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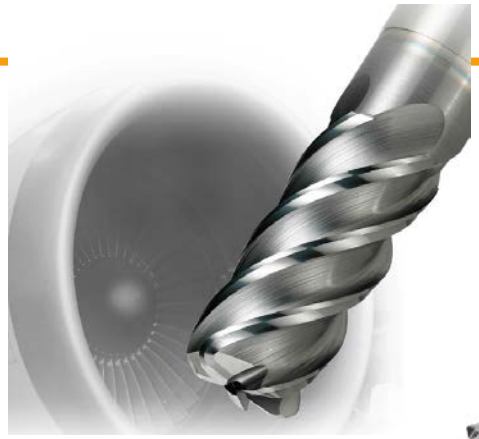
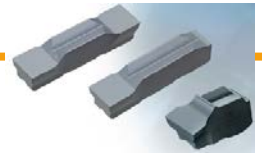
# MMUS Fall 2019 Product Launch

DIA EDGE






## New Products / Product Line Expansions

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MITSUBISHI MATERIALS U.S.A.

# 2019 Fall Product Launch

- Quick & Concise Summary View of all New Product & Product Expansions for Fall 2019
- New Products
  - Overview
  - Features & Benefits
  - Application Example
  - Product Info & Links
- Product Expansions
  - Expansion details
- Quick Links/Hyperlinks
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# Table of Contents




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# MB8100 Series

**Non-coated CBN grades for Hardened Steel turning**

**NEW PRODUCT**

## MB8110 For Continuous Cutting

MB8100 having a most excellent wear resistance on this is ideal for continuous cutting.

## MB8120 For General Cutting

MB8120 provides excellent wear and fracture resistance and is suitable for wider range of applications.

## MB8130 For Heavy Interrupted Cutting

MB8130 having a most excellent fracture resistance on this series is ideal for heavy interrupted machining and in an unstable cutting condition.





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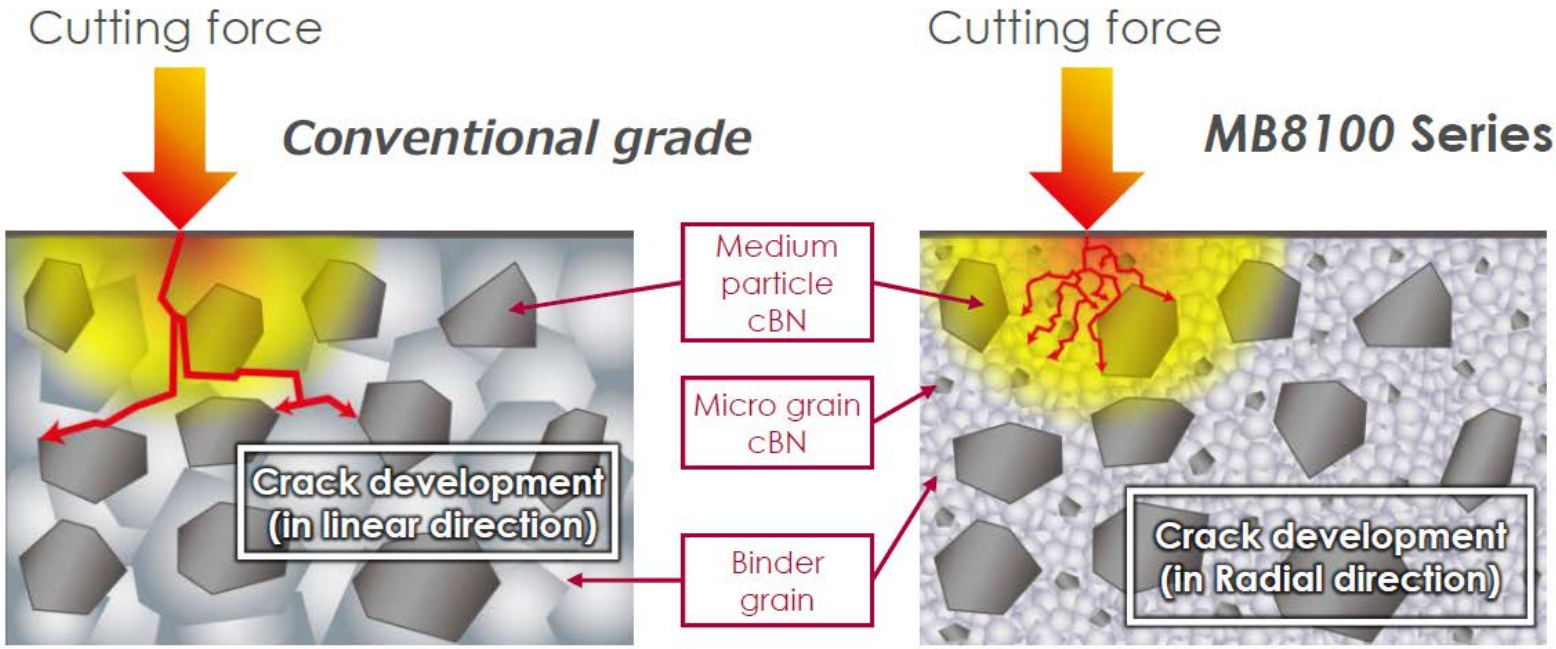
# MB8100 Series Overview

- ✓ Non-Coated CBN Grade for High-Hardened Steels
- ✓ Replaces MB810, MB8025 & MB835
- ✓ Non-coated version of BC8100 series
  - ➢ For use where fracture occurs with BC8100 due to coating peeling
- ✓ World's smallest "Ultra Micro-particle Binder"
  - ➢ 1/5th size of conventional
  - ➢ More resistant to sudden fracture due to increased bonding interface suppression of crack dispersion in linear direction





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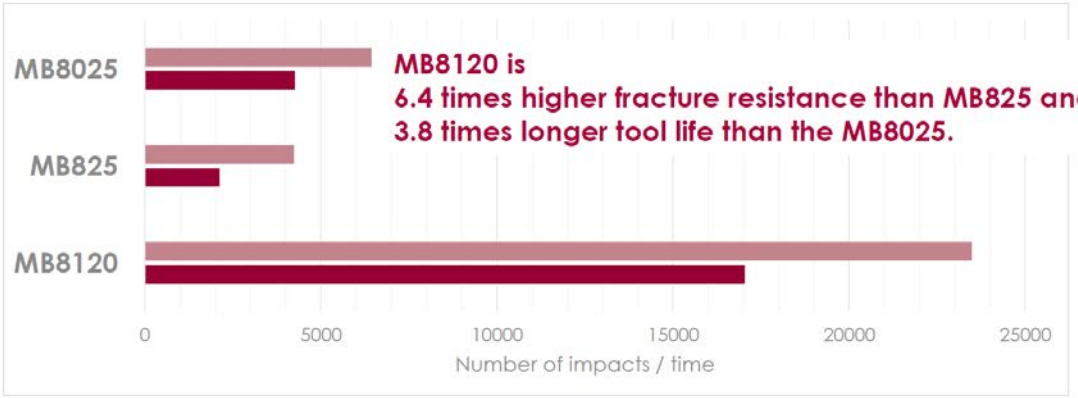
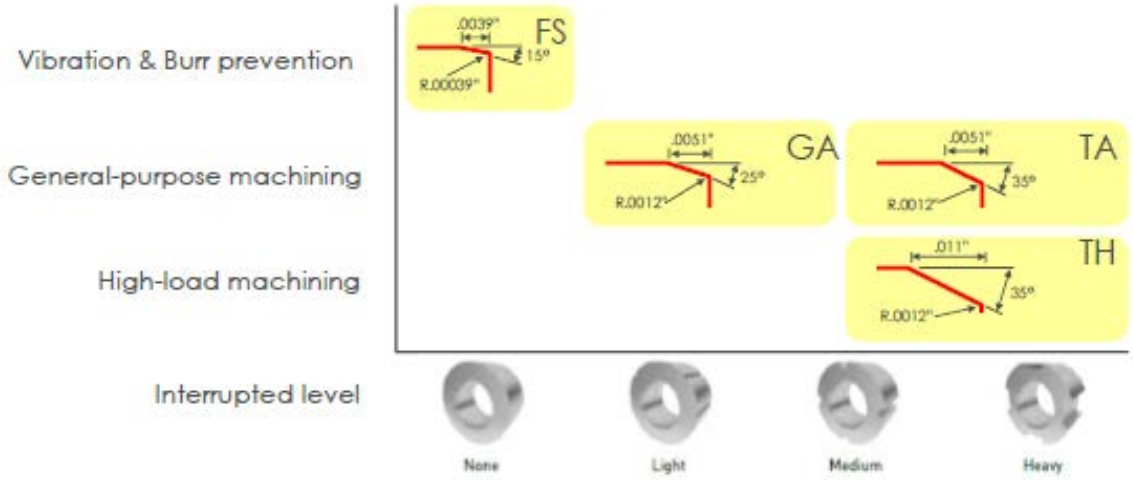
# MB8100 Features & Benefits

- ✓ "Ultra Micro Particle Binder"
  - ➢ Highly resistant to fracture compared to conventional




AISI = 5120 (60 HRC) Light interrupted cutting workpiece Dry
vc: 820 SFM, fr: 0.0059 IPR, ap: 0.0039"

- ✓ 4 Edge preps available




- ➢ Superior wear resistance



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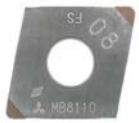
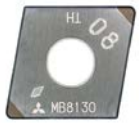
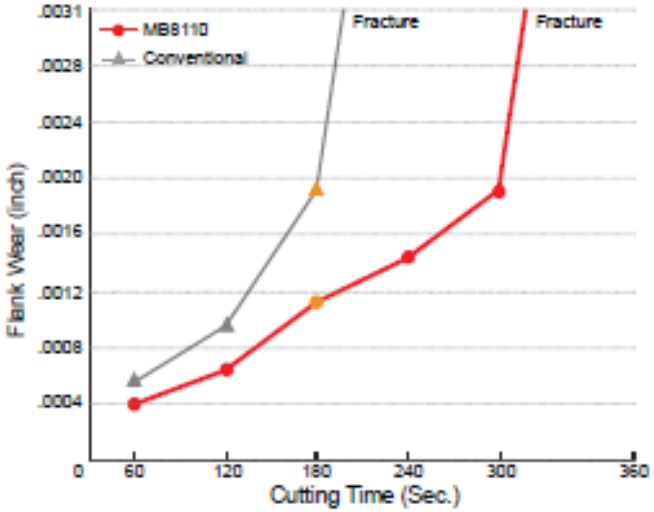




# MB8100 Application Example

## Tool Life (Flank Wear)

| | |
|---|---|
| Insert | NP-CNGA432-GA2 |
| Workpiece Material | AISI 5120 (60HRC) |
| Machining Methods | External Continuous Cutting |
| Cutting Speed **vc** (SFM) | 820 |
| Feed per Rev. **f** (IPR) | .004 |
| Depth of Cut **ap** (inch) | .008 |
| Cutting Mode | Dry Cutting |




### Cutting Edge after 180 sec.


MB8110

Conventional

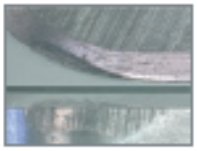
## Heavy Cutting

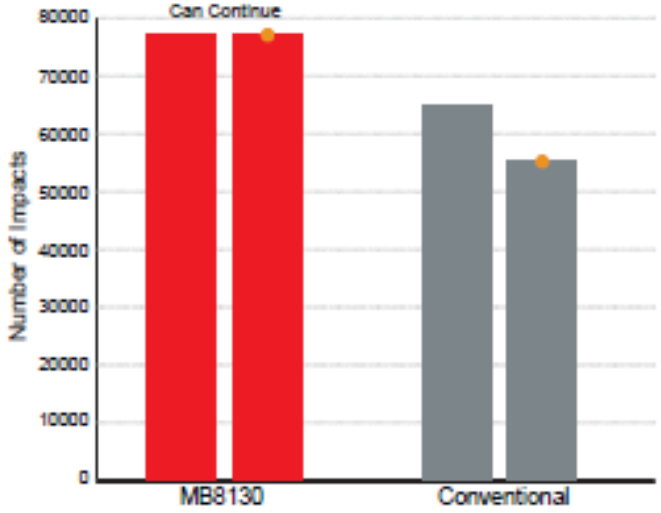
| | |
|---|---|
| Insert | NP-CNGA432-GA2 |
| Workpiece Material | AISI 5120 (60HRC) |
| Machining Methods | External Heavy Interrupted Cutting |
| Cutting Speed **vc** (SFM) | 490 |
| Feed per Rev. **f** (IPR) | .002 |
| Depth of Cut **ap** (inch) | .004 |
| Cutting Mode | Wet Cutting |

77000 Impacts


MB8130

54000 Impacts


Conventional





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# MB8100 Series Info & Links


Tool News B215G

***New Petit Cut G class Negative Inserts: CNGA, DNGA, SNGA, TNGA & VNGA**

***New Petit Cut Positive Inserts Inserts: CCGW, DCGW, TPGB & VBGW**

***MB8110 in FS & FSW/FBW breakers**

***MB8120 in GA, TA & GAW/GBW breakers WNGA,**

***MB8130 In TA & TH breakers**

***MB8100 Series – Internet Link***


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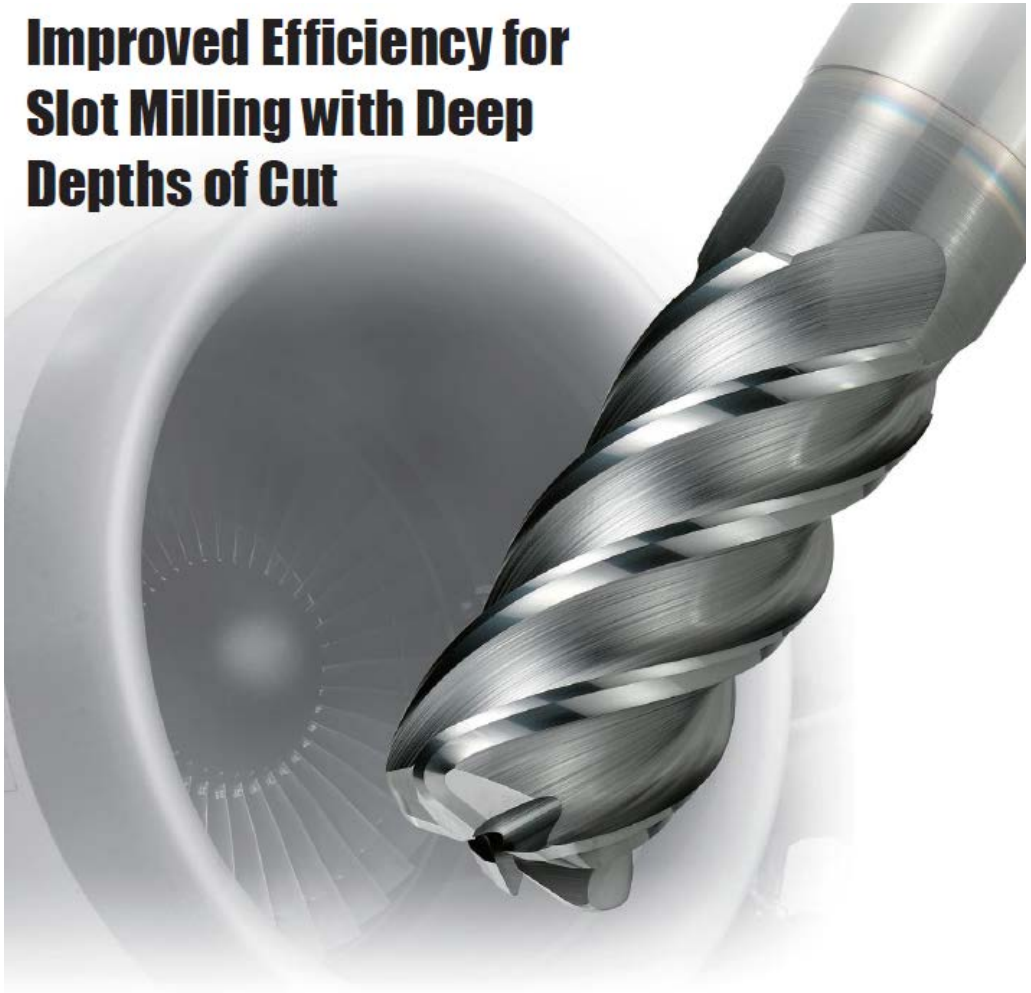
# VQT5MVRB

**Corner Radius End Mill for High Efficiency Titanium Alloy Machining**

**NEW PRODUCT**

## Improved Efficiency for Slot Milling with Deep Depths of Cut



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# VQT5MVRB Overview

- Corner Radius End Mill for High Efficiency Titanium Alloy Machining
- 5 Flutes with center thru-coolant hole
- SMART MIRACLE Coating
- (3) Sizes available, DC: 16mm, 20mm and 25mm

Conventional

Sharp corner R

Image of rake face

**VQT5MVRB**


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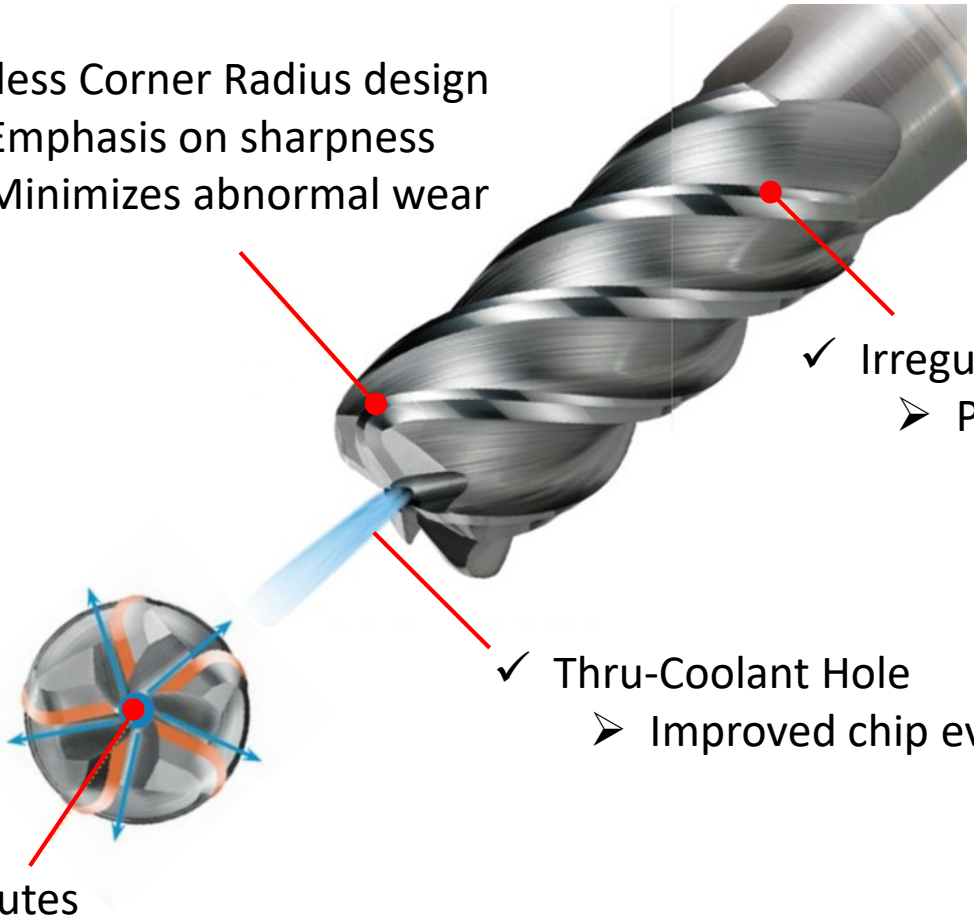
# VQT5MVRB Features & Benefits

- ✓ Seamless Corner Radius design
  - ➢ Emphasis on sharpness
  - ➢ Minimizes abnormal wear



- ✓ Irregular Helix
  - ➢ Prevents chatter and vibration
- ✓ Thru-Coolant Hole
  - ➢ Improved chip evacuation
- ✓ 5-Flutes
  - ➢ Optimization of flute shape improves chip evacuation, and is ideal for slot milling with deep depths of cut.

Machined surface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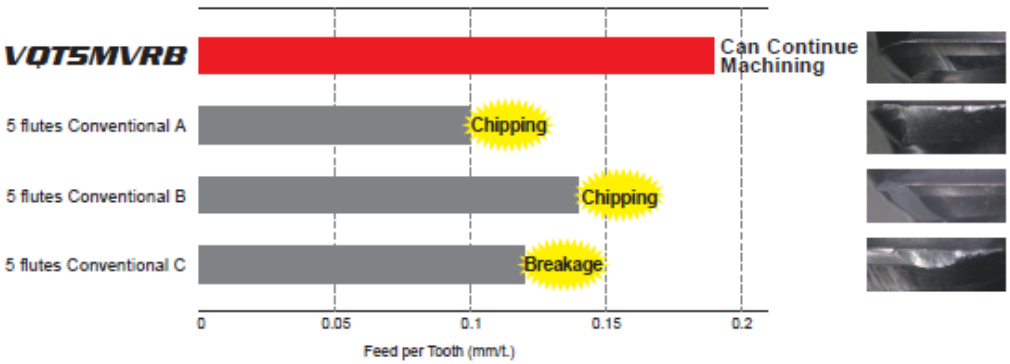
# VQT5MVRB Features & Benefits

## Comparison of Maximum Cutting Feed for Titanium Alloy Slot Milling

As compared with conventional products, high efficiency milling can be achieved.




<Cutting Conditions>

| | | | |
|---|---|---|---|
| Workpiece | : Ti-6Al-4V | Cutting Length | : 60mm (1 slot) |
| Tool | : VQT5MVRB160R300N048C | Overhang Length | : 48mm (DC×3) |
| Revolution | : n=1200min-1 | Cutting Mode | : Slot Milling |
| Depth of Cut | : ap=16mm | | Internal Coolant + |
| Width of Cut | : ae=16mm (Slot) | | External Coolant (Emulsion) |
| | | Machine | : Vertical MC (BT50) |

| *D1 Tolerance* | *DC≦.63"* | *.787"≦DC≦.984"* |
|---|---|---|
| Upper limit | 0 | 0 |
| Lower limit | -.00118" | -.00157" |

| *CornerR Tolerance* | *.63"≦RE≦.984"* |
|---|---|
| Upper limit | .00079" |
| Lower limit | -.00079" |

| *Shank dia. Tolerance* | *DCON=.63"* | *.787"≦DCON≦.984"* |
|---|---|---|
| Upper limit | 0 | 0 |
| Lower limit | -.00043" | -.00051" |


**Chip removal rate :**
**15.26 in³/min achieved!**

Work material: Titanium alloy (Ti6Al4V)
Tool: VQT5MVRB250R400N075C (Ø25)
Spindle speed: 636 RPM
Table feed: 8.11 IPM
Depth of cut: ap 1.97", ae .98"
Overhang: 2.95" (3D)
Cutting method: Slot milling
Coolant: Internal + External supply (Emulsion)
Machine tool: Vertical M/C(BT50)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# VQT5MVRB Application Example

## Slot Milling with Deep Depths of Cut in Titanium Alloy

The seamless design of corner radius and cutting edge provides for stable tool life.

Conventional

Fractures ( After 6 slots )

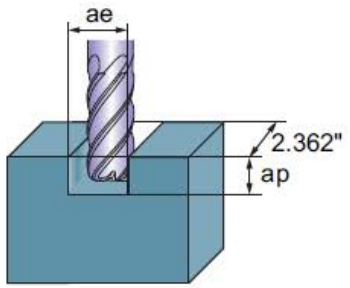
<Cutting Conditions>

| | |
|---|---|
| Workpiece Material | : Ti-6Al-4V |
| Tool | : VQT5MVRB160R300N048C |
| Revolution | : n=1200min$^{-1}$ |
| Feed Rate | : vf=26.0 IPM |
| Depth of Cut | : ap=.630 inch |
| Width of Cut | : ae=.630 inch (slot) |
| Cutting Length | : 2.362 inch (1 slot) |
| Overhang Length | : 1.890 inch (DC×3) |
| Cutting Mode | : Slot Milling<br>Internal Coolant +<br>External Coolant (Emulsion) |
| Machine | : Vertical MC (BT50) |

**VQT5MVRB**

After 17 slots

**Triple Tool Life**





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# VQT5MVRB Series Product Info & Links


**Tool News B230A**

## Identification Code

■ End Mills

| End Mill Names | |
|---|---|
| VQT | SMART MIRACLE End Mill for Titanium Alloys |

| Features | |
|---|---|
| V | Irregular Spiral Helix Angle |

| Cutting Dia. | |
|---|---|
| 160 | DC=16mm |
| 200 | DC=20mm |
| 250 | DC=25mm |

| Usable Length | |
|---|---|
| N048 | LU=48mm |
| N060 | LU=60mm |
| N075 | LU=75mm |

**VQT 5 M V RB 250 R400 N075 C**

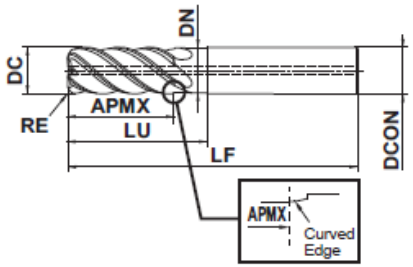
| No. of Flutes | |
|---|---|
| 5 | 5 flute |

| Flute Length | |
|---|---|
| M | Medium |

| End Cutting Edge | |
|---|---|
| RB | Raduis |

| Corner Radius | |
|---|---|
| R300 | 3mm |
| R400 | 4mm |

| Coolant Hole | |
|---|---|
| C | Center Through |




(mm)

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

***VQT5MVRB – Internet Link***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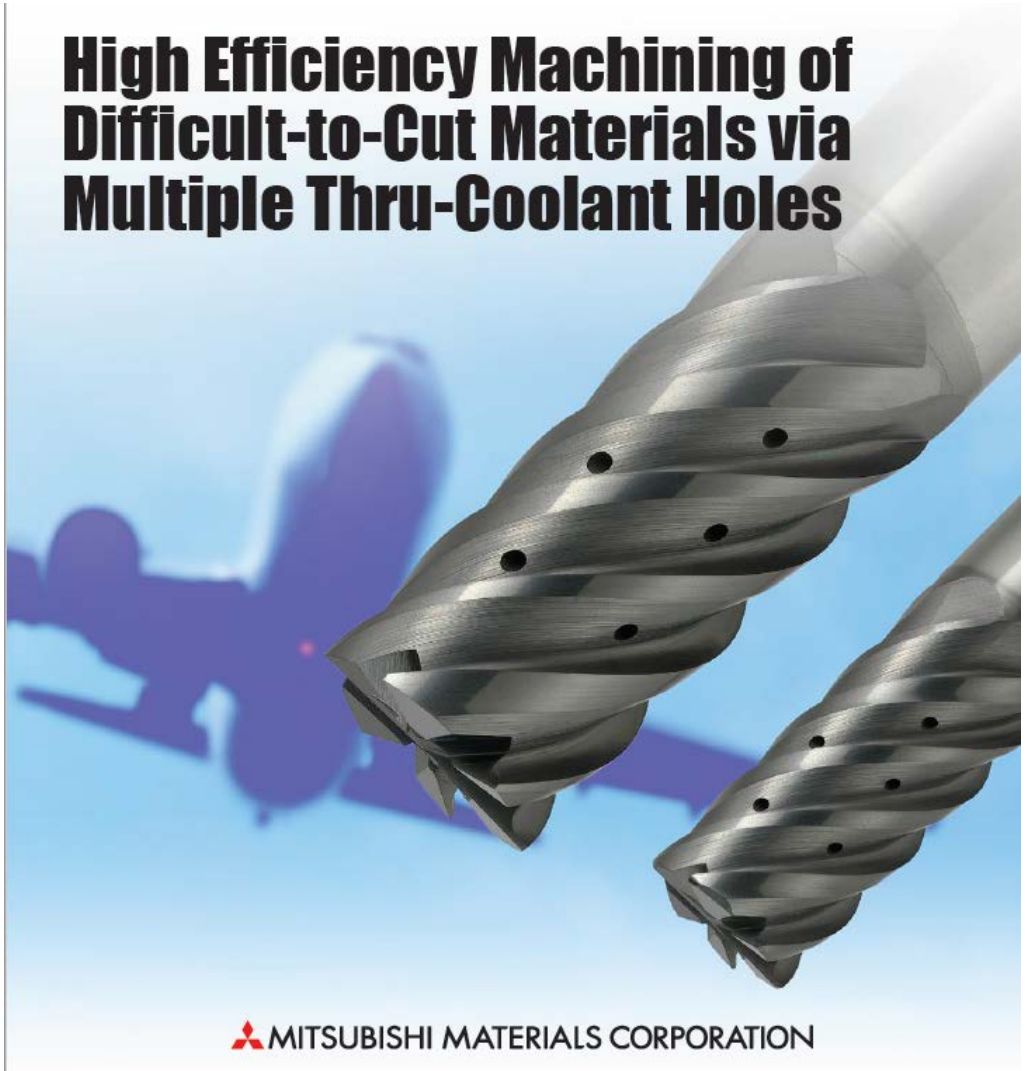
# VQ CoolStar

**Vibration Control End Mills with Multiple Thru-Coolant Holes**

**NEW PRODUCT**





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# VQ CoolStar Overview

- Vibration Control End Mill with multiple thru-coolant holes for machining of difficult–to-cut materials
- Irregular helix flutes
- SMART MIRACLE Coating with smoothening treatment
- Unique “ZERO-μ Surface” *Super-fine-particle/super-hard base material

## VQ6MHVCH

**4 Sizes (DC=10mm, 12mm, 16mm, 20mm)**

End mill, Medium cut length,
6 flute, Irregular helix flutes,
with multiple thru-coolant holes

## VQ6MHVRBCH

**10 Sizes (DC=10mm, 12mm, 16mm, 20mm)**

Corner radius, Medium cut length,
6 flute, Irregular helix flutes,
with multiple thru-coolant holes


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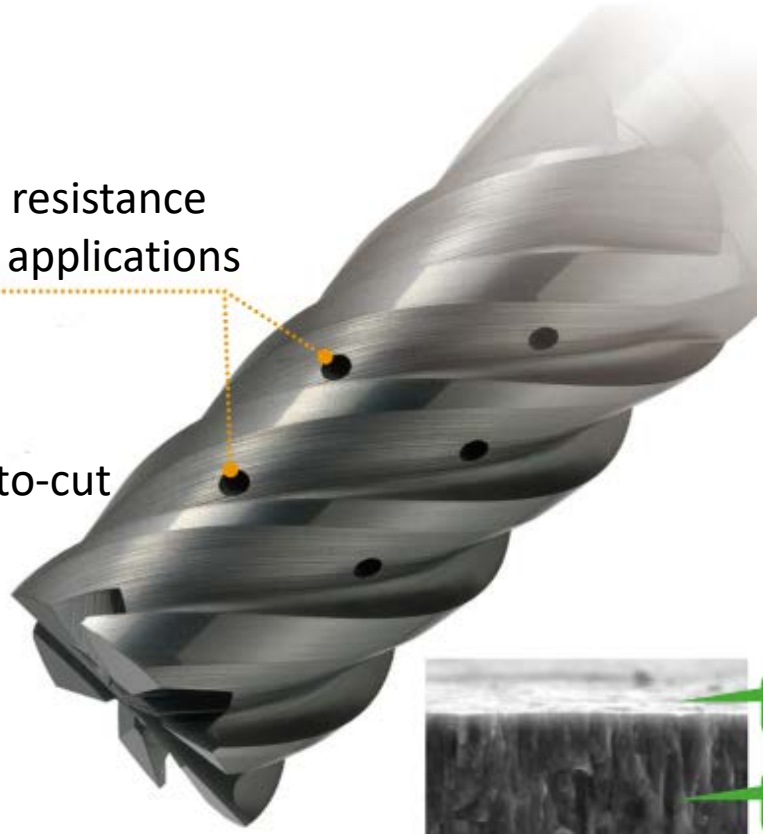
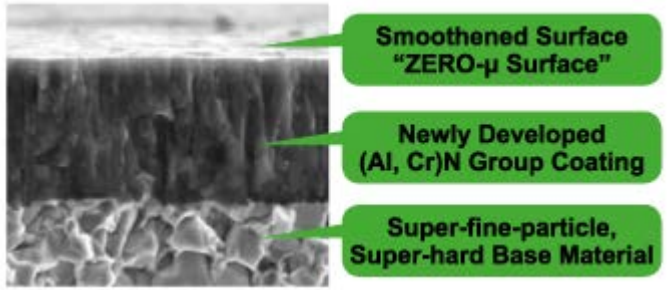
# VQ CoolStar Features & Benefits

- ✓ Multiple Thru-Coolant Holes
  - ➢ Greatly improves welding resistance
  - ➢ Wide-range of machining applications
- ✓ Vibration Control Design
  - ➢ Excellent stability
  - ➢ Especially suited for difficult-to-cut materials
- ✓ Smart Miracle Coating
  - ➢ Substantially better wear resistance
- ✓ Smoothening treatment
  - ➢ Better machined surfaces
  - ➢ Reduced cutting resistance
  - ➢ Improved chip discharge






- ✓ ZERO-μ Surface
  - ➢ Retains cutting edge sharpness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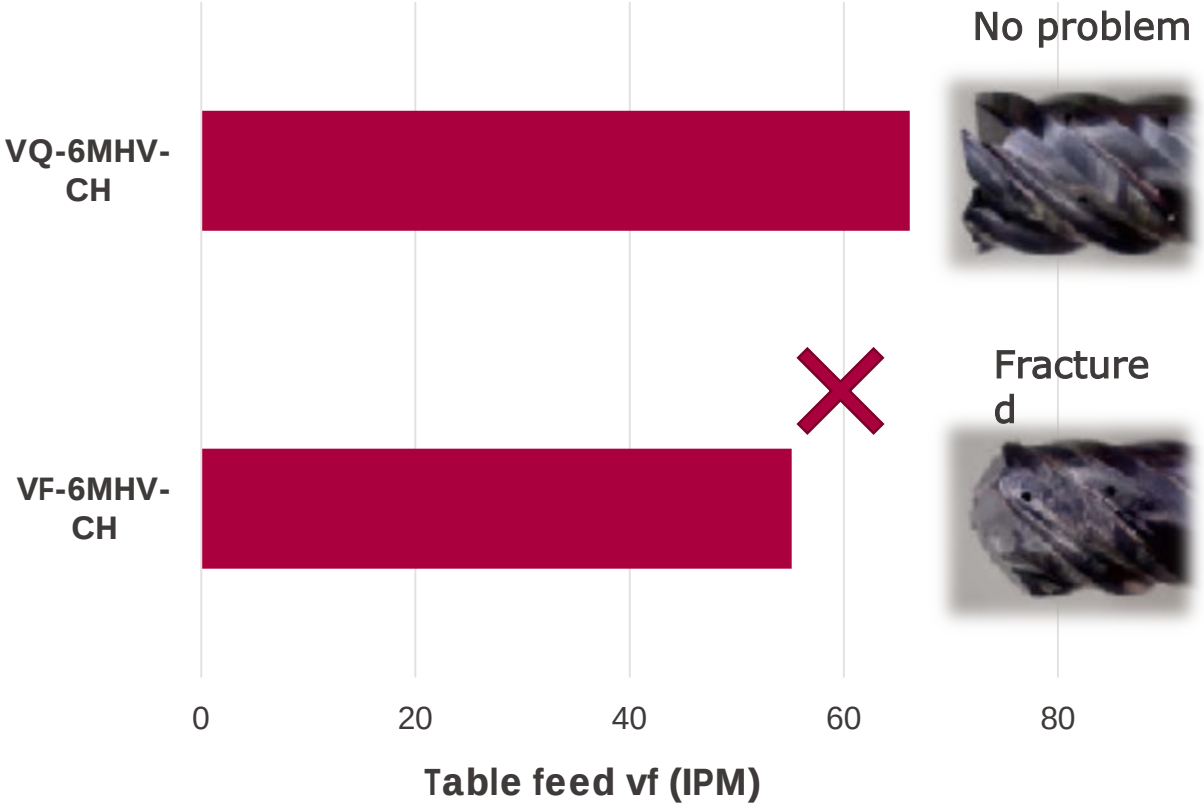
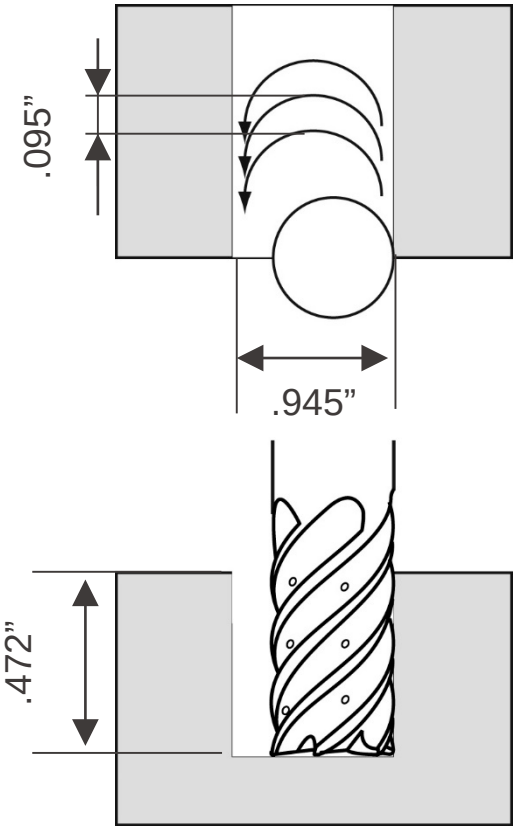
# VQ CoolStar Application Example

## Trochoidal Machining

Size:Ø16mm, Work material:Ti-6Al-4V
Spindle speed:2,000RPM(328SFM), Depth of cut: ap=.472”, ae=.945”,
Trochoidal machining (Down cut)
Coolant: Emulsion





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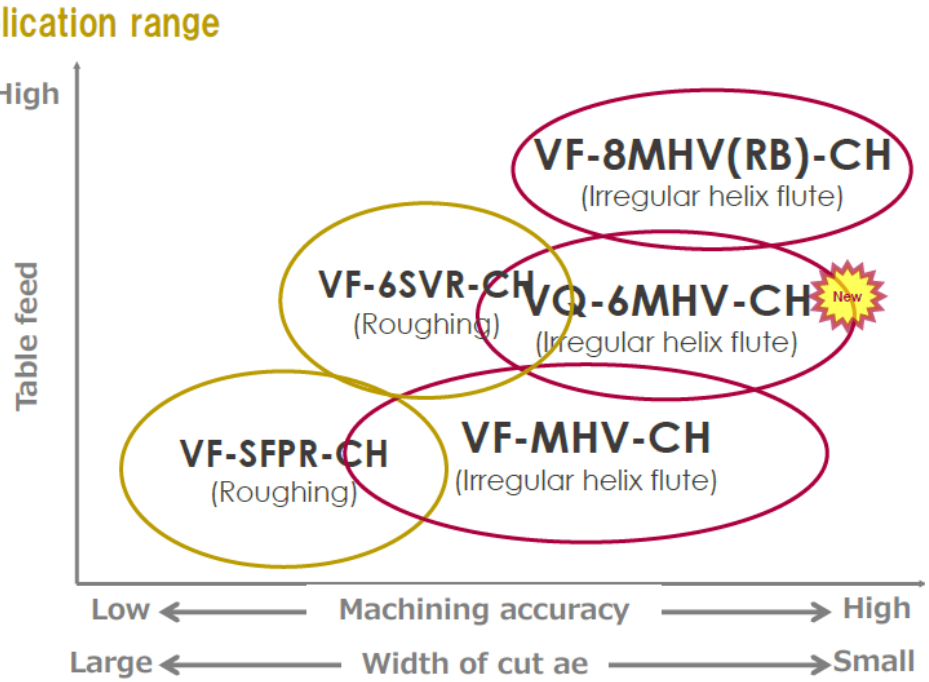
# VQ CoolStar Product Info & Links


*VQ6MHVCH (4 Sizes)
-10mm, 12mm, 16mm & 20mm DC

*VQ6MHVRBCH (10 sizes)
-10mm DC/0.5mm & 1mm RE
-12mm DC/0.5mm & 1mm RE
-16mm DC/1mm, 3mm & 4mm RE
-20mm DC/1mm, 3mm & 4mm RE

***VQ CoolStar – Internet Link***





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# DSA Series

**Solid Carbide Drill for Machining of Heat Resistant Alloys**

**NEW PRODUCT**


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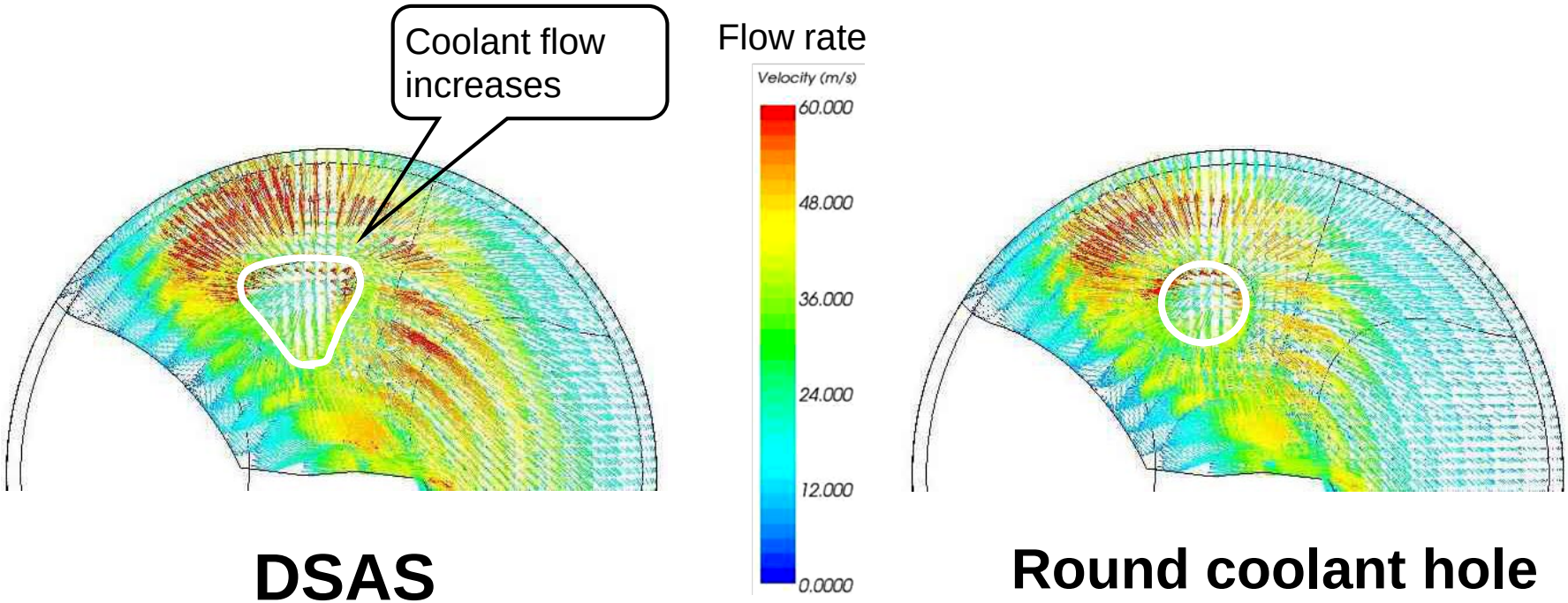
# DSA Series Overview

- Solid Carbide Drill for Heat Resistant Alloys
- DSA**S**: with coolant hole
- DSA**E**: without coolant hole
- New grade DP9020
- Available DC: 3mm-12mm(Included inch DC)

**DSAS**




**DSAS**

**Round coolant hole**

Comparison of coolant flow rate (Spindle speed 4700 RPM)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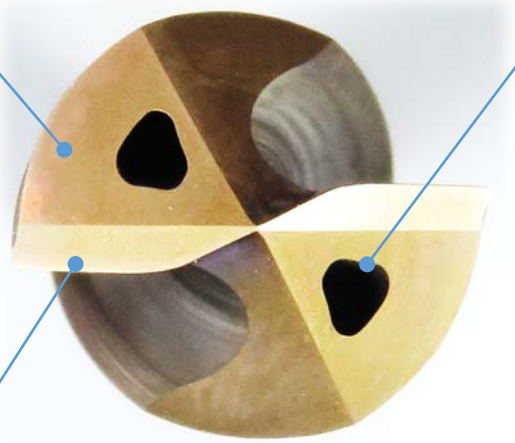
# DSA Series Features & Benefits

## New grade for heat resistant alloys machining: DP9020

New hard grade provides both high wear and fracture resistance, leading to extend tool life.



## TRI-Cooling Technology

The unique hole geometry increases the coolant flow rate, resulting in high lubricity and cooling effect. (Available in size of Ø5(0.2”) or more)

## Straight cutting edge with dedicated honing

The tough straight cutting edge with the dedicated honing enables stable chip formation as well as preventing the cutting edge from chipping.

## Special margin

The thin margin suitable for machining heat resistant alloys reduces the contact area with a workpiece and suppresses the generation of work-affected layers.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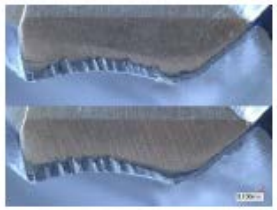
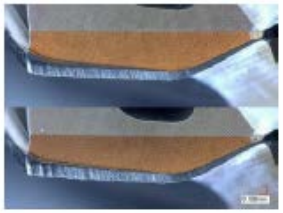
# DSA Series Market Comparison

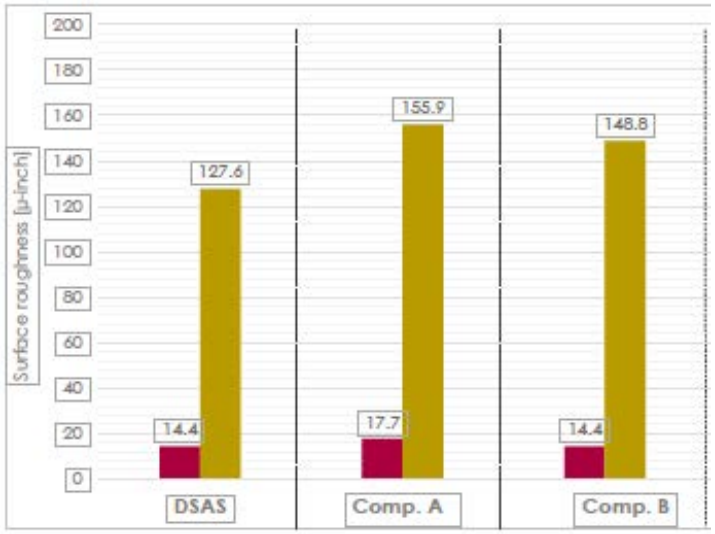
## DSA Series vs. Conventional

- High Hole Position Accuracy
- Longer Tool Life
- Excellent Wall Surface Roughness
- Excellent Chip Control

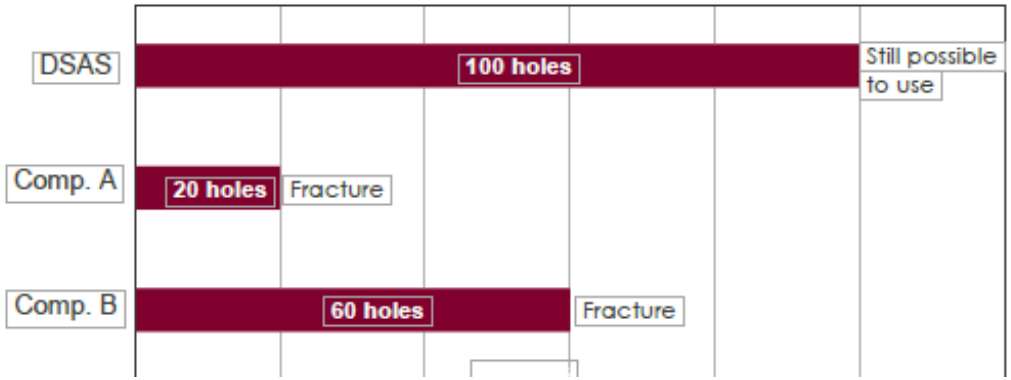
| | | |
|---|---|---|
| Workpiece | Rene41 | |
| Vendor | Conventional | Test (Mitsubishi Materials) |
| Holder | | DSAS0580X03S060 |
| vc. (SFM) | 81 | 77 |
| fr (IPR) | 0.0024 | 0.0024 |
| ld (inch) | 0.47 | 0.47 |
| Coolant | Emulsion Internal | Emulsion Internal |
| Quantity | 20 holes | 60 holes |

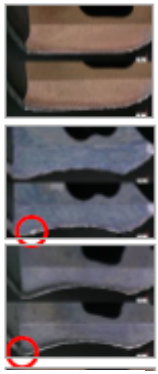







Cutting conditions: Drill dia.: DC=7(0.28") vc=130 SFM, fr=0.0059 IPR, ld=0.39" (Through hole)
Work material: Ti-6Al-4V Coolant: Emulsion [10%] (Internal coolant) Machine tool: Vertical M/C



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Work material: Ti-6Al-4V Coolant: Emulsion [10%] (Internal coolant) Machine tool: Vertical M/C


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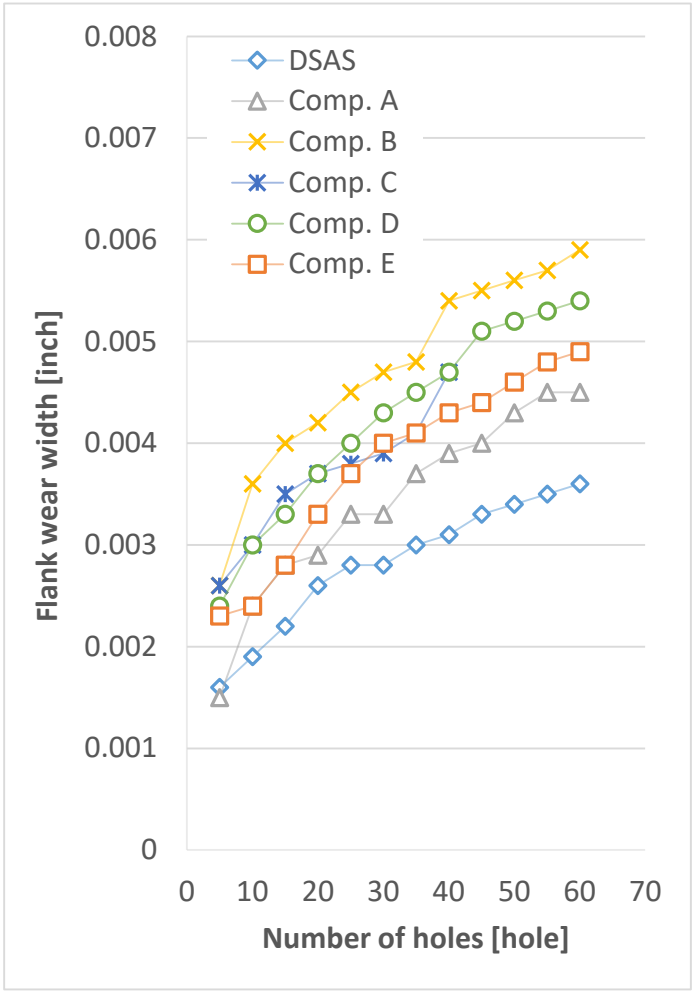
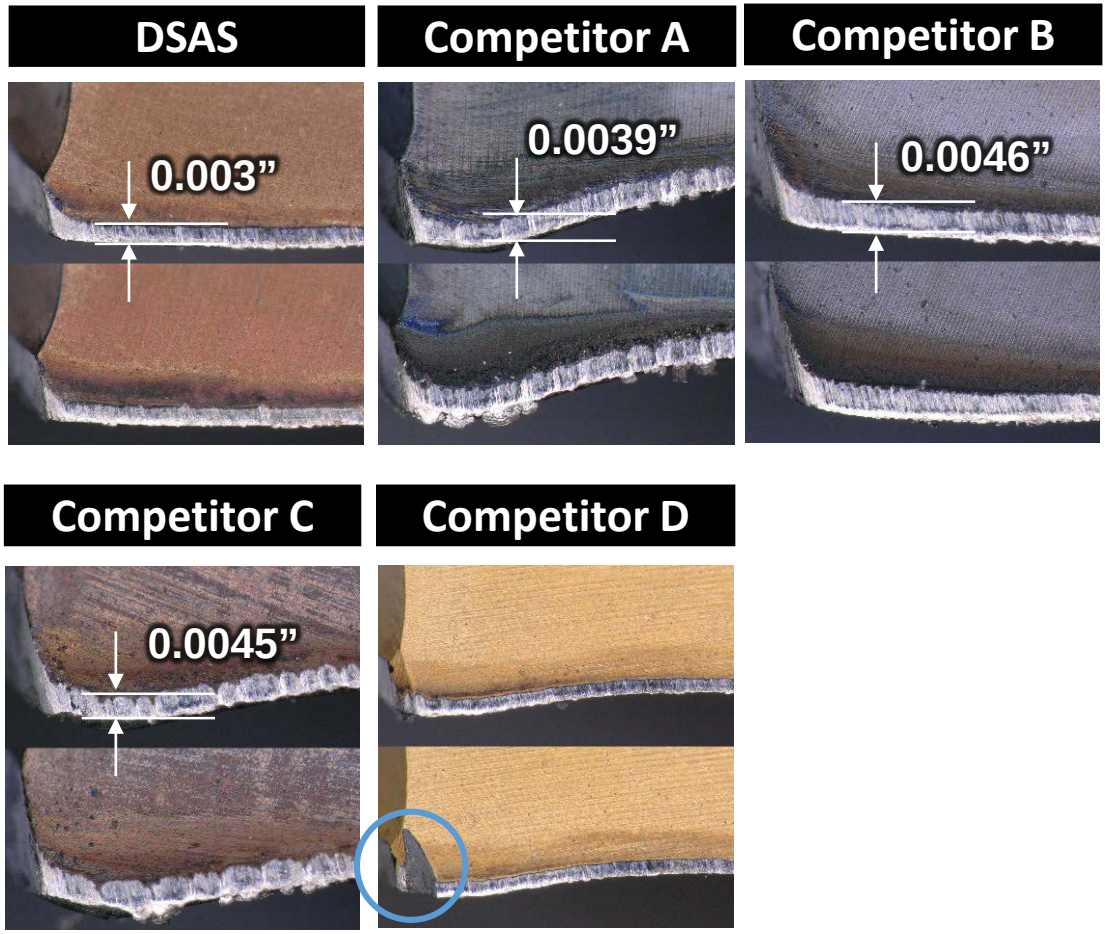
# DSA Series Application Example

## Inconel718




Flank wear width after drilling 60 holes




※Fracture occurred after drilling 30 holes.

Cutting conditions

Drill dia.: DC=7 vc=49 SFM fr=0.0039 IPR ld=0.47” (Through hole)
Workpiece material: Inconel718, Coolant: Emulsion [10%] (Internal coolant) Machine tool: Vertical M/C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# DSA Series Info & Links


**Tool News B256A**

## Recommended Cutting Conditions

(inch)

| Workpiece Material | | | Heat Resistant Alloys Inconel718 etc. | | Titanium Alloys Ti-6Al-4V etc. | |
|---|---|---|---|---|---|---|
| DC inch | DC mm | L/D | Cutting Speed **vc** (SFM) | Feed **fr** (Min.—Max.) (IPR) | Cutting Speed **vc** (SFM) | Feed **fr** (Min.—Max.) (IPR) |
| **.1181** | **3.000** | **≤ 3** | 30 | .002 (.002—.004) | 130 | .003 (.002—.005) |
| **.1575** | **4.000** | **≤ 3** | 30 | .002 (.002—.004) | 130 | .004 (.003—.006) |
| **.1969** | **5.000** | **≤ 3** | 40 | .003 (.002—.005) | 130 | .005 (.003—.008) |
| **.2362** | **6.000** | **≤ 3** | 50 | .004 (.003—.006) | 130 | .006 (.004—.008) |
| **.3150** | **8.000** | **≤ 3** | 50 | .004 (.003—.006) | 140 | .007 (.006—.010) |
| **.3937** | **10.000** | **≤ 3** | 60 | .004 (.003—.006) | 140 | .009 (.007—.011) |
| **.4724** | **12.000** | **≤ 3** | 65 | .005 (.003—.006) | 150 | .009 (.008—.012) |

Note 1) Spindle through & high pressure coolant system is recommended to make stable holes.
Note 2) Emulsion type of water-soluble coolant is recommended.
Note 3) In non water-insoluble coolant, reduce the cutting speed by 10%-20%.
Note 4) When drilling length of DCx1 or more with the use of external coolant system, step drilling is recommended in every DCx0.5 to encourage chips to break.

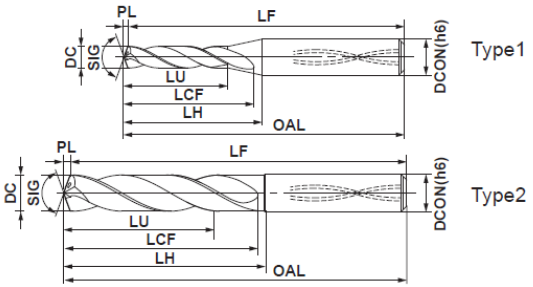
* When looking at coating the color can vary depending on the direction of viewing.This does not have any effect on the performance of the drill.

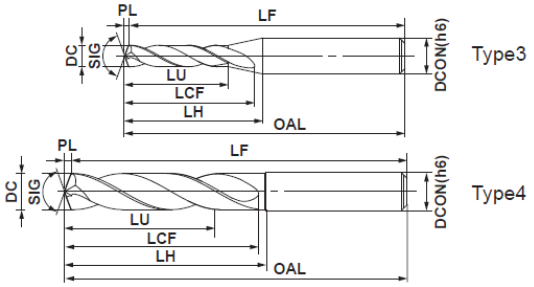
(inch)

| Type | Tolerance | DC=.1181 | .1181<DC≤.2362 | .2362<DC≤.3937 | .3937<DC≤.4724 |
|---|---|---|---|---|---|
| Type1,2,3,4 | DC | $^{0}_{-.00071}$ | $^{0}_{-.00071}$ | $^{0}_{-.00087}$ | $^{0}_{-.00106}$ |
| | DCON | $^{0}_{-.00031}$ | $^{0}_{-.00031}$ | $^{0}_{-.00035}$ | $^{0}_{-.00043}$ |

(mm)

| Type | Tolerance | DC=3 | 3<DC≤6 | 6<DC≤10 | 10<DC≤12 |
|---|---|---|---|---|---|
| Type1,2,3,4 | DC | $^{0}_{-0.018}$ | $^{0}_{-0.018}$ | $^{0}_{-0.022}$ | $^{0}_{-0.027}$ |
| | DCON | $^{0}_{-0.008}$ | $^{0}_{-0.008}$ | $^{0}_{-0.009}$ | $^{0}_{-0.011}$ |




## DSA Series – Internet Link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# GY Series

## Cutting Off & Grooving System

**Product Line Expansion**

## GL breaker insert expansion

- for Aluminum Alloys
- Shape Additions:
  - GY2G0200D005N-GL
  - GY2G0250E005N-GL
  - GY2G0300F005N-GL


***GY Series – Internet Link***


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# VPX Series

**Indexable Multi-Purpose Milling Cutter**

**Product Line Expansion**

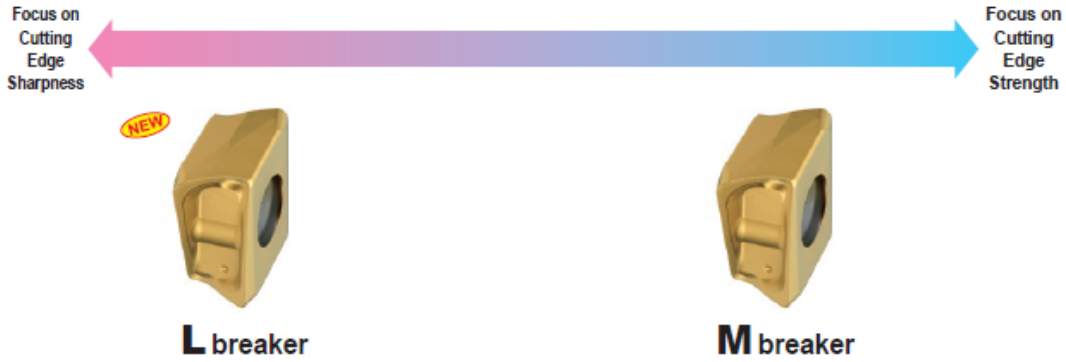
## L breaker insert expansion

P M K N S H

- VPX200 Series additon
- Additions: Total 48 items
  - LOGU0904***PNER-L
  - LOGU0904***PNFR-L
  - MP6120,MP6130, MP7130, MC5020, MP9120, MP9130, VP15TF, TF15

**Chip Breaker System**

New L breaker with low cutting resistance has been added.




***VPX Series – Internet Link***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# WJX Series

**High Feed Radius Milling Cutter with Double Sided Insert**

**Product Line Expansion**

## L&R breaker insert expansion

P M K S H

- *Available Nov. 2019
- Additions: Total 14 items
  - JOMU140715ZZER-L
  - JOMU140715ZZER-R
  - MP6120, MP6130, MP7130, MP7140, MC7020, MP9120, MP9130, VP15TF, VP30RT

## Small diameter cutter body expansion

- Additions: Total 7 items
  - (Inch arbor type) WJX14UR2.0003AA, WJX14UR2.0004AA
  - (Metric arbor type) WJX14-050A03AR, WJX14-050A04AR, WJX14R05003BA, WJX14R05004BA, WJX14-052A04AR

***WJX Series – Internet Link***


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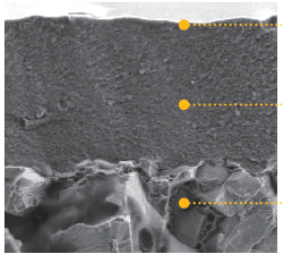
# AJX Series

## High Feed Radius Milling Cutter

**Product Line Expansion**

## MP9140 grade expansion

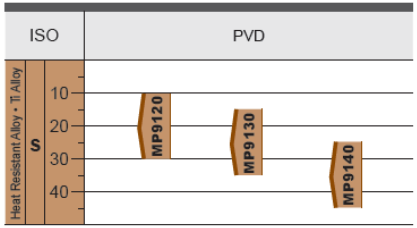
- JL breaker insert
- Additions: Total 5 items
  - JOMT**********-JL
    (AJX06, 08, 09, 12, 14)



Smooth surface is excellent in proving welding resistance.

The high Al-rich AlTiN coating succeeds in dramatically improving wear and heat resistance.

Special cemented carbide substrate with improved fracture resistance.




| Grade | Features |
|---|---|
| **MP9120** | Focus on Wear Resistance |
| **MP9130** | Standard Grade |
| **MP9140** | Focus on Fracture Resistance |

***AJX Series – Internet Link***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# FMAX

**High Feed Finish Milling Cutter for Aluminum Alloys**

**Product Line Expansion**

## Cutter body expansion

- For compact and smaller machining centers
- Light weight and high rigidity body
- Additions: Total 4 items
  - FMAXR10010CLW
  - FMAXR10016CLW
  - FMAXR12514CLW
  - FMAXR12520CLW


***FMAX – Internet Link***


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