
VFFDRB

DUPLEX CORNER RADIUS END MILL FOR HIGH FEED
MACHINING OF HARDENED STEELS



VFFDRB

DUPLEX CORNER RADIUS END MILL



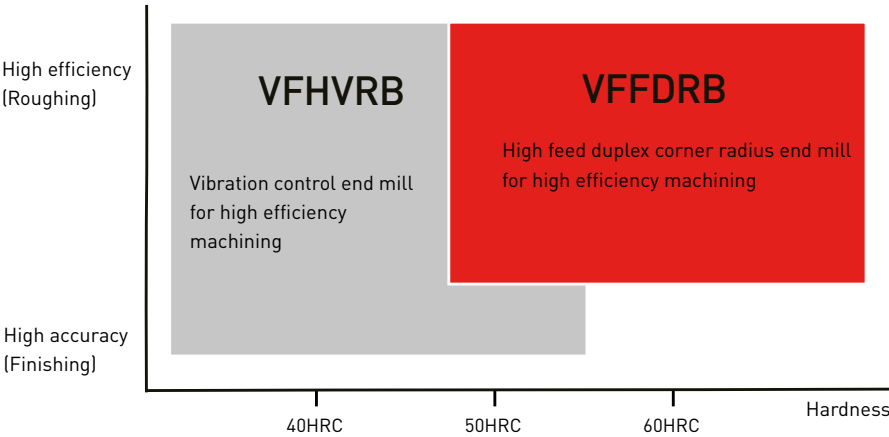
HIGH EFFICIENCY GEOMETRY

- Thin chips and a long cutting edge to provide both high performance and long tool life.
- Ideal for the machining of hardened steels.
- Reduced cutting force in the radial direction reduces tool vibration and deflection.



PERFORMANCE AND APPLICATION RANGE

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



APPLICATION / TOOL - SELECTION CHART

Machining conditions	Long overhangs (>5xD) 	High feed 	ap (>0.05xD) 
VFFDRB	◎	◎	—
VFHVRB	○	○	◎

VFFDRB



DC<6

DC>8

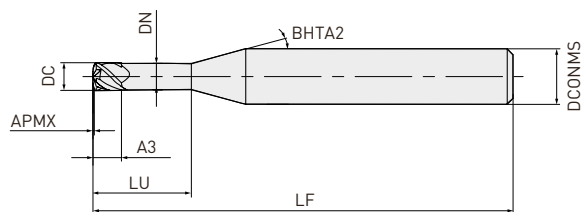
SHORT CUT LENGTH, 4 – 6 FLUTE

P

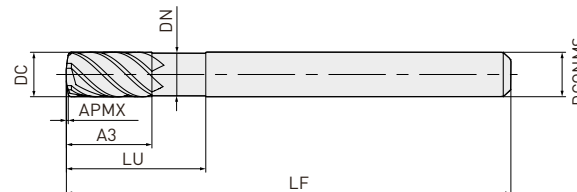
H



1



2



DC < 12

0
-0.020

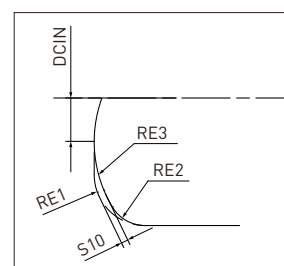
DCON = 6 8 ≤ DCON ≤ 10 DCON = 12

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.

Order number	Stock	DC	RE1	APMX	LF	A3	LU	DN	DCONMS	ZEFP	RMPX	Duplex corner radius				Type
												S10	DCIN	RE2	RE3	
VFFDRBD0300	●	3	0.64	0.18	60	3	10	2.8	6	4	2.1°	0.08	0.375	0.5	2	1
VFFDRBD0400	●	4	0.71	0.25	60	4	12	3.8	6	4	1.9°	0.13	0.5	0.5	3	1
VFFDRBD0600	●	6	0.92	0.36	80	9	18	5.6	6	4	1.7°	0.21	0.75	0.6	5	2
VFFDRBD0800	●	8	1.16	0.44	90	12	24	7.6	8	6	1.7°	0.22	1.6	0.8	4.5	2
VFFDRBD1000	●	10	1.47	0.57	100	15	30	9.4	10	6	1.7°	0.28	2	1	5.5	2
VFFDRBD1200	●	12	1.77	0.7	100	18	36	11.4	12	6	1.8°	0.34	2.4	1.2	6.5	2

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RECOMMENDED CUTTING CONDITIONS

SIDE MILLING

Material		DC	Vc	n	fz	Vf	ap	ae
P	Carbon steel, Alloy steel (180 – 280HB), Alloy tool steel (≤350HB)	3	150	16000	0.15	9600	0.12	1.5
		4	150	12000	0.20	9600	0.16	2.0
		6	150	8000	0.35	11000	0.24	3.0
		8	150	6000	0.35	13000	0.32	4.8
		10	150	4800	0.40	12000	0.40	6.0
		12	150	4000	0.45	11000	0.48	7.2
	Prehardened steel (35 – 45HRC)	3	135	14000	0.15	8400	0.12	1.5
		4	135	11000	0.20	8800	0.16	2.0
		6	135	7200	0.35	10000	0.24	3.0
		8	135	5400	0.35	11000	0.32	4.8
		10	135	4300	0.40	10000	0.40	6.0
		12	135	3600	0.45	9700	0.48	7.2
M H H	Hardened steel (40 – 55HRC), Ferritic and martensitic stainless steel (>200HB), Precipitation hardening stainless steel (<450HB)	3	120	13000	0.15	7800	0.12	1.5
		4	120	9500	0.21	8000	0.16	2.0
		6	120	6400	0.35	9000	0.24	3.0
		8	120	4800	0.35	10000	0.32	4.8
		10	120	3800	0.40	9100	0.40	6.0
	Hardened steel (55 – 62HRC)	12	120	3200	0.45	8600	0.48	7.2
		3	80	8500	0.10	3400	0.12	1.5
		4	80	6400	0.15	3800	0.16	2.0
		6	80	4200	0.30	5000	0.24	3.0
		8	80	3200	0.30	5800	0.32	4.8
		10	80	2500	0.35	5300	0.40	6.0
		12	80	2100	0.40	5000	0.48	7.2

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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 5xD, reduce the spindle speed by 30 % and the feed rate by 50 %.

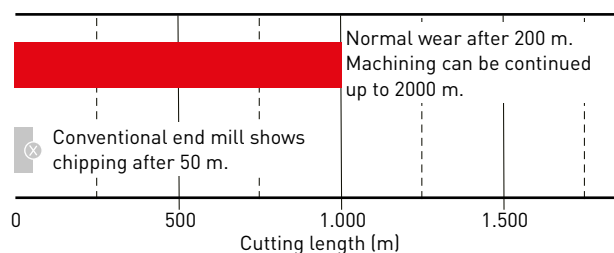
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APPLICATION EXAMPLES

TOOL LIFE COMPARISON WHEN MACHINING ALLOY TOOL STEEL (Ø6 – 7xD OVERHANG)

VFFDRB achieves more than 20 times longer tool life compared to competitors for extreme overhang applications (7xD).

Work material	DIN X40CrMoV51 (52HRC)
Tool size	VFFDRBD0600
n (min ⁻¹)	6.400
Vc (m/min)	120
Vf (mm/min)	6.400
fz (mm)	0.25
ap (mm)	0.3
ae (mm)	1.5
Overhang (mm)	42 (7xD)
Machining centre	Vertical (HSK63)
Cutting method	Down cut, Air blow



VFFDRB
(Cutting length 200 m)

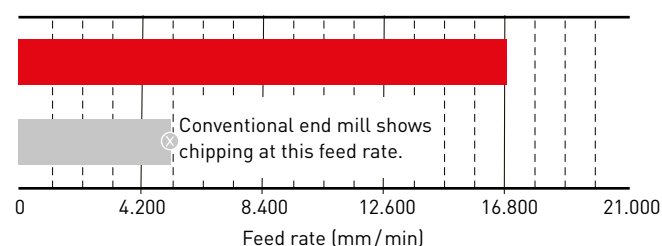


Conventional
(Cutting length 50 m)

MACHINING EFFICIENCY COMPARISON WHEN MACHINING ALLOY TOOL STEEL (Ø10 - 3D OVERHANG)

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

Work material	DIN X40CrMoV51 (52HRC)
Tool size	VFFDRBD1000
n (min ⁻¹)	3.500
Vc (m/min)	110
Vf (mm/min)	5.250-16.800
ap (mm)	0.3
ae (mm)	5.5
Overhang (mm)	30
Machining centre	Horizontal M/C (BT40)
Cutting method	Down cut, Air blow



VFFDRB
6 flutes
Vf (16.800 mm/min)



Conventional end mill
Vf (5.250 mm/min)

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Published by:  MITSUBISHI MATERIALS TOOLS EUROPE | 2015.01