

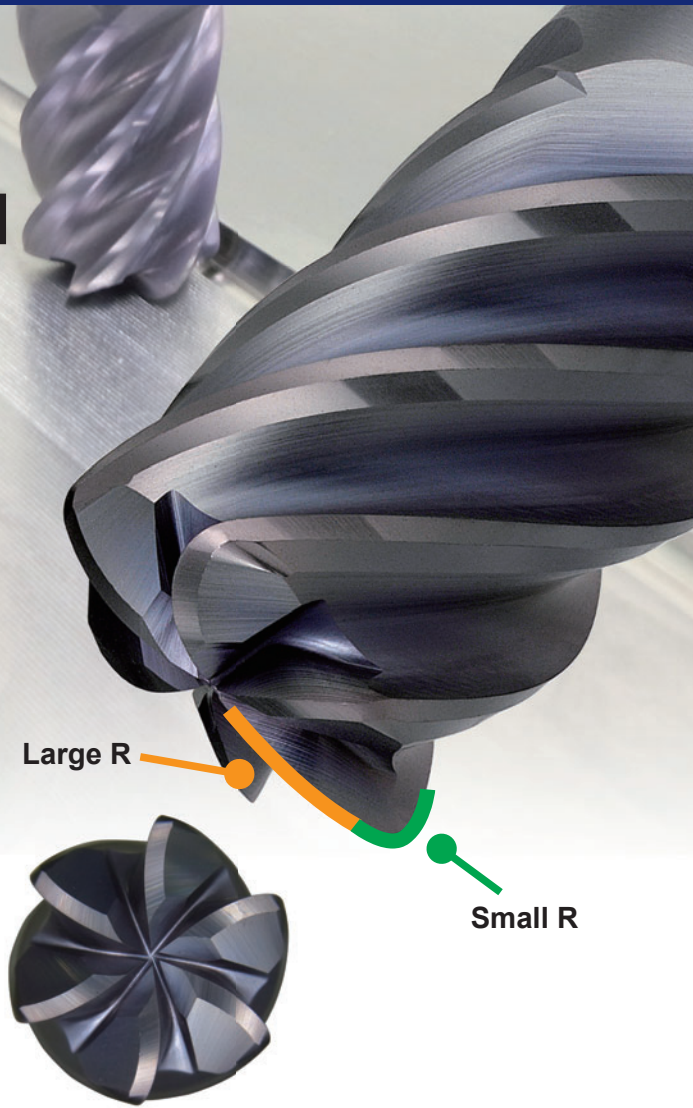
IMPACT MIRACLE

End Mill Series

New Product

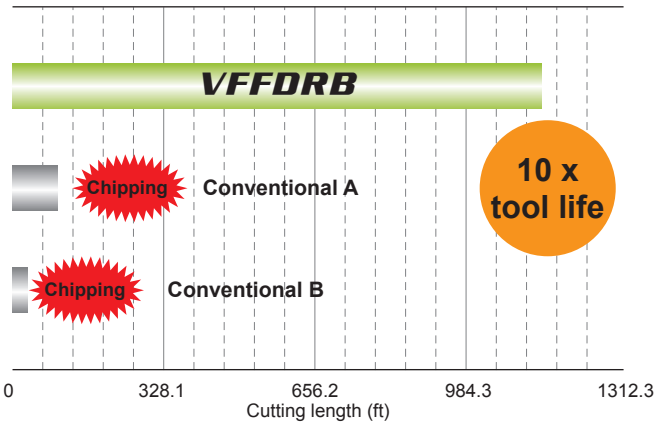
VFFDRB

New duplex corner radius and multi-flute geometry for high feed, stable machining of hardened steels.

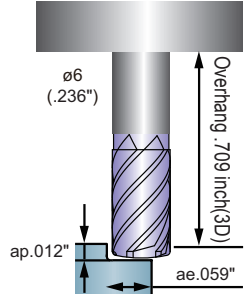
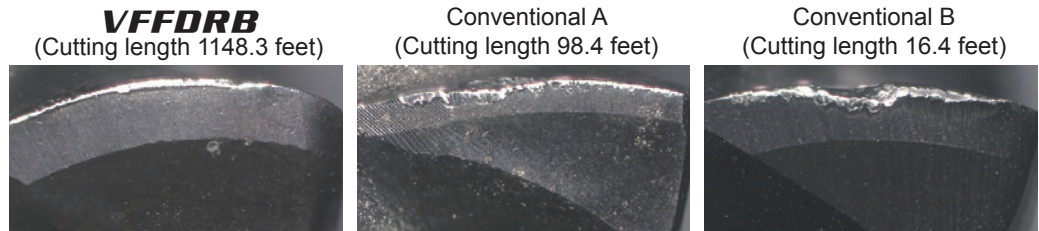


Cutting Performance

Tool life comparison in AISI D2 (ø6)

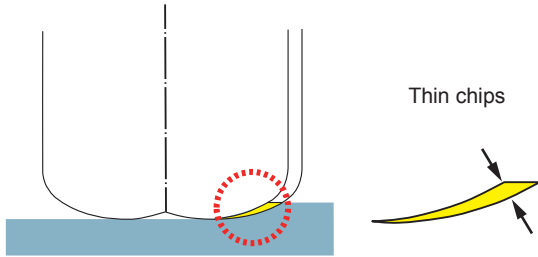


<Cutting conditions>
 Work piece : AISI D2 (60HRC)
 Tool : VFFDRBD0600
 Revolution : 3700 RPM (230 SFM)
 Feed rate : 233 IPM (.016 IPT)
 Depth of cut : ap=.012 inch, ae=.059 inch
 Overhang : .709 inch (3D)
 Machining center : Vertical M/C (HSK63)
 Coolant : Air blow



Features

High efficiency machining geometry

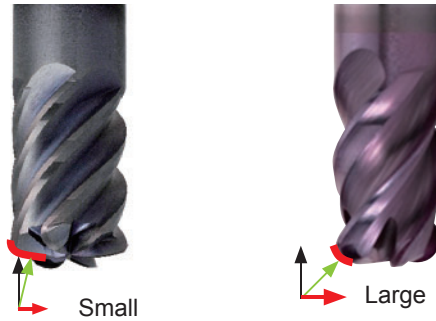


Thin chips and a long cutting edge combine to provide both high performance and long tool life.

Vibration control geometry

VFFDRB

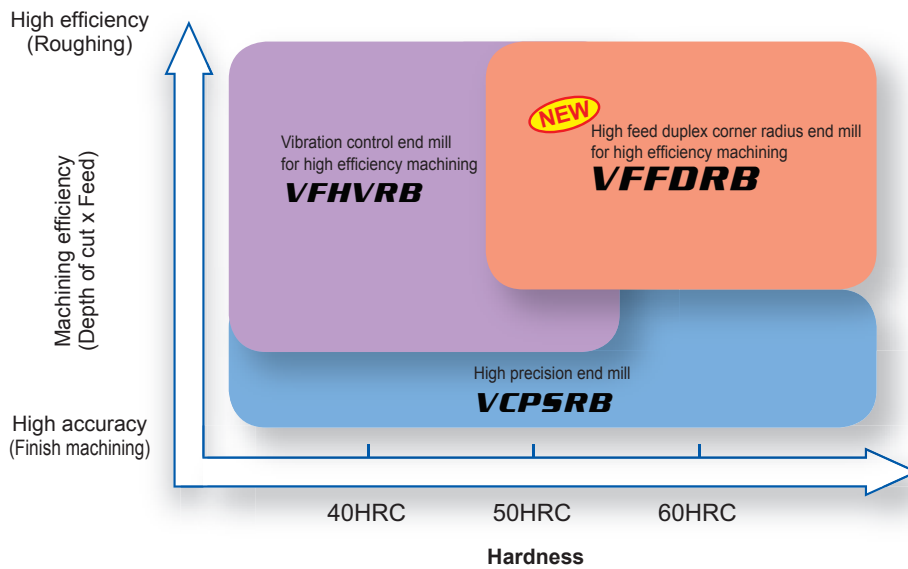
Conventional radius



Reduced cutting resistance in the radial direction suppresses tool vibration and reduces deflection.

Performance and Application Range

High efficiency machining of high hardened steels over 60 HRC can be achieved.



Application / Tool - Selection Chart

Content of processing	Hardened materials (Over 50 HRC)	Long overhangs (Over 5D)	High feed	Large ap (Over 0.05D)
High feed duplex corner radius end mill VFFDRB	⊙	⊙	⊙	×
Vibration control end mill for high efficiency machining VFHVRB	○	○	○	⊙

⊙...First recommendation
○...Second recommendation
×...Not recommended

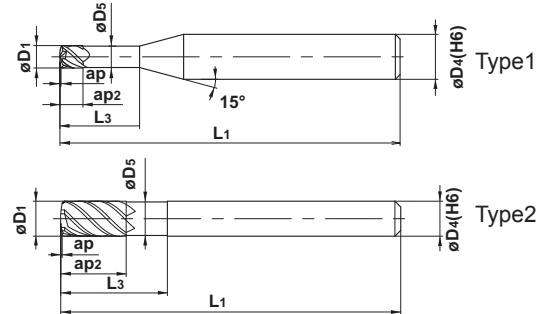
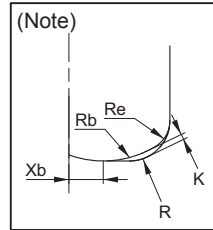
VFFDRB

NEW



Duplex corner radius end mill, Short cut length, 4-6 flute, For high feed

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (<=45HRC)	Hardened Steel (<=55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
○	○	◎	◎				



D1	D1 ≤ 12				
	0				
h6	D4 = 6			8 ≤ D4 ≤ 10	D4 = 12
	0	0	0	0	0
	-0.008	-0.009	-0.011		

- High feed rate possible due to the duplex corner radius geometry.
- Multi-flutes enable high feed machining.

Unit : mm

Order Number	D1	R*	ap	ap2	L3	D5	L1	D4	N	Duplex corner radius				α	Stock	Type
										K	Xb	Re	Rb			
VFFDRBD0300	3	0.64	0.18	3	10	2.8	60	6	4	0.08	0.375	0.5	2	2.1	★	1
VFFDRBD0400	4	0.71	0.25	4	12	3.8	60	6	4	0.13	0.5	0.5	3	1.9	★	1
VFFDRBD0600	6	0.92	0.36	9	18	5.6	80	6	4	0.21	0.75	0.6	5	1.7	★	2
VFFDRBD0800	8	1.16	0.44	12	24	7.6	90	8	6	0.22	1.6	0.8	4.5	1.7	★	2
VFFDRBD1000	10	1.47	0.57	15	30	9.4	100	10	6	0.28	2	1	5.5	1.7	★	2
VFFDRBD1200	12	1.77	0.7	18	36	11.4	110	12	6	0.34	2.4	1.2	6.5	1.8	★	2

R* = Approx.R N = Number of Flutes α = Max.Ramping Angle

(Note) When machining in the approx.R as radius end mill, the uncut portions(K) is generated.

RECOMMENDED CUTTING CONDITIONS

Dia. (mm)	n (min ⁻¹)	vf		ap (mm)	ae (mm)	n (min ⁻¹)	vf		ap (mm)	ae (mm)
		(mm/min)	(IPM)				(mm/min)	(IPM)		
3	16000	9600	378.0	0.12	1.5	14000	8400	330.7	0.12	1.5
4	12000	9600	378.0	0.16	2.0	11000	8800	346.5	0.16	2.0
6	8000	11000	433.1	0.24	3.0	7200	10000	393.7	0.24	3.0
8	6000	13000	511.8	0.32	4.8	5400	11000	433.1	0.32	4.8
10	4800	12000	472.4	0.40	6.0	4300	10000	393.7	0.40	6.0
12	4000	11000	433.1	0.48	7.2	3600	9700	381.9	0.48	7.2

Dia. (mm)	n (min ⁻¹)	vf		ap (mm)	ae (mm)	n (min ⁻¹)	vf		ap (mm)	ae (mm)
		(mm/min)	(IPM)				(mm/min)	(IPM)		
3	13000	7800	307.1	0.12	1.5	8500	3400	133.9	0.12	1.5
4	9500	8000	315.0	0.16	2.0	6400	3800	149.6	0.16	2.0
6	6400	9000	354.3	0.24	3.0	4200	5000	196.9	0.24	3.0
8	4800	10000	393.7	0.32	4.8	3200	5800	228.3	0.32	4.8
10	3800	9100	358.3	0.40	6.0	2500	5300	208.7	0.40	6.0
12	3200	8600	388.6	0.48	7.2	2100	5000	196.9	0.48	7.2

1) When ramping, it is recommended to reduce the feed rate by 50%. The recommended ramping angle is 1 deg.

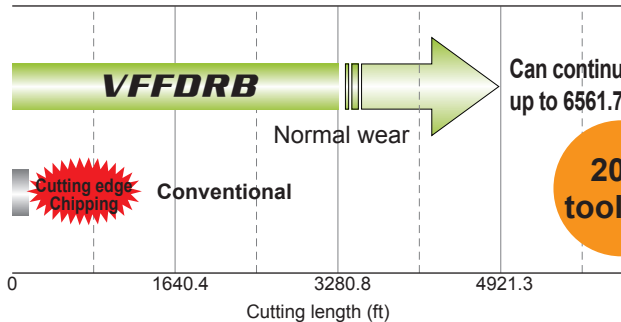
2) When the overhang is longer than 5D, reduce the spindle speed by 30% and the feed rate by 50%.

★ : Inventory maintained in Japan.

Cutting Performance

Tool life comparison when machining AISI H13 (ø6 - 7D overhang)

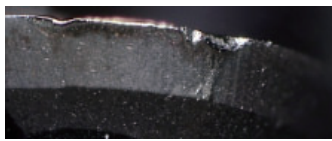
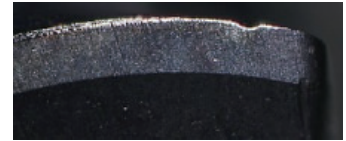
VFFDRB achieves more than 20 times longer tool life compared to conventional for extreme overhang applications (7D)



VFFDRB
(Cutting length 3280.8 feet)



VFFDRB
(Cutting length 1640.4 feet)



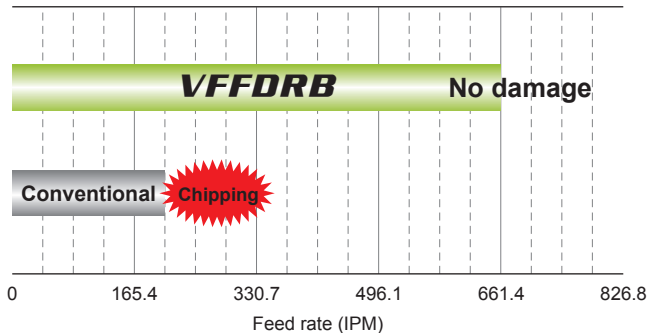
Conventional
(Cutting length 164.0 feet)

<Cutting conditions>

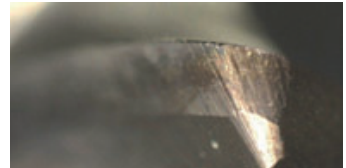
Work piece	: AISI H13 (52HRC)	Depth of cut	: ap=.012 inch, ae=.059 inch
Tool	: VFFDRBD0600	Overhang	: 1.66 inch (7D)
Revolution	: 6400 RPM (395 SFM)	Machining center	: Vertical M/C (HSK63)
Feed rate	: 252 IPM (.01 IPT)	Coolant	: Air blow

Machining efficiency comparison when machining AISI H13 ø10 - 3D overhang)

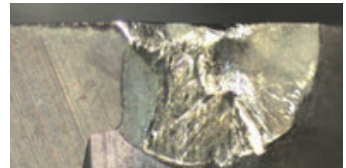
Feed rate increase x 3 compared to conventional radius end mills.



VFFDRB
6 flutes
Feed rate
(661 IPM)



Conventional
Feed rate
(207 IPM)



<Cutting conditions>

Work piece	: AISI H13 (52HRC)	Depth of cut	: ap=.012 inch, ae=.217 inch
Tool	: VFFDRBD1000	Overhang	: 1.18 inch
Revolution	: 3500 RPM (360 SFM)	Machining center	: Horizontal M/C (BT40)
Feed rate	: 207-661 IPM	Coolant	: Down cut, Air blow

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.

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