MITSUBISHI
MITSUBISHI MATERIALS

TOOL NEWS

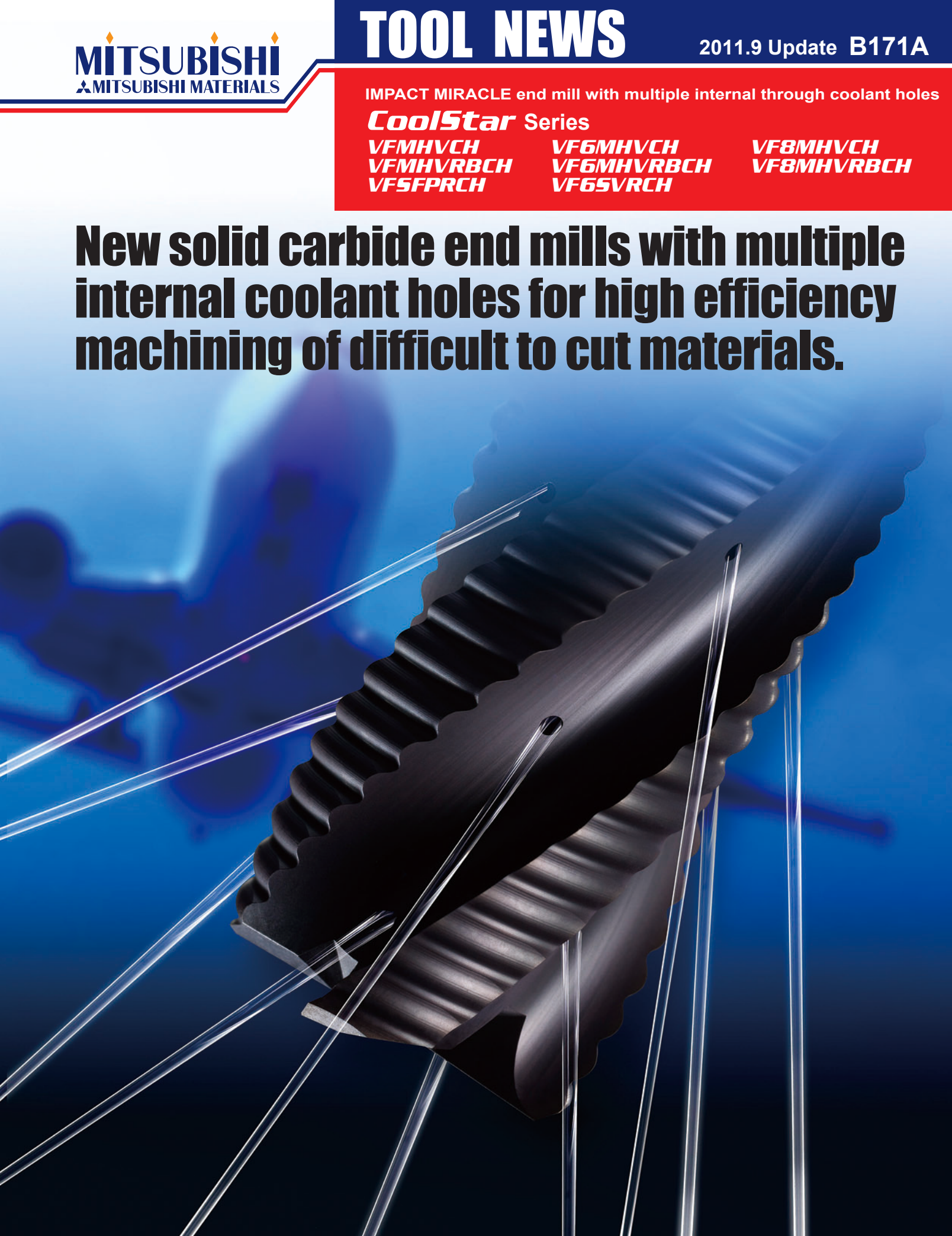
2011.9 Update B171A

IMPACT MIRACLE end mill with multiple internal through coolant holes

CoolStar Series

VFMHVCH
VFMHVRBCH
VF5FPRCH
VF6MHVCH
VF6MHVRBCH
VF6SVRCH
VF8MHVCH
VF8MHVRBCH

New solid carbide end mills with multiple internal coolant holes for high efficiency machining of difficult to cut materials.



IMPACT MIRACLE END MILLS

IMPACT MIRACLE end mill with multiple internal through coolant holes

CoolStar Series

VFMHVCH
VFMHVRBCH
VF5FPRCH

VF6MHVCH
VF6MHVRBCH
VF6SVRCH

VF8MHVCH
VF8MHVRBCH

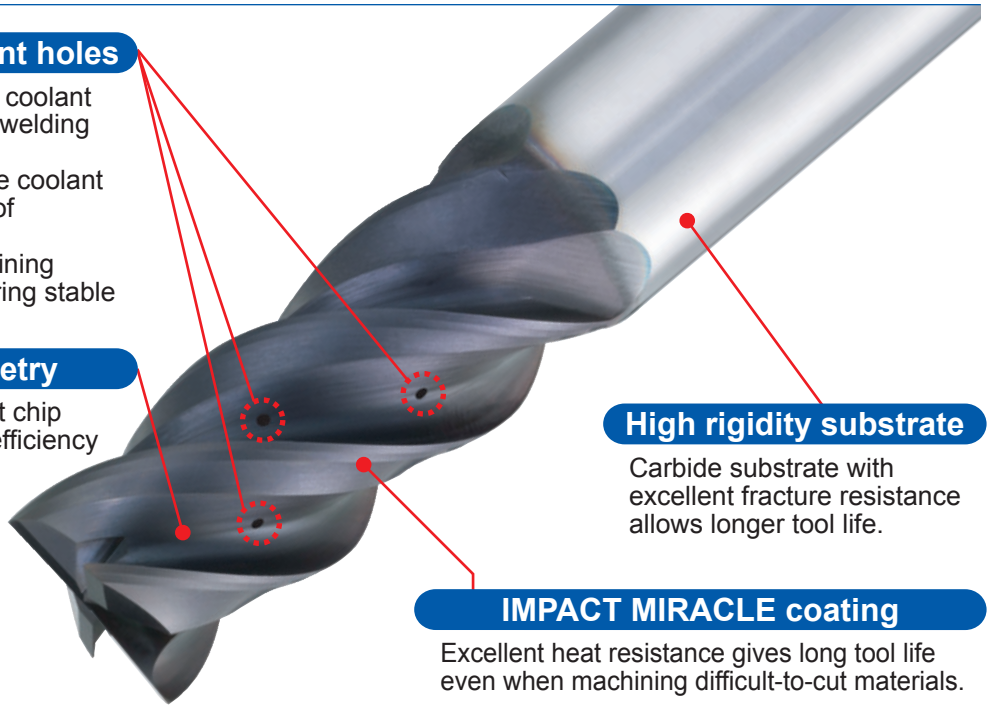
Features

Multiple internal coolant holes

The multiple internal through coolant system is used for improved welding resistance.
The spiral arrangement of the coolant holes enables a wide range of machining applications.
Especially suitable for machining difficult-to-cut materials, offering stable machining.

Unique flute geometry

Flute geometry with excellent chip disposal properties for high efficiency machining.



High rigidity substrate

Carbide substrate with excellent fracture resistance allows longer tool life.

IMPACT MIRACLE coating

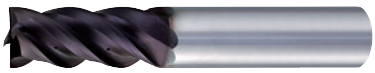
Excellent heat resistance gives long tool life even when machining difficult-to-cut materials.

Wide selection

VFMHVCH

End mill, Medium cut length,
4 flute, Irregular helix flutes,
with multiple internal through coolant

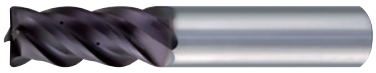
ø16mm, ø20mm



VFMHVRBCH

Corner radius end mill,
Medium cut length, 4 flute,
Irregular helix flutes,
with multiple internal through coolant

ø16mm(2 options)**, ø20mm**(2 options)



VF6MHVCH

End mill, Medium cut length,
6 flute, Irregular helix flutes,
with multiple internal through coolant

ø10mm, ø12mm
ø16mm, ø20mm

VF6MHVRBCH

Corner radius end mill,
Medium cut length, 6 flute,
Irregular helix flutes,
with multiple internal through coolant

ø10mm(2 options)**, ø12mm**(2 options)
ø16mm(2 options)**, ø20mm**(2 options)

VF8MHVCH

End mill, Medium cut length,
8 flute, Irregular helix flutes,
with multiple internal through coolant

ø16mm, ø20mm

VF8MHVRBCH

Corner radius end mill,
Medium cut length, 8 flute,
Irregular helix flutes,
with multiple internal through coolant

ø16mm(2 options)**, ø20mm**(2 options)

VF5FPRCH

Roughing end mill,
Short cut length, 4 flute,
with multiple internal through coolant

ø16mm, ø20mm

VF6SVRCH

Roughing end mill,
Short cut length, 6 flute,
Irregular helix flutes,
with multiple internal through coolant

ø16mm, ø20mm

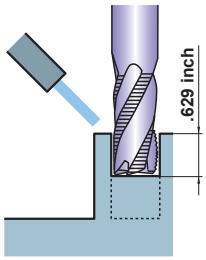
*Contact Mitsubishi Materials for special geometries other than our standard products.

Cutting Performance

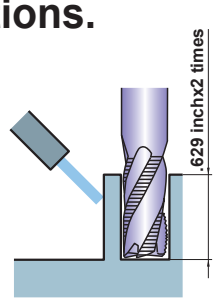
● Stable coolant supply is possible for various applications.

VFSFPRCH

Excellent chip removal and cooling.



First step



Second step

Conventional product (External coolant)

Welding occurred during the second stage of machining (machining stopped).

Deep slotting

End mill	VFSFPRCHD1600 (ø16mm)
Work material	Titanium Alloy
Revolution	2000min^{-1} (330 SFM)
Feed rate	15.7 IPM (.002 IPT)
Cutting fluid	Emulsion (101.5 PSI)

● Tool life comparison when machining stainless steel and titanium alloy.

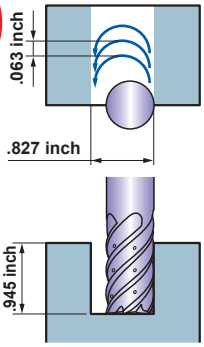
VF6MHVCH

Excellent chip removal and cooling.

Conventional product (External coolant)

Chip packing

Stainless steel



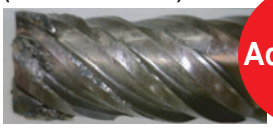
End mill	VF6MHVCHD1600 (ø16mm)
Work material	AISI 304
Revolution	3000min^{-1} (490 SFM)
Feed rate	70.9 IPM (.004 IPT)
Cutting fluid	Emulsion (101.5 PSI)

VF6MHVCH

Excellent chip removal and cooling.

Feed rate:70.9 IPM (.004 IPT)

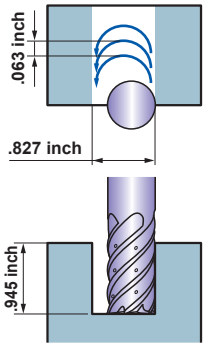
Conventional product (External coolant)



Adhesion

Feed rate:53.1 IPM (.003 IPT)

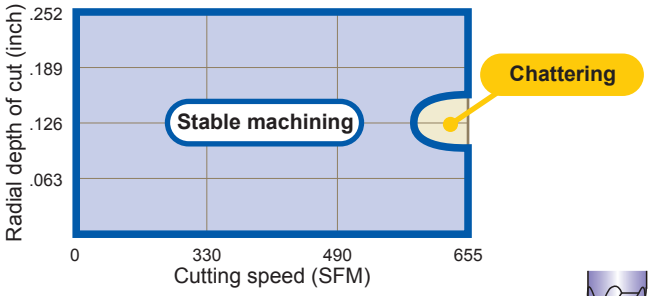
Titanium alloy



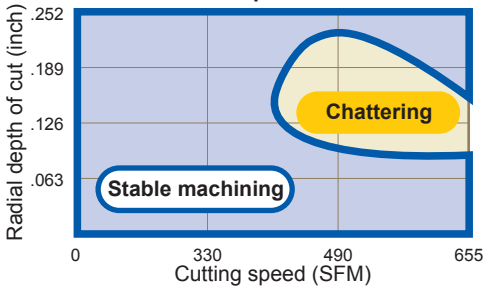
End mill	VF6MHVCHD1600 (ø16mm)
Work material	Titanium Alloy
Revolution	3000min^{-1} (490 SFM)
Feed rate	70.9 IPM (.004 IPT)
Cutting fluid	Emulsion (101.5 PSI)

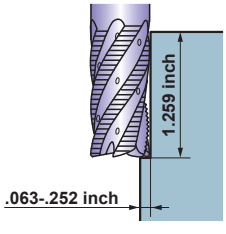
● Stable cutting area comparison when machining stainless steel.

VF6SVRCH



Competitor's





End mill	VF6SVRCH1600 (ø16mm)
Work material	AISI 304
Revolution	2000–4000min^{-1} (330–655SFM)
Feed rate	23.6–47.2 IPM (.002 IPT)
Cutting fluid	Emulsion (101.5 PSI)

IMPACT MIRACLE END MILLS

VFMHVCH

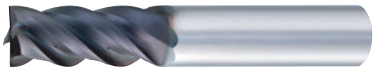
End mill, Medium cut length, 4 flute, Irregular helix flutes, with multiple internal through coolant

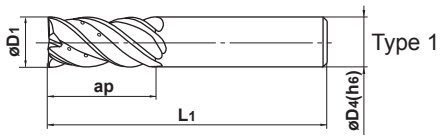
0 — -0.03

h6 D4 = 16 0 — -0.011
D4 = 20 0 — -0.013

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

CoolStar end mills





Type 1

UWC VF 42° 45° Helix angle Gash land

● Vibration control end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
VFMHVCHD1600	16	35	90	16	4	★	1
D2000	20	45	110	20	4	★	1

★ : Inventory maintained in Japan.

Recommended Cutting Conditions

Shoulder milling

Work material	Austenitic Stainless Steel AISI 304, AISI 316 Titanium Alloy			Heat resistant alloys Inconel, etc.		
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)
16	2000	560	22.0	800	110	4.3
20	1600	510	20.1	600	100	3.9
Depth of cut	≤0.1D, 0.5D-1.5D			≤0.05D, 0.5D-1.5D		

D:Dia.

Slotting

Work material	Austenitic Stainless Steel AISI 304, AISI 316 Titanium Alloy		
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)
16	1400	170	6.7
20	1100	130	5.1
Depth of cut	D, 0.5D-1.5D		

D:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is very low, then vibration can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
3) For shoulder milling, climb cutting is recommended.

VFMHVRBCH

Corner radius end mill, Medium cut length, 4 flute, Irregular helix flutes, with multiple internal through coolant

R ±0.015 | 0 — -0.03 | h6 D4 = 16 0 — -0.011 D4 = 20 0 — -0.013

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	Aluminium Alloy
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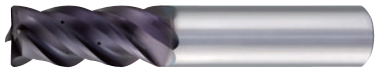
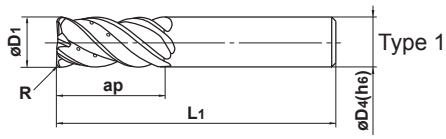
CoolStar end mills





UWC VF 42° 45° Helix angle

● Vibration control corner radius end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.

Unit : mm

Order Number	Dia. D1	Corner Radius R	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
VFMHVRBCHD1600R100	16	1	35	90	16	4	★	1
D1600R300	16	3	35	90	16	4	★	1
D2000R100	20	1	45	110	20	4	★	1
D2000R300	20	3	45	110	20	4	★	1

★ : Inventory maintained in Japan.

Recommended Cutting Conditions

Shoulder milling

Work material	Austenitic Stainless Steel AISI 304, AISI 316 Titanium Alloy			Heat resistant alloys Inconel, etc.		
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)
16	2000	560	22.0	800	110	4.3
20	1600	510	20.1	600	100	3.9
Depth of cut	≤0.1D, 0.5D-1.5D			≤0.05D, 0.5D-1.5D		

D:Dia.

Slotting

Work material	Austenitic Stainless Steel AISI 304, AISI 316 Titanium Alloy		
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)
16	1400	170	6.7
20	1100	130	5.1
Depth of cut	D, 0.5D-1.5D		

D:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is very low, then vibration can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
3) For shoulder milling, climb cutting is recommended.

IMPACT MIRACLE END MILLS

VF6MHVCH

End mill, Medium cut length, 6 flute, Irregular helix flutes with multiple internal through coolant

D1 ≤ 12 0 — -0.020
D1 > 12 0 — -0.030

h6

D4 = 10 0 — -0.009
D4 = 12 0 — -0.011
D4 = 16 0 — -0.011
D4 = 20 0 — -0.013

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
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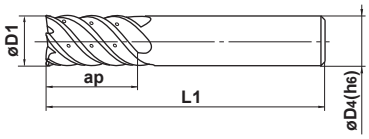
CoolStar end mills



Type 1

UWC VF

Helix angle

Gash land

● Vibration control end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
VF6MHVCHD1000	10	22	70	10	6	●	1
D1200	12	26	75	12	6	●	1
D1600	16	32	90	16	6	★	1
D2000	20	38	100	20	6	★	1

● : Inventory maintained.
★ : Inventory maintained in Japan.

Recommended Cutting Conditions

Shoulder milling

Work material	Austenitic Stainless Steel AISI 304, AISI 316 Titanium Alloy			Heat resistant alloys Inconel, etc.		
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)
10	4800	2000	78.7	1300	260	10.2
12	4000	2000	78.7	1100	230	9.1
16	3000	1600	63.0	800	180	7.1
20	2400	1400	55.1	640	150	5.9
Depth of cut	≤0.1D, 0.5D-1.5D			≤0.05D, 0.5D-1.5D		

D:Dia.

Trochoidal milling

Work material	Austenitic Stainless Steel AISI 304, AISI 316 Titanium Alloy		
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)
10	4800	1400	55.1
12	4000	1200	47.2
16	3000	1100	43.3
20	2400	900	35.4
Depth of cut	1.5D≤, ≤0.1D, 0.5D-1.5D		

D:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is very low, then vibration can occur. In this case, please reduce the revolution and feed rate proportionately.
3) Climb cutting is recommended.

VF6MHVRBCH

Corner radius end mill, Medium cut length, 6 flute, Irregular helix flutes, with multiple internal through coolant

R ±0.015

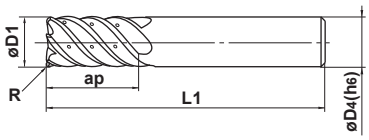
D1 ≤ 12 0 — -0.020
D1 > 12 0 — -0.030

h6

D4 = 10 0 — -0.009
D4 = 12 0 — -0.011
D4 = 16 0 — -0.011
D4 = 20 0 — -0.013

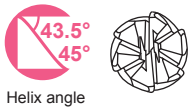
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
				◎	◎		

CoolStar
end mills



Type 1

UWC VF



Helix angle

● Vibration control corner radius end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.

Unit : mm

Order Number	Dia. D1	Corner Radius R	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
VF6MHVRBCHD1000R050	10	0.5	22	70	10	6	●	1
D1000R100	10	1	22	70	10	6	●	1
D1200R050	12	0.5	26	75	12	6	●	1
D1200R100	12	1	26	75	12	6	●	1
D1600R100	16	1	32	90	16	6	★	1
D1600R300	16	3	32	90	16	6	★	1
D2000R100	20	1	38	100	20	6	★	1
D2000R300	20	3	38	100	20	6	★	1

● : Inventory maintained.
★ : Inventory maintained in Japan.

Recommended Cutting Conditions

Shoulder milling

Work material	Austenitic Stainless Steel AISI 304, AISI 316 Titanium Alloy			Heat resistant alloys Inconel, etc.		
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)
10	4800	2000	78.7	1300	260	10.2
12	4000	2000	78.7	1100	230	9.1
16	3000	1600	63.0	800	180	7.1
20	2400	1400	55.1	640	150	5.9
Depth of cut	≤0.1D 0.5D-1.5D			≤0.05D 0.5D-1.5D		

D:Dia.

Trochoidal milling

Work material	Austenitic Stainless Steel AISI 304, AISI 316 Titanium Alloy		
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)
10	4800	1400	55.1
12	4000	1200	47.2
16	3000	1100	43.3
20	2400	900	35.4
Depth of cut	1.5D≤ ≤0.1D 0.5D-1.5D		

D:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is very low, then vibration can occur. In this case, please reduce the revolution and feed rate proportionately.
3) Climb cutting is recommended.

IMPACT MIRACLE END MILLS

VF8MHVCH NEW

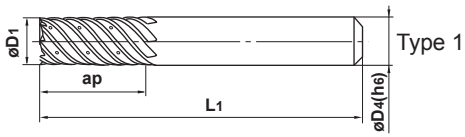
End mill, Medium cut length, 8 flute, Irregular helix flutes, with multiple internal through coolant

0 — -0.03

h6 D4 = 16 0 — -0.011
D4 = 20 0 — -0.013

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

CoolStar end mills



UWC VF 44° 45° Helix angle Gash land

- Vibration control 8 flute end mill with multiple internal through coolant holes ensures efficient side finishing of difficult-to-cut materials such as stainless steels, titanium and inconel alloys.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
VF8MHVCHD1600	16	32	90	16	8	★	1
D2000	20	38	100	20	8	★	1

★ : Inventory maintained in Japan.

Recommended Cutting Conditions

Shoulder milling

Work material	Austenitic Stainless Steel AISI 304, AISI 316 Titanium Alloy			Heat resistant alloys Inconel, etc.		
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)
16	3000	2100	82.7	800	240	9.4
20	2400	1900	74.8	640	200	7.9
Depth of cut	≤0.08D, 0.5D-1.5D			≤0.05D, 0.5D-1.5D		

D:Dia.

Trochoidal milling

Work material	Austenitic Stainless Steel AISI 304, AISI 316 Titanium Alloy		
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)
16	3000	1400	55.1
20	2400	1200	47.2
Depth of cut	1.5D≤, ≤0.08D, 0.5D-1.5D		

D:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is very low, then vibration can occur. In this case, please reduce the revolution and feed rate proportionately.
3) Climb cutting is recommended.

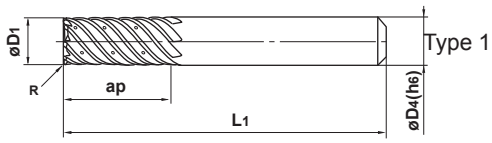
VF8MHVRBCH NEW

Corner radius end mill, Medium cut length, 8 flute, Irregular helix flutes, with multiple internal through coolant

R ±0.015 | 0 — -0.03 | h6 D4 = 16 0 — -0.011 D4 = 20 0 — -0.013

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

CoolStar end mills



UWC VF 44° 45° Helix angle

- Vibration control 8 flute corner radius end mill with multiple internal through coolant holes ensures efficient side finishing of difficult-to-cut materials such as stainless steels, titanium and inconel alloys.

Unit : mm

Order Number	Dia. D1	Corner Radius R	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
VF8MHVRBCHD1600R100	16	1	32	90	16	8	★	1
D1600R300	16	3	32	90	16	8	★	1
D2000R100	20	1	38	100	20	8	★	1
D2000R300	20	3	38	100	20	8	★	1

★: Inventory maintained in Japan.

Recommended Cutting Conditions

Shoulder milling

Work material	Austenitic Stainless Steel AISI 304, AISI 316 Titanium Alloy			Heat resistant alloys Inconel, etc.		
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)
16	3000	2100	82.7	800	240	9.4
20	2400	1900	74.8	640	200	7.9
Depth of cut	≤0.08D, 0.5D-1.5D			≤0.05D, 0.5D-1.5D		

D:Dia.

Trochoidal milling

Work material	Austenitic Stainless Steel AISI 304, AISI 316 Titanium Alloy		
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)
16	3000	1400	55.1
20	2400	1200	47.2
Depth of cut	1.5D≤, ≤0.08D, 0.5D-1.5D		

D:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is very low, then vibration can occur. In this case, please reduce the revolution and feed rate proportionately.
3) Climb cutting is recommended.

IMPACT MIRACLE END MILLS

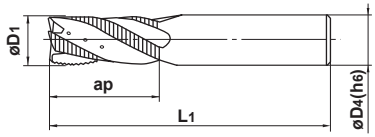
VFSFPRCH

Roughing end mill, Short cut length, 4 flute, with multiple internal through coolant

h6 D4 = 16 0 — -0.011
D4 = 20 0 — -0.013

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

CoolStar end mills



Type 1

UWC VF 30° Helix angle

● Roughing end mill with multiple internal through coolant holes suitable for difficult-to-cut materials.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
VFSFPRCHD1600	16	33	90	16	4	★	1
D2000	20	38	100	20	4	★	1

★ : Inventory maintained in Japan.

Recommended Cutting Conditions

Shoulder milling

Work material	Austenitic Stainless Steel AISI 304, AISI 316 Titanium Alloy			Heat resistant alloys Inconel, etc.		
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)
16	1200	300	11.8	800	110	4.3
20	1000	300	11.8	600	100	3.9
Depth of cut	≤0.5D, 0.5D-1.5D			≤0.3D, 0.5D-1.0D		

D:Dia.

Trochoidal milling

Work material	Austenitic Stainless Steel AISI 304, AISI 316 Titanium Alloy		
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)
16	800	100	3.9
20	600	80	3.1
Depth of cut	D, 0.5D-1.0D		

D:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) If the rigidity of the machine or the workpiece installation is very low, then vibration can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
3) For shoulder milling, climb cutting is recommended.

VF6SVRCH

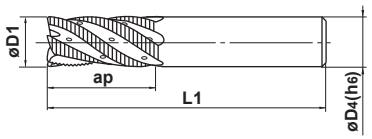
Roughing end mill, Short cut length, 6 flute, Irregular helix flutes, with multiple internal through coolant

h6

D4 = 16 0 — -0.011
D4 = 20 0 — -0.013

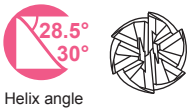
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
				◎	◎		

CoolStar end mills



Type 1

UWC VF



Helix angle

- 6 flute roughing end mill with multiple internal through coolant holes ensures efficient side finishing of difficult-to-cut materials such as stainless steels, titanium and inconel alloys.

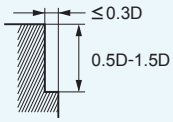
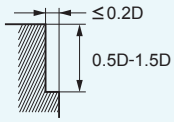
Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
VF6SVRCHD1600	16	33	90	16	6	★	1
D2000	20	38	100	20	6	★	1

★ : Inventory maintained in Japan.

Recommended Cutting Conditions

Shoulder milling

Work material	Austenitic Stainless Steel AISI 304, AISI 316 Titanium Alloy			Heat resistant alloys Inconel, etc.		
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)	Revolution (min^{-1})	Feed rate (mm/min)	Feed rate (IPM)
16	2400	1200	47.2	800	160	6.3
20	2000	1000	39.4	600	140	5.5
Depth of cut						

D:Dia.

1) If the depth of cut is shallow, the revolution and feed rate can be increased.
2) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is very low, then vibration can occur. In this case, please reduce the revolution and feed rate proportionately.
3) Climb cutting is recommended.

ÍMPACT MIRACLE END MILLS

IMPACT MIRACLE end mill
with multiple internal through coolant holes

CoolStar Series

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 attaching inserts or spare parts, please use only the correct wrench or spanner. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

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