

Advanced
Engineering

Hitachi Tool

HITACHI
Inspire the Next

No. 426

Epoch21

CBN-EPSB/EPSR

*Cubic Boron Nitride End Mill
for high hardened materials*

CBN
Cubic Boron Nitride

D 0.2 - 2

I_n ~10xD



**Diameter
checked**
Labelled on box

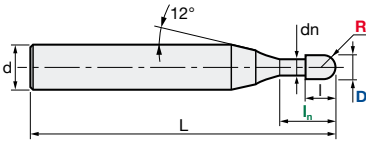
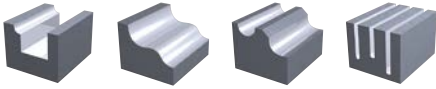
D μm



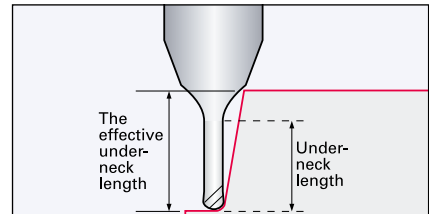
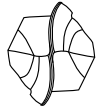
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CBN-EPSB | Epoch CBN Ball End Mill

CBN Cubic Boron Nitride	V max High Speed	Roughing	Semi-Finishing	Finishing	Super-Finishing	HRC 72	No. of Teeth 2	Rake Angle Negative
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D	0 / -0.01 mm
R	± 0.005 mm
d	h4



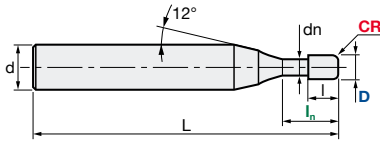
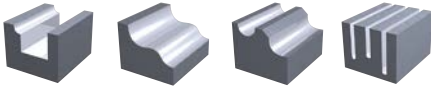
		Size								Effective Underneck Using Length by Draft Angle				
ID Code	Item Code	Z	D	R	I _n	I	dn	L	d	0.5°	1°	1.5°	2°	3°
CB001	CBN-EPSB-2002-0.5-F	2	0.2	0.1	0.5	0.12	0.18	50	4	0.67	0.70	0.72	0.75	0.80
CB002	CBN-EPSB-2002-1-F				1					1.19	1.24	1.28	1.32	1.38
CB003	CBN-EPSB-2003-0.75-F		0.3	0.15	0.75	0.18	0.27			0.95	0.99	1.02	1.05	1.10
CB004	CBN-EPSB-2003-1.5-F				1.5					1.73	1.79	1.83	1.88	2.03
CB005	CBN-EPSB-2004-1-F		0.4	0.2	1	0.24	0.37			1.21	1.25	1.29	1.32	1.38
CB006	CBN-EPSB-2004-2-F				2					2.25	2.31	2.37	2.43	2.68
CB007	CBN-EPSB-2005-1.5-F		0.5	0.25	1.5	0.3	0.47			1.73	1.78	1.83	1.87	2.00
CB008	CBN-EPSB-2005-3-⊕				3					3.28	3.36	3.46	3.62	3.99
CB009	CBN-EPSB-2006-1.5-F		0.6	0.3	1.5	0.36	0.57			1.73	1.78	1.82	1.86	1.98
CB010	CBN-EPSB-2006-3-F				3					3.28	3.36	3.46	3.61	3.97
CB011	CBN-EPSB-2008-2.5-F		0.8	0.4	2.5	0.48	0.77			2.76	2.83	2.89	2.99	3.28
CB012	CBN-EPSB-2008-5-⊕				5					5.33	5.48	5.72	5.99	6.60
CB014	CBN-EPSB-2010-2.5-F		1	0.5	2.5	0.6	0.96			2.77	2.84	2.89	3.00	3.28
CB015	CBN-EPSB-2010-5-F				5					5.34	5.50	5.74	5.99	6.60
CB013	CBN-EPSB-2010-10-⊕		1.5	0.75	10	0.9	1.44			10.50	10.95	11.44	11.98	13.23
CB017	CBN-EPSB-2015-5-F				5					5.36	5.53	5.75	6.00	6.58
CB016	CBN-EPSB-2015-10-⊕		2	1	10	1.2	1.92			10.54	10.98	11.46	11.98	13.22
CB020	CBN-EPSB-2020-5-F				5					5.38	5.56	5.77	6.01	6.56
CB018	CBN-EPSB-2020-10-F		2	1	10	1.2	1.92			10.58	11.01	11.48	11.99	13.20
CB019	CBN-EPSB-2020-20-⊕	20			21.00			21.90	22.88	23.96	x			

F	Fine Type	≤ 5x D
⊕	Strong Type	> 5x D

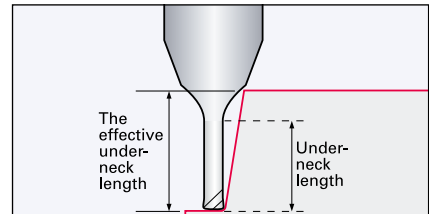
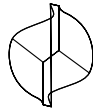
x = no contact

CBN-EPSR | Epoch CBN Radius End Mill

CBN Cubic Boron Nitride	V max High Speed	▽ Roughing	▽▽ Semi-Finishing	▽▽▽ Finishing	▽▽▽▽ Super-Finishing	HRC 72	No. of Teeth 2	Rake Angle Negative
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D	0 / -0.01 mm
CR	± 0.005 mm
d	h4

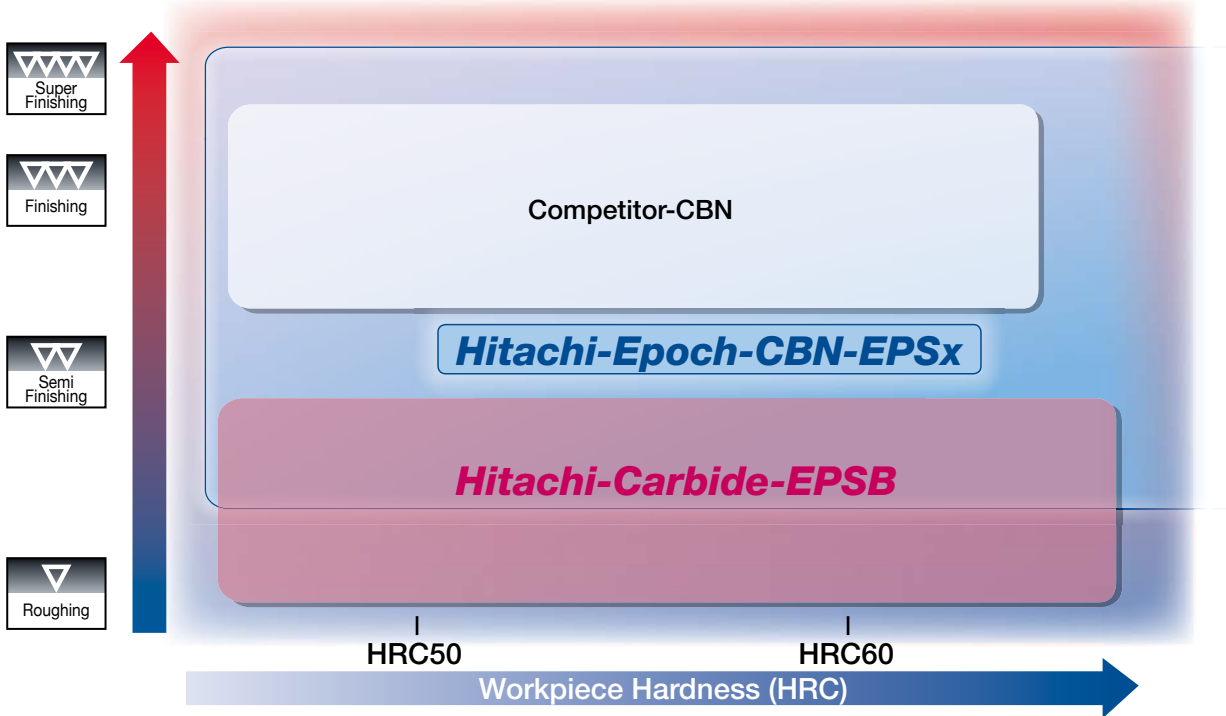


		Size								Effective Underneck Using Length by Draft Angle				
ID Code	Item Code	Z	D	CR	l_n	l	dn	L	d	0.5°	1°	1.5°	2°	3°
CB021	CBN-EPSR-2002-0.5-005	2	0.2	0.05	0.5	0.07	0.18	50	4	0.67	0.70	0.73	0.76	0.81
CB022	CBN-EPSR-2002-1-005				1					1.19	1.24	1.28	1.32	1.39
CB023	CBN-EPSR-2003-0.75-005		0.3		0.75	0.11	0.27			0.96	0.99	1.03	1.06	1.12
CB024	CBN-EPSR-2003-1.5-005				1.5					1.74	1.79	1.84	1.89	2.06
CB025	CBN-EPSR-2004-1-005		0.4		1	0.14	0.37			1.22	1.26	1.30	1.34	1.40
CB026	CBN-EPSR-2004-2-005				2					2.25	2.32	2.38	2.46	2.73
CB027	CBN-EPSR-2005-1.5-01		0.5		1.5	0.18	0.47			1.74	1.79	1.84	1.88	2.05
CB028	CBN-EPSR-2005-3-01				3					3.28	3.37	3.48	3.65	4.04
CB029	CBN-EPSR-2006-1.5-01		0.6		1.5	0.21	0.57			1.74	1.79	1.84	1.88	2.05
CB030	CBN-EPSR-2006-3-01				3					3.28	3.37	3.48	3.65	4.04
CB031	CBN-EPSR-2008-2.5-01		0.8		2.5	0.28	0.77			2.77	2.84	2.91	3.05	3.37
CB032	CBN-EPSR-2008-5-01				5					5.34	5.51	5.76	6.04	6.69
CB034	CBN-EPSR-2010-2.5-02		1		2.5	0.35	0.96			2.78	2.85	2.93	3.06	3.37
CB035	CBN-EPSR-2010-5-02				5					5.35	5.53	5.78	6.05	6.69
CB033	CBN-EPSR-2010-10-02				10					10.51	10.97	11.48	12.03	13.33
CB037	CBN-EPSR-2015-5-02		1.5		5	0.53	1.44			5.38	5.58	5.83	6.11	6.75
CB036	CBN-EPSR-2015-10-02				10					10.56	11.03	11.53	12.09	13.39
CB040	CBN-EPSR-2020-5-02		2		5	0.7	1.92			5.40	5.63	5.88	6.16	6.82
CB038	CBN-EPSR-2020-10-02				10					10.61	11.08	11.59	12.15	13.45
CB039	CBN-EPSR-2020-20-02	20		21.04	21.97			22.99	24.11	x				

x = no contact

CBN-EPSB/EPSR | Epoch CBN Ball/Radius End Mill

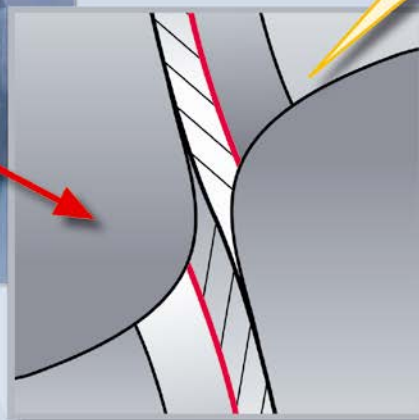
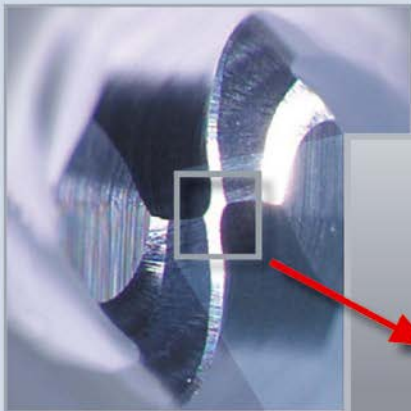
Comparison of application fields



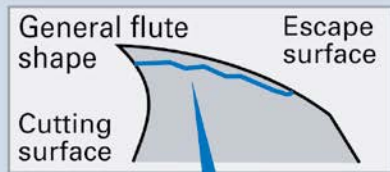
The Effect of CBN-EPSB Flute Shape:



Double-Face Effect of new Shape prevents shape from deteriorating



By creating two faces on the escape surface, the first surface has the effect of stopping wear.



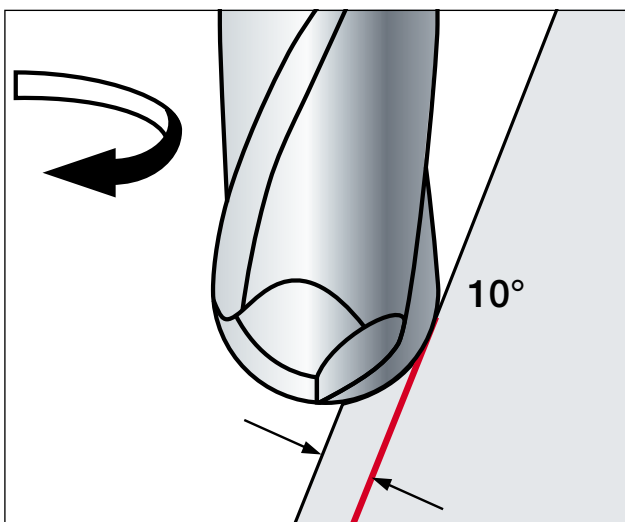
Direction of wear progress



CBN-EPSB/EPSR | Epoch CBN Ball/Radius End Mill

Comparison of finish cutting accuracy:

Company	Item	R
Hitachi Tool	Epoch-CBN	0.5
Competitor A	Competitor CBN	
Competitor B		
Competitor C		



Machine: Sodick MC430L

W = 1.2379 (HRC62)

n = 40,000 min⁻¹

V_c = 125 m/min

V_f = 2,400 mm/min

f_z = 0.03 mm/tooth

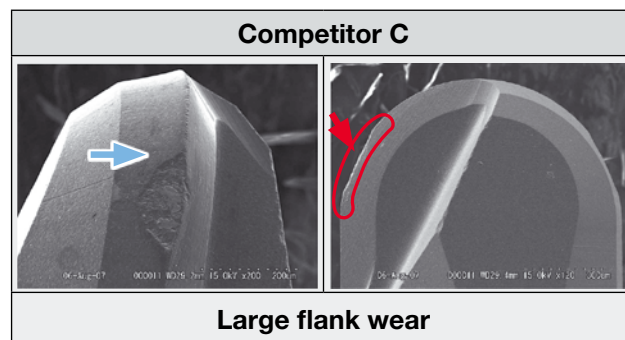
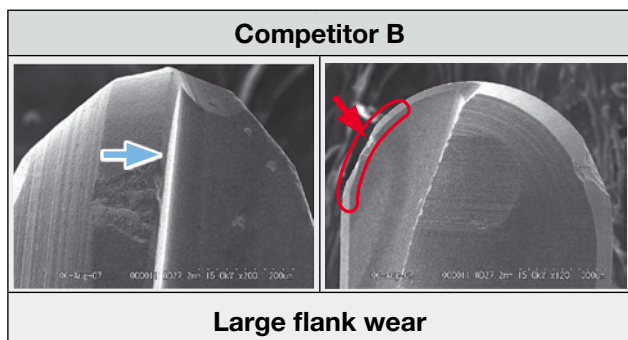
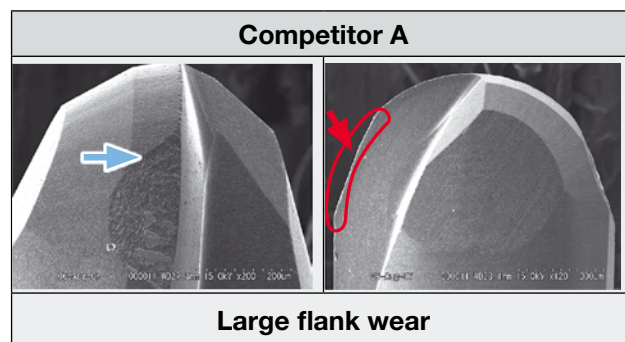
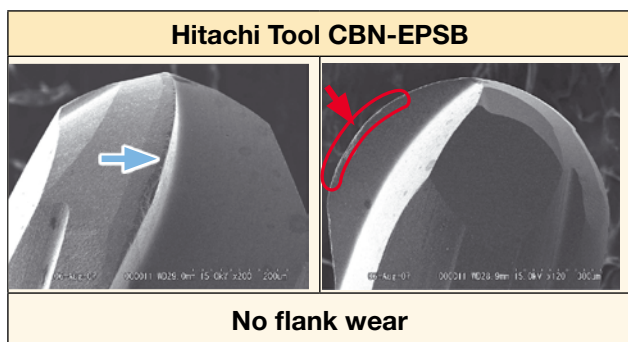
Z = 0.05 mm

Mist blow

Depth of Cutting: 0.05 mm

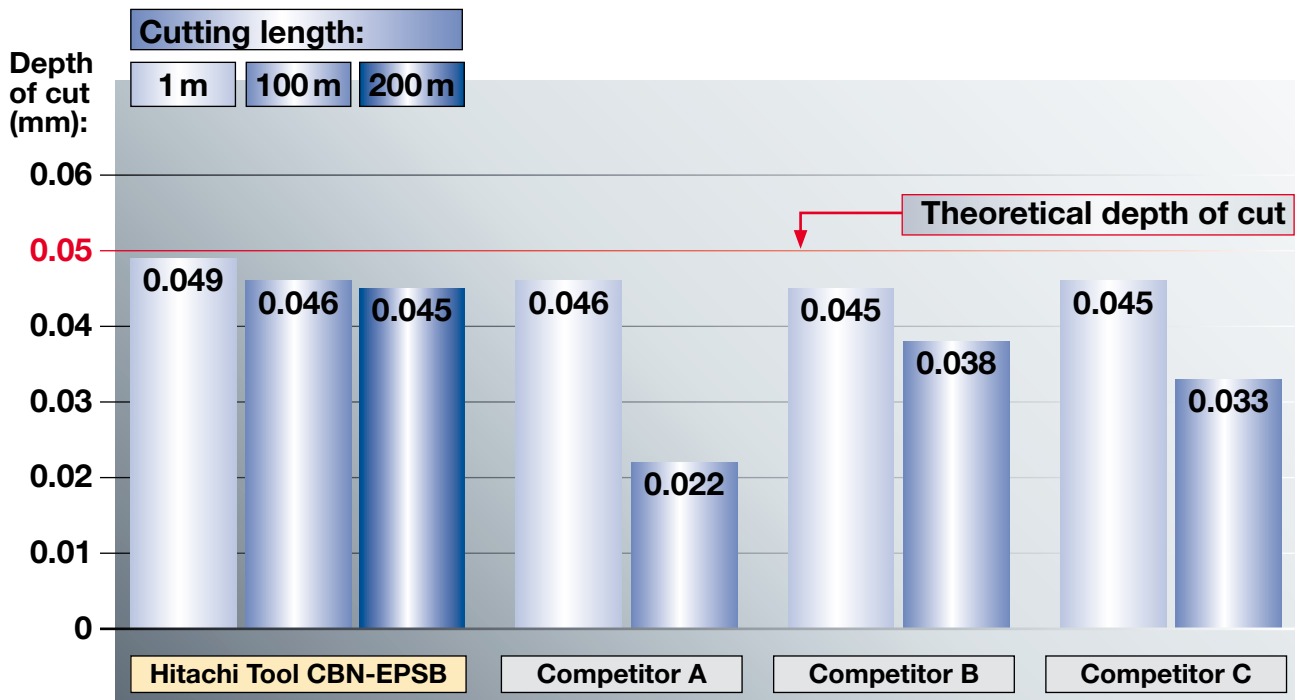
Comparison of tool wear state

Cutting length: 100m, oil mist

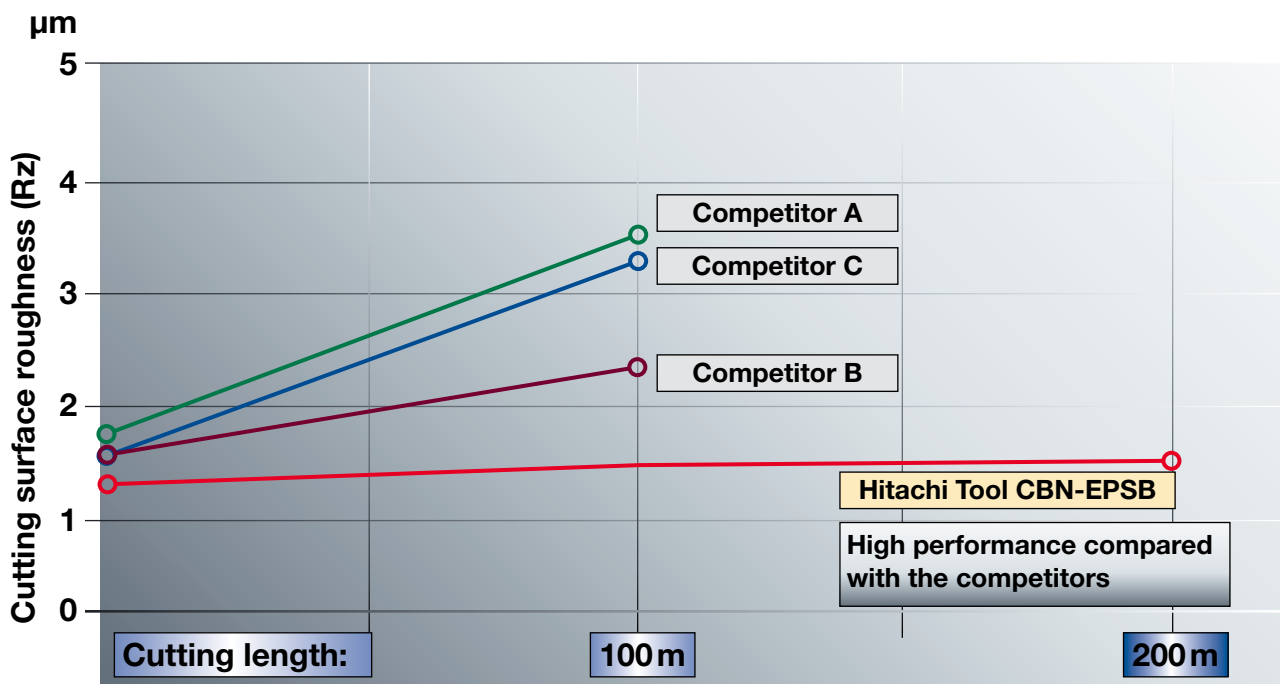


CBN-EPSB/EPSR | Epoch CBN Ball/Radius End Mill

Comparison of cutting error



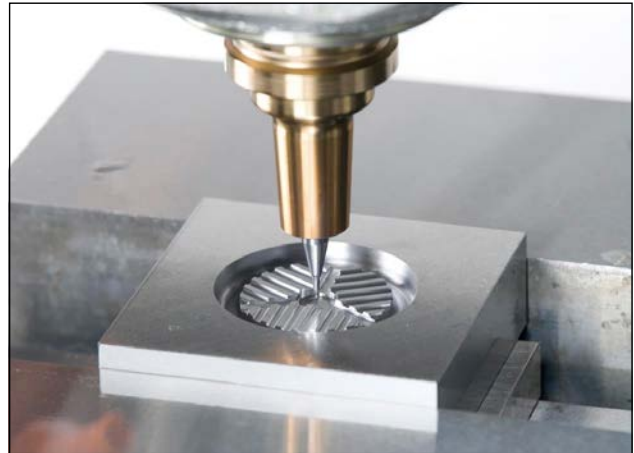
Comparison of finish surface roughness



CBN-EPSB/EPSR | Epoch CBN Ball/Radius End Mill

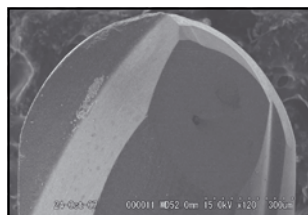
Direct milling: Comparison of performance from roughing to finishing

Material: 1.2379 (HRC62)

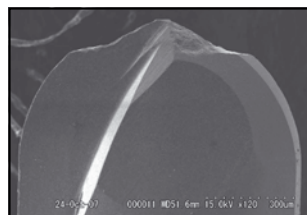


Roughing

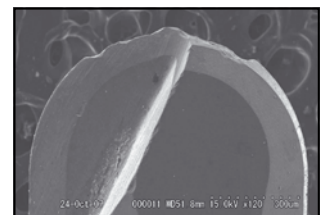
Tool = R 1 mm
 $n = 31,800 \text{ min}^{-1}$
 $V_c = 100 \text{ m/min}$
 $V_f = 3,180 \text{ mm/min}$
 $f_z = 0.05 \text{ mm/tooth}$
 $a_p = 0.05 \text{ mm}$
 $a_e = 0.15 \text{ mm}$
Dry (Air Blow)



Epoch-CBN
2 pockets



Competitor A
2 pockets

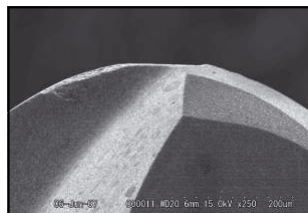


Competitor C
1 pocket

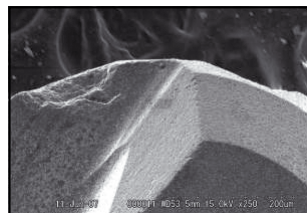


Finishing

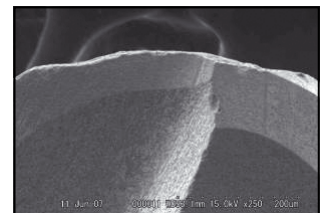
Tool = R 0.5 mm
 $n = 40,000 \text{ min}^{-1}$
 $V_c = 125 \text{ m/min}$
 $V_f = 2,000 \text{ mm/min}$
 $f_z = 0.025 \text{ mm/tooth}$
 $a_p = 0.03 \text{ mm}$
 $a_e = 0.09 \text{ mm}$
Dry (Air Blow)



Epoch-CBN
400 m flat milling



Competitor A
400 m flat milling



Competitor C
400 m flat milling

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Cubic Boron Nitride

Product Range

Solid Carbide End Mills

*micro***EndMill**

HD
COATING

Epoch21

D 0.2 - 2
L ~ 10xD

CBN
Cubic Boron Nitride

MINIATURE

3D-Cut

Indexable Milling Tools

Indexable
Milling

WHNSB Drills

WHNSB
NONSTEP BORER

Milling Chucks

Milling
Chucks

Distributed by:



Diameter
checked
Labelled on box
D µm

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