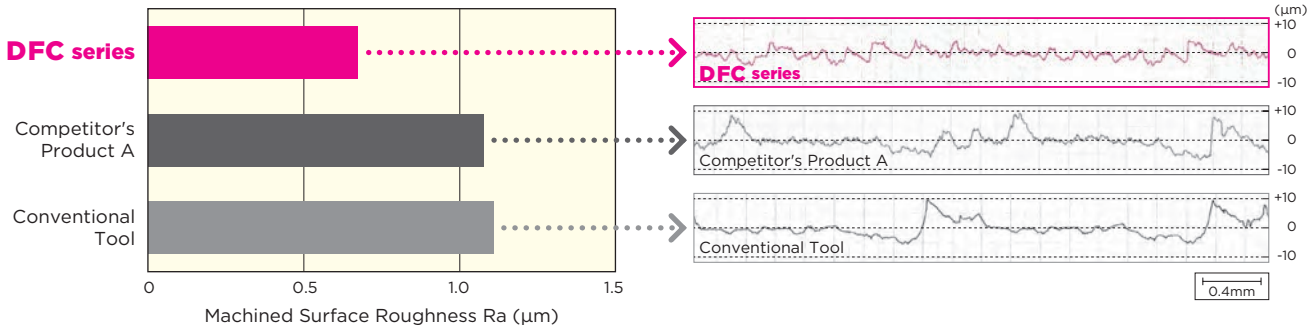
Chip flow direction control (a > b) ⇒ chip biting suppressed

Cutting Performance



Face Milling

(1) Machined surface roughness:
Better than competitors' products

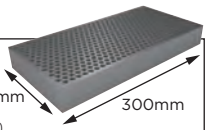


Work Material: S50C Tool: DFC 09100RS Insert: XNMU 060608PNER-G Grade: ACP200 Cutting Conditions: vc = 200m/min, fz = 0.2mm/t, ap = 3mm, ae = 85mm, Dry

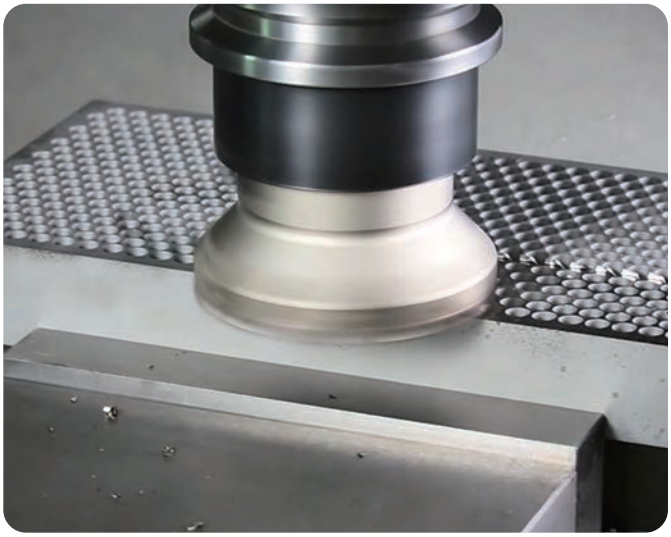
(2) Cutting edge strength / Cutting edge damage during heavy interrupted cutting:
Cutting edge strength surpasses competitors' double-sided cutters

	fz (mm/t)		
	0.3	0.4	0.5
DFC series	○	○	○
Competitor's Product B (Double-sided, 6 Corners)	○	Damage (Midway through 2 passes)	
Competitor's Product C (Double-sided, 6 Corners)	Damage (Midway through 3 passes)		
Competitor's Product D (Double-sided tangential)	Damage (Midway through 3 passes)		

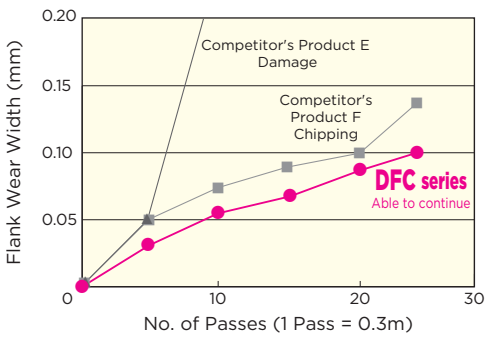
(Cutting Distance: 0.9m)



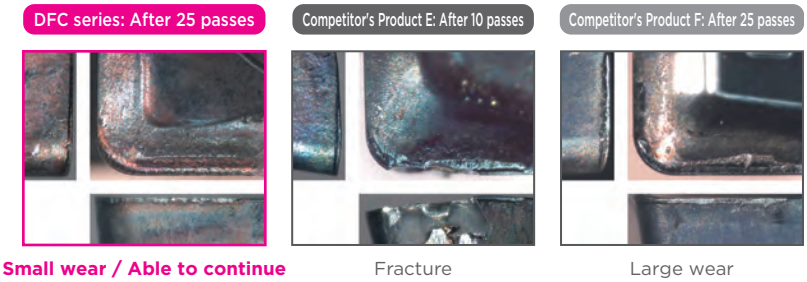
Work Material: S50C (With Holes)
Tool: DFC 09100RS
Insert: XNMU 060608PNER-G Grade: ACP300
Cutting Conditions: vc = 150m/min, ap = 3mm, ae = 50mm, Dry



(3) Wear resistance: Achieves long tool life thanks to excellent wear resistance



Comparison of cutting edge damage

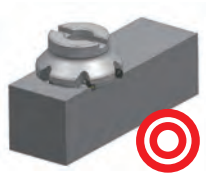


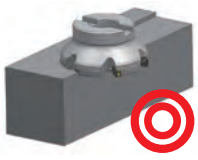
Small wear / Able to continue | Fracture | Large wear

Work Material: S50C Tool: DFC 09100RS Insert: XNMU 060608PNER-G Grade: ACP200 Cutting Conditions: vc = 200m/min, fz = 0.2mm/t, ap = 3mm, ae = 85mm, Dry

Applications and Recommended Chipbreakers

Face Milling	Shoulder Milling	Side Milling	Helical Milling	Ramping
G	GS	G/GS		



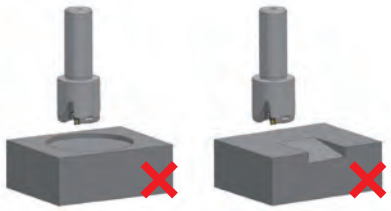


Guidelines for Shoulder Milling Conditions

Maximum Radial Depth of Cut
G type: ae ≤ 10% of cutter diameter
GS type: ae ≤ 50% of cutter diameter

Recommended Axial Depth of Cut
ap = 3mm

Recommended Feed Rate
fz ≤ 0.2mm/t
(for general steel)



Applications which are not applicable

Product Range

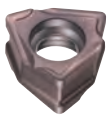
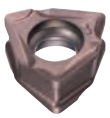
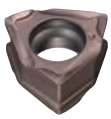
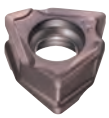
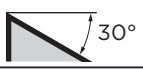
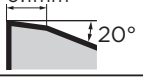
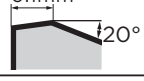
Type	Cat. No.	Description	Dia. (mm) ø25	ø32	ø40	ø50	ø63	ø80	ø100	ø125	ø160	ø200	Shape
Shell	DFC 09000R (Inch)	Standard Pitch						5	6	7	8	10	
Shell	DFC 09000RS	Standard Pitch				4	4	5	6	7	8	10	
Shell	DFCM 09000R (Inch)	Fine Pitch						7	8	11	12	16	
Shell	DFCM 09000RS	Fine Pitch				5	6	7	8	11	12	16	
Shell	DFCF 09000R (Inch)	Extra Fine Pitch						9	11	14	16	20	
Shell	DFCF 09000RS	Extra Fine Pitch				6	7	9	11	14	16	20	
Shank	DFC 09000E	Standard Pitch	2	2	3	3*	4*	5*					
Shank	DFCM 09000E	Fine Pitch		3	4	5*	6*	7*					

Number in ● shows the number of teeth (Inch) Inch Bore *mark: Different-diameter shanks in stock

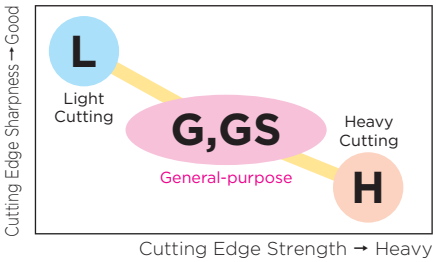
Insert Grades

Lineup includes general-purpose grade ACU2500, steel milling grades ACP100/ACP200/ACP300, stainless steel milling grades ACM200/ACM300, cast iron milling grades ACK200/ACK300, and exotic alloy milling grades ACS2500/ACS3000, applicable to various work materials.

Chipbreaker Selection

Work Material	P Steel, M Stainless Steel, K Cast Iron, S Exotic Alloy			
Applications	Light Cutting	General-purpose to Interrupted Milling	Shoulder Milling	Heavy Cutting
Features	Low Rigidity Milling, Reduction of Burrs	Face Milling	Shoulder Milling	Heavy Side Milling, Hardened Steel
Chipbreaker	L type	G type	GS type	H type
Chipbreaker				
Cutting Edge Cross Section	 30°	 0.1mm 20°	 0.1mm 20°	 0.15mm 20°

Chipbreaker Selection Guide



Insert Mounting Precautions

No Gap

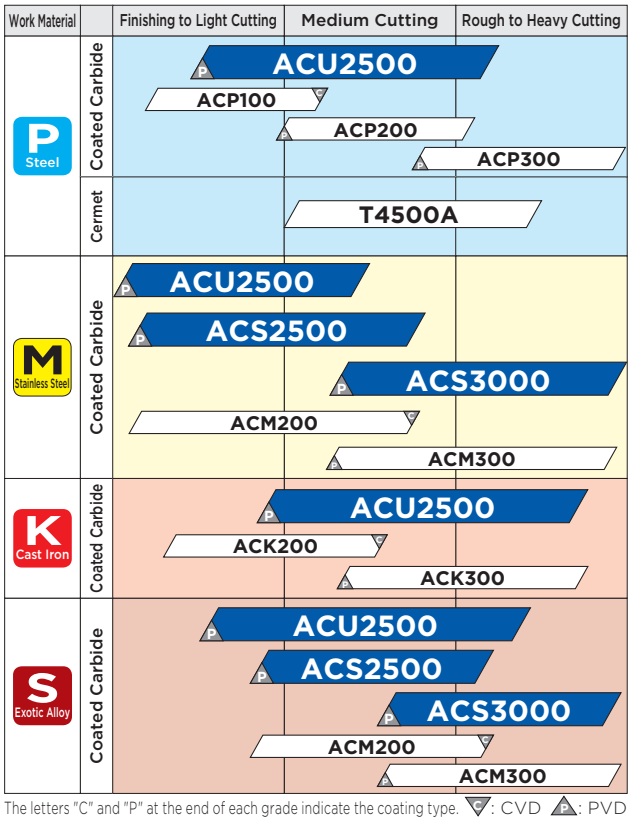
Make sure there is no gap

Gap

Place the insert face flat onto the cutter's insert pocket and tighten the flat insert screw with the recommended torque.

Grade Application Range

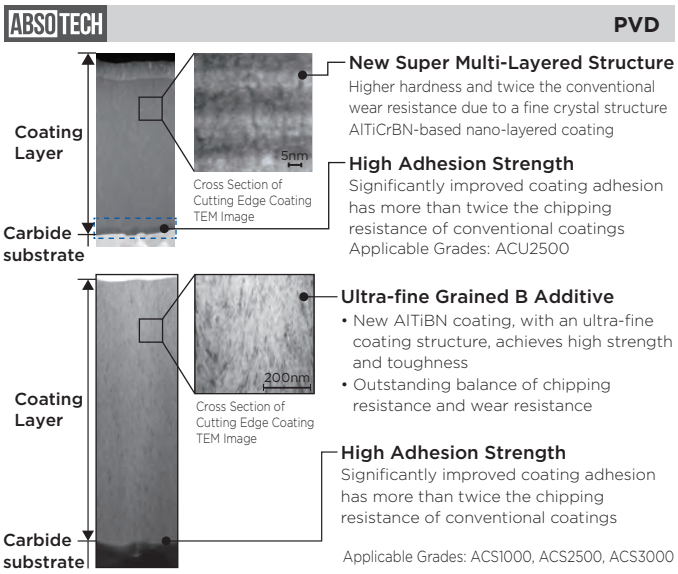
The wide lineup of grades now includes grades for exotic alloy **ACS2500/ACS3000**, supporting various work materials



The letters "C" and "P" at the end of each grade indicate the coating type. C: CVD P: PVD

Grade Features

New coating technology that realises absolute stability ABSOTECH™ (Absolute Technology)



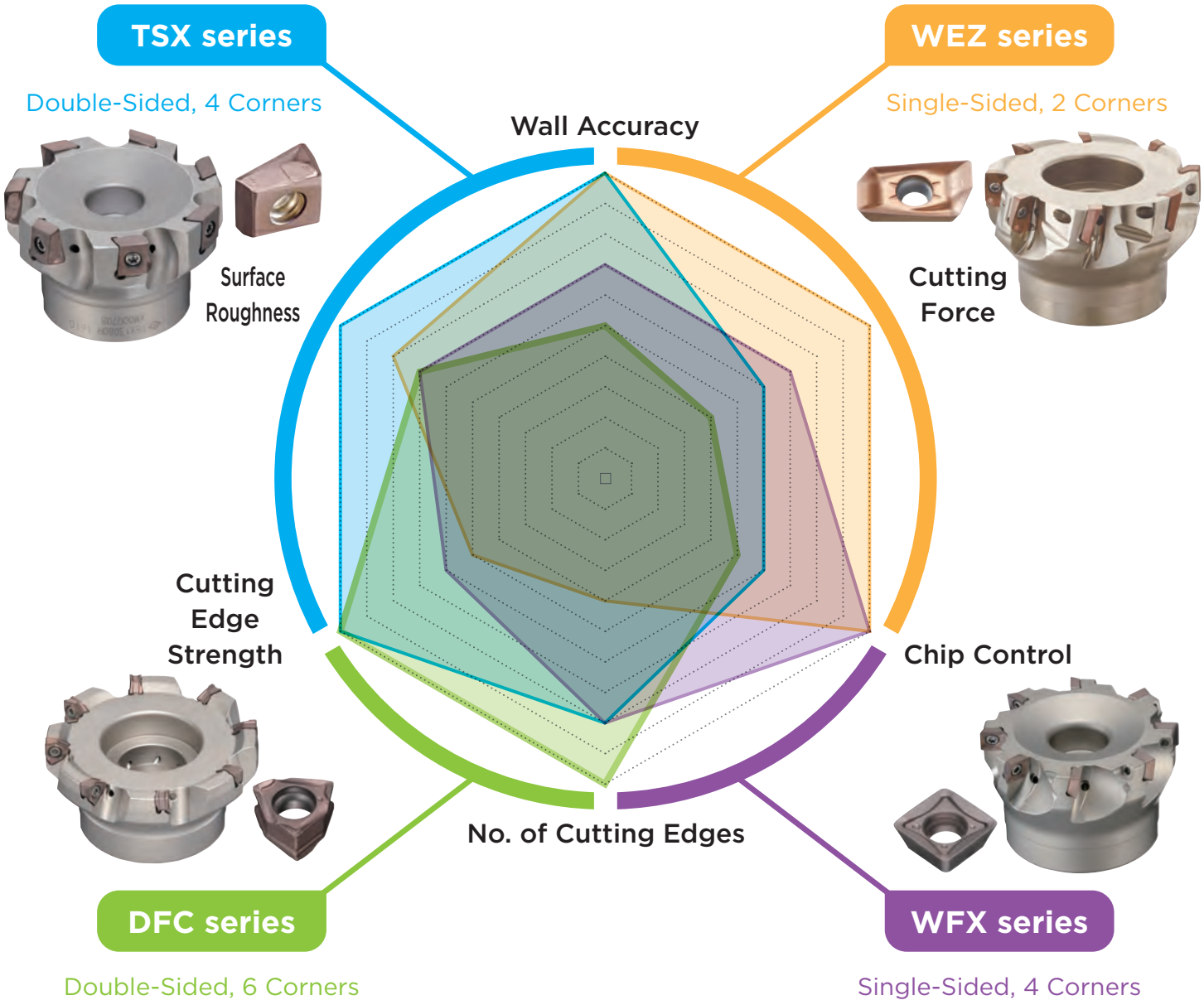
P ACP200/ACP300/ACK300/ACM300 — NEW SUPER ZX COAT

Realises superb stability due to a carbide substrate optimised for steel, cast iron, and stainless steel with a highly chipping-resistant coating.

C ACP100/ACK200/ACM200 — SUPER FF COAT

Realises superb stability in high-efficiency machining due to a carbide substrate optimised for steel, cast iron, and stainless steel with a highly wear-resistant coating.

Shoulder Milling Selection Guide



★★★: 1st Recommendation

	Surface Roughness	Wall Accuracy	Cutting Force	Chip Control	No. of Cutting Edges	Cutting Edge Strength
WEZ series	★★★	★★★	★★★	★★★	★	★½
TSX series	★★★	★★★	★★	★½	★★	★★★
DFC series	★½	★	★	★½	★★★	★★★
WFX series	★½	★★	★★	★★★	★★	★★

*For the details of each product, see the WEZ series (Tooling News No. 528), TSX series (Tooling News No. 523), and WFX series (Tooling News No. 491).

DFC09000R(S) type Expansion

P Steel | M Stainless Steel | K Cast Iron | S Exotic Alloy

Rake Angle	Radial	-9°
	Axial	-5°

6mm 90°

Face Milling | Shoulder Milling | Groove Milling | Side Milling

Fig 1

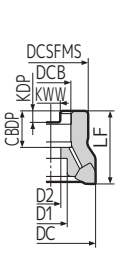


Fig 2

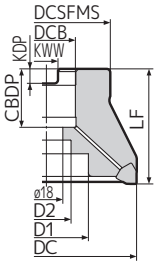


Fig 3

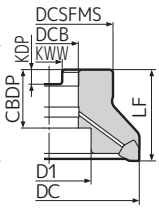


Fig 4

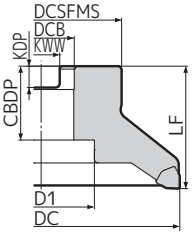


Fig 5

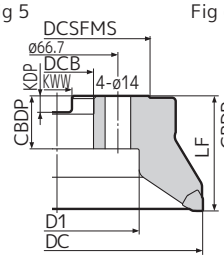
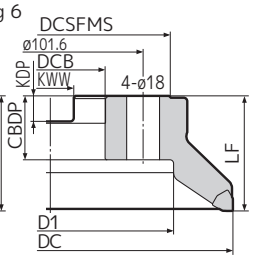


Fig 6



Body (Standard Pitch)

Dimensions (mm)

	Cat. No.	Stock	Dia. DC	Boss DCSFMS	Height LF	Hole Dia. DCB	Keyway Width KWW	Keyway Depth KDP	Mounting Depth CBDP	Bolt D1	Bolt D2	Number of Teeth	Weight (kg)	Fig
Metric	**DFC 09050RS**	●	**50**	41	40	**22**	10.4	6.3	20	18	11	4	0.3	1
	09063RS	●	**63**	50	40	**22**	10.4	6.3	20	18	11	4	0.5	1
	09080RS	●	***80**	55	50	**27**	12.4	7	22	20	14	5	1.0	1
	09100RS	●	**100**	70	50	**32**	14.4	8	32	46	—	6	1.4	3
	09125RS	●	**125**	80	63	**40**	16.4	9	29	52	29	7	2.8	1
	09160RS	●	**160**	100	63	**40**	16.4	9	29	90	—	8	4.6	5
	09200RS	●	**200**	130	63	**60**	25.7	14	35	135	—	10	5.7	6
Inch	**DFC 09080R**	●	***80**	55	50	**25.4**	9.5	6	25	20	14	5	1.0	1
	09100R	●	***100**	70	63	**31.75**	12.7	8	32	46	27	6	2.0	2
	09125R	●	**125**	80	63	**38.1**	15.9	10	35.5	55	30	7	2.8	1
	09160R	●	**160**	100	63	**50.8**	19.1	11	38	72	—	8	3.6	4
	09200R	●	**200**	130	63	**47.625**	25.4	14	35	135	—	10	6.0	6

Inserts are sold separately. Take note of the cutter mounting size (DCB) when selecting a cutter.

For mounting the ø80 and ø100mm sized cutters marked with * to an arbor, use a JIS B1176 hex socket bolt (ø80: M12 x 30 to 35mm, ø100: M16 x 40 to 45mm).

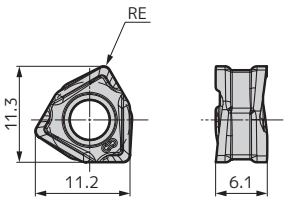
Insert

Dimensions (mm)

Grade Classification		Coated Carbide											
Process	High-speed/Light Cutting	PS	PM			K		MS	MS		MS		
	Medium Cutting	PS	PM	PM		K			MS	MS	MS	MS	
	Roughing	PS		PM	PM		K	New		MS		MS	

Cat. No.	ACU2500	ACP100	ACP200	ACP300	ACK200	ACK300	ACS1000	ACS2500	ACS3000	ACM200	ACM300	Corner Radius RE	Fig
XNMU 060604PNER-L	●	—	●	●	—	●				—	▲	0.4	1
060608PNER-L	●	—	●	●	—	●		●	●	—	▲	0.8	1
XNMU 060604PNER-G	●	●	●	●	●	●			●	▲	▲	0.4	1
060608PNER-G	●	●	●	●	●	●		●	●	▲	▲	0.8	1
060612PNER-G	●	●	●	●	●	●				▲	▲	1.2	1
060616PNER-G	●	●	●	●	●	●				▲	▲	1.6	1
XNMU 060604PNER-GS	●	●	●	●						▲	▲	0.4	1
060608PNER-GS	●	●	●	●						▲	▲	0.8	1
060612PNER-GS	●	●	●	●						▲	▲	1.2	1
060616PNER-GS	●	●	●	●						▲	▲	1.6	1
XNMU 060608PNER-H	●	●	●	●	●	●				▲	▲	0.8	1
060612PNER-H	●	●	●	●	●	●				▲	▲	1.2	1
060616PNER-H	●	●	●	●	●	●				▲	▲	1.6	1

Fig 1



XNMU060608PNER- ■

Identification Code

DFC 09 050 R S

DFC	09	050	R	S
Series Code	Insert Size	Dia.	Feed Direction	Metric Bore

Recommended Cutting Conditions

ISO	Work Material	Hardness	Cutting Speed vc (m/min) Min. - **Optimum** - Max.	Feed Rate fz (mm/t) Min. - **Optimum** - Max.	Depth of Cut ap (mm)	Insert Grade
P	General Steel	180 to 280 HB	150 - **200** - 250	0.10 - **0.20** - 0.30	< 6	ACU2500 ACP200 ACP300
	Mild Steel	≤ 180HB	180 - **250** - 350	0.15 - **0.25** - 0.35	< 6	
	Die Steel	200 to 220 HB	100 - **150** - 200	0.10 - **0.18** - 0.25	< 4	
M	Stainless Steel	—	160 - **205** - 250	0.12 - **0.18** - 0.25	< 6	ACU2500 ACS2500 ACS3000 ACM300
K	Cast Iron	250HB	100 - **175** - 250	0.10 - **0.20** - 0.30	< 6	ACU2500 ACK200 ACK300
S	Exotic Alloy	—	30 - **50** - 80	0.10 - **0.20** - 0.30	< 6	ACU2500 ACS2500 ACS3000 ACM200 ACM300

For shoulder milling, the GS type chipbreaker is recommended. Use at ae ≤ 50% of cutter diameter and fz ≤ 0.2mm/t.

Note · The cutting conditions above are a guide. Actual conditions will need to be adjusted according to machine rigidity, work clamp rigidity, depth of cut and other factors.
· For groove milling, adjust the feed rate to around 70% of the above values.

Parts

Applicable Cutter	Flat Insert Screw		Integrated Wrench	Detachable Wrench		Anti-seizure Cream
				Handle Grip	Bit	
DC ø50 to 125	BFTX03512IP	N·m 3.0	—	HPS1015	TRB15IP	SUMI-P
Other than above			TRDR15IP	—	—	

N·m Recommended Tightening Torque (N·m) ● mark: Standard stocked item ● mark: Standard stocked item (expanded item) ▲ mark: To be replaced by a new product, made to order, or discontinued (please confirm stock availability) Blank: Made-to-order item — mark: Not available

DFCM09000R(S) type Expansion

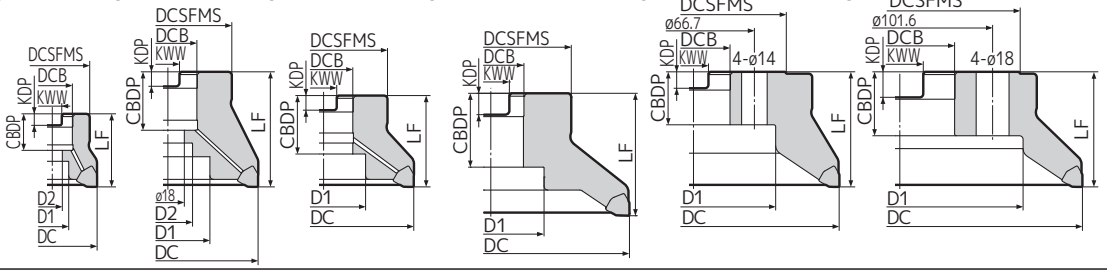
P Steel | M Stainless Steel | K Cast Iron | S Exotic Alloy

Rake Angle	Radial	-9°
	Axial	-5°

6mm 90°

Face Milling | Shoulder Milling | Groove Milling | Side Milling

Fig 1



Body (Fine Pitch)

Dimensions (mm)

	Cat. No.	Stock	Dia. DC	Boss DCSFMS	Height LF	Hole Dia. DCB	Keyway Width KWW	Keyway Depth KDP	Mounting Depth CBDP	Bolt D1	Bolt D2	Number of Teeth	Weight (kg)	Fig
Metric	**DFCM 09050RS**	●	**50**	41	40	**22**	10.4	6.3	20	18	11	5	0.3	1
	09063RS	●	**63**	50	40	**22**	10.4	6.3	20	18	11	6	0.5	1
	09080RS	●	***80**	55	50	**27**	12.4	7	22	20	14	7	0.9	1
	09100RS	●	**100**	70	50	**32**	14.4	8	32	46	—	8	1.4	3
	09125RS	●	**125**	80	63	**40**	16.4	9	29	52	29	11	2.7	1
	09160RS	●	**160**	100	63	**40**	16.4	9	29	90	—	12	4.5	5
	09200RS	●	**200**	130	63	**60**	25.7	14	35	135	—	16	5.6	6
Inch	**DFCM 09080R**	●	***80**	55	50	**25.4**	9.5	6	25	20	14	7	0.9	1
	09100R	●	***100**	70	63	**31.75**	12.7	8	32	46	27	8	1.9	2
	09125R	●	**125**	80	63	**38.1**	15.9	10	35.5	55	30	11	2.7	1
	09160R	●	**160**	100	63	**50.8**	19.1	11	38	72	—	12	3.5	4
	09200R	●	**200**	130	63	**47.625**	25.4	14	35	135	—	16	5.9	6

Inserts are sold separately. Take note of the cutter mounting size (DCB) when selecting a cutter.

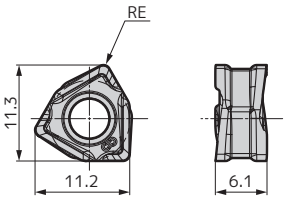
For mounting the cutters marked with * to an arbor, use a JIS B1176 hex socket bolt (ø80: M12 x 30 to 35mm, ø100: M16 x 40 to 45mm).

Insert

Dimensions (mm)

Grade Classification		Coated Carbide												
Process	High-speed/Light Cutting	●	●			●		●	●		●			
	Medium Cutting	●	●	●		●			●	●	●	●		
	Roughing	●		●	●		●	New ●		●		●		
Cat. No.		ACU2500	ACP100	ACP200	ACP300	ACK200	ACK300	ACS1000	ACS2500	ACS3000	ACM200	ACM300	Corner Radius RE	Fig
XNMU 060604PNER-L		●	—	●	●	—	●				—	▲	0.4	1
060608PNER-L		●	—	●	●	—	●		●	●	—	▲	0.8	1
XNMU 060604PNER-G		●	●	●	●	●	●			●	▲	▲	0.4	1
060608PNER-G		●	●	●	●	●	●		●	●	▲	▲	0.8	1
060612PNER-G		●	●	●	●	●	●				▲	▲	1.2	1
060616PNER-G		●	●	●	●	●	●				▲	▲	1.6	1
XNMU 060604PNER-GS		●	●	●	●						▲	▲	0.4	1
060608PNER-GS		●	●	●	●						▲	▲	0.8	1
060612PNER-GS		●	●	●	●						▲	▲	1.2	1
060616PNER-GS		●	●	●	●						▲	▲	1.6	1
XNMU 060608PNER-H		●	●	●	●	●	●				▲	▲	0.8	1
060612PNER-H		●	●	●	●	●	●				▲	▲	1.2	1
060616PNER-H		●	●	●	●	●	●				▲	▲	1.6	1

Fig 1



XNMU060608PNER- ■

Identification Code

DFC M 09 050 R S

DFC	M	09	050	R	S
Series Code	Fine Pitch	Insert Size	Dia.	Feed Direction	Metric Bore

Recommended Cutting Conditions

ISO	Work Material	Hardness	Cutting Speed vc (m/min) Min. - **Optimum** - Max.	Feed Rate fz (mm/t) Min. - **Optimum** - Max.	Depth of Cut ap (mm)	Insert Grade
P	General Steel	180 to 280 HB	150 - **200** - 250	0.10 - **0.20** - 0.30	< 6	ACU2500 ACP200 ACP300
	Mild Steel	≤ 180HB	180 - **250** - 350	0.15 - **0.25** - 0.35	< 6	
	Die Steel	200 to 220 HB	100 - **150** - 200	0.10 - **0.18** - 0.25	< 4	
M	Stainless Steel	—	160 - **205** - 250	0.12 - **0.18** - 0.25	< 6	ACU2500 ACS2500 ACS3000 ACM300
K	Cast Iron	250HB	100 - **175** - 250	0.10 - **0.20** - 0.30	< 6	ACU2500 ACK200 ACK300
S	Exotic Alloy	—	30 - **50** - 80	0.10 - **0.20** - 0.30	< 6	ACU2500 ACS2500 ACS3000 ACM200 ACM300

For shoulder milling, the GS type chipbreaker is recommended. Use at ae ≤ 50% of cutter diameter and fz ≤ 0.2mm/t.

Note
- The cutting conditions above are a guide. Actual conditions will need to be adjusted according to machine rigidity, work clamp rigidity, depth of cut and other factors.
- For groove milling, adjust the feed rate to around 70% of the above values.

Parts

Applicable Cutter	Flat Insert Screw		Integrated Wrench	Detachable Wrench		Anti-seizure Cream
				Handle Grip	Bit	
DC ø50 to 125	BFTX03512IP	N·m 3.0	—	HPS1015	TRB15IP	SUMI-P
Other than above			TRDR15IP	—	—	

N·m Recommended Tightening Torque (N·m) ● mark: Standard stocked item ● mark: Standard stocked item (expanded item) ▲ mark: To be replaced by a new product, made to order, or discontinued (please confirm stock availability) Blank: Made-to-order item — mark: Not available

DFCF09000R(S) type Expansion

P Steel M Stainless Steel K Cast Iron S Exotic Alloy

Rake Angle	Radial	-9°
	Axial	-5°

6mm 90°

Face Milling Shoulder Milling Groove Milling Side Milling

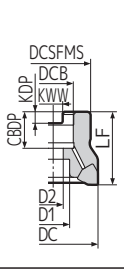
Fig 1


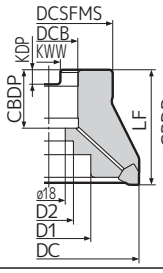
Fig 2


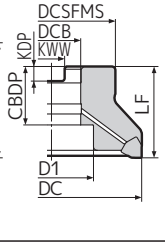
Fig 3


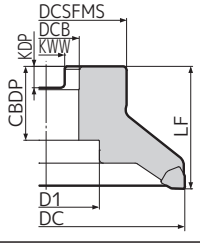
Fig 4


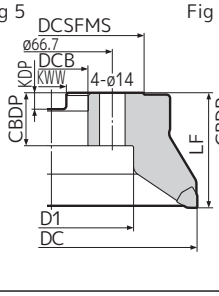
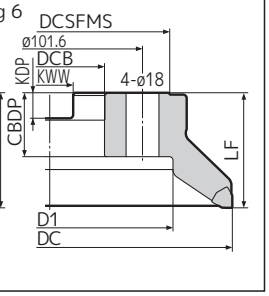
Fig 5


Fig 6


Body (Extra Fine Pitch)

Dimensions (mm)

	Cat. No.	Stock	Dia. DC	Boss DCSFMS	Height LF	Hole Dia. DCB	Keyway Width KWW	Keyway Depth KDP	Mounting Depth CBDP	Bolt D1	Bolt D2	Number of Teeth	Weight (kg)	Fig
Metric	**DFCF 09050RS**	●	**50**	41	40	**22**	10.4	6.3	20	18	11	6	0.3	1
	09063RS	●	**63**	50	40	**22**	10.4	6.3	20	18	11	7	0.5	1
	09080RS	●	***80**	55	50	**27**	12.4	7	22	20	14	9	0.9	1
	09100RS	●	**100**	70	50	**32**	14.4	8	32	46	—	11	1.3	3
	09125RS	●	**125**	80	63	**40**	16.4	9	29	52	29	14	2.6	1
	09160RS	●	**160**	100	63	**40**	16.4	9	29	90	—	16	4.5	5
	09200RS	●	**200**	130	63	**60**	25.7	14	35	135	—	20	5.5	6
Inch	**DFCF 09080R**	●	***80**	55	50	**25.4**	9.5	6	25	20	14	9	0.9	1
	09100R	●	***100**	70	63	**31.75**	12.7	8	32	46	27	11	1.9	2
	09125R	●	**125**	80	63	**38.1**	15.9	10	35.5	55	30	14	2.7	1
	09160R	●	**160**	100	63	**50.8**	19.1	11	38	72	—	16	3.5	4
	09200R	●	**200**	130	63	**47.625**	25.4	14	35	135	—	20	5.8	6

Inserts are sold separately. Take note of the cutter mounting size (DCB) when selecting a cutter.

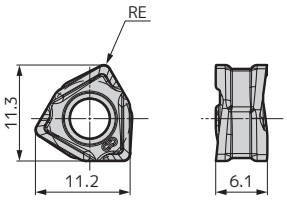
For mounting the cutters marked with * to an arbor, use a JIS B1176 hex socket bolt (ø80: M12 x 30 to 35mm, ø100: M16 x 40 to 45mm).

Insert

Dimensions (mm)

Grade Classification		Coated Carbide												
Process	High-speed/Light Cutting	PS PM	PM			K		MS	MS		MS			
	Medium Cutting	PS PM	PM	PM		K			MS	MS	MS	MS		
	Roughing	PS		PM	PM		K	New		MS		MS		
Cat. No.		ACU2500	ACP100	ACP200	ACP300	ACK200	ACK300	ACS1000	ACS2500	ACS3000	ACM200	ACM300	Corner Radius RE	Fig
XNMU 060604PNER-L		●	—	●	●	—	●				—	▲	0.4	1
060608PNER-L		●	—	●	●	—	●		●	●	—	▲	0.8	1
XNMU 060604PNER-G		●	●	●	●	●	●			●	▲	▲	0.4	1
060608PNER-G		●	●	●	●	●	●		●	●	▲	▲	0.8	1
060612PNER-G		●	●	●	●	●	●				▲	▲	1.2	1
060616PNER-G		●	●	●	●	●	●				▲	▲	1.6	1
XNMU 060604PNER-GS		●	●	●	●						▲	▲	0.4	1
060608PNER-GS		●	●	●	●						▲	▲	0.8	1
060612PNER-GS		●	●	●	●						▲	▲	1.2	1
060616PNER-GS		●	●	●	●						▲	▲	1.6	1
XNMU 060608PNER-H		●	●	●	●	●	●				▲	▲	0.8	1
060612PNER-H		●	●	●	●	●	●				▲	▲	1.2	1
060616PNER-H		●	●	●	●	●	●				▲	▲	1.6	1

Fig 1



XNMU060608PNER- ■

Identification Code

DFC F 09 050 R S

DFC	F	09	050	R	S
Series Code	Extra Fine Pitch	Insert Size	Dia.	Feed Direction	Metric Bore

Recommended Cutting Conditions

ISO	Work Material	Hardness	Cutting Speed Vc (m/min) Min. - **Optimum** - Max.	Feed Rate fz (mm/t) Min. - **Optimum** - Max.	Depth of Cut ap (mm)	Insert Grade
P	General Steel	180 to 280 HB	150 - **200** - 250	0.10 - **0.20** - 0.30	< 6	ACU2500 ACP200 ACP300
	Mild Steel	≤ 180HB	180 - **250** - 350	0.15 - **0.25** - 0.35	< 6	
	Die Steel	200 to 220 HB	100 - **150** - 200	0.10 - **0.18** - 0.25	< 4	
M	Stainless Steel	—	160 - **205** - 250	0.12 - **0.18** - 0.25	< 6	ACU2500 ACS2500 ACS3000 ACM300
K	Cast Iron	250HB	100 - **175** - 250	0.10 - **0.20** - 0.30	< 6	ACU2500 ACK200 ACK300
S	Exotic Alloy	—	30 - **50** - 80	0.10 - **0.20** - 0.30	< 6	ACU2500 ACS2500 ACS3000 ACM200 ACM300

For shoulder milling, the GS type chipbreaker is recommended. Use at ae ≤ 50% of cutter diameter and fz ≤ 0.2mm/t.

Note
- The cutting conditions above are a guide. Actual conditions will need to be adjusted according to machine rigidity, work clamp rigidity, depth of cut and other factors.
- For groove milling, adjust the feed rate to around 70% of the above values.

Parts

Applicable Cutter	Flat Insert Screw		Integrated Wrench	Detachable Wrench		Anti-seizure Cream
				Handle Grip	Bit	
DC ø50 to 125	BFTX03512IP	N·m 3.0	—	HPS1015	TRB15IP	SUMI-P
Other than above			TRDR15IP	—	—	

N·m Recommended Tightening Torque (N·m) ● mark: Standard stocked item ● mark: Standard stocked item (expanded item) ▲ mark: To be replaced by a new product, made to order, or discontinued (please confirm stock availability) Blank: Made-to-order item — mark: Not available

DFC(M)09000E type Expansion

P Steel | M Stainless Steel | K Cast Iron | S Exotic Alloy

Rake Angle	Radial	-9°
	Axial	-5°

6mm 90°

Face Milling | Shoulder Milling | Groove Milling | Side Milling

Fig 1

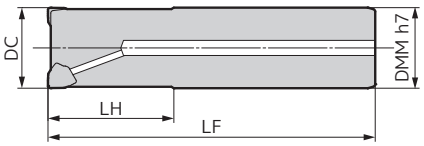
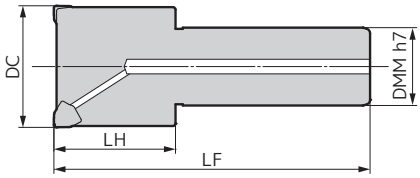


Fig 2



Body (Standard Pitch)

Dimensions (mm)

Cat. No.	Stock	Dia. DC	Shank DMM	Head LH	Overall Length LF	Number of Teeth	Fig
DFC 09025E	●	**25**	25	40	120	2	1
09032E	●	**32**	32	50	130	2	1
09040E	●	**40**	32	50	130	3	2
09050E	●	**50**	32	50	130	3	2
09050E-42		**50**	42	50	150	3	2
09063E	●	**63**	32	50	130	4	2
09063E-42		**63**	42	50	150	4	2
09080E	●	**80**	32	50	130	5	2
09080E-42		**80**	42	50	150	5	2

Body (Fine Pitch)

Dimensions (mm)

Cat. No.	Stock	Dia. DC	Shank DMM	Head LH	Overall Length LF	Number of Teeth	Fig
DFCM 09032E	●	**32**	32	50	130	3	1
09040E	●	**40**	32	50	130	4	2
09050E	●	**50**	32	50	130	5	2
09050E-42		**50**	42	50	150	5	2
09063E	●	**63**	32	50	130	6	2
09063E-42		**63**	42	50	150	6	2
09080E	●	**80**	32	50	130	7	2
09080E-42		**80**	42	50	150	7	2

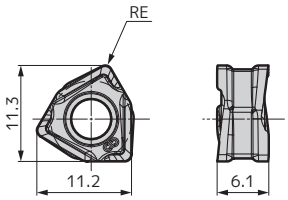
Inserts are sold separately.

Insert

Dimensions (mm)

Grade Classification		Coated Carbide												
Process	High-speed/Light Cutting	P M K S	P M			K		M S	M S		M S		Corner Radius RE	Fig
	Medium Cutting	P M K S	P M	P M		K			M S	M S	M S	M S		
	Roughing	P M K S		P M	P M		K	New		M S		M S		
Cat. No.		ACU2500	ACP100	ACP200	ACP300	ACK200	ACK300	ACS1000	ACS2500	ACS3000	ACM200	ACM300		
XNMU 060604PNER-L		●	—	●	●	—	●				—	▲	0.4	1
060608PNER-L		●	—	●	●	—	●		●	●	—	▲	0.8	1
XNMU 060604PNER-G		●	●	●	●	●	●			●	▲	▲	0.4	1
060608PNER-G		●	●	●	●	●	●		●	●	▲	▲	0.8	1
060612PNER-G		●	●	●	●	●	●				▲	▲	1.2	1
060616PNER-G		●	●	●	●	●	●				▲	▲	1.6	1
XNMU 060604PNER-GS		●	●	●	●						▲	▲	0.4	1
060608PNER-GS		●	●	●	●						▲	▲	0.8	1
060612PNER-GS		●	●	●	●						▲	▲	1.2	1
060616PNER-GS		●	●	●	●						▲	▲	1.6	1
XNMU 060608PNER-H		●	●	●	●	●	●				▲	▲	0.8	1
060612PNER-H		●	●	●	●	●	●				▲	▲	1.2	1
060616PNER-H		●	●	●	●	●	●				▲	▲	1.6	1

Fig 1



XNMU060608PNER- ■

Identification Code

DFC **M** **09** **025** **E**

DFC	M	09	025	E
Series Code	Fine Pitch	Insert Size	Dia.	Shank type

Parts

Flat Insert Screw		Wrench	Anti-seizure Cream
	N·m		
BFTX03512IP	**3.0**	TRDR15IP	SUMI-P

Recommended Cutting Conditions

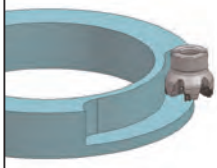
ISO	Work Material	Hardness	Cutting Speed vc (m/min) Min. - **Optimum** - Max.	Feed Rate fz (mm/t) Min. - **Optimum** - Max.	Depth of Cut ap (mm)	Insert Grade
P	General Steel	180 to 280 HB	150 - **200** - 250	0.10 - **0.20** - 0.30	< 6	ACU2500 ACP200 ACP300
	Mild Steel	≤ 180HB	180 - **250** - 350	0.15 - **0.25** - 0.35	< 6	
	Die Steel	200 to 220 HB	100 - **150** - 200	0.10 - **0.18** - 0.25	< 4	
M	Stainless Steel	—	160 - **205** - 250	0.12 - **0.18** - 0.25	< 6	ACU2500 ACS2500 ACS3000 ACM300
K	Cast Iron	250HB	100 - **175** - 250	0.10 - **0.20** - 0.30	< 6	ACU2500 ACK200 ACK300
S	Exotic Alloy	—	30 - **50** - 80	0.10 - **0.20** - 0.30	< 6	ACU2500 ACS2500 ACS3000 ACM200 ACM300

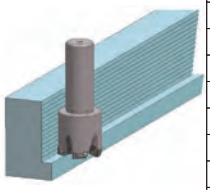
For shoulder milling, the GS type chipbreaker is recommended. Use at ae ≤ 50% of cutter diameter and fz ≤ 0.2mm/t.

Note
- The cutting conditions above are a guide. Actual conditions will need to be adjusted according to machine rigidity, work clamp rigidity, depth of cut and other factors.
- For groove milling, adjust the feed rate to around 70% of the above values.

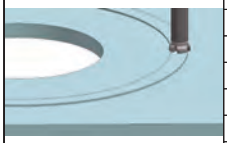
N·m Recommended Tightening Torque (N·m) ● mark: Standard stocked item ● mark: Standard stocked item (expanded item) ▲ mark: To be replaced by a new product, made to order, or discontinued (please confirm stock availability) Blank: Made-to-order item — mark: Not available

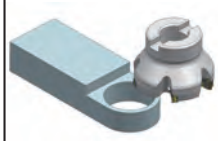
Application Examples

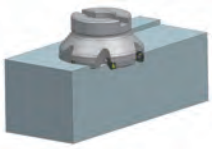
Ring Component (SCM440)		Sumitomo	Competitor's Product
	Tool	DFCM09050RS	Double-Sided, 6 Corners
	Grade	ACP200	—
	Chipbreaker	GS	—
	Diameter (mm)	50	50
	Number of Teeth	5	5
	vc (m/min)	140	140
	vf (mm/min)	1,113	1,113
	fz (mm/t)	0.25	0.25
	ap (mm)	2.5	2.5
	ae (mm)	30	30
	Coolant	Dry	Dry
	Results	With no chip biting, tool life of 600%	

Machine Vise (S45C)		Sumitomo	Competitor's Product
	Tool	DFCM09050E	Single-Sided, 2 Corners
	Grade	ACP200	—
	Chipbreaker	GS	—
	Diameter (mm)	50	50
	Number of Teeth	5	5
	vc (m/min)	188	188
	vf (mm/min)	1,200	800
	fz (mm/t)	0.20	0.13
	ap (mm)	5	5
	ae (mm)	13	13
	Coolant	Air Blow	Air Blow
	Results	150% Machining Efficiency	

Multiple Block Milling (SCMnH1)		Sumitomo	Competitor's Product
	Tool	DFC09160RS	Double-Sided, 8 Corners
	Grade	ACP300	—
	Chipbreaker	G	—
	Diameter (mm)	160	160
	Number of Teeth	8	12
	vc (m/min)	150	150
	vf (mm/min)	500	500
	fz (mm/t)	0.21	0.14
	ap (mm)	1.0	0.5
	ae (mm)	100	100
	Coolant	Wet	Wet
	Results	200% Machining Efficiency Tool Life 300%	

Construction Machinery Component (S50C)		Sumitomo	Competitor's Product
	Tool	DFC09063RS	Single-Sided, 2 Corners
	Grade	ACP200	—
	Chipbreaker	G	—
	Diameter (mm)	63	63
	Number of Teeth	4	5
	vc (m/min)	180	180
	vf (mm/min)	1,092	910
	fz (mm/t)	0.3	0.2
	ap (mm)	2.0	2.0
	ae (mm)	50	50
	Coolant	Dry	Dry
	Results	120% Machining Efficiency	

Automotive Component (S50C)		Sumitomo	Competitor's Product
	Tool	DFC09080RS	Single-Sided, 4 Corners
	Grade	ACP200	—
	Chipbreaker	G	—
	Diameter (mm)	80	80
	Number of Teeth	5	5
	vc (m/min)	226	200
	vf (mm/min)	1,260	800
	fz (mm/t)	0.28	0.20
	ap (mm)	2.0	2.0
	ae (mm)	5.0	5.0
	Coolant	Wet	Wet
	Results	160% Machining Efficiency	

Pump Component (FCD400)		Sumitomo	Competitor's Product
	Tool	DFCF09100R	Double-Sided, 6 Corners
	Grade	ACK300	—
	Chipbreaker	G	—
	Diameter (mm)	100	100
	Number of Teeth	11	8
	vc (m/min)	335	335
	vf (mm/min)	1,825	1,825
	fz (mm/t)	0.15	0.21
	ap (mm)	2.0	2.0
	ae (mm)	75	75
	Coolant	Dry	Dry
	Results	Tool Life Over 150%	

< SAFETY NOTES >

- Very hot or lengthy chips may be discharged while the machine is in operation. Therefore, machine guards, safety goggles or other protective covers must be used. Fire safety precautions must also be considered.
- Please handle with care as this product has sharp edges.
- Improper cutting conditions or mis-handling of the tool may result in breakages or projectiles. Therefore, please use the tool within its recommended conditions.
- When using non-water soluble cutting oil, precautions against fire must be taken and please ensure that a fire extinguisher is placed near the machine.

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