

High Precision Violet Series Drills for Counter Boring

New sizes  
included

**VA-PDS-CB**

# Exclusive design for counter boring.

- Innovative cutting edge geometry for high performance counter boring.
- Excellent chip breaking and high precision flat surfaces.



# High Precision Violet Series Drills for Counter Boring

# VA-PDS-CB

## Features

### Special point geometry for excellent chip breaking

#### Thinning geometry

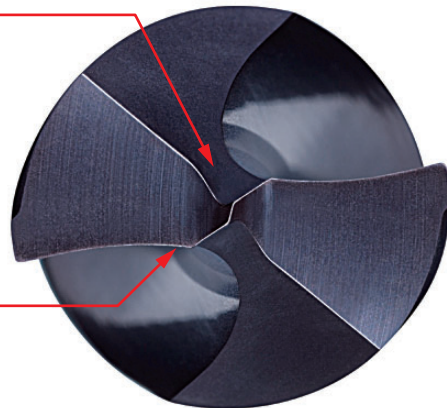
Unique thinning geometry is used to give excellent chip breaking.

#### Centre cutting edge

Ensures stable, high feed machining.

#### High precision flat surface

Can obtain the same level of flatness (under 0.05mm) as that of conventional counter boring tools.  
 (\* $\phi 14.1$ - $\phi 20.1$  : Under 0.10mm  
 $\phi 22.0$ - $\phi 32.0$  : Under 0.15mm)



## Ideal chip geometry



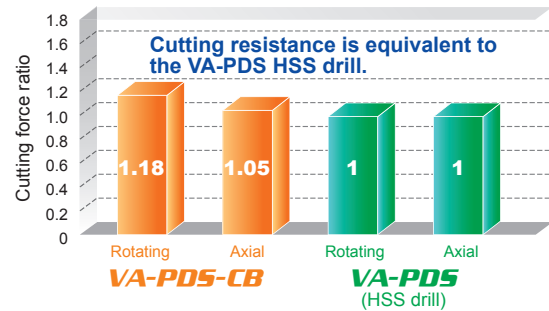
VA-PDS-CB



Conventional end mill

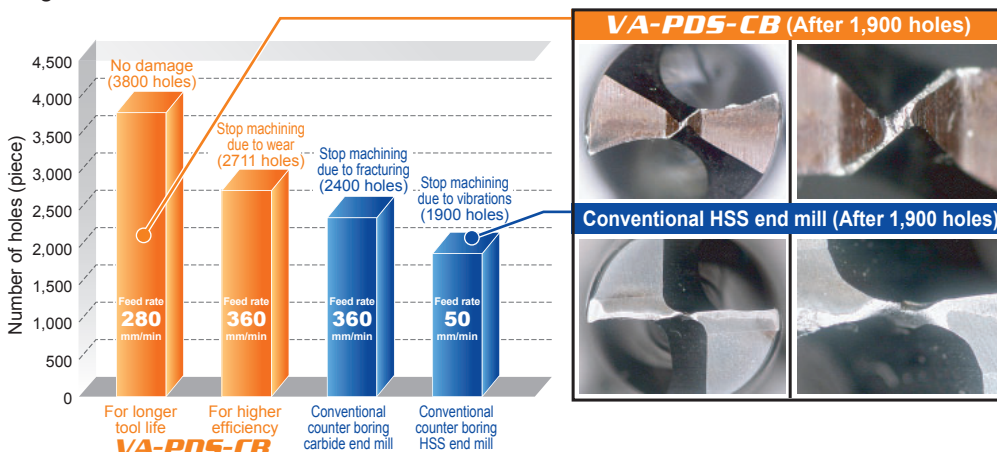
## Versatile

Low cutting force means suitability for all machines that can use HSS drills.



## High efficiency machining

The VA-PDS-CB drill delivers the same high performance as a conventional counter boring end mill but gives longer tool life.

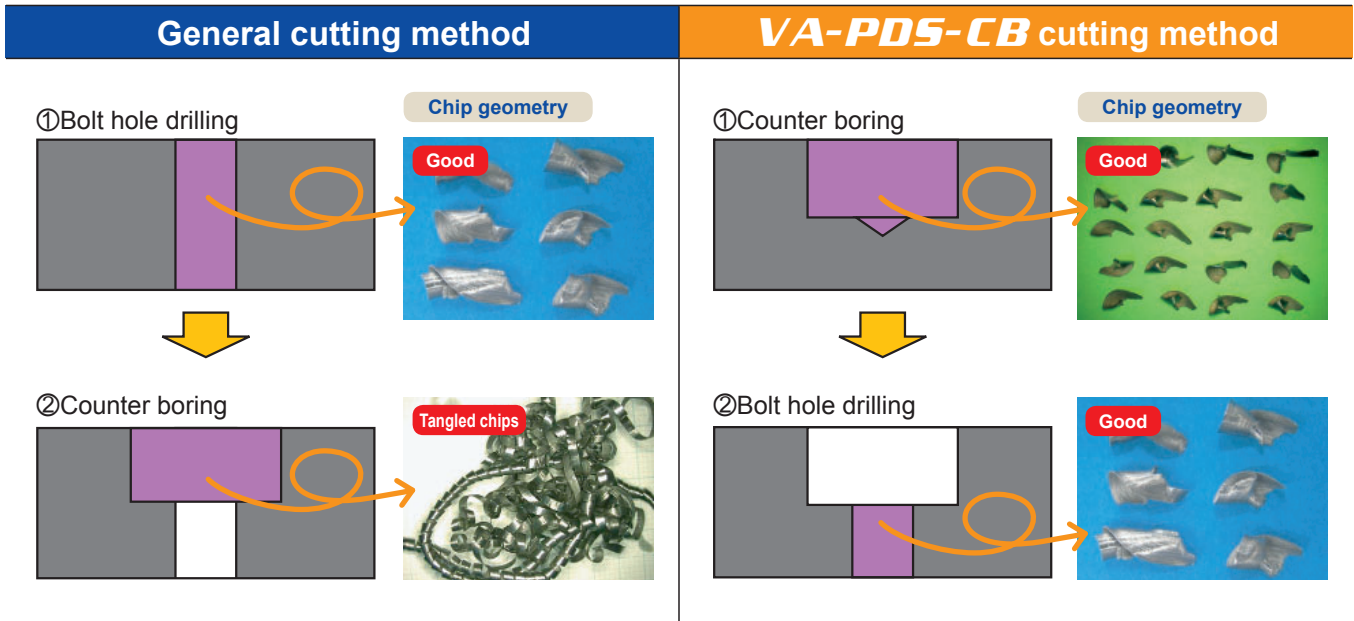


#### Cutting conditions

Drill	VAPDSCBD0800 ( $\phi 8$ )
Workpiece	S50C
Cutting speed	35m/min (for longer tool life) 45m/min (for higher efficiency)
Feed rate	280mm/min (for longer tool life) 360mm/min (for higher efficiency)
Feed	0.20mm/rev
Pilot drilling	None
Coolant	W.S.O.

## Recommended cutting method

VA-PDS-CB breaks up chips and prevents them wrapping around the tool.

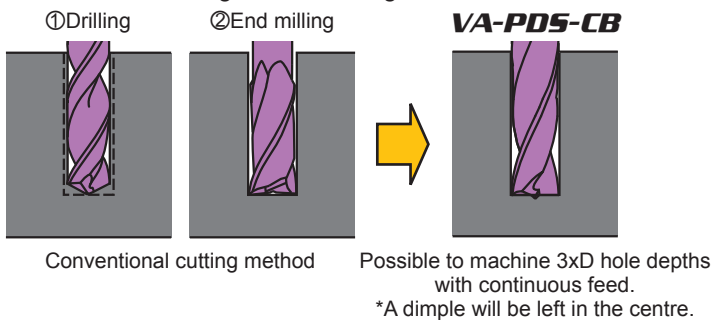


Note) When counter boring using the VA-PDS-CB after drilling a bolt hole (pilot hole), unbroken chips may form and wrap around the tool.

## Other machining examples

### Deep cunter boring

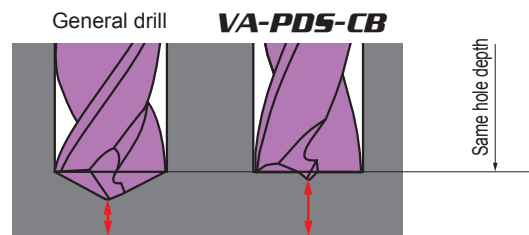
Since non-peck drilling is possible up to the effective flute length\*, there is no need to drill a pilot hole, therefore shortening the machining time.



\*Effective flute length = Flute length - Diameter × (1.0 to 1.5) - Penetration length

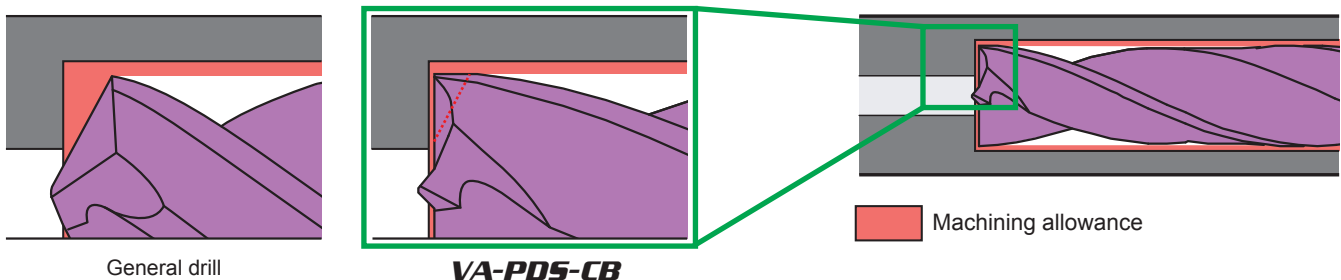
### Blind hole

The small dimple allows a thicker base material on blind holes.



### Pilot hole for boring

The 180° point angle reduces the machining allowance on the end face. This reduces vibration during the finish boring operation and extends tool life.



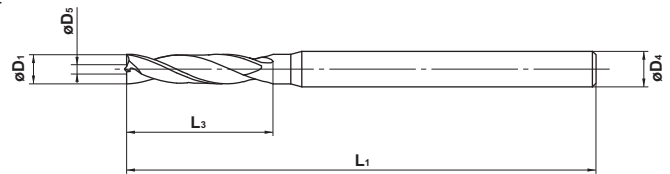
# VIOLET DRILLS

## VA-PDS-CB

Short flute length, High precision, For counter boring



Carbon Steel Alloy Steel	Hardened Steel	Stainless Steel	Cast Iron	Light Alloy	Heat Resistant Alloy		D1 ≤ 3	3 < D1 ≤ 6	6 < D1 ≤ 10	10 < D1 ≤ 18	18 < D1 ≤ 30	30 < D1 ≤ 32	
○		○	○	○			D1 Tolerance (mm)	0 -0.014	0 -0.018	0 -0.022	0 -0.027	0 -0.033	0 -0.039



- Unique geometry offers high efficiency counter boring. Excellent chip breaking and flat counterbored surface.

Unit : mm

Order Number	Drill Dia. D1	118° Dia. D5	Flute Length L3	Overall Length L1	Shank Dia. D4	Stock	Order Number	Drill Dia. D1	118° Dia. D5	Flute Length L3	Overall Length L1	Shank Dia. D4	Stock
NEW VAPDSCBD0200	2.0	0.7	12	60	3	●	VAPDSCBD0600	6.0	1.4	27	80	6	●
NEW D0210	2.1	0.7	12	60	3	●	D0610	6.1	1.4	30	80	8	●
NEW D0220	2.2	0.7	12	60	3	●	NEW D0620	6.2	1.4	30	80	8	●
NEW D0230	2.3	0.7	13	60	3	●	NEW D0630	6.3	1.4	30	80	8	●
NEW D0240	2.4	0.7	13	60	3	●	NEW D0640	6.4	1.4	30	80	8	●
NEW D0250	2.5	0.7	13	60	3	●	D0650	6.5	1.4	30	80	8	●
NEW D0260	2.6	0.8	15	60	3	●	D0660	6.6	1.8	30	80	8	●
NEW D0270	2.7	0.8	15	60	3	●	NEW D0670	6.7	1.8	30	80	8	●
NEW D0280	2.8	0.8	15	60	3	●	D0680	6.8	1.8	32	80	8	●
NEW D0290	2.9	0.8	15	60	3	●	D0690	6.9	1.8	32	80	8	●
D0300	3.0	0.8	15	60	3	●	D0700	7.0	1.8	32	80	8	●
NEW D0310	3.1	0.8	17	70	4	●	D0710	7.1	1.8	32	80	8	●
NEW D0320	3.2	0.8	17	70	4	●	NEW D0720	7.2	1.8	32	80	8	●
D0330	3.3	0.8	19	70	4	●	NEW D0730	7.3	1.8	32	80	8	●
D0340	3.4	0.8	19	70	4	●	NEW D0740	7.4	1.8	32	80	8	●
D0350	3.5	0.8	19	70	4	●	D0750	7.5	1.8	32	80	8	●
NEW D0360	3.6	1.0	21	70	4	●	NEW D0760	7.6	2.0	35	85	8	●
NEW D0370	3.7	1.0	21	70	4	●	NEW D0770	7.7	2.0	35	85	8	●
D0380	3.8	1.0	21	70	4	●	D0780	7.8	2.0	35	85	8	●
NEW D0390	3.9	1.0	21	70	4	●	D0790	7.9	2.0	35	85	8	●
D0400	4.0	1.0	21	70	4	●	D0800	8.0	2.0	35	85	8	●
NEW D0410	4.1	1.0	21	80	6	●	D0810	8.1	2.0	35	90	10	●
D0420	4.2	1.0	21	80	6	●	D0850	8.5	2.0	35	90	10	●
D0430	4.3	1.0	23	80	6	●	D0860	8.6	2.8	38	93	10	●
NEW D0440	4.4	1.0	23	80	6	●	D0880	8.8	2.8	38	93	10	●
D0450	4.5	1.0	23	80	6	●	D0900	9.0	2.8	38	93	10	●
NEW D0460	4.6	1.4	25	80	6	●	D0910	9.1	2.8	38	93	10	●
NEW D0470	4.7	1.4	25	80	6	●	D0950	9.5	2.8	38	93	10	●
D0480	4.8	1.4	25	80	6	●	D0960	9.6	3.2	41	96	10	●
NEW D0490	4.9	1.4	25	80	6	●	D0980	9.8	3.2	41	96	10	●
D0500	5.0	1.4	25	80	6	●	D1000	10.0	3.2	41	96	10	●
D0510	5.1	1.4	25	80	6	●	D1010	10.1	3.2	41	101	12	●
NEW D0520	5.2	1.4	25	80	6	●	D1030	10.3	3.2	41	101	12	●
NEW D0530	5.3	1.4	25	80	6	●	D1050	10.5	3.2	41	101	12	●
NEW D0540	5.4	1.4	27	80	6	●	NEW D1080	10.8	3.7	45	105	12	●
D0550	5.5	1.4	27	80	6	●	D1100	11.0	3.7	45	105	12	●
NEW D0560	5.6	1.4	27	80	6	●	D1110	11.1	3.7	45	105	12	●
NEW D0570	5.7	1.4	27	80	6	●	D1150	11.5	3.7	45	105	12	●
D0580	5.8	1.4	27	80	6	●	D1180	11.8	3.7	45	105	12	●
NEW D0590	5.9	1.4	27	80	6	●	D1200	12.0	3.7	49	109	12	●

● : Inventory maintained in Japan.



Unit : mm

Order Number	Drill Dia. D1	118° Dia. D5	Flute Length L3	Overall Length L1	Shank Dia. D4	Stock
<b>VAPDSCBD1250</b>	12.5	3.7	49	109	12	●
<b>D1300</b>	13.0	4.2	49	109	12	●
<b>D1350</b>	13.5	4.2	51	121	16	●
<b>D1380</b>	13.8	4.2	51	121	16	●
<b>D1400</b>	14.0	4.2	51	121	16	●
<b>D1410</b>	14.1	5.5	58	123	16	●
<b>NEW</b> <b>D1420</b>	14.2	5.5	58	123	16	●
<b>NEW</b> <b>D1450</b>	14.5	5.5	58	123	16	●
<b>D1480</b>	14.8	5.5	58	123	16	●
<b>D1500</b>	15.0	5.5	58	123	16	●
<b>NEW</b> <b>D1550</b>	15.5	5.5	60	125	16	●
<b>NEW</b> <b>D1570</b>	15.7	5.5	60	125	16	●
<b>D1580</b>	15.8	5.5	60	125	16	●
<b>D1600</b>	16.0	5.5	60	125	16	●
<b>D1700</b>	17.0	5.5	62	132	20	●
<b>D1750</b>	17.5	5.5	63	133	20	●
<b>D1760</b>	17.6	6.5	63	133	20	●
<b>NEW</b> <b>D1770</b>	17.7	6.5	63	133	20	●
<b>D1780</b>	17.8	6.5	63	133	20	●
<b>D1800</b>	18.0	6.5	63	133	20	●
<b>D1810</b>	18.1	6.5	65	135	20	●
<b>D1900</b>	19.0	6.5	65	135	20	●
<b>D1980</b>	19.8	7.5	67	137	20	●
<b>D2000</b>	20.0	7.5	67	137	20	●
<b>D2010</b>	20.1	7.5	67	137	20	●
<b>NEW</b> <b>D2100</b>	21.0	7.5	75	165	25	●
<b>D2200</b>	22.0	7.5	75	165	25	●
<b>D2300</b>	23.0	7.5	80	170	25	●
<b>D2400</b>	24.0	8.5	80	170	25	●
<b>NEW</b> <b>D2500</b>	25.0	8.5	85	180	25	●
<b>D2600</b>	26.0	9.0	85	180	32	●
<b>NEW</b> <b>D2700</b>	27.0	9.0	95	190	32	●
<b>D2800</b>	28.0	10.0	95	190	32	●
<b>D2900</b>	29.0	10.0	100	195	32	●
<b>D3000</b>	30.0	11.0	100	195	32	●
<b>NEW</b> <b>D3100</b>	31.0	11.0	105	200	32	●
<b>D3200</b>	32.0	13.0	105	200	32	●

## RECOMMENDED CUTTING CONDITIONS

Work Material	Structural steel Aluminium alloy		Carbon steel AISI 1049 Alloy steel SCM Cast iron FCD		Alloy tool steel AISI D2 (Low-hardness materials) Ferritic stainless steel AISI 430, AISI 405 Martensitic stainless steel AISI 420, AISI 440		Alloy tool steel AISI H13 (-40HRC) Precipitation hardeningstainless steel ASTM 630, ASTM 631	
	Drill Dia. (mm)	Revolution (min <sup>-1</sup> )	Feed rate (mm/rev)	Revolution (min <sup>-1</sup> )	Feed rate (mm/rev)	Revolution (min <sup>-1</sup> )	Feed rate (mm/rev)	Revolution (min <sup>-1</sup> )
<b>2.0</b>	5600	0.07	4800	0.07	3200	0.07	2800	0.04
<b>3.0</b>	3700	0.10	3200	0.10	2100	0.10	1900	0.05
<b>4.0</b>	2800	0.12	2400	0.12	1600	0.12	1400	0.06
<b>5.0</b>	2200	0.14	1900	0.14	1300	0.14	1150	0.07
<b>6.0</b>	1850	0.15	1600	0.15	1050	0.15	950	0.08
<b>8.0</b>	1400	0.20	1200	0.20	800	0.20	720	0.10
<b>10.0</b>	1100	0.23	960	0.23	640	0.21	570	0.11
<b>12.0</b>	950	0.26	800	0.26	530	0.24	470	0.12
<b>14.0</b>	800	0.27	680	0.27	450	0.25	410	0.13
<b>16.0</b>	700	0.28	500	0.28	360	0.26	300	0.14
<b>18.0</b>	620	0.29	450	0.29	320	0.27	260	0.15
<b>20.0</b>	560	0.30	400	0.30	290	0.27	240	0.15
<b>22.0</b>	510	0.32	360	0.32	260	0.29	220	0.16
<b>24.0</b>	460	0.33	330	0.33	240	0.30	200	0.16
<b>26.0</b>	430	0.35	310	0.35	220	0.31	180	0.17
<b>28.0</b>	400	0.36	290	0.36	210	0.33	170	0.18
<b>30.0</b>	370	0.37	270	0.37	190	0.34	160	0.18
<b>32.0</b>	350	0.38	250	0.38	180	0.35	150	0.19

- 1) The above cutting conditions are for drilling 3xD hole depths without a pilot hole. When drilling holes smaller than 1xD hole depths, it is possible to increase the revolutions by 20%.
- 2) Drilling without a pilot hole is recommended. If there is a pilot hole, chips are not broken. Use a peck feed when chip breaking is necessary.
- 3) For counter boring of a sloped face, a carbide end mill is recommended.
- 4) When machining austenitic stainless steels (JIS SUS304, SUS316), reduce the revolutions by 30-60% and the feed rate by 40-60%.
- 5) Please use a collet type drill chuck or a milling chuck.
- 6) Please reduce the revolution and feed rate depending on the drilling situation when the installation of workpiece or machine lacks rigidity.
- 7) Use sufficient cutting fluid.

The above-mentioned cutting condition is standard when using water-soluble cutting fluid.  
Please reduce the revolutions when using non-water-soluble cutting fluid.

# Violet Coated High Precision Drill

The superior heat and abrasion resistance combined with geometries designed for specific purposes gives greater precision, efficiency and longer tool life.

VA-PDS and VA-PDM are for steel and hardened materials up to 40HRC.

VA-PDS-SUS and VA-PDM-SUS are suitable for stainless steels and softer materials.

<b>Violet Coated High Precision Drill VA-PDS, VA-PDM</b>	<b>Violet Coated High Precision Drill for Stainless Steel VA-PDS-SUS, VA-PDM-SUS</b>
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**VA-PDS**  $\varnothing 0.5 \sim \varnothing 13.0$



**VA-PDM**  $\varnothing 0.5 \sim \varnothing 32.0$



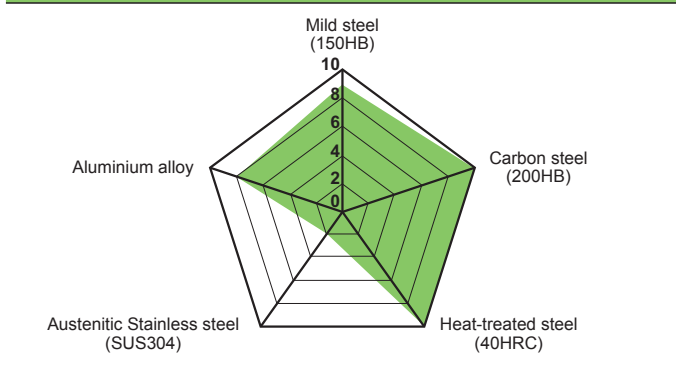
**VA-PDS-SUS**  $\varnothing 0.5 \sim \varnothing 20.0$



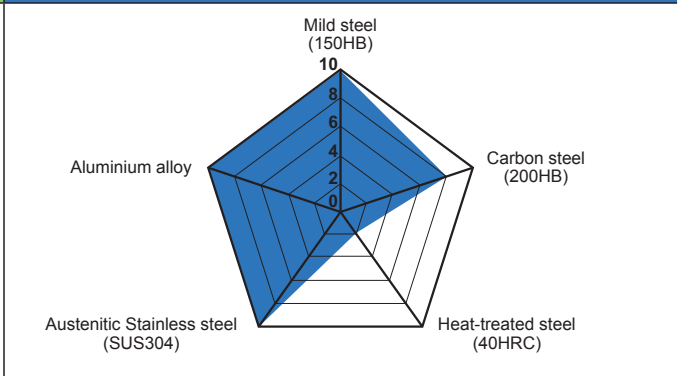
**VA-PDM-SUS**  $\varnothing 0.5 \sim \varnothing 13.0$



## Application Radar Chart



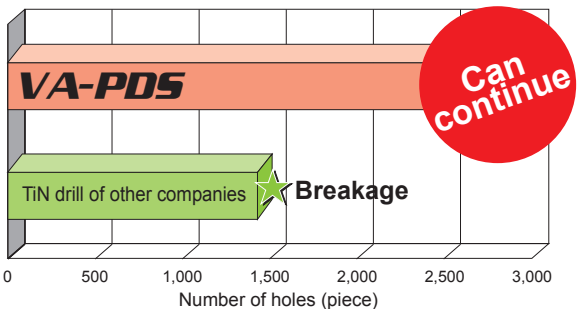
## Application Radar Chart



## Cutting Example

**VA-PDS**

Realization of long tool life with excellent abrasion resistance



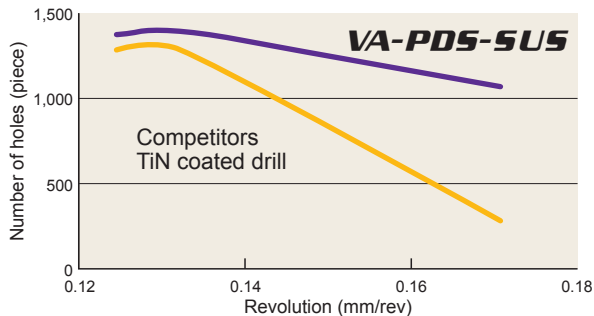
The chart shows that the VA-PDS drill can drill over 3,000 holes, while a TiN drill of other companies reaches a breakage point around 1,500 holes. A red circle with the text "Can continue" is placed over the VA-PDS bar.

Drill	VA-PDS $\varnothing 6.0$
Workpiece	S50C
Revolution	$1,800 \text{ min}^{-1}$ (35m/min)
Feed	0.3mm/rev
Hole depth	16mm Penetration
Coolant	Emulsion

## Cutting Example

**VA-PDS-SUS**

High performance over a wide range of cutting conditions



The graph plots the number of holes drilled (piece) against the cutting speed (Revolution in mm/rev). The VA-PDS-SUS drill (purple line) maintains a high number of holes (around 1,000-1,400) across the range of cutting speeds, while a competitor's TiN coated drill (yellow line) shows a sharp decline in performance as cutting speed increases.

Drill	VA-PDS-SUS $\varnothing 6.0$
Workpiece	SUS304
Revolution	$800 \text{ min}^{-1}$ (15m/min)
Hole depth	16mm Penetration
Coolant	Emulsion

**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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(Tools specifications subject to change without notice.)