



# MEDICAL

APPLICATIONS



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■ Co-Cr Alloy ■ Titanium Alloy ■ UHMWPE

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The combination of VP coating and a high-strength micro-grain cemented carbide substrate increases wear resistance.



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### Drilling

Employs new TRI-Cooling Technology with a new tool grade DP7020 for high efficiency & longer tool life.



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### Taper Hole Machining

High efficiency taper hole machining using vibration control radius end mills.



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### Profile Machining

The combination of IMPACT MIRACLE coating and a high-strength micro-grain cemented carbide substrate increases wear resistance.



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## KNEE-SYSTEM

■ Co-Cr Alloy ■ Titanium Alloy ■ UHMWPE



### Profile Machining

Variable curve geometry ensures stable machining of difficult-to-cut materials.



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### Pocket Machining

High efficiency machining because high feed rates and larger depths of cut can be utilised.



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# BONE PLATES

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## Multifunctional Milling

Possible to machine complex geometries that are previously difficult to machine.



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■ Titanium Alloy ■ SUS316 ■ SUS317



## Deep Hole Drilling

Ultra productivity machining due to through coolant holes plus the flute geometry and cutting edge geometry are optimised for deep hole drilling.



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## Deep Machining with Small Diameter

Machining of a deep cavity and complex parts are possible with a variety of neck lengths.



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## External Turning & Cut Off

The combination of VP coating and a high-strength micro-grain cemented carbide substrate increases wear resistance.



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# SPINE

■ Co-Cr Alloy ■ Titanium Alloy ■ Stainless Steel



## Side Cutting

Delivers superior vibration resistance for difficult-to-cut materials and on applications with long overhangs.



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# INSTRUMENT

■ Titanium Alloy ■ Stainless Steel



## Rough Milling

High efficiency machining possible by using a high feed radius milling cutter when machining difficult-to-cut materials.



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## Deep Hole Drilling

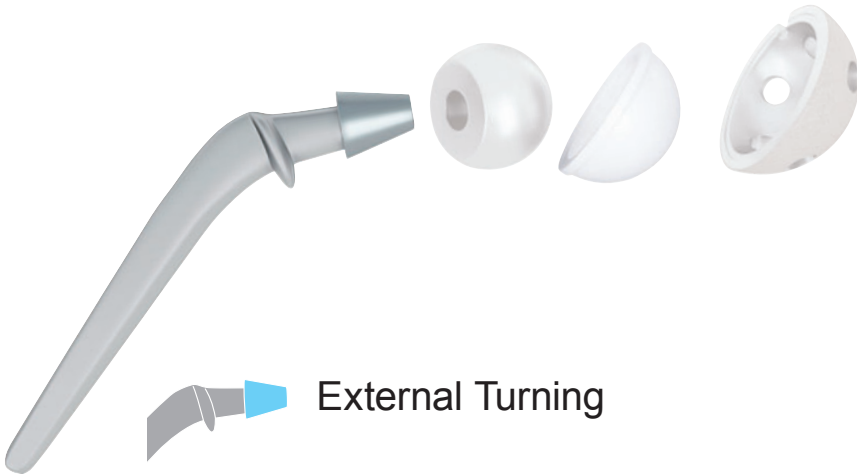
Ultra productivity machining due to through coolant holes plus the flute geometry and cutting edge geometry are optimised for deep hole drilling.



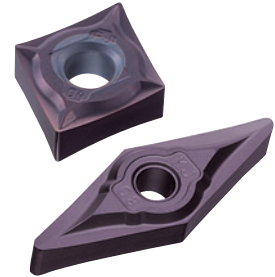
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# HIP-SYSTEM

Work Materials [Co-Cr Alloy, **Titanium Alloy**, UHMWPE]



Good cutting performance



**VPO5RT/VP10RT**  
**FJ/MJ Breaker**  
 (TOOLS NEWS B036G)

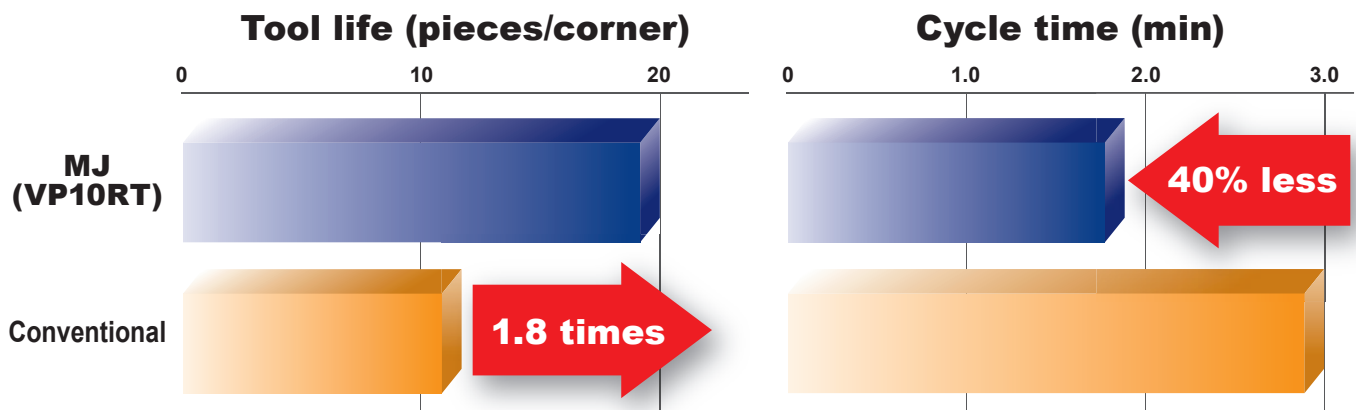
## Key Point on Machining

- A good balance of wear and fracture resistance for turning Co-Cr Alloy and Titanium Alloy.
- Reduced heat generation with the use of a sharp cutting edge.

## Application Example

- **1.8 times longer tool life than conventional products !**  
 → **Conventional insert chipped, MJ(VP10RT) no damage !**
- **High efficiency with large depth of cut !**

<b>Insert (Grade)</b>	CNMG120404-MJ (VP10RT)
<b>Machine</b>	CNC Lathe Machine
<b>Work Material</b>	Titanium Alloy
<b>Cutting Speed</b>	45 m/min
<b>Revolution</b>	280 min <sup>-1</sup>
<b>Feed</b>	0.16 mm/rev
<b>Depth of Cut</b>	Conventional: 1.5 mm → MJ (VP10RT): 2.3 mm 50%UP



# HIP-SYSTEM

Work Materials [Co-Cr Alloy, **Titanium Alloy**, UHMWPE]



## Key Point on Machining

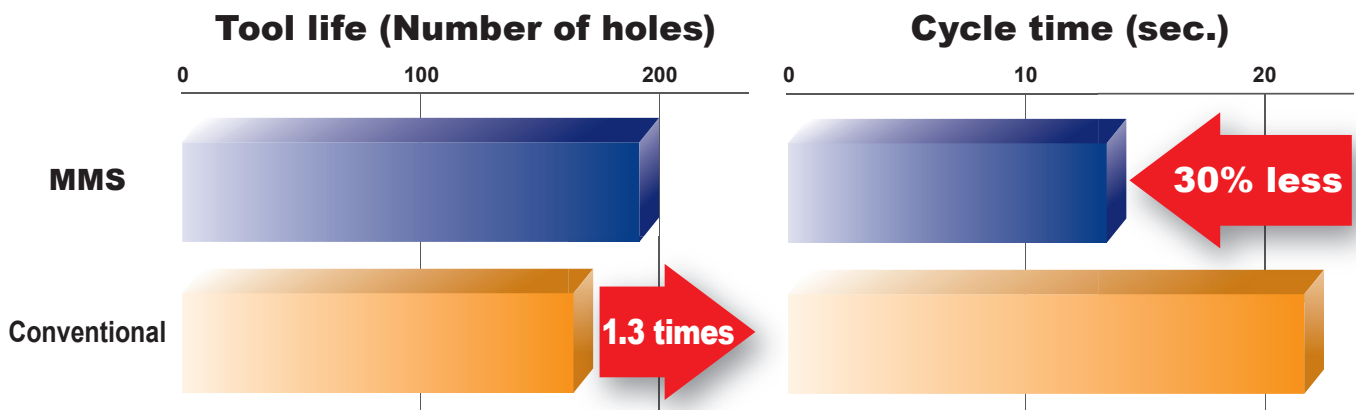
- Promotes smooth chip evacuation.
- Use of internal coolant hole improves cooling effect.

**MMS Drill**  
(TOOLS NEWS B180G)

## Application Example

- **1.3 times longer tool life than conventional products !**
- **High efficiency with high-speed drilling.**

<b>Drill (Grade)</b>	MMS1600X3D (DP7020) ø16 mm
<b>Machine</b>	Machining Center
<b>Work Material</b>	Titanium Alloy
<b>Hole Depth</b>	50 mm
<b>Cutting Speed</b>	Conventional: 40 m/min → MMS: 60 m/min 50%UP
<b>Feed</b>	0.15 mm/rev Non-peck
<b>Coolant</b>	W.S.O (0.6 MPa)



# HIP-SYSTEM

Work Materials [**Co-Cr Alloy**, Titanium Alloy, UHMWPE]



## Key Point on Machining

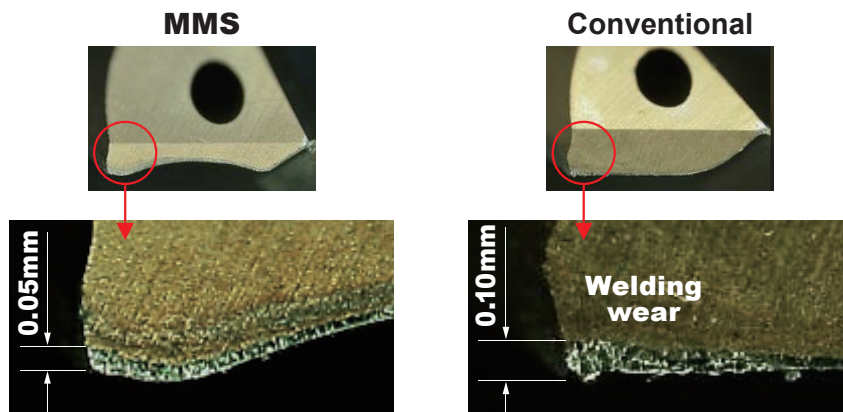
- MMS drill offer longer tool life and can be used for Stainless Steels, Titanium Alloy and Co-Cr Alloy.
- Use of internal coolant holes improves the cooling effect.

**MMS Drill**  
(TOOLS NEWS B180G)

## Cutting Example

- **MMS drill shows good wear resistance when drilling Co-Cr Alloy !**

<b>Drill (Grade)</b>	MMS0500X5DB (DP7020) ø5 mm
<b>Machine</b>	Machining Center
<b>Work Material</b>	Co-Cr Alloy (42 HRC)
<b>Hole Depth</b>	15 mm
<b>Cutting Speed</b>	30 m/min
<b>Revolution</b>	1900 min <sup>-1</sup>
<b>Feed</b>	97 mm/min (0.05 mm/rev) Non-peck
<b>Coolant</b>	W.S.O (0.7 Mpa)



When machining 30 holes

# HIP-SYSTEM

Work Materials [Co-Cr Alloy, **Titanium Alloy**, UHMWPE]



## **VFHVRB** Vibration Control End Mill

(TOOLS NEWS B177G)

### Key Point on Machining

- IMPACT MIRACLE coating with high heat resistance enables to long tool life.
- Enables high efficiency machining and prevent vibration.
- Possible to machine complex geometries previously difficult to machine.

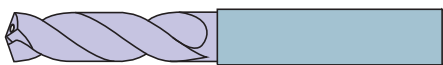
### Application Example

- **Three processes with one tool with helical taper milling !**
- **Excellent surface finish !**

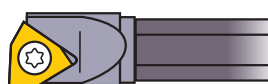
End mill	4 Flutes Radius End mill VFHVRBD0800R10N24 (ø8 mm)
Machine	Multi-axis Turning
Work Material	Titanium Alloy
Hole Depth	15 mm
Cutting Speed	60 m/min
Revolution	2400 min <sup>-1</sup>
Feed	380 mm/min (0.04 mm/tooth)
Coolant	W.S.O

#### <Conventional>

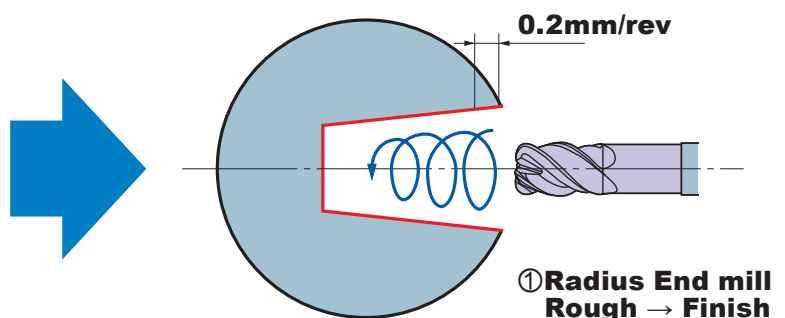
① Drilling



② Taper boring  
Rough → Finish

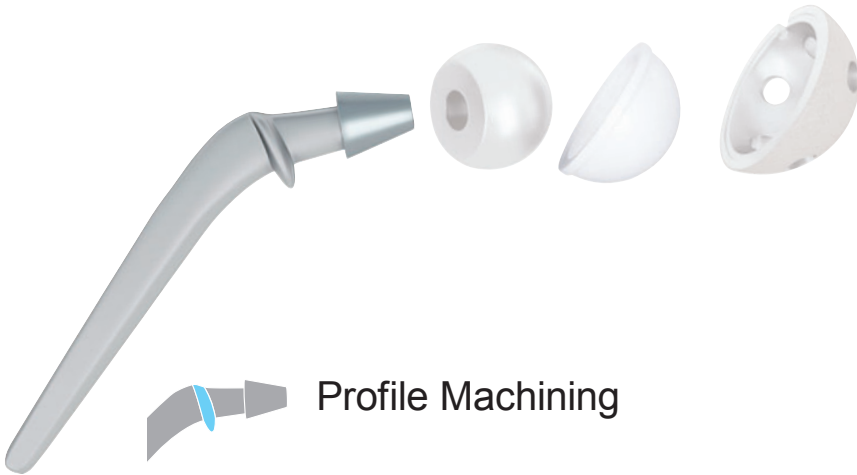


#### <Helical Taper Milling>



# HIP-SYSTEM

Work Materials [**Co-Cr Alloy**, Titanium Alloy, UHMWPE]



Higher efficiency and Longer tool life



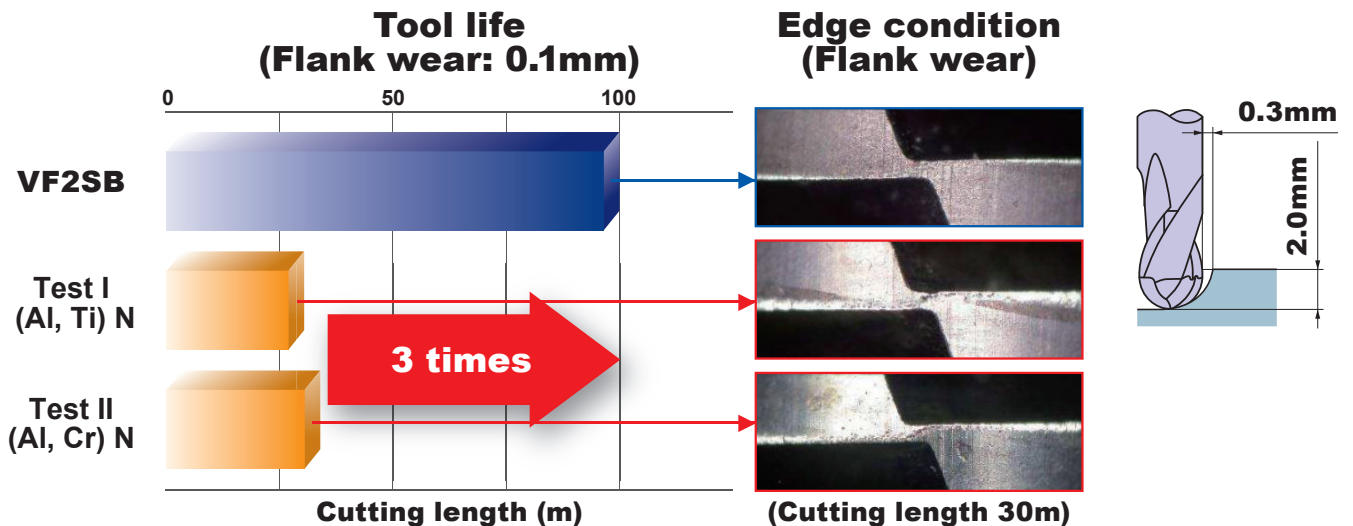
## Key Point on Machining

- Cutting edge geometry with excellent chipping resistance.
- IMPACT MIRACLE coating with high heat resistance enables to long tool life.

## Application Example

- **3 times longer tool life than conventional products when milling Co-Cr Alloy.**

<b>End mill</b>	2 Flutes Ball End mill VF2SBR0300 (ø6 mm)
<b>Machine</b>	Machining Center (BT40)
<b>Work Material</b>	Co-Cr Alloy
<b>Revolution</b>	5000 min <sup>-1</sup> (vc100 m/min)
<b>Feed</b>	1000 mm/min (0.1 mm/tooth)
<b>Coolant</b>	W.S.O





# KNEE-SYSTEM

Work Materials [**Co-Cr Alloy**, Titanium Alloy, UHMWPE]



## Key Point on Machining

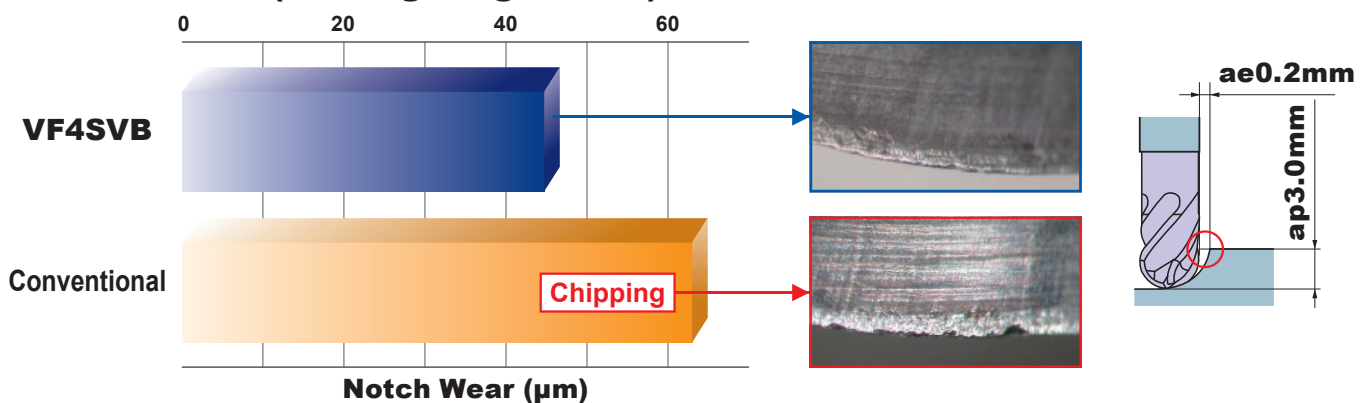
- A good balance of wear and fracture resistance for machining Co-Cr Alloy and Titanium Alloy.
- “Variable curve” radius cutting edges for difficult-to-cut materials.

## Cutting Example

- **VF4SVB has longer tool life than conventional tools.**

<b>End-mill</b>	4 Flutes Ball End mill VF4SVBR0500 (ø10 mm)
<b>Machine</b>	Machining Center (BT40)
<b>Work Material</b>	Co-Cr Alloy (36 HRC)
<b>Cutting Speed</b>	100 m/min
<b>Revolution</b>	3200 min <sup>-1</sup>
<b>Feed</b>	3200 mm/min
<b>Chip Load</b>	0.25 mm/tooth
<b>Coolant</b>	W.S.O

## Flank wear comparison (Cutting length 60m)



# KNEE-SYSTEM

Work Materials [**Co-Cr Alloy**, Titanium Alloy, UHMWPE]



Special curved surface gash corner radius

## **VFHVRB** Vibration Control End Mill

(TOOLS NEWS B177G)

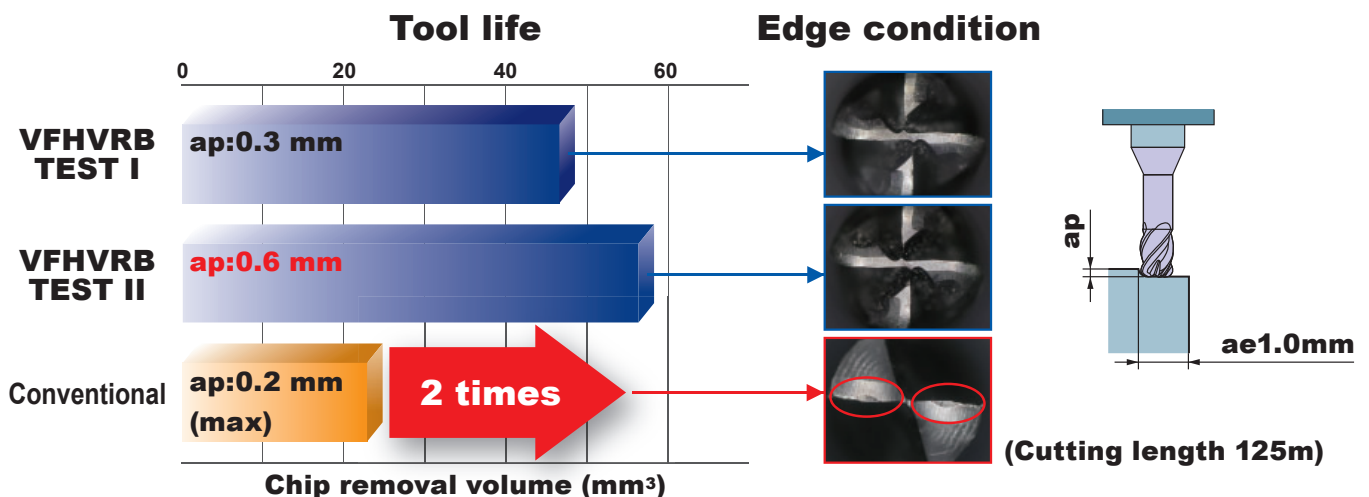
### Key Point on Machining

- Vibration control geometry for stable machining and a smooth cutting action.
- VFHVRB makes finishing easy !

### Cutting Example: Co-Cr-Alloy

- **2 times longer tool life than conventional products !**
- **High efficiency due to high feed and large depth of cut.**

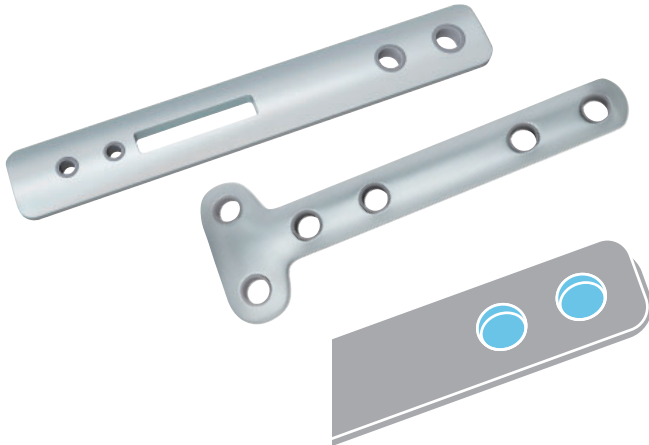
		VFHVRB	Conventional
Size	Dia.	ø3 mm	ø3 mm
	Radius	0.8 mm	0.2 mm
Machine		Micro Machining Center (HSK E-25)	
Number of Flute		4	2
Cutting Speed		50 m/min	50 m/min
Feed		2000 mm/min	1000 mm/min
Coolant		W.S.O	





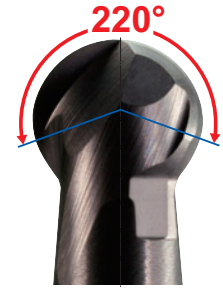
# BONE PLATES

Work Materials [**Titanium Alloy**, SUS316]



Drilling+Chamfering

Wide range  
Wide application



**VF2WB**  
(TOOLS NEWS B169G)

## Key Point on Machining

- IMPACT MIRACLE coating with high heat resistance enables to long tool life.
- Possible to machine complex geometries previously difficult to machine.

## Application Example

- **Four processes with one tool when helical machining !**
- **Fine finished surface and small burrs.**

<b>End mill</b>	Wide range Ball End mill VF2WBR0150N080 (ø3 mm)
<b>Machine</b>	Machining Center (BT40)
<b>Work Material</b>	Titanium Alloy
<b>Cutting Speed</b>	113 m/min
<b>Revolution</b>	12000 min <sup>-1</sup>
<b>Feed</b>	500 mm/min
<b>Helical Pitch</b>	0.1-0.2 mm/rev
<b>Coolant</b>	W.S.O

### <Conventional>

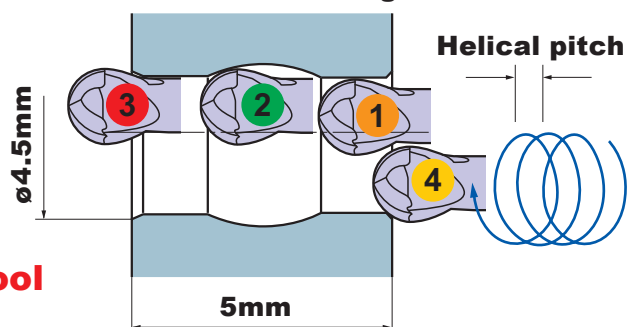
- ① Drilling
- ② Internal profile
- ③ Chamfer
  - Upper
  - Under



**Three tools → One tool**

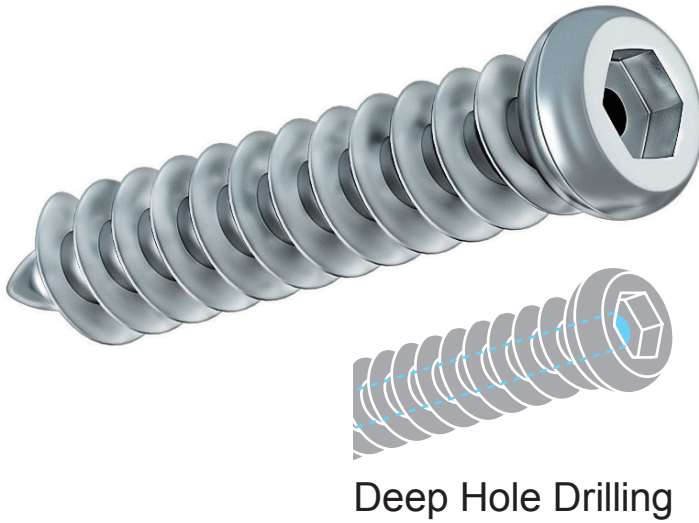
### <Improvement>

Helical machining



# SCREWS

Work Materials [**Titanium Alloy**, SUS316, SUS317]



Excellent chip evacuation

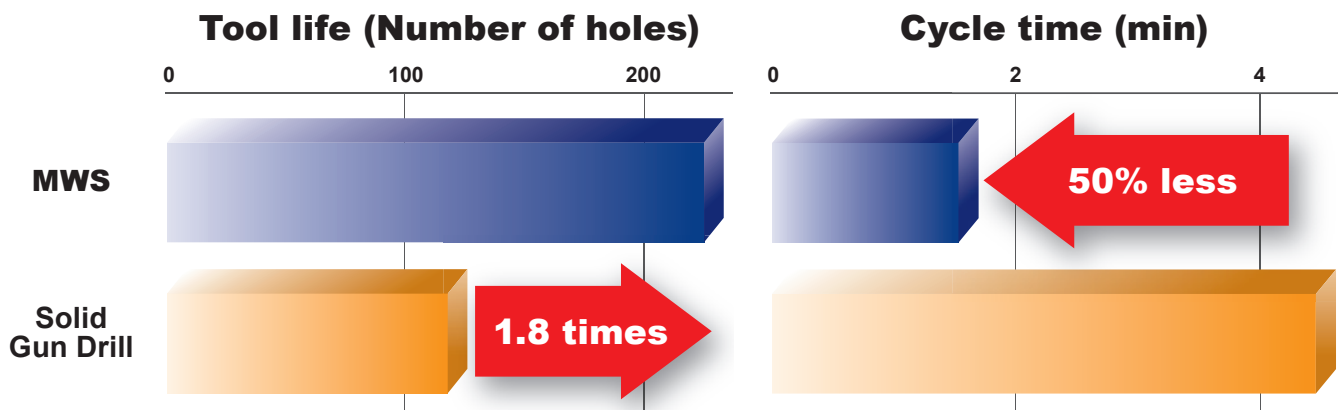
## Key Point on Machining

- Promotes smooth chip evacuation.
- Use of internal coolant hole improves cooling.

## Application Example

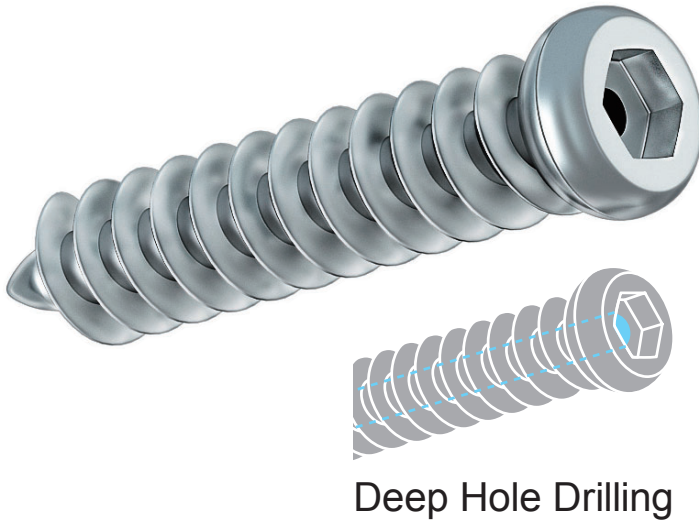
• **Ultra productivity machining and longer tool life !**

<b>Work Material</b>	Titanium Alloy		
<b>Machine</b>	Swiss Lathe Machine		
<b>Hole Size</b>	ø1.8 mm Depth:50 mm	Pilot drill:MWS0180SB (ø1.8 mm)	Depth:4 mm
<b>Drill</b>	MWS0180X30DB (ø1.8 mm)	Solid Gun Drill (ø1.8 mm)	
<b>Revolution</b>	1770 min <sup>-1</sup>		2650 min <sup>-1</sup>
<b>Cutting Speed</b>	10 m/min		15 m/min
<b>Feed</b>	0.02 mm/rev Non-peck		0.005 mm/rev Non-peck
<b>Coolant</b>	Oil (Coolant pressure 10 MPa)		



# SCREWS

Work Materials [Titanium Alloy, **SUS316**, SUS317]



Excellent chip evacuation



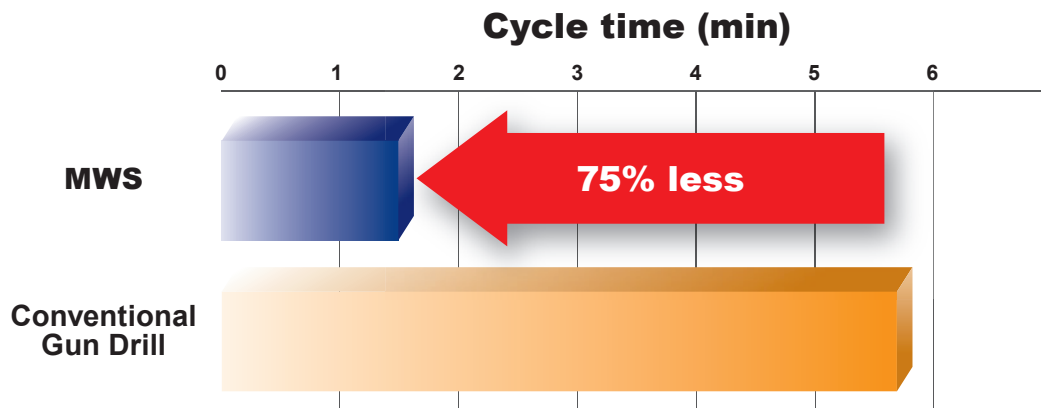
## Key Point on Machining

- Promotes smooth chip evacuation.
- Use of internal coolant hole improves cooling.

## Application Example

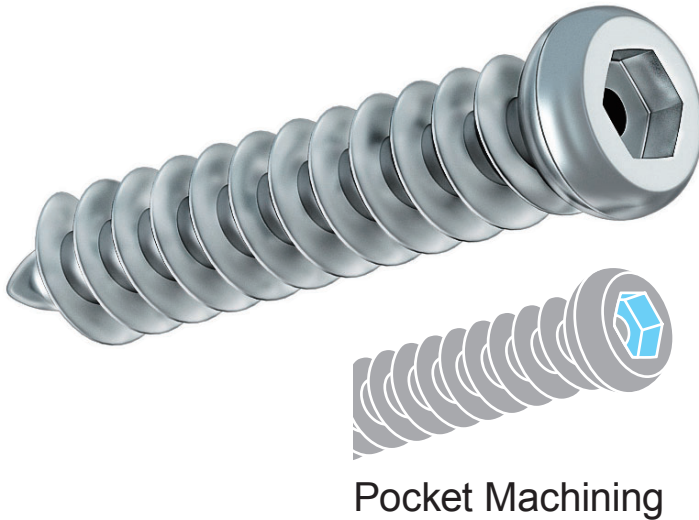
- **High efficiency deep hole drilling of SUS316L.**
- **4 times faster cycle time than a gun drill !**

<b>Work Material</b>	SUS316L	
<b>Machine</b>	Swiss Lathe Machine	
<b>Hole Size</b>	ø2.5 mm Depth:70 mm Pilot drill:MWS0250SB (ø2.5 mm) Depth:5.0 mm	
<b>Drill</b>	MWS0250X30DB (ø2.5 mm)	Gun Drill (ø2.5 mm)
<b>Revolution</b>	2500 min <sup>-1</sup>	5000 min <sup>-1</sup>
<b>Cutting Speed</b>	20 m/min	40 m/min
<b>Feed</b>	0.020 mm/rev Non-peck	0.0025 mm/rev Non-peck
<b>Coolant</b>	Oil (Coolant pressure 6 MPa)	



# SCREWS

Work Materials [**Titanium Alloy**, SUS316, SUS317]



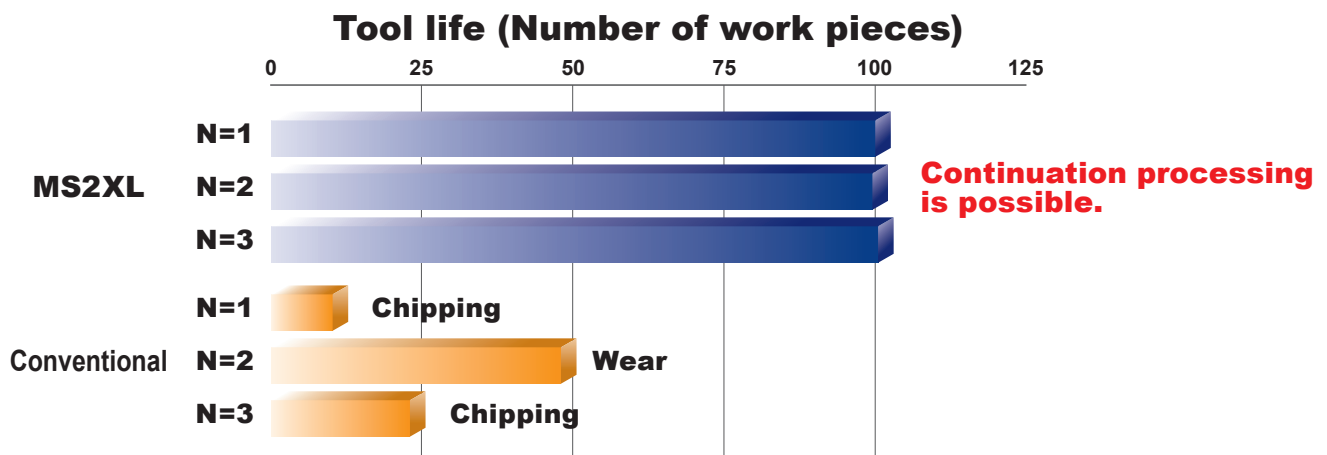
## Key Point on Machining

- Cutting edge geometry with excellent chipping resistance.
- Small diameter combined with a variety of neck lengths aid in machining of deep cavity and complex parts.

## Application Example

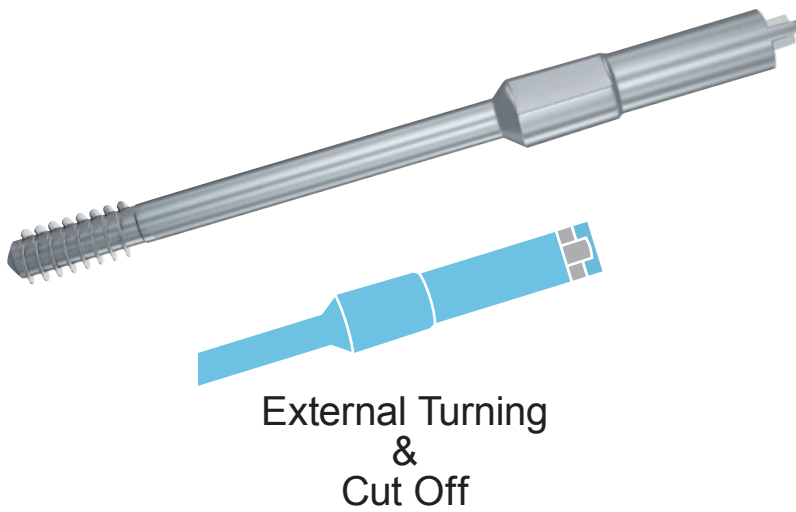
- **Realized stable tool life.**

<b>Work Material</b>	Titanium Alloy
<b>Machine</b>	Swiss Lathe Machine
<b>End mill</b>	Long Neck Square End mill (2 flutes) MS2XLD0070N040 (ø0.7 mm)
<b>Revolution</b>	18000 min <sup>-1</sup> (vc40 m/min)
<b>Feed</b>	200 mm/min (0.005 mm/tooth)
<b>Depth of Cut</b>	ap0.06 mm
<b>Coolnat</b>	Oil

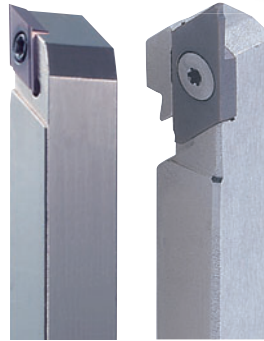


# SCREWS

Work Materials [**Titanium Alloy**, SUS316, SUS317]



Good cutting performance



**Small Tools**  
**VP15TF**  
(GENERAL CATALOG C005\*)

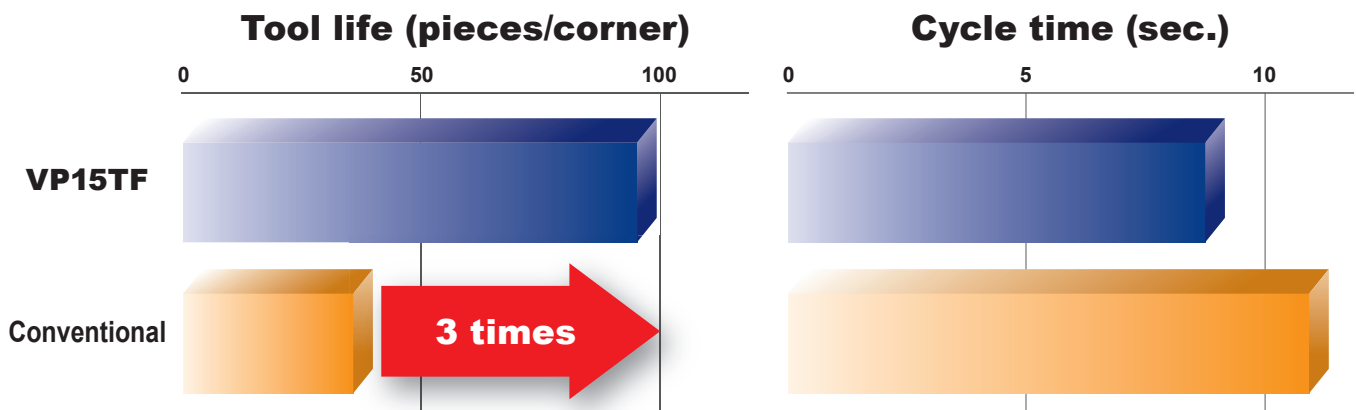
## Key Point on Machining

- A good balance of wear and fracture resistance for turning Titanium Alloy and Stainless Steel.
- Reduced heat generation with the use of a sharp cutting edge.

## Application Example

• **3 times longer tool life than conventional products !**

<b>Machine</b>	Swiss Lathe Machine	
<b>Work material</b>	Titanium Alloy	
<b>Operation</b>	Cut Off	
<b>Width of Insert</b>	1 mm	
<b>Insert (grade)</b>	Mitsubishi	Conventional
	CTAT10120V5RR-B (VP15TF)	Similar Insert (PVD coating)
<b>Cutting Speed</b>	36 m/min	30 m/min
<b>Feed</b>	0.02 mm/rev	0.02 mm/rev



# SPINE

Work Materials [Co-Cr Alloy, **Titanium Alloy**, Stainless Steel]



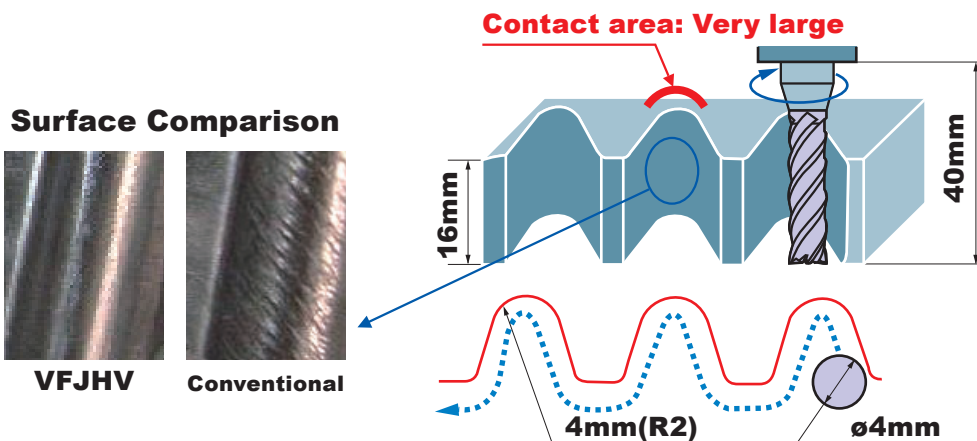
## Key Point on Machining

- **IMPACT MIRACLE** coating with high heat resistance enables long tool life.
- Delivers superior vibration resistance for difficult-to-cut materials.

## Cutting Example

- **Good surface finish and high efficiency from the use of irregular helix flutes.**

<b>End mill</b>	4 Flutes Vibration Control Square End mill VFJHVD0400 (ø4 mm)
<b>Machine</b>	Multi-axis Turning (HSK63)
<b>Work Material</b>	Titanium Alloy
<b>Cutting Speed</b>	30 m/min
<b>Revolution</b>	2400 min <sup>-1</sup>
<b>Feed</b>	380 mm/min
<b>Depth of Cut</b>	ap16 mm ae0.2 mm
<b>Coolant</b>	W.S.O



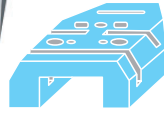
**Long over hang and small diameter needed due to the shape of the work piece.**





# INSTRUMENT

Work Materials [Titanium Alloy, **Stainless Steel**]



Rough Milling



**AJX**  
(TOOLS NEWS B028G)

Improved chip removal

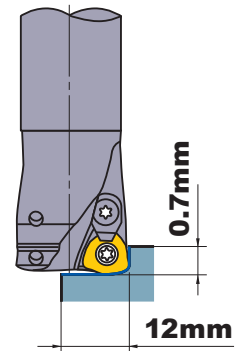
## Key Point on Machining

- AJX can achieves extra high feed rates for ultimate efficiency in rough machining.
- Wide selection of inserts with high wear and fracture resistance, for general machining operations.

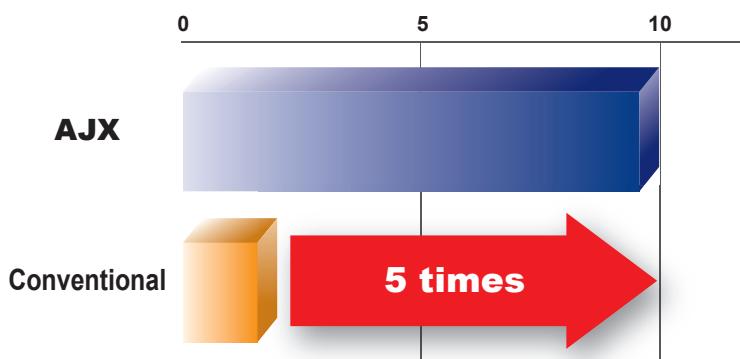
## Application Example: Surgical Equipment

- **AJX achieves 5 times longer tool life than conventional products when milling 17-4PH.**

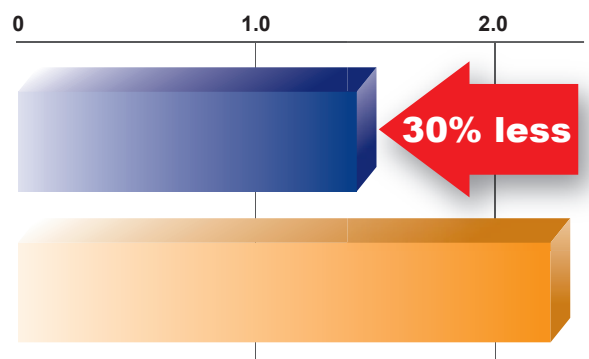
<b>Work Material</b>	17-4PH 42 HRC	
<b>Machine</b>	Machining Center (HSK63)	
<b>Tool</b>	<b>Holder</b>	AJX06R203SA20S (ø20mm 3flutes)
	<b>Insert (Grade)</b>	JOMT06T215ZZSR-JM (VP15TF)
<b>Cutting Speed</b>	120 m/min (Conventional: 100 m/min)	
<b>Feed</b>	2850 mm/min (Conventional: 2000 mm/min)	
<b>Coolant</b>	Air blow	



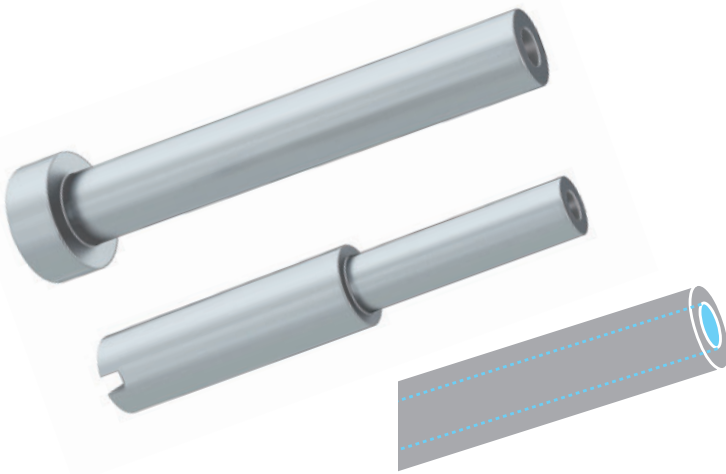
### Tool life (Number of work pieces)



### Cycle time (min)



Work Materials [Titanium Alloy, **Stainless Steel**]



Deep Hole Drilling



**MWS**  
Super long drill  
(TOOLS NEWS B129G)

Excellent chip evacuation

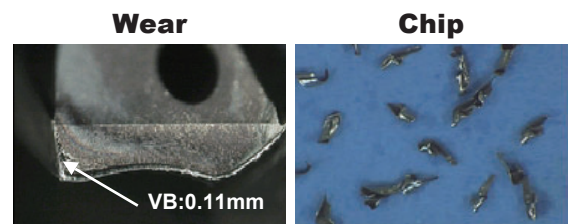
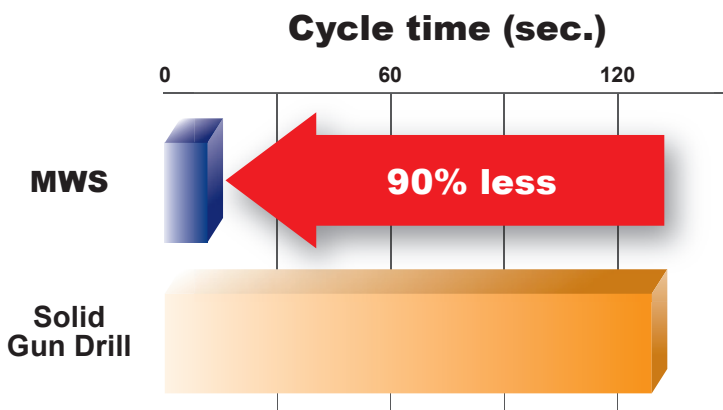
## Key Point on Machining

- Promotes smooth chip evacuation.
- Use of internal coolant hole improves cooling.

## Cutting Example

- **High efficiency deep hole drilling of 17-4PH.**
- **10 times faster cycle time than gun drill !**

<b>Work Material</b>	17-4PH 32 HRC		
<b>Machine</b>	Swiss Lathe Machine		
<b>Hole Size</b>	ø2.3 mm	Depth:70 mm	Pilot drill:MWS0230SB (ø2.3 mm) Depth:5 mm
<b>Drill</b>	MWS0230X30DB (ø2.3 mm)		Solid Gun Drill
<b>Revolution</b>	5500 min <sup>-1</sup>		5500 min <sup>-1</sup>
<b>Cutting Speed</b>	40 m/min		40 m/min
<b>Feed</b>	0.06 mm/rev Non-peck		0.006 mm/rev Non-peck
<b>Coolant</b>	Oil (Coolant pressure 14 MPa)		

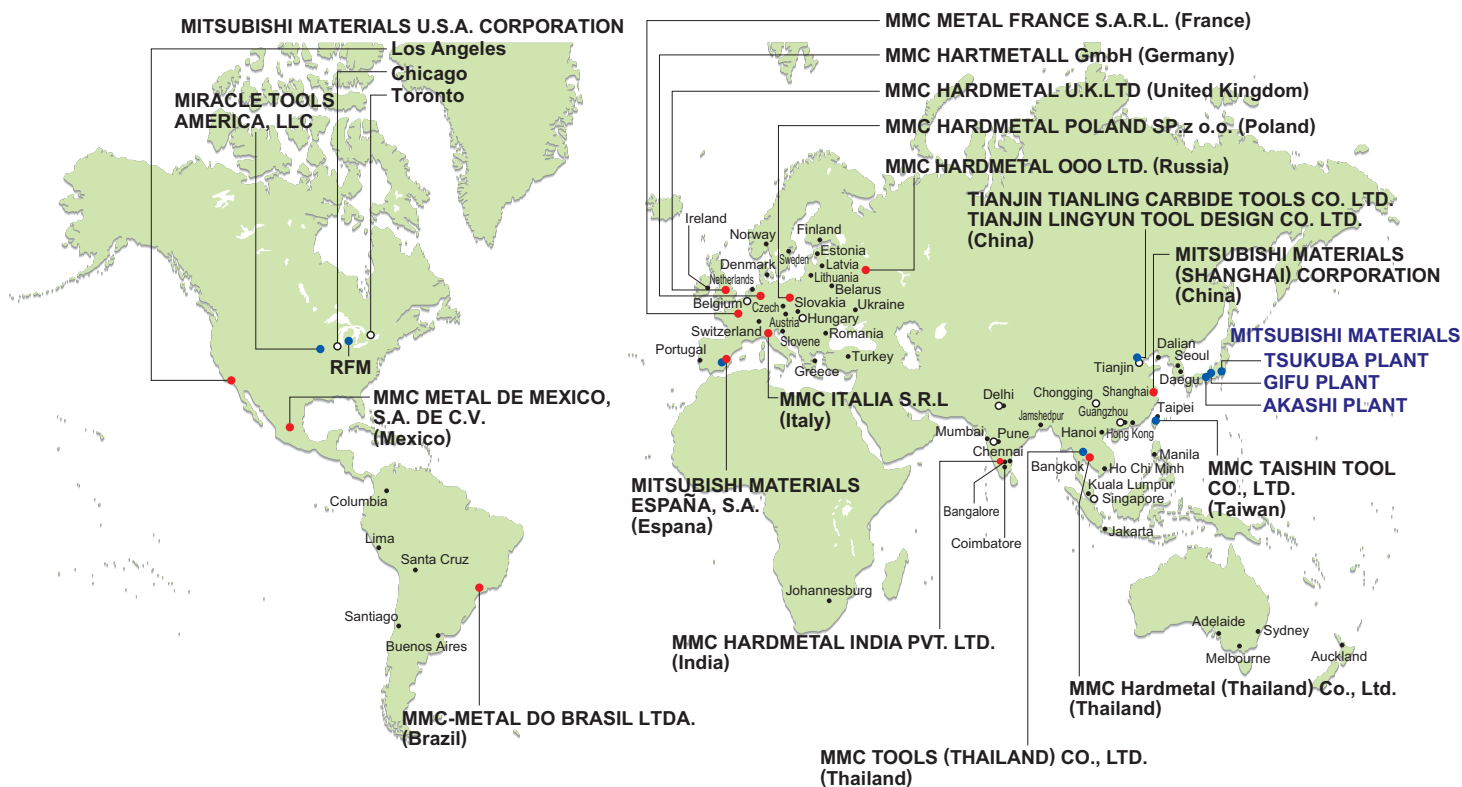


When machining 150holes

**Continuation processing is possible.**



# Global Network



- Sales Office
- Factory
- Representative Office
- Agency



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