MITSUBISHI MITSUBISHI MATERIALS TOOL NEWS

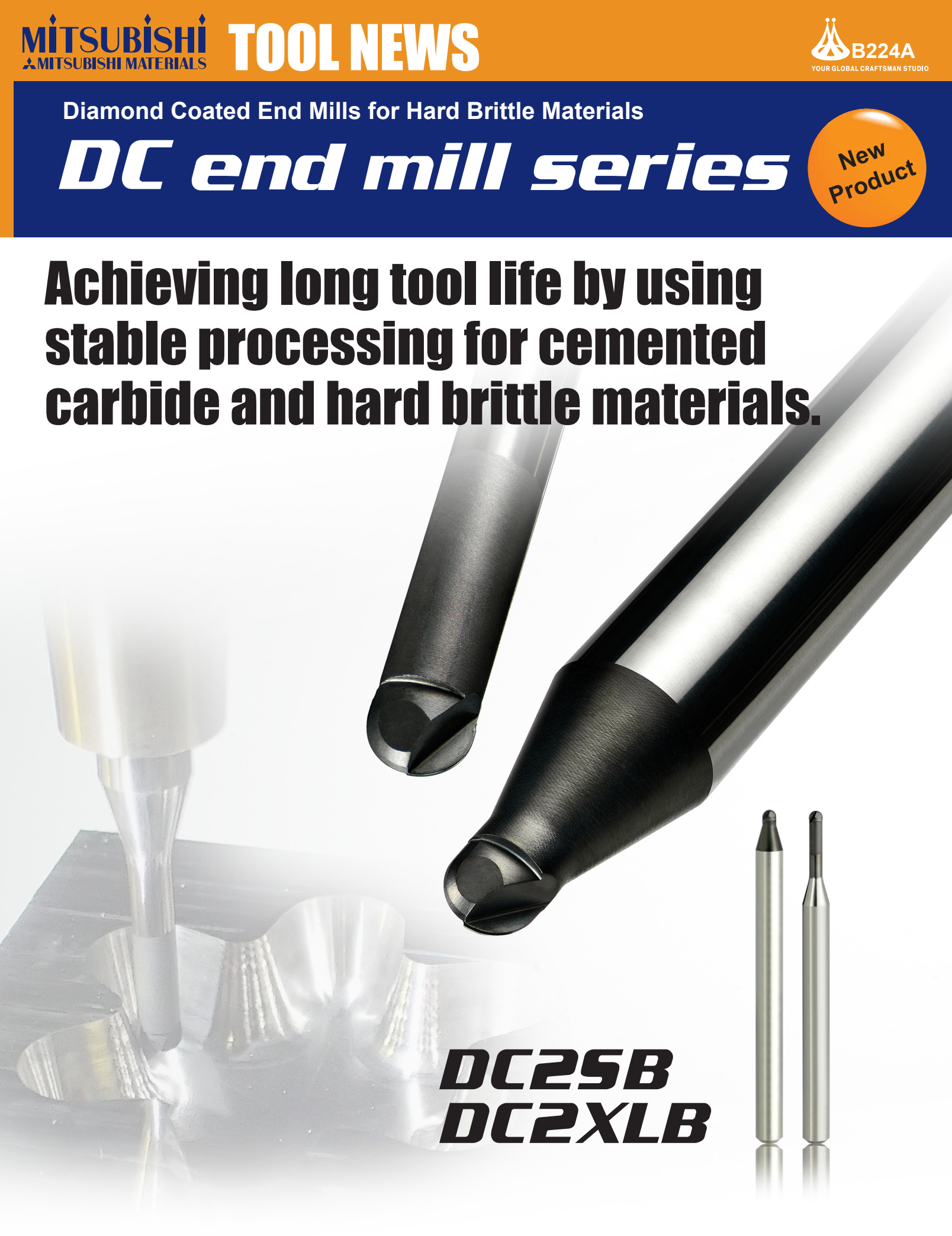
B224A
YOUR GLOBAL CRAFTSMAN STUDIO

Diamond Coated End Mills for Hard Brittle Materials

DC end mill series

New Product

Achieving long tool life by using stable processing for cemented carbide and hard brittle materials.



DC2SB
DC2XLB

Diamond Coated End Mills for Hard Brittle Materials

DC end mill series

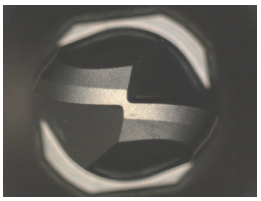
Long Tool Life with Stable Processing

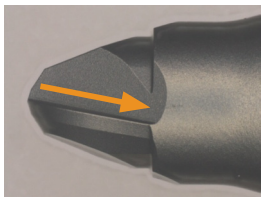
An edge shape made with coexisting sharpness and high edge strength

Straight flute rake angle has improved sharpness.
As a result, chips are discharged to the tool axis and sudden damage near the ball center is restricted.

Newly developed DC

Uniquely developed coating technology not only dramatically improves coating adhesiveness and wear resistance but also inhibits peeling of the coating and sudden abrasions. As a result, stable and long-life processing of hard brittle materials such as cemented carbide and alumina is achieved.





An image showing the occurrence of chip discharge

DC2SB

Suitable DC ball end mill for cemented carbide and other hard brittle materials processing.

Finish Cutting / Rough Cutting

F ■■■□□ R ■■■■□

N

DC2XLB

Suitable DC long neck ball end mill for cemented carbide and other hard brittle materials processing.

Finish Cutting / Rough Cutting

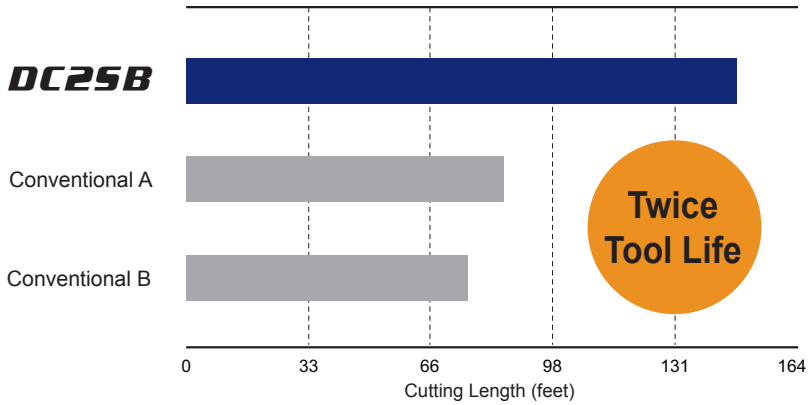
F ■■■□□ R ■■■■□

N

Cutting Performance

Cemented Carbide Dry

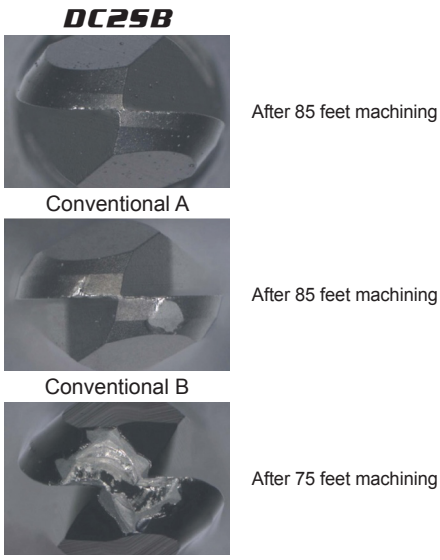
Twice the longevity compared with conventional products

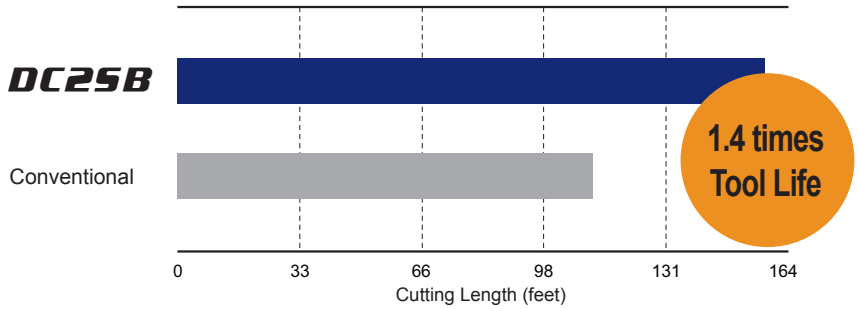


<Cutting Conditions>

Work Material : Ultra Micro-particle Cemented Carbide HRA91.0
Tool : DC2SBR0100
Revolution : 30000 min^{-1}
Cutting Speed : 270 SFM (ap .004 inch)
Feed Rate : 11.811 IPM
Feed per Tooth : .0002 IPT
Depth of Cut : ap .004 inch, ae .012 inch
Cutting Mode : Dry
Machine : MC (HSK-E25)

Damage of the Cutting Edge

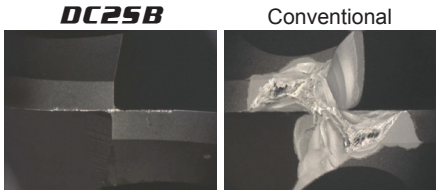




<Cutting Conditions>

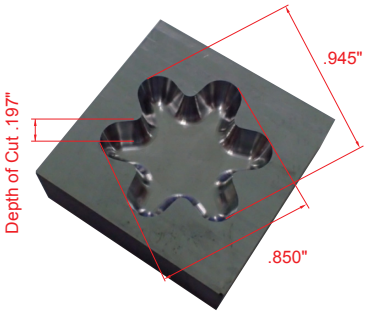
Work Material : Ultra Micro-particle Cemented Carbide HRA91.0
Tool : DC2SBR0300
Revolution : 20000 min^{-1}
Cutting Speed : 440 SFM (ap .008 inch)
Feed Rate : 7.874 IPM
Feed per Tooth : .0002 IPT
Depth of Cut : ap .008 inch, ae .016 inch
Cutting Mode : Dry
Machine : MC (RS20)

Damage of the Cutting Edge



Case Study

Cemented Carbide Mold Hexalobular



(inch)

Process	Size	n min^{-1}	vf IPM	ap	ae	Finishing Allowance	Cutting Time h:m:s	Number of Tools pcs
Rough Cutting	R2	24000	9.449	.008	.016	.004	2:12:24	2
Medium Cutting	R1	30000	11.811	.004	.012	.002	0:49:20	1
Finish Cutting	R1	30000	11.811	.004	.004	.000	0:37:30	1

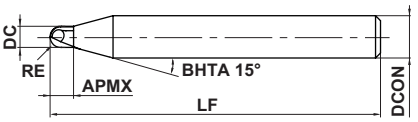
Model Size : .945×.850×.197 inch
Work Material : CIS VM-20 (92HRA)
Tool : DC2SB
Cutting Mode : Air Blow
Machine : MC (RS20)

Cutting Time : 219 min Tools Used : 4

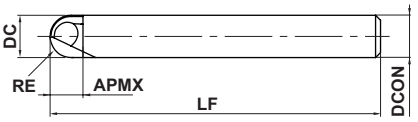
DC2SB

Ball nose, Short cut length, 2 flute, For hard brittle materials

Cemented Carbide	Alumina Zirconia	Silicon Carbide Silicon Nitride	Quartz Glass
◎	○	○	○



Type1



Type2

R					
	0.1≤RE≤3				
	±0.01				
h6	4≤DCON≤6				
	0 - 0.008				

● Suitable DC ball end mill for cemented carbide and other hard brittle materials processing.

(mm)

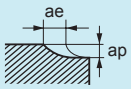
Order Number	RE	DC	APMX	LF	DCON	* No.F	Stock	Type
DC2SBR0010	0.1	0.2	0.12	50	4	2	★	1
DC2SBR0020	0.2	0.4	0.24	50	4	2	★	1
DC2SBR0030	0.3	0.6	0.42	50	4	2	★	1
DC2SBR0040	0.4	0.8	0.56	50	4	2	★	1
DC2SBR0050	0.5	1	0.7	50	4	2	★	1
DC2SBR0075	0.75	1.5	1	50	4	2	★	1
DC2SBR0100	1	2	1.4	50	4	2	★	1
DC2SBR0150	1.5	3	2.1	60	6	2	★	1
DC2SBR0200	2	4	2.8	60	6	2	★	1
DC2SBR0250	2.5	5	3.5	60	6	2	★	1
DC2SBR0300	3	6	4.2	60	6	2	★	2

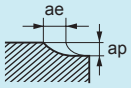
* Number of Flutes

★ : Inventory maintained in Japan.

Recommended Cutting Conditions

(mm)

Work material		Cemented carbide					Alumina Zirconia				
DC	**RE**	**n** (min^{-1})	**vf** (mm/min)	**vf** (inch) (IPM)	**ap**	**ae**	**n** (min^{-1})	**vf** (mm/min)	**vf** (inch) (IPM)	**ap**	**ae**
0.2	**0.1**	30000	100	3.9	0.01	0.01	30000	100	3.9	0.01	0.01
0.4	**0.2**	30000	150	5.9	0.02	0.08	30000	150	5.9	0.02	0.08
0.6	**0.3**	30000	200	7.9	0.03	0.14	30000	200	7.9	0.03	0.14
0.8	**0.4**	30000	250	9.8	0.04	0.19	30000	250	9.8	0.04	0.19
1	**0.5**	30000	300	11.8	0.05	0.25	30000	300	11.8	0.05	0.25
1.5	**0.75**	30000	300	11.8	0.075	0.275	30000	300	11.8	0.075	0.275
2	**1**	30000	300	11.8	0.1	0.3	30000	300	11.8	0.1	0.3
3	**1.5**	27500	275	10.8	0.125	0.33	27500	275	10.8	0.125	0.33
4	**2**	24000	240	9.4	0.15	0.35	24000	240	9.4	0.15	0.35
5	**2.5**	22000	220	8.7	0.175	0.37	22000	220	8.7	0.175	0.37
6	**3**	20000	200	7.9	0.2	0.4	20000	200	7.9	0.2	0.4
Depth of cut											

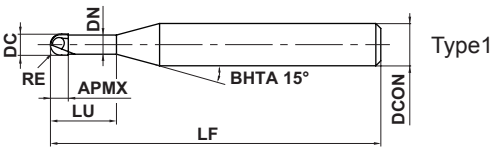
Work material		Silicon carbide Silicon nitride					Quartz glass				
DC	**RE**	**n** (min^{-1})	**vf** (mm/min)	**vf** (inch) (IPM)	**ap**	**ae**	**n** (min^{-1})	**vf** (mm/min)	**vf** (inch) (IPM)	**ap**	**ae**
0.2	**0.1**	30000	50	2.0	0.005	0.005	30000	150	5.9	0.015	0.015
0.4	**0.2**	30000	75	3.0	0.01	0.04	30000	225	8.9	0.03	0.12
0.6	**0.3**	30000	100	3.9	0.015	0.07	30000	300	11.8	0.045	0.21
0.8	**0.4**	30000	125	4.9	0.02	0.095	30000	375	14.8	0.06	0.285
1	**0.5**	30000	150	5.9	0.025	0.125	30000	450	17.7	0.075	0.375
1.5	**0.75**	30000	150	5.9	0.038	0.138	30000	450	17.7	0.113	0.413
2	**1**	30000	150	5.9	0.05	0.15	30000	450	17.7	0.15	0.45
3	**1.5**	27500	138	5.4	0.063	0.165	27500	413	16.3	0.188	0.495
4	**2**	24000	120	4.7	0.075	0.175	24000	360	14.2	0.225	0.525
5	**2.5**	22000	110	4.3	0.088	0.185	22000	330	13.0	0.263	0.555
6	**3**	20000	100	3.9	0.1	0.2	20000	300	11.8	0.3	0.6
Depth of cut											

1) The cemented carbide in the above mentioned cutting conditions table is based on CIS standard VM-40(90HRA).
2) Air blow or dry processing is recommended with cemented carbide processing.
   ⁎Note: Using coolants or oil mists may decrease tool longevity.
3) The use of a water soluble cutting oil is recommended with the processing of hard brittle materials other than the cemented carbide mentioned in the above table. Be sure to filter the oil and eliminate any chip discharge that adheres to the tool.
4) Cutting conditions may need adjustments depending on the type of work material.
5) Reduce the rotation speed and feed rate shown in the above table at a similar ratio when no rigidity in the machinery or work mounting and occurrence of chatter or abnormal sound.
6) Implementation of special countermeasures is recommended since fine chip discharge may enter gaps in the processing machinery.

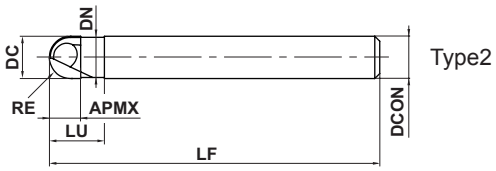
DC2XLB

Ball nose, Short cut length, 2 flute, Long neck, For hard brittle materials

Cemented Carbide	Alumina Zirconia	Silicon Carbide Silicon Nitride	Quartz Glass
◎	○	○	○



Type1



Type2

R	0.1≤RE≤3				
	±0.01				
h6	4≤DCON≤6				
	0 - 0.008				

● Suitable DC long neck ball end mill for cemented carbide and other hard brittle materials processing.

(mm)

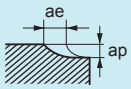
Order Number	RE	DC	APMX	LU	DN	LF	DCON	* No.F	Stock	Type
DC2XLBR0010N005	0.1	0.2	0.12	0.5	0.18	50	4	2	★	1
DC2XLBR0020N010	0.2	0.4	0.24	1	0.36	50	4	2	★	1
DC2XLBR0030N015	0.3	0.6	0.36	1.5	0.56	50	4	2	★	1
DC2XLBR0040N020	0.4	0.8	0.48	2	0.76	50	4	2	★	1
DC2XLBR0050N025	0.5	1	0.6	2.5	0.96	50	4	2	★	1
DC2XLBR0050N050	0.5	1	0.6	5	0.96	50	4	2	★	1
DC2XLBR0075N038	0.75	1.5	0.9	3.8	1.44	50	4	2	★	1
DC2XLBR0100N060	1	2	1.2	6	1.94	50	4	2	★	1
DC2XLBR0100N100	1	2	1.2	10	1.94	50	4	2	★	1
DC2XLBR0150N080	1.5	3	1.8	8	2.9	60	6	2	★	1
DC2XLBR0200N100	2	4	2.4	10	3.9	60	6	2	★	1
DC2XLBR0250N100	2.5	5	3	10	4.9	60	6	2	★	1
DC2XLBR0300N100	3	6	3.6	10	5.85	60	6	2	★	2

* Number of Flutes

★ : Inventory maintained in Japan.

Recommended Cutting Conditions

(mm)

Work material			Cemented carbide					Alumina Zirconia				
DC	**RE**	**LU**	**n** (min^{-1})	**vf** (mm/min)	**vf** (inch) (IPM)	**ap**	**ae**	**n** (min^{-1})	**vf** (mm/min)	**vf** (inch) (IPM)	**ap**	**ae**
0.2	**0.1**	**0.5**	30000	30	1.2	0.005	0.01	30000	30	1.2	0.005	0.01
0.4	**0.2**	**1**	30000	100	3.9	0.015	0.08	30000	100	3.9	0.015	0.08
0.6	**0.3**	**1.5**	30000	200	7.9	0.03	0.14	30000	200	7.9	0.03	0.14
0.8	**0.4**	**2**	30000	250	9.8	0.04	0.19	30000	250	9.8	0.04	0.19
1	**0.5**	**2.5**	30000	300	11.8	0.05	0.25	30000	300	11.8	0.05	0.25
1	**0.5**	**5**	30000	300	11.8	0.05	0.25	30000	300	11.8	0.05	0.25
1.5	**0.75**	**3.8**	30000	300	11.8	0.075	0.275	30000	300	11.8	0.075	0.275
2	**1**	**6**	30000	300	11.8	0.1	0.3	30000	300	11.8	0.1	0.3
2	**1**	**10**	30000	300	11.8	0.1	0.3	30000	300	11.8	0.1	0.3
3	**1.5**	**8**	27500	275	10.8	0.125	0.33	27500	275	10.8	0.125	0.33
4	**2**	**10**	24000	240	9.4	0.15	0.35	24000	240	9.4	0.15	0.35
5	**2.5**	**10**	22000	220	8.7	0.175	0.37	22000	220	8.7	0.175	0.37
6	**3**	**10**	20000	200	7.9	0.2	0.4	20000	200	7.9	0.2	0.4
Depth of cut												

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0.2	**0.1**	**0.5**	30000	15	.6	0.003	0.005	30000	45	1.8	0.008	0.015
0.4	**0.2**	**1**	30000	50	2.0	0.008	0.04	30000	150	5.9	0.023	0.12
0.6	**0.3**	**1.5**	30000	100	3.9	0.015	0.07	30000	300	11.8	0.045	0.21
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2	**1**	**6**	30000	150	5.9	0.05	0.15	30000	450	17.7	0.15	0.45
2	**1**	**10**	30000	150	5.9	0.05	0.15	30000	450	17.7	0.15	0.45
3	**1.5**	**8**	27500	138	5.4	0.063	0.165	27500	413	16.3	0.188	0.495
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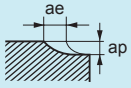
Depth of cut												

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6) Implementation of special countermeasures is recommended since fine chip discharge may enter gaps in the processing machinery.

Diamond Coated End Mills for Hard Brittle Materials

DC end mill series

For your safety
●Don't touch breakers and chips without gloves. ●Please machine within recommended application range, and exchange expired tools with new parts in advance. ●Please use safety cover and wear safety glasses. ●When using compounded cutting oils, please take fire prevention. ●When attaching chips or spare parts, please use the attached wrench or driver. ●When using tools in revolution machining, please make a trial run to check run-out, vibration, abnormal sounds etc.

MITSUBISHI MATERIALS CORPORATION

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