


Sumitomo High Efficiency, Double-sided 90° Milling Cutter

# DFC Milling Cutter

**P M K S**

Superior Toughness & Excellent Tool Life  
High Performance Double-sided 6 Edge Inserts



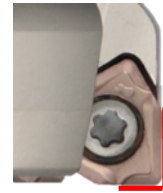
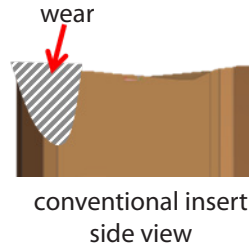
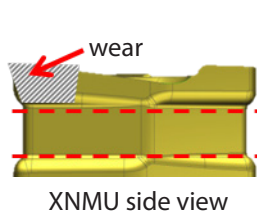
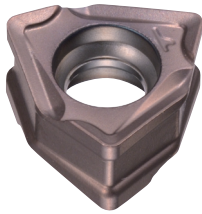
## DFC Mill Features & Benefits

- High toughness insert design enables stable cutting and high efficiency machining with high feed rate
- Optimized machining accuracy by separating the insert contact areas and the cutting edges
- Large lineup for DFC available from 1" through 8" in standard, fine pitch and extra-fine pitch styles

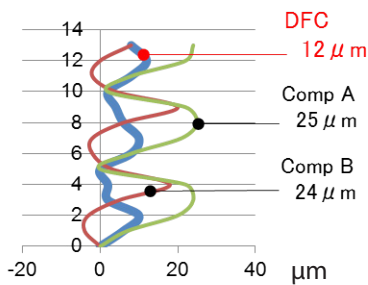
## Insert Characteristics

Precise repositioning of inserts due to thick supporting area

Optimized cutting edge yields excellent machining accuracy



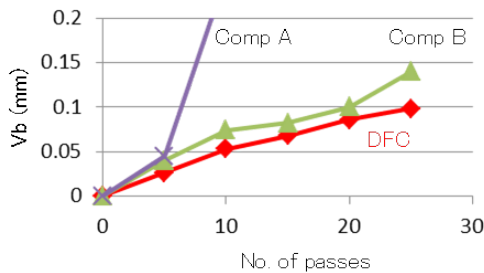
### Squareness Performance



Work material : 1049 steel

Cutting Conditions:  $v_c=650$  SFM  $f_z=.0039$  IPT  
 $D_C=63$ mm  
 $a_p=.197"$  x 3 pass,  $a_e=.197"$

### Wear Resistance Chart



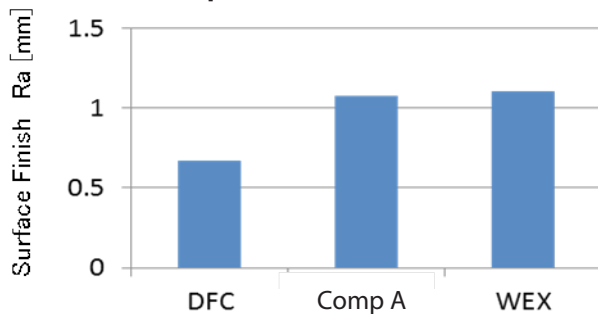
Work material: 1049 steel  
 Cutting Conditions:  $v_c=650$  SFM  $f_z=.0079$  IPT  
 $D_C=100$ mm cutter  
 $a_p=.118"$ ,  $a_e=3.346"$

### Cutting Edge Strength

	Feed Per Tooth (in/t)		
	0.012	0.016	0.020
DFC	•	•	•
Comp A	•	damage	
Comp B	damage		

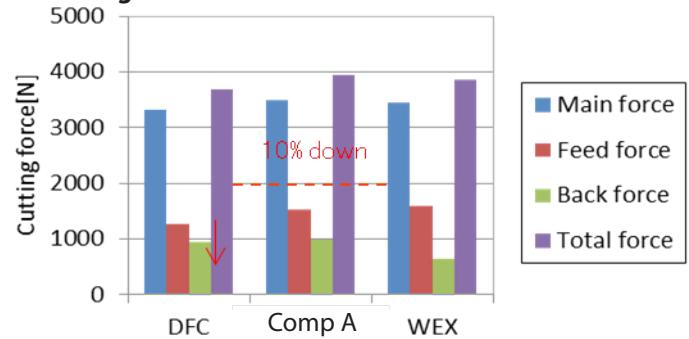
Work material: 1049 steel with holes  
 Cutting Conditions:  $v_c=650$  SFM  $f_z=.0079$  IPT  
 $D_C=100$ mm cutter  
 $a_p=.118"$ ,  $a_e=2.047"$  x 3 pass

### Surface Finish Graph



Work material: 1049 steel  
 Cutting Conditions:  $v_c=650$  SFM  $f_z=.0079$  IPT  
 $D_C=100$ mm cutter  
 $a_p=.118"$ ,  $a_e=3.346"$

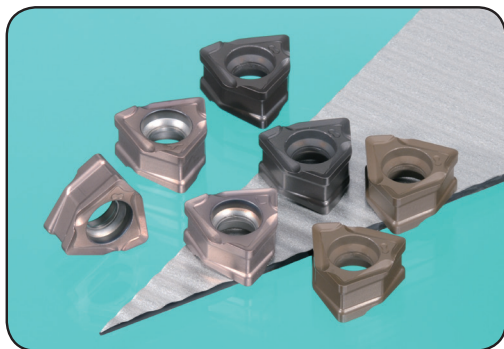
### Cutting Force



Work material: 1049 steel  
 Cutting Conditions:  $v_c=650$  SFM  $f_z=.0079$  IPT  
 $D_C=100$ mm cutter  
 $a_p=.118"$ ,  $a_e=2.953"$



# Inserts



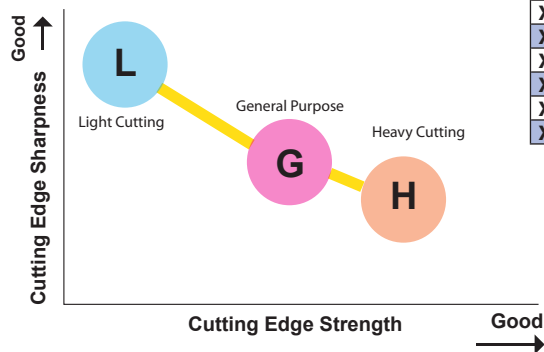
**XNMU Inserts**

Max. Depth of Cut: 6mm (.236")

	P	K	M	S	Radius
ACP100	●	●	●	●	.016
ACP200	●	●	●	●	.031
ACP300	●	●	●	●	.016
ACK200	●	●	●	●	.031
ACK300	●	●	●	●	.047
ACM200	●	●	●	●	.063
ACM300	●	●	●	●	.031
XNMU060604PNER-L	●	●	●	●	.016
XNMU060608PNER-L	●	●	●	●	.031
XNMU060604PNER-G	●	●	●	●	.016
XNMU060608PNER-G	●	●	●	●	.031
XNMU060612PNER-G	●	●	●	●	.047
XNMU060616PNER-G	●	●	●	●	.063
XNMU060608PNER-H	●	●	●	●	.031
XNMU060612PNER-H	●	●	●	●	.047
XNMU060616PNER-H	●	●	●	●	.063

● USA stocked item

Material	P10/M10/C7	P20/M20/C6	P30/M30/C5A	P40/M40/C5
Steel	<b>ACP100</b>			
	<b>ACP200</b>			
	<b>ACP300</b>			
Cast Iron	K01	K10	K20	K30
	<b>ACK200</b>			
	<b>ACK300</b>			
Stainless Steel	Wear Resistance ← → Fracture Resistance			
	<b>ACM200</b>			
	<b>ACM300</b>			

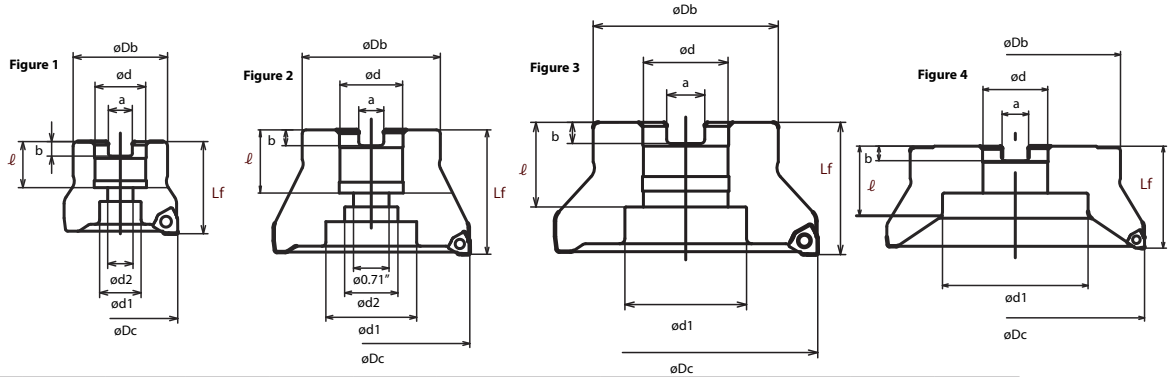
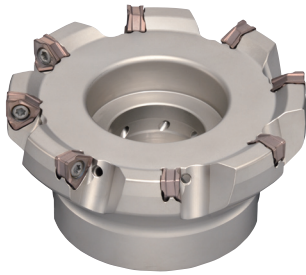


Work Material	Steel, Cast Iron		
	L type	G type	H type
Chip breaker			
Feature	Low cutting force	General purpose	Strong edge
Cutting edge figure			
Application	Light cut, low rigidity milling and reduced burr formation	Main breaker, General purpose to interrupted milling	Roughing, heavy interrupted and hardness steel milling.

## Running Conditions

ISO	Work Material	Hardness	Cutting Speed (SFM) Min. - Optimum - Max.	Feed Rate (in./t) Min. - Optimum - Max.	D.O.C. (in.)	Grade
P	General Steel	180 ~ 280HB	500 - 650 - 820	0.004 - 0.008 - 0.012	<0.236	ACP200 ACP300
	Soft Steel	<180HB	600 - 820 - 1,150	0.006 - 0.010 - 0.014	< 0.236	ACP200 ACP300
	Die Steel	200 ~ 220HB	330 - 500 - 650	0.004 - 0.007 - 0.010	< 0.157	ACP200 ACP300
M	PH Stainless Steel	>220HB	300 - 500 - 750	0.004 - 0.007 - 0.010	<0.196	ACM200
	Austenitic Stainless	<250HB	525 - 675 - 820	0.005 - 0.007 - 0.010	<0.236	ACM300
K	Cast Iron	250HB	500 - 750 - 1150	0.004 - 0.008 - 0.012	<0.236	ACK200 ACK300

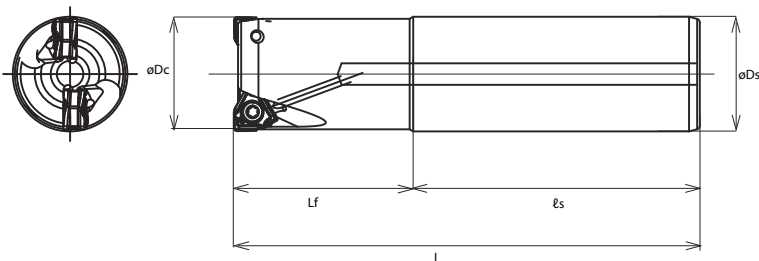
# DFC Shell Mill Inch Lineup



<b>Body (Standard Pitch) - Inch</b>													
Cat. No.	Stock	Dimensions (in.)									No. of Teeth	Weight (lbs)	Fig.
		øDc	øDb	Lf	ød	a	b	ℓ	ød1	ød2			
DFC22000R	●	2.000	1.500	1.750	0.750	0.312	0.190	0.750	0.609	0.406	4	0.66	1
DFC22500R	●	2.500	1.750	1.750	1.000	0.375	0.220	0.750	0.797	0.531	5	1.10	1
DFC23000R	●	3.000	2.250	1.750	1.000	0.375	0.220	0.750	0.797	0.531	6	2.20	1
DFC24000R	●	4.000	2.870	2.000	1.250	0.500	0.280	0.750	1.000	0.656	6	3.08	3
DFC25000R	●	5.000	3.750	2.500	1.500	0.625	0.380	1.000	2.000	1.181	7	6.17	1
DFC26000R	●	6.000	4.380	2.500	1.500	0.625	0.380	1.000	2.000	1.181	8	10.14	4
DFC28000R	●	8.000	5.906	2.500	2.500	1.000	0.560	1.594	5.118	-	10	12.56	1
<b>Body (Fine Pitch) - Inch</b>													
DFCM22000R	●	2.000	1.500	1.750	0.750	0.312	0.190	0.750	0.609	0.406	5	0.66	1
DFCM22500R	●	2.500	1.750	1.750	1.000	0.375	0.220	0.750	0.797	0.531	6	1.10	1
DFCM23000R	●	3.000	2.250	1.750	1.000	0.375	0.220	0.750	0.797	0.531	8	1.98	1
DFCM24000R	●	4.000	2.870	2.000	1.250	0.500	0.280	0.750	1.000	0.656	10	3.08	3
DFCM25000R	●	5.000	3.750	2.500	1.500	0.625	0.380	1.000	2.000	1.181	12	5.95	1
DFCM26000R	●	6.000	4.380	2.500	1.500	0.625	0.380	1.000	2.000	1.181	14	9.90	4
DFCM28000R	●	8.000	5.906	2.500	2.500	1.000	0.560	1.594	5.118	-	15	12.05	1
<b>Body (Extra-Fine Pitch) - Inch</b>													
DFCF22000R	●	2.000	1.500	1.750	0.750	0.312	0.190	0.750	0.609	0.406	6	0.66	1
DFCF22500R	●	2.500	1.750	1.750	1.000	0.375	0.220	0.750	0.797	0.531	7	1.10	1
DFCF23000R	●	3.000	2.250	1.750	1.000	0.375	0.220	0.750	0.797	0.531	9	2.00	1
DFCF24000R	●	4.000	2.870	2.000	1.250	0.500	0.280	0.750	1.000	0.656	11	2.86	3
DFCF25000R	●	5.000	3.750	2.500	1.500	0.625	0.380	1.000	2.000	1.181	14	5.73	1
DFCF26000R	●	6.000	4.380	2.500	1.500	0.625	0.380	1.000	2.000	1.181	16	12.41	4
DFCF28000R	●	8.000	5.906	2.500	2.500	1.000	0.560	1.594	5.118	-	20	14.75	1



● USA stocked item

# DFC Endmill Inch Lineup

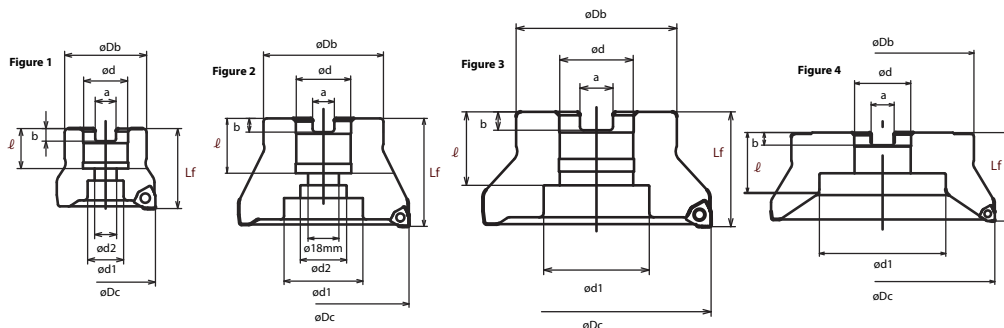
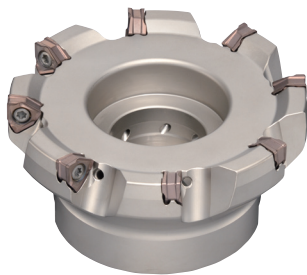


<b>Body (Shank Type)</b>							
Cat. No.	Stock	Dimensions (in.)					No. of Teeth
		øDc	øDs	Lf	ℓs	L	
DFC21000EW	●	1.000	1.000	2.060	2.281	4.341	2
DFC21250EW	●	1.250	1.250	2.060	2.281	4.341	3
DFC21500EW	●	1.500	1.250	2.060	2.281	4.341	3
DFC22000EW	●	2.000	1.250	2.060	2.281	4.341	4
DFC22500EW	●	2.500	1.250	2.060	2.281	4.341	5
DFCM21500EW	●	1.500	1.250	2.060	2.281	4.341	4
DFCM22000EW	●	2.000	1.250	2.060	2.281	4.341	5
DFCM22500EW	●	2.500	1.250	2.060	2.281	4.341	7

# Hardware

Insert Screw	Insert Wrench	Coolant Through Bolts	
		Catalog Number	Cutter Size
		BFXH 3/8 x 1	2.00"
BFTX03512IP	TRDR15IP Torque: 3.0 N • m	BFXH 1/2 x 1 1/4	2.50"
		BFXH 1/2 x 1 1/4	3.00"
		BFXH 5/8 x 1 1/4	4.00"
		BFXH 3/4 x 2	5.00"

# DFC Shell Mill Metric Lineup



## Body (Standard Pitch) - Metric

Cat. No.	Stock	Dimensions (mm)									No. of Teeth	Weight (kg)	Fig.
		øD <sub>C</sub>	øD <sub>B</sub>	L <sub>f</sub>	ød	a	b	ℓ	ød <sub>1</sub>	ød <sub>2</sub>			
DFC09050RS	★	50	41	40	22	10.4	6.3	20	18	11	4	0.3	1
DFC09063RS	★	63	50	40	22	10.4	6.3	20	18	11	4	0.5	1
DFC09080RS	★	80	55	50	27	12.4	7	22	20	14	5	1	1
DFC09100RS	★	100	70	50	32	14.4	8	26	46	32	6	1.4	3
DFC09125RS	★	125	80	63	40	16.4	9	29	52	29	7	2.8	1
DFC09160RS	★	160	100	63	40	16.4	9	29	90	-	8	4.6	4
DFC09080R	★	80	55	50	25.4	9.5	6	25	20	14	5	1	1
DFC09100R	★	100	70	63	31.75	12.7	8	32	27	18	6	2	2
DFC09125R	★	125	80	63	38.1	15.9	10	35.5	55	30	7	2.8	1
DFC09160R	★	160	100	63	50.8	19.1	11	38	72	-	8	3.6	4

## Body (Fine Pitch) - Metric

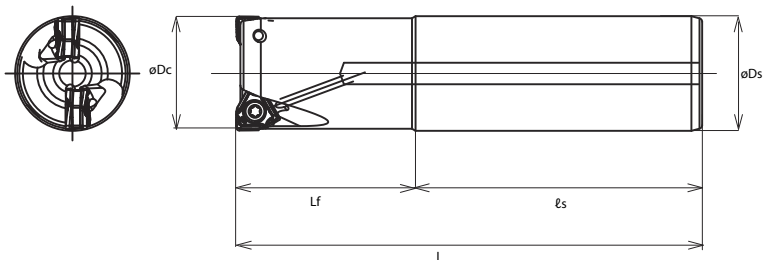
DFCM09050RS	★	50	41	40	22	10.4	6.3	20	18	11	5	0.3	1
DFCM09063RS	★	63	50	40	22	10.4	6.3	20	18	11	6	0.5	1
DFCM09080RS	★	80	55	50	27	12.4	7	22	20	14	7	0.9	1
DFCM09100RS	★	100	70	50	32	14.4	8	26	46	32	8	1.4	3
DFCM09125RS	★	125	80	63	40	16.4	9	29	52	29	11	2.7	1
DFCM09160RS	★	160	100	63	40	16.4	9	29	90	-	12	4.5	4
DFCM09080R	★	80	55	50	25.4	9.5	6	25	20	14	7	0.9	1
DFCM09100R	★	100	70	63	31.75	12.7	8	32	27	18	8	1.9	2
DFCM09125R	★	125	80	63	38.1	15.9	10	35.5	55	30	11	2.7	1
DFCM09160R	★	160	100	63	50.8	19.1	11	38	72	-	12	3.5	4

## Body (Extra-Fine Pitch) - Metric

DFCF09050RS	★	50	41	40	22	10.4	6.3	20	18	11	6	0.3	1
DFCF09063RS	★	63	50	40	22	10.4	6.3	20	18	11	7	0.5	1
DFCF09080RS	★	80	55	50	27	12.4	7	22	20	14	9	0.9	1
DFCF09100RS	★	100	70	50	32	14.4	8	26	46	32	11	1.3	3
DFCF09125RS	★	125	80	63	40	16.4	9	29	52	29	14	2.6	1
DFCF09160RS	★	160	100	63	40	16.4	9	29	90	-	16	4.6	4
DFCF09080R	★	80	55	50	25.4	9.5	6	25	20	14	9	0.9	1
DFCF09100R	★	100	70	63	31.75	12.7	8	32	27	18	11	1.9	2
DFCF09125R	★	125	80	63	38.1	15.9	10	35.5	55	30	14	2.7	1
DFCF09160R	★	160	100	63	50.8	19.1	11	38	72	-	16	3.5	4

★ worldwide warehouse item

# DFC Endmill Metric Lineup



## Body (Shank Type)

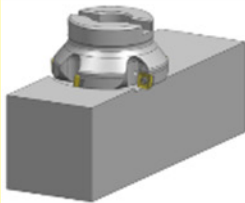
Cat. No.	Stock	Dimensions (mm)					No. of Teeth
		øD <sub>C</sub>	øD <sub>S</sub>	L <sub>f</sub>	ℓ <sub>s</sub>	L	
DFC09025E	★	25	25	40	80	120	2
DFC09032E	★	32	32	50	80	130	2
DFC09040E	★	40	32	50	80	130	3
DFC09050E	★	50	32	50	80	130	3
DFC09050E-42	★	50	42	50	100	150	3
DFC09063E	★	63	32	50	80	130	4
DFC09063E-42	★	63	42	50	100	150	4
DFC09080E	★	80	32	50	80	130	5
DFC09080E-42	★	80	42	50	100	150	5
DFCM09032E	★	32	32	50	80	130	3
DFCM09040E	★	40	32	50	80	130	4
DFCM09050E	★	50	32	50	80	130	5
DFCM09050E-42	★	50	42	50	100	150	5
DFCM09063E	★	63	32	50	80	130	6
DFCM09063E-42	★	63	42	50	100	150	6
DFCM09080E	★	80	32	50	80	130	7
DFCM09080E-42	★	80	42	50	100	150	7

★ worldwide warehouse item

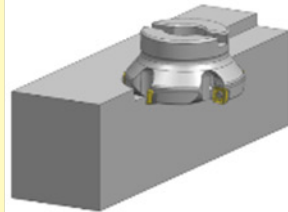
# High efficiency machining due to its optimized cutting edge geometry and highly rigid body

## For a wide range of applications

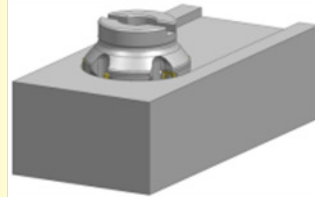
Face Milling



Shoulder Milling



Slot Milling



Side Face Milling



## Application Examples

Work Material	Sumitomo	Comp. A	Work Material	Sumitomo	Comp. A		
	<b>Breaker</b>	G		<b>Breaker</b>	G		
	<b>Grade</b>	ACP200		<b>Grade</b>	ACP200		
	<b>V<sub>c</sub> (sfm)</b>	750		650	<b>V<sub>c</sub> (sfm)</b>	600	600
	<b>V<sub>f</sub> (ipm)</b>	49.61		35.83	<b>V<sub>f</sub> (ipm)</b>	42.99	35.83
	<b>f<sub>t</sub></b>	0.0110		0.0079	<b>f<sub>t</sub></b>	0.0118	0.0079
	<b>a<sub>p</sub></b>	0.079"		0.079"	<b>a<sub>p</sub></b>	2 pass x 0.079"	2 pass x 0.079"
	<b>a<sub>e</sub></b>	2.0"		2.0"	<b>a<sub>e</sub></b>	2.0"	2.0"
	<b>Dry or Wet</b>	Wet		Wet	<b>Dry or Wet</b>	Dry	Dry
	<b>Tool Diameter</b>	3"		3"	<b>Tool Diameter</b>	63mm	63mm
	<b># of Teeth</b>	5		5	<b># of Teeth</b>	4	5
	<b>Result</b>	Efficiency: 158% achieved		<b>Result</b>	Efficiency: 120% achieved		
<b>Evaluation</b>	Wear resistance, efficiency		<b>Evaluation</b>	Wear resistance, efficiency			

Work Material	Sumitomo	Comp. A	
	<b>Breaker</b>	G	
	<b>Grade</b>	ACP200	
	<b>V<sub>c</sub> (sfm)</b>	500	500
	<b>V<sub>f</sub> (ipm)</b>	21.10	15.91
	<b>f<sub>t</sub></b>	0.0067	0.0035
	<b>a<sub>p</sub></b>	0.087	0.087
	<b>a<sub>e</sub></b>	2.5"	2.5"
	<b>Dry or Wet</b>	Dry	Dry
	<b>Tool Diameter</b>	3"	3"
	<b># of Teeth</b>	5	7
	<b>Result</b>	Efficiency: 133% achieved Tool life: 138% achieved	
<b>Evaluation</b>	Wear resistance, efficiency		



In addition to drastic economic advantage from DFC, double-sided 90° milling cutter, Sumitomo Electric Carbide, Inc. also provides a wide variety of high performance 90° milling cutters to fulfill your needs in any application!





# SUMITOMO

**CARBIDE - CBN - DIAMOND**

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