
VQT5MVRB

CORNER RADIUS END MILL

FOR HIGH EFFICIENCY TITANIUM ALLOY MACHINING



VQT5MVRB

IMPROVED EFFICIENCY FOR DEEP SLOT MILLING

The combination of 5 flutes and a centre through coolant hole enable highly efficient rough cutting of titanium alloys.

IRREGULAR HELIX

Chatter and vibration are controlled even during deep shoulder machining.

CORNER RADIUS (EMPHASIS ON EDGE SHARPNESS)

The seamless blend between the corner radius and peripheral cutting edge suppresses abnormal wear and provides a stable tool life.

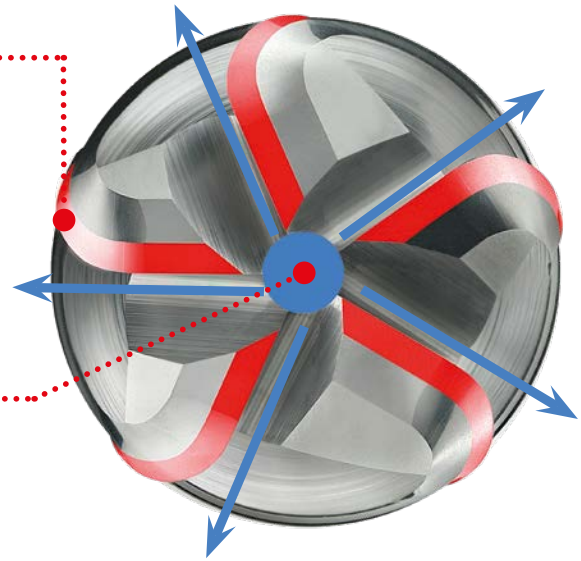
(Non-standard corner radius sizes are available by special order)



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OPTIMUM FLUTE DESIGN

Optimisation of the 5-flute geometry improves chip evacuation and is ideal for deep slot and shoulder milling.



CENTRE THROUGH COOLANT HOLE

Ample cutting fluid is supplied to the cutting edges and also enables a smooth and efficient discharge of chips.

IDENTIFICATION CODE

VQT5MVRB

End mill names		Features		DC		Neck length	
VQT	SMART MIRACLE End mill for titanium alloys	V	Irregular spiral Helix angle	160	DC = 16 mm	N048	LU = 48 mm
				200	DC = 20 mm	N060	LU = 60 mm
				250	DC = 25 mm	N075	LU = 75 mm

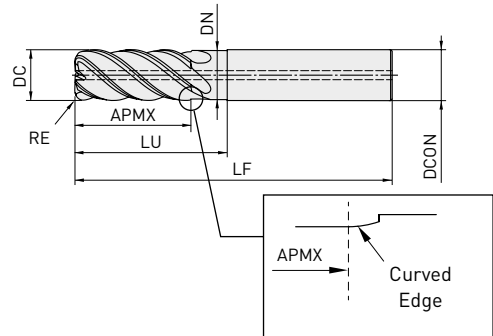
VQT	5	M	V	RB	250	R400	N075	C
No. of flutes		Flute length		End cutting edge		Corner radius		Coolant hole
5	5 flute	M	Medium	RB	Radius	R100	1 mm	C Centre through
						R300	3 mm	
						R400	4 mm	
						R600	6 mm	

NEW

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4 0°
41.5°
43°

CORNER RADIUS, MEDIUM CUT LENGTH, 5 FLUTE, IRREGULAR HELIX, WITH THROUGH COOLANT HOLE

S

RE

±0.02



DC < 16 20 < DC < 25

0 0
-0.03 -0.04

DCON = 16 20 < DCON < 25

0 0
-0.011 -0.013

- Flute geometry suitable for deep slotting and effective chip evacuation.
- Sharp cutting edges provide long tool life when machining titanium alloys.

Order number	Stock	DC	RE	APMX	LU	DN	LF	DCON	ZEFP
VQT5MVRB160R100N48C	●	16	1	35	48	15.5	120	16	
VQT5MVRB160R300N48C	●	16	3	35	48	15.5	120	16	
VQT5MVRB160R400N48C	●	16	4	35	48	15.5	120	16	
VQT5MVRB200R100N60C	●	20	1	45	60	19.5	135	20	
VQT5MVRB200R300N60C	●	20	3	45	60	19.5	135	20	
VQT5MVRB200R400N60C	●	20	4	45	60	19.5	135	20	5
VQT5MVRB200R600N60C	●	20	6	45	60	19.5	135	20	
VQT5MVRB250R100N75C	●	25	1	55	75	24.5	155	25	
VQT5MVRB250R300N75C	●	25	3	55	75	24.5	155	25	
VQT5MVRB250R400N75C	●	25	4	55	75	24.5	155	25	
VQT5MVRB250R600N75C	●	25	6	55	75	24.5	155	25	

1. SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electric transmitted) may not work. When measuring the tool length, please use a contact type (non-electrical) or a laser tool setter.
2. Non-standard corner R sizes are available by special order. Please contact us for details.

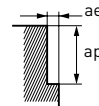


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RECOMMENDED CUTTING CONDITIONS

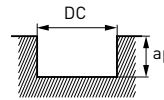
SHOULDER MILLING

Material	Overhang length DC×3					
	DC	Vc	n	Vf	ap	ae
S Titanium alloys Ti-6Al-4V etc.	16	80	1600	800	32	2.4
	20	80	1300	650	40	3.0
	25	80	1000	500	50	3.8

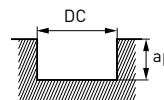


SLOT MILLING

Material	Depth of cut DC×1					
	RE	DC	Vc	n	Vf	ap
S Titanium alloys Ti-6Al-4V etc.	1-4	16	60	1200	420	16
		16	60	1200	300	16
		20	60	950	330	20
		20	60	950	238	20
		25	50	640	220	25
		25	50	640	160	25



Material	Depth of cut DC×2					
	RE	DC	Vc	n	Vf	ap
S Titanium alloys Ti-6Al-4V etc.	1-4	16	60	1200	240	32
		16	60	1200	180	32
		20	60	950	190	40
		20	60	950	143	40
		25	50	640	130	50
		25	50	640	96	50



1. SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electrically transmitted) may not work. When measuring the tool length, please use a contact type (non-electrical) or a laser tool setter.
2. When cutting titanium alloys, the use of water-soluble cutting fluid is effective.
3. The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the work material installation is poor, vibration or abnormal sound can occur. In this case, please reduce the speed and feed rate proportionately, or set a lower depth of cut.
4. If the depth of cut is smaller, the speed and feed rate can be increased.
5. When machining deep slots where the depth of cut exceeds the diameter DC, use a high strength holder or one equipped with a retaining mechanism. Additionally ensure the clamping and workpiece rigidity are sufficient.

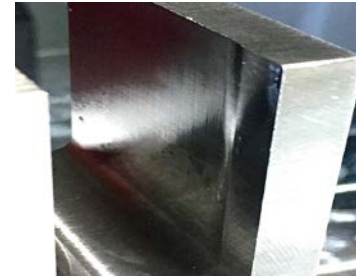
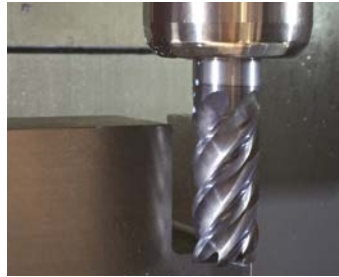
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APPLICATION EXAMPLE

METAL REMOVAL RATE : 250CC/MIN CAN BE ACHIEVED.

High depths of cut can shorten machining times.
Irregular helix flutes enables excellent surface finishes.

Material	Ti-6AL-4V
Tool	VQT5MVRB250R400N075C
n (min ⁻¹)	636
Vf (mm/min)	206
ap (mm)	50
ae (mm)	25
Overhang (mm)	75
Cutting mode	Slot milling
Coolant	Internal + External coolant (Emulsion)
Machine	Vertical MC (BT50)



Machined Surface

CUTTING PERFORMANCE

SLOT MILLING AT HIGH DEPTHS OF CUT IN TITANIUM ALLOY.

The seamless blend between the corner radius and peripheral cutting edge suppresses abnormal wear and provides a stable tool life.

Material	Ti-6AL-4V
Tool	VQT5MVRB160R300N048C
n (min ⁻¹)	1200
Vf (mm/min)	660
ap (mm)	16
ae (mm)	16
Cutting length (mm)	60
Overhang (mm)	48
Cutting mode	Slot milling
Coolant	Internal + External coolant (Emulsion)
Machine	Vertical MC (BT50)



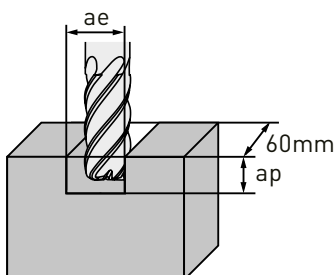
After 17 slots



Fracture (After 6 slots)



Conventional



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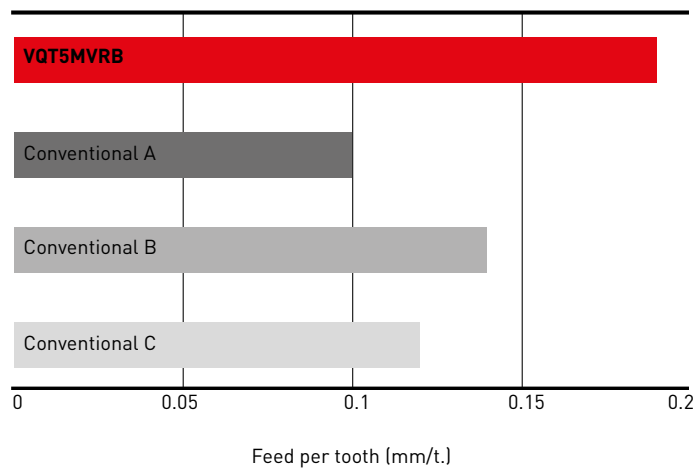
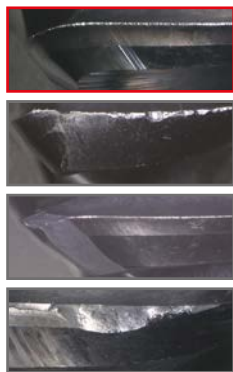
CUTTING PERFORMANCE

COMPARISON OF MAXIMUM FEED RATES WHEN SLOT MACHINING TITANIUM ALLOY.

Higher efficiencies can be achieved when compared with conventional products.

Material	Ti-6Al-4V
Tool	VQT5MVRB160R300N048C
n (min ⁻¹)	1200
ap (mm)	16
ae (mm)	16
Cutting length (mm)	60
Overhang (mm)	48
Cutting mode	Slot milling
Coolant	Internal + External coolant (Emulsion)
Machine	Vertical MC (BT50)

FEED COMPARISON



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