MITSUBISHI
MITSUBISHI MATERIALS

TOOLS NEWS

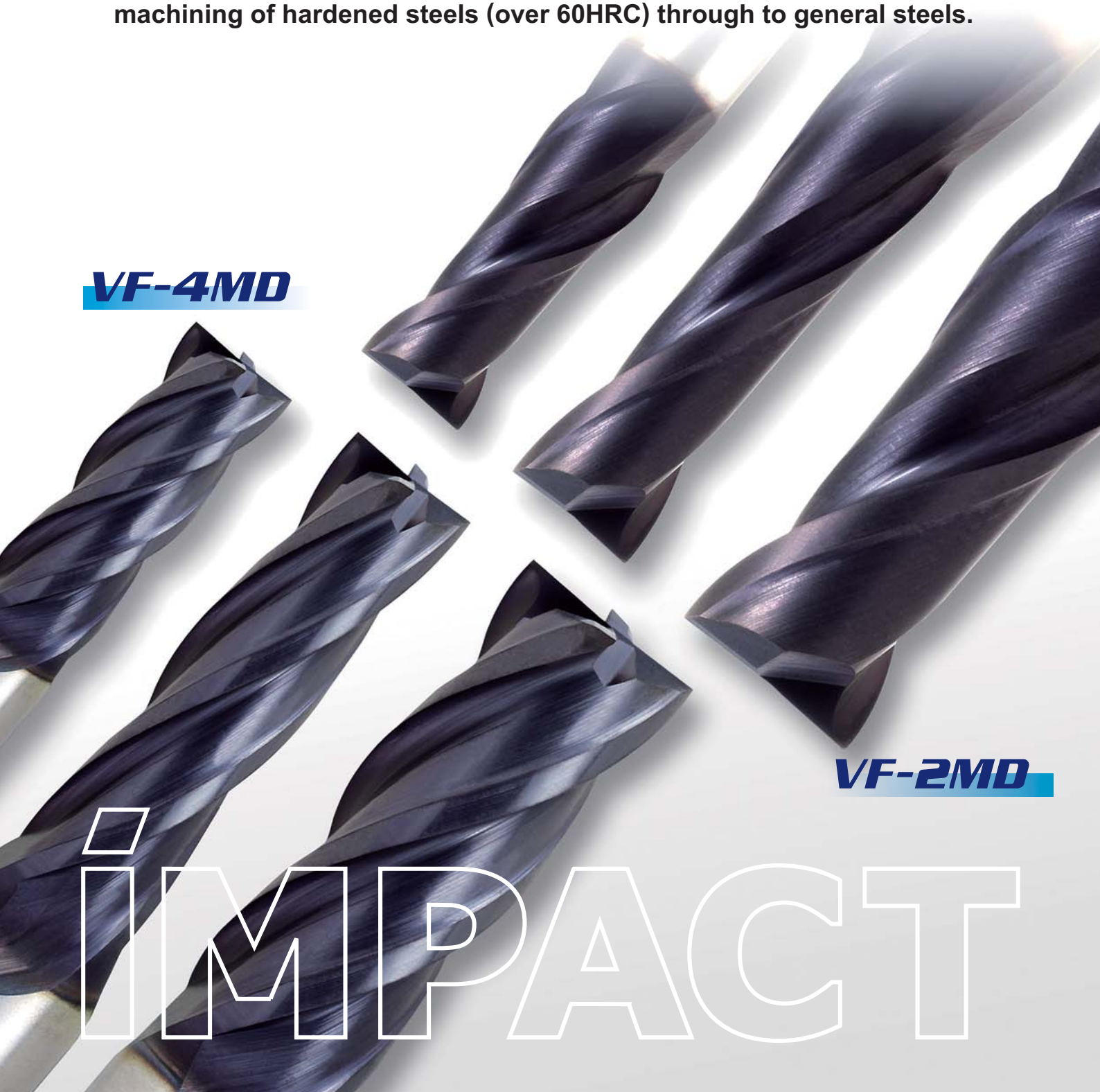
B157G

IMPACT MIRACLE Square End Mill Series

VF-2MD VF-4MD

General-purpose 2 and 4 flute IMPACT MIRACLE end mills now available!

■ IMPACT MIRACLE coating with high heat resistance is used to enable the machining of hardened steels (over 60HRC) through to general steels.

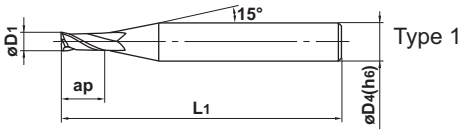


IMPACT MIRACLE END MILL

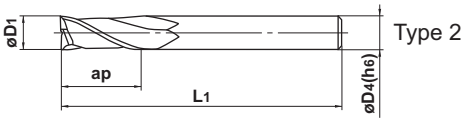
VF-2MD

Medium cut length, 2 flute

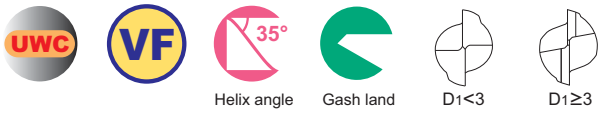
0 − -0.020 h6 4≤D4≤6 0 − -0.008



Type 1



Type 2



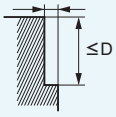
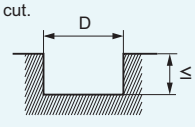
● 2 flute slot drill for high-speed machining of hardened steel.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
VF2MDD0050	0.5	1.3	40	4	2	●	1
D0100	1	2.5	40	4	2	●	1
D0150	1.5	3.8	40	4	2	●	1
D0200	2	5	40	4	2	●	1
D0250	2.5	6.3	40	4	2	●	1
D0300	3	7.5	50	6	2	●	1
D0400	4	10	50	6	2	●	1
D0500	5	12.5	50	6	2	●	1
D0600	6	15	50	6	2	●	2

● : Inventory maintained.

Recommended Cutting Conditions

Work Material	Carbon Steel, Alloy Steel, Tool Steel Pre-hardened Steel (−45HRC) JIS SKD61, NAK			Hardened steel (45−55HRC) JIS SKD61, STAVAX			Hardened steel (55HRC−) JIS SKD11, HSS		
Dia. (mm)	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of Cut (mm)	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of Cut (mm)	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of Cut (mm)
0.5	40000	1000	0.015	40000	960	0.015	30000	600	0.01
1	40000	2000	0.06	32000	1600	0.06	16000	550	0.05
1.5	40000	3000	0.12	32000	1900	0.08	10600	500	0.08
2	30000	3000	0.18	24000	1900	0.10	8100	400	0.1
2.5	24000	2600	0.25	19000	1600	0.13	6400	350	0.13
3	20000	2300	0.30	16000	1400	0.15	5400	300	0.15
4	15000	2000	0.40	12000	1200	0.20	4000	240	0.2
5	12000	1600	0.50	9000	900	0.25	3200	190	0.2
6	10000	1400	0.60	7000	700	0.30	2700	160	0.2
Depth of Cut	≤Please refer to the list above for depth of cut.   ≤Please refer to the list above for depth of cut. D:Dia.								

1) If the rigidity of the machine or the workpiece installation is very low, or chattering is generated, please reduce the revolution and the feed rate proportionately.
2) When slotting with end mills with ϕ3 or larger, reduce the revolution to 50−70% and the feed rate to 40−60%.
3) When drilling, reduce the feed rate by 70%.
4) Drilling is not recommended for workpieces of 55HRC or above.

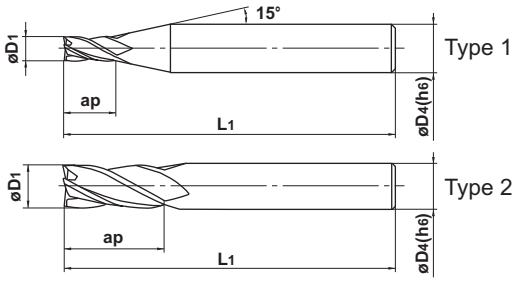
VF-4MD

Medium cut length, 4 flute

D1≤12	0 — -0.020
D1>12	0 — -0.030

h6

4≤D4≤6	0 — -0.008
8≤D4≤10	0 — -0.009
12≤D4≤16	0 — -0.011
D4=20	0 — -0.013



UWC VF 35° Helix angle Gash land

● 4 flute end mill for high-speed machining of hardened steel.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
VF4MDD0100	1	2.5	40	4	4	●	1
D0150	1.5	3.8	40	4	4	●	1
D0200	2	5	40	4	4	●	1
D0250	2.5	6.3	40	4	4	●	1
D0300	3	7.5	50	6	4	●	1
D0400	4	10	50	6	4	●	1
D0500	5	12.5	50	6	4	●	1
D0600	6	15	50	6	4	●	2
D0800	8	20	60	8	4	●	2
D1000	10	25	70	10	4	●	2
D1200	12	30	90	12	4	●	2
D1600	16	40	100	16	4	●	2
D2000	20	50	110	20	4	●	2

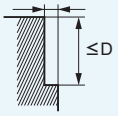
● : Inventory maintained.

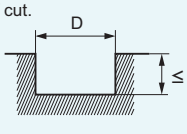
Recommended Cutting Conditions

Work Material	Carbon Steel, Alloy Steel, Tool Steel Pre-hardened Steel (—45HRC) JIS SKD61, NAK			Hardened steel (45—55HRC) JIS SKD61, STAVAX			Hardened steel (55HRC—) JIS SKD11, HSS		
Dia. (mm)	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of Cut (mm)	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of Cut (mm)	Revolution (min^{-1})	Feed Rate (mm/min)	Depth of Cut (mm)
1	40000	3000	0.06	32000	2400	0.06	16000	710	0.05
1.5	40000	4500	0.12	32000	3600	0.08	10600	650	0.08
2	30000	4500	0.18	24000	3600	0.10	8100	520	0.10
2.5	24000	3900	0.25	19000	3000	0.13	6400	450	0.13
3	20000	3500	0.30	16000	2700	0.15	5400	390	0.15
4	15000	3000	0.40	12000	2400	0.20	4000	450	0.20
5	12000	2400	0.50	9000	1800	0.25	3200	380	0.20
6	10000	2100	0.60	7000	1400	0.30	2700	320	0.20
8	8000	1500	0.80	5600	1100	0.40	2000	240	0.20
10	6400	1400	1.00	4500	950	0.50	1600	210	0.30
12	5400	1200	1.00	3800	860	0.50	1300	160	0.30
16	2400	550	3.00	1200	280	0.80	1000	130	0.30
20	1900	480	4.00	1000	240	1.00	800	100	0.30

Depth of Cut

≤Please refer to the list above for depth of cut.





≤Please refer to the list above for depth of cut.

D:Dia.

1) If the rigidity of the machine or the workpiece installation is very low, or chattering is generated, please reduce the revolution and the feed rate proportionately.
2) When slotting with end mills with ϕ3 or larger, reduce the revolution to 50—70% and the feed rate to 40—60%.

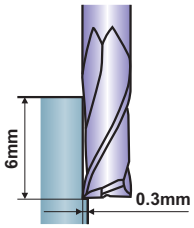
IMPACT MIRACLE END MILL

●Shoulder milling of hardened steel

In comparison with conventional end mills, VF-2MD shows much higher fracture resistance.

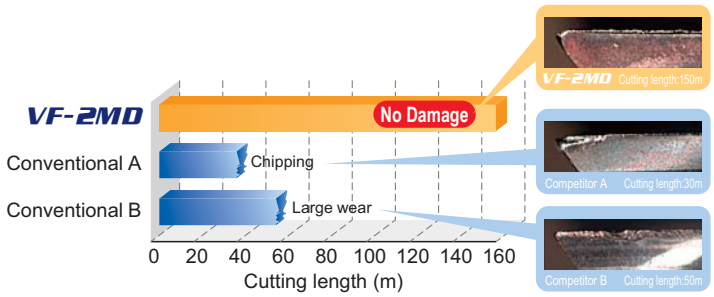
VF-2MD

<Cutting Mode>



End mill	VF2MDD0600
Workpiece	JIS SKD61 (52HRC)
Revolution	7000min^{-1} (130m/min)
Feed rate	980mm/min (0.07mm/tooth)
Machining method	Down cut, Air blow

<Cutting performance>

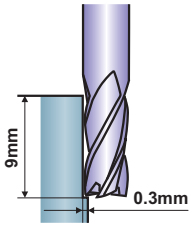


●Cutting resistance comparison

In comparison with a conventional 6 flute end mill for hardened steel, VF-4MD achieves lower cutting resistance.

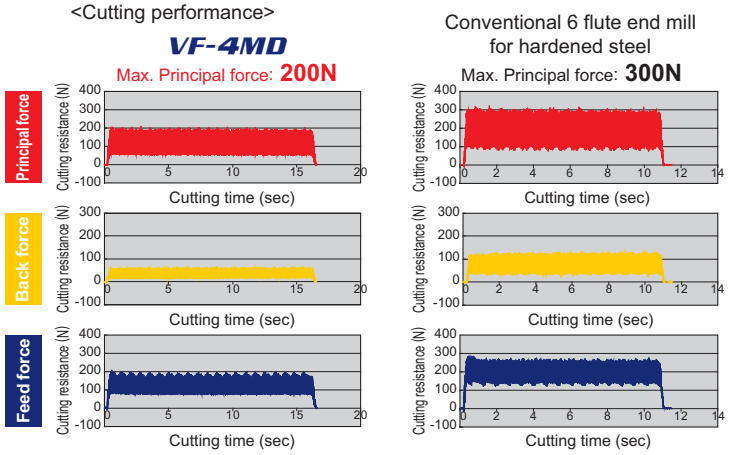
VF-4MD

<Cutting Mode>



End mill	VF4MDD0600
Workpiece	JIS SKD61 (52HRC)
Revolution	1800min^{-1} (34m/min)
Feed rate	VF-4MD : 300mm/min (0.04mm/tooth) Conventional 6 flute end mill : 450mm/min (0.04mm/tooth)
Machining method	Down cut, Air blow

<Cutting performance>



For Your Safety
●Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

MITSUBISHI MATERIALS CORPORATION

JQA-2522
JQA-EM0541
(Akashi Plant)

MITSUBISHI MATERIALS CORPORATION
Area Marketing & Operations Dept.
KFC bldg., 8F, 1-6-1, Yokoami, Sumida-ku, Tokyo 130-0015, Japan
TEL +81-3-5819-8772 FAX +81-3-5819-8774

MITSUBISHI MATERIALS U.S.A. CORPORATION
Headquarters
17401, Eastman Street, Irvine, California, 92614, USA
TEL +1-949-862-5100 FAX +1-949-862-5180

MMC HARTMETALL GmbH
Comeniusstr.2, 40670, Meerbusch GERMANY
TEL +49-2159-9189-0 FAX +49-2159-918966

MMC METAL SINGAPORE PTE LTD.
10, Arumugam Road, #04-00 Lion Industrial Bldg.,409957, SINGAPORE
TEL +65-6743-9370 FAX +65-6749-1469

Mitsubishi Carbide Home page : http://www.mitsubishicarbide.com
(Tools specifications subject to change without notice.)

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