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# VQT5MVRB

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CORNER RADIUS END MILL

FOR HIGH EFFICIENCY TITANIUM ALLOY MACHINING

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# VQT5MVRB

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## IMPROVED EFFICIENCY FOR DEEP SLOT MILLING

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

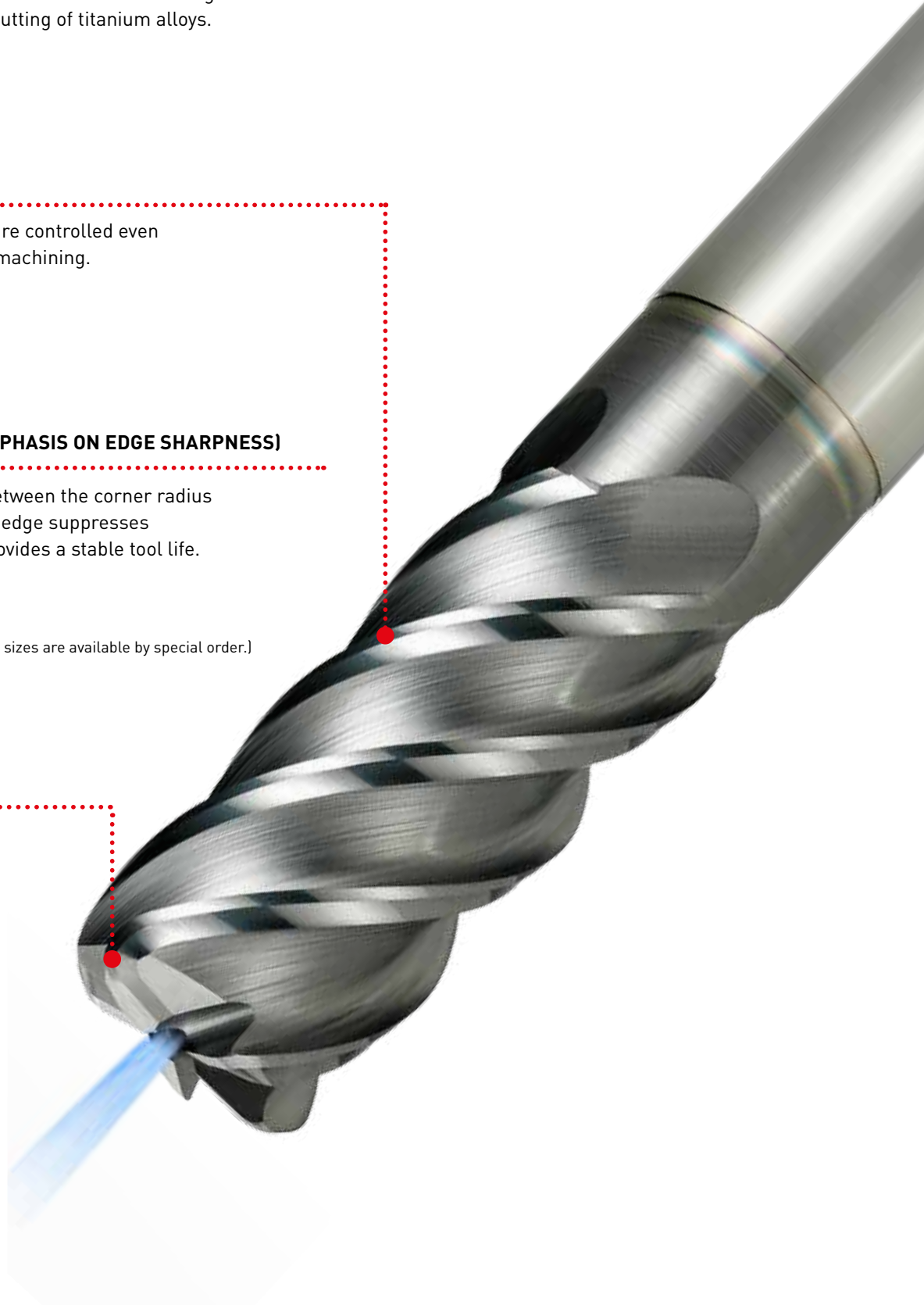
### IRREGULAR HELIX

Chatter and vibration are controlled even during deep shoulder machining.

### CORNER RADIUS (EMPHASIS ON EDGE SHARPNESS)

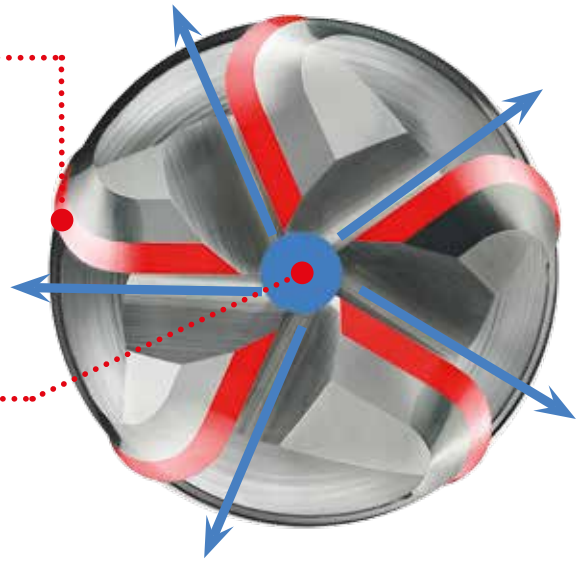
The seamless blend between the corner radius and peripheral cutting edge suppresses abnormal wear and provides a stable tool life.

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



### 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	
<b>VQT</b>	SMART MIRACLE End Mill for Titanium Alloys	<b>V</b>	Irregular Spiral Helix Angle	160	DC = 16mm	N048	LU = 48 mm
				200	DC = 20mm	N060	LU = 60 mm
				250	DC = 25mm	N075	LU = 75 mm

<b>VQT</b>	<b>5</b>	<b>M</b>	<b>V</b>	<b>RB</b>	<b>250</b>	<b>R400</b>	<b>N075</b>	<b>C</b>
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No. of Flutes		Flute Length		End Cutting Edge		Corner Radius		Coolant Hole	
<b>5</b>	5 flute	<b>M</b>	Medium	<b>RB</b>	Radius	<b>R300</b>	3 mm	<b>C</b>	Centre Through
						<b>R400</b>	4 mm		

# VQT5MVRB

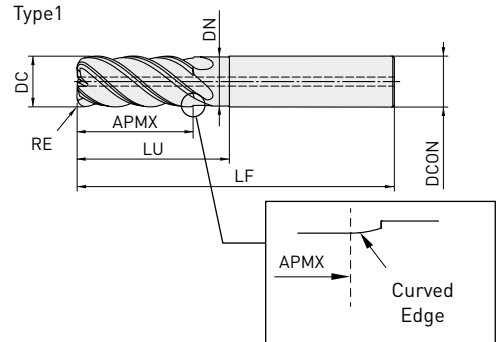


CORNER RADIUS, MEDIUM CUT LENGTH, 5 FLUTE, IRREGULAR HELIX, WITH THROUGH COOLANT HOLE

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	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	DC	RE	APMX	LU	DN	LF	DCON	No. F*	Stock	Type
<b>NEW</b> VQT5MVRB160R300N048C	16	3	34	48	15.5	100	16	5	●	1
<b>NEW</b> VQT5MVRB200R400N060C	20	4	44	60	19.5	120	20	5	●	1
<b>NEW</b> VQT5MVRB250R400N075C	25	4	54	75	24.5	140	25	5	●	1

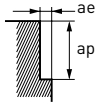
1. SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electric transmitted) may not work. When measuring the tool length, please use a contact type (non-electrical) or a laser tool setter.
  2. Non-standard corner R sizes are available by special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

## SPECIAL CORNER R SIZE RANGE

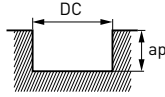
DC	RE
16	1-5
20, 25	1-6

# RECOMMENDED CUTTING CONDITIONS

## SHOULDER MILLING

		S				
Material	Titanium Alloys Ti-6Al-4V etc.					
		Overhang Length DC×3				
DC	Vc (m/min)	n (min <sup>-1</sup> )	Vf (mm/min)	ap (mm)	ae (mm)	
16	70	1400	700	32	2.4	
20	70	1100	550	40	3	
25	70	890	440	50	3.8	
Depth of Cut					DC=Dia.	

## SLOT MILLING

		S							
Material	Titanium Alloys Ti-6Al-4V etc.								
		Depth of Cut DC×1				Depth of Cut DC×2			
DC	Vc (m/min)	n (min <sup>-1</sup> )	Vf (mm/min)	ap (mm)	Vc (m/min)	n (min <sup>-1</sup> )	Vf (mm/min)	ap (mm)	
16	60	1200	420	16	60	1200	240	32	
20	60	950	330	20	60	950	190	40	
25	50	640	220	25	50	640	130	50	
Depth of Cut									DC=Dia.

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. 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. For slot milling, use a chuck with a high clamping force.

# 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
Revolution n (min <sup>-1</sup> )	636
Table Feed Vf (mm/min)	206
Depth of Cut ap (mm)	50
Width of Cut ae (mm)	25
Overhang (mm)	75
Cutting Mode	Slot Milling
Coolant	Internal Coolant + 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
Revolution n (min <sup>-1</sup> )	1200
Table Feed Vf (mm/min)	660
Depth of Cut ap (mm)	16
Width of Cut ae (mm)	16
Cutting Length (mm)	60
Overhang (mm)	48
Cutting Mode	Slot Milling
Coolant	Internal Coolant + External Coolant (Emulsion)
Machine	Vertical MC (BT50)

### VQT5MVRB



After 17 slots



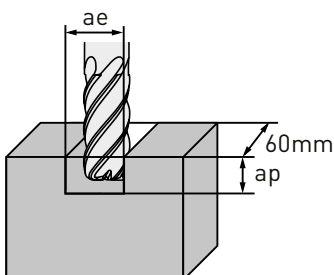
Tool life  
+300 %



Fracture ( After 6 slots )



Conventional



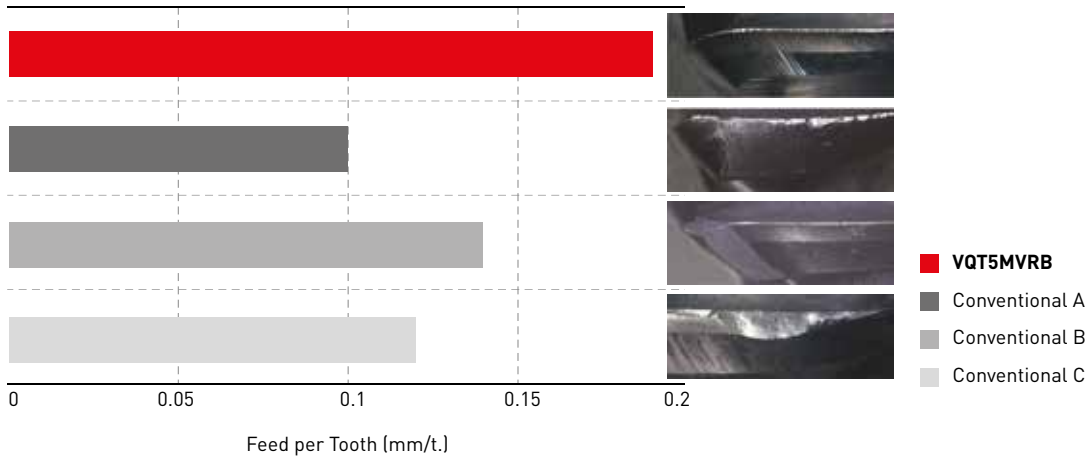
# CUTTING PERFORMANCE

## 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
Revolution n (min <sup>-1</sup> )	1200
Depth of Cut ap (mm)	16
Width of Cut ae (mm)	16
Cutting Length (mm)	60
Overhang (mm)	48
Cutting Mode	Slot Milling
Coolant	Internal Coolant + External Coolant (Emulsion)
Machine	Vertical MC (BT50)

### FEED COMPARISON



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