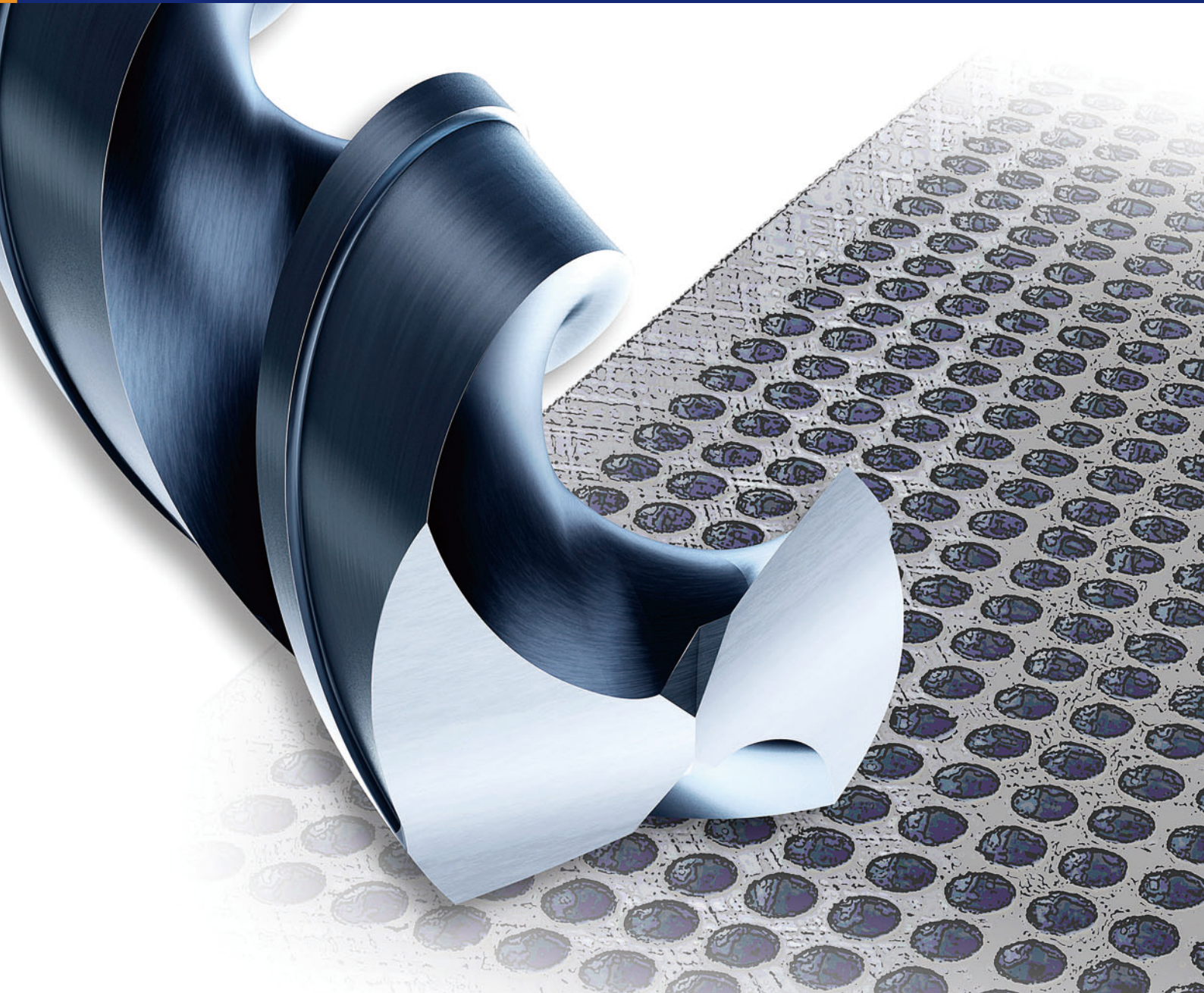


HSS milling shank drills
SE High Precision Drill Series

SEPDS/SEPDM

SEPDS
Addition



**New HSS drill with newly developed
proprietary D-STH surface treatment.
Excellent for a wide range of work
materials, wear resistant, lubricity and
sharp cutting edge.**

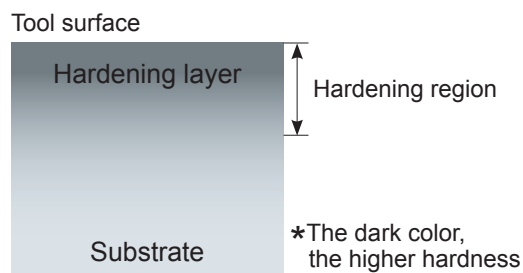
HSS milling shank drills

SEPDS/SEPDM

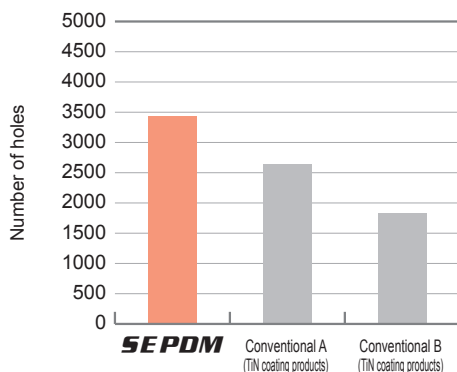
SE High Precision Drill Series

Excellent wear resistance

Adopted proprietary D-STH surface treatment with evolved nitriding and oxidation. D-STH treatment realizes the same level of sharpness as non-coating and excellent wear resistant like coating.

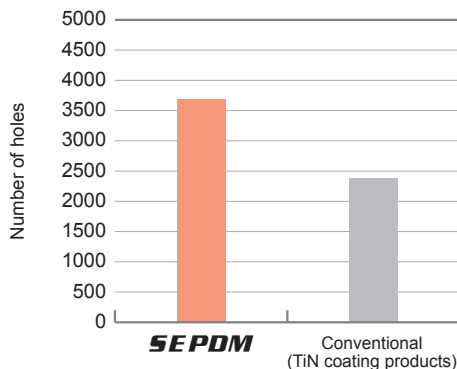


Drilling of Carbon Steel S50C



<Cutting Conditions>
 Work material : JIS S50C/DIN-C50/AISI-1049
 Tool : SEPDM0300 (ø3mm)
 Revolution : 2650min⁻¹
 Cutting speed : 25m/min
 Feed rate : 398mm/min
 Feed : 0.15mm/rev
 Hole depth : 8mm (Through hole)
 Cutting mode : Emulsion
 Continuous feed machining
 Machine tools : Gantry type M/C (BT40)

Drilling of Stainless Steel SUS304



<Cutting Conditions>
 Work material : JIS SUS304/DIN-X5CrNi1810/ASTM-S30400
 Tool : SEPDM0300 (ø3mm)
 Revolution : 1590min⁻¹
 Cutting speed : 25m/min
 Feed rate : 398mm/min
 Feed : 0.05mm/rev
 Hole depth : 7mm (Blind hole)
 Cutting mode : Emulsion
 Continuous feed machining
 Machine tools : Gantry type M/C (BT40)

High-accuracy drill diameter JIS h6

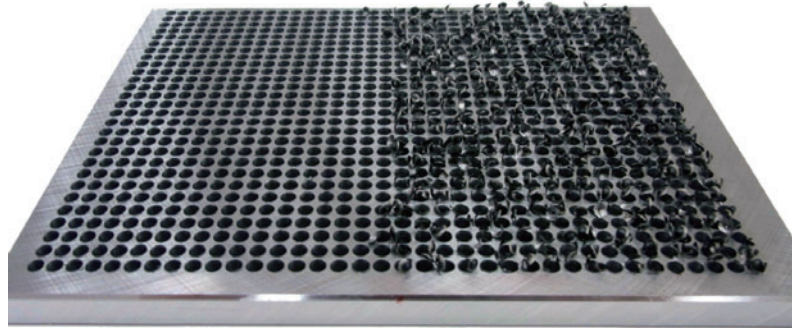
Achieving the unprecedented highest accuracy with the new surface treatment.

Diameter	0.5<DC≤3	3<DC≤4
Tolerance	0 -0.006	0 -0.008

Small burr in the feed direction

Having sharp cutting edge compared to coating drills.

Comparison of burr



SEPDM

Conventional
(Coated product)

<Cutting Conditions>

Work material : JIS S50C/DIN-C50/AISI-1049

Tool : SEPDMMD0400 (ø4mm)

Cutting Speed : 35m/min

Feed : 0.15mm/rev

Hole depth : 13mm (Through hole)

Cutting mode : Emulsion

Continuous feed machining

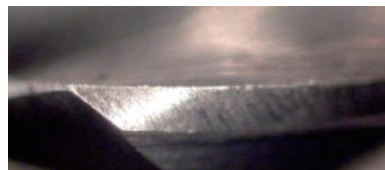
Excellent welding resistance and smooth chip discharge

Minute holes on a tool surface helps coolant penetrate into the holes, which result in the superior lubricity. The lubricity provides excellent welding resistance and chip disposal.

Weld resistance

SEPDM

Conventional(Coated product)



Welding of Aluminum: Small



Welding of Aluminum: Large

<Cutting Conditions>

Work material : JIS AC4B/DIN-G-AISI9Cu3/ASTM-356.0

Tool : SEPDMMD0300 (ø3mm)

Cutting Speed : 35m/min

Feed : 0.13mm/rev

Hole depth : 9mm (Blind hole)

Cutting mode : Emulsion

Continuous feed machining

HSS MILLING SHANK DRILLS

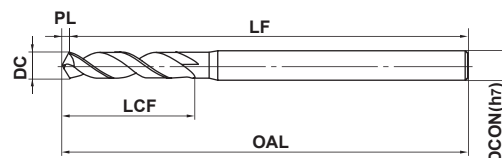
SEPDS

NEW

SE High Precision Drill (S)



$0.5 \leq DC \leq 3$	$3.1 \leq DC \leq 4$
$\begin{matrix} 0 \\ -0.006 \end{matrix}$	$\begin{matrix} 0 \\ -0.008 \end{matrix}$



- Unique D-STH process dramatically improves sharpness and welding resistance and smooth chip discharge.

Unit : mm

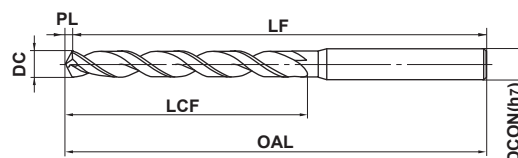
Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
SEPDS0050	0.5	3.1	50.1	50	0.1	3	●
SEPDS0055	0.55	3.11	50.11	50	0.11	3	●
SEPDS0060	0.6	5.12	50.12	50	0.12	3	●
SEPDS0065	0.65	5.13	50.13	50	0.13	3	●
SEPDS0070	0.7	5.14	50.14	50	0.14	3	●
SEPDS0075	0.75	5.16	50.16	50	0.16	3	●
SEPDS0080	0.8	5.17	50.17	50	0.17	3	●
SEPDS0085	0.85	5.18	50.18	50	0.18	3	●
SEPDS0090	0.9	6.19	50.19	50	0.19	3	●
SEPDS0095	0.95	6.2	50.2	50	0.2	3	●
SEPDS0100	1	6.2	50.2	50	0.2	3	●
SEPDS0110	1.1	8.2	55.2	55	0.2	3	●
SEPDS0120	1.2	8.3	55.3	55	0.3	3	●
SEPDS0130	1.3	9.3	55.3	55	0.3	3	●
SEPDS0140	1.4	9.3	55.3	55	0.3	3	●
SEPDS0150	1.5	9.3	55.3	55	0.3	3	●
SEPDS0160	1.6	11.3	55.3	55	0.3	3	●
SEPDS0170	1.7	11.4	55.4	55	0.4	3	●
SEPDS0180	1.8	11.4	55.4	55	0.4	3	●
SEPDS0190	1.9	12.4	55.4	55	0.4	3	●
SEPDS0200	2	12.4	60.4	60	0.4	3	●
SEPDS0210	2.1	12.4	60.4	60	0.4	3	●
SEPDS0220	2.2	12.5	60.5	60	0.5	3	●
SEPDS0230	2.3	13.5	60.5	60	0.5	3	●
SEPDS0240	2.4	13.5	60.5	60	0.5	3	●
SEPDS0250	2.5	13.5	60.5	60	0.5	3	●
SEPDS0260	2.6	15.5	60.5	60	0.5	3	●
SEPDS0270	2.7	15.6	60.6	60	0.6	3	●
SEPDS0280	2.8	15.6	60.6	60	0.6	3	●
SEPDS0290	2.9	15.6	60.6	60	0.6	3	●
SEPDS0300	3	15.6	60.6	60	0.6	3	●
SEPDS0310	3.1	17.6	70.6	70	0.6	4	●
SEPDS0320	3.2	17.7	70.7	70	0.7	4	●
SEPDS0330	3.3	19.7	70.7	70	0.7	4	●
SEPDS0340	3.4	19.7	70.7	70	0.7	4	●
SEPDS0350	3.5	19.7	70.7	70	0.7	4	●
SEPDS0360	3.6	21.8	70.8	70	0.8	4	●
SEPDS0370	3.7	21.8	70.8	70	0.8	4	●
SEPDS0380	3.8	21.8	70.8	70	0.8	4	●
SEPDS0390	3.9	21.8	70.8	70	0.8	4	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
SEPDS0400	4	21.8	70.8	70	0.8	4	●

● : Inventory maintained in Japan.



0.5 ≤ DC ≤ 3	3.1 ≤ DC ≤ 4
0 -0.006	0 -0.008



- Unique D-STH process dramatically improves sharpness and welding resistance and smooth chip discharge.

Unit : mm

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
SEPDMD0050	0.50	6.15	50.15	50	0.15	3	●
SEPDMD0055	0.55	6.17	50.17	50	0.17	3	●
SEPDMD0060	0.60	8.18	50.18	50	0.18	3	●
SEPDMD0065	0.65	8.20	50.20	50	0.2	3	●
SEPDMD0070	0.70	10.21	50.21	50	0.21	3	●
SEPDMD0075	0.75	10.23	50.23	50	0.23	3	●
SEPDMD0080	0.80	10.24	50.24	50	0.24	3	●
SEPDMD0085	0.85	10.26	50.26	50	0.26	3	●
SEPDMD0090	0.90	12.27	50.27	50	0.27	3	●
SEPDMD0095	0.95	12.29	50.29	50	0.29	3	●
SEPDMD0100	1.0	12.3	60.3	60	0.3	3	●
SEPDMD0110	1.1	16.3	60.3	60	0.3	3	●
SEPDMD0120	1.2	16.4	60.4	60	0.4	3	●
SEPDMD0130	1.3	16.4	60.4	60	0.4	3	●
SEPDMD0140	1.4	18.4	60.4	60	0.4	3	●
SEPDMD0150	1.5	18.5	60.5	60	0.5	3	●
SEPDMD0160	1.6	20.5	60.5	60	0.5	3	●
SEPDMD0170	1.7	20.5	60.5	60	0.5	3	●
SEPDMD0180	1.8	22.5	60.5	60	0.5	3	●
SEPDMD0190	1.9	22.6	60.6	60	0.6	3	●
SEPDMD0200	2.0	23.6	70.6	70	0.6	3	●
SEPDMD0210	2.1	23.6	70.6	70	0.6	3	●
SEPDMD0220	2.2	26.7	70.7	70	0.7	3	●
SEPDMD0230	2.3	26.7	70.7	70	0.7	3	●
SEPDMD0240	2.4	29.7	70.7	70	0.7	3	●
SEPDMD0250	2.5	29.8	70.8	70	0.8	3	●
SEPDMD0260	2.6	29.8	70.8	70	0.8	3	●
SEPDMD0270	2.7	32.8	70.8	70	0.8	3	●
SEPDMD0280	2.8	32.8	70.8	70	0.8	3	●
SEPDMD0290	2.9	32.9	70.9	70	0.9	3	●
SEPDMD0300	3.0	32.9	70.9	70	0.9	3	●
SEPDMD0310	3.1	35.9	85.9	85	0.9	4	●
SEPDMD0320	3.2	36.0	86.0	85	1.0	4	●
SEPDMD0330	3.3	36.0	86.0	85	1.0	4	●
SEPDMD0340	3.4	39.0	86.0	85	1.0	4	●
SEPDMD0350	3.5	39.1	86.1	85	1.1	4	●
SEPDMD0360	3.6	39.1	86.1	85	1.1	4	●
SEPDMD0370	3.7	39.1	86.1	85	1.1	4	●
SEPDMD0380	3.8	43.1	86.1	85	1.1	4	●
SEPDMD0390	3.9	43.2	86.2	85	1.2	4	●

Order Number	DC	LCF	OAL	LF	PL	DCON	Stock
SEPDMD0400	4.0	42.8	85.8	85	0.8	4	●

HSS MILLING SHANK DRILLS

RECOMMENDED CUTTING CONDITIONS

Work material	Mild Steel ($\leq 180\text{HB}$), Aluminum Alloy ($\text{Si} < 5\%$)				Carbon Steel, Alloy Steel ($180\text{--}280\text{HB}$), Gray Cast Iron ($\leq 350\text{MPa}$), Copper, Copper Alloys				Alloy Steel, Tool Steel ($\leq 250\text{HB}$) Ferritic and Martensitic Stainless Steel ($\leq 200\text{HB}$)			
	SS400, S10C, A6061, A7075 etc				S45C, SCM440, FC300 etc				SKD11, SUS410, SUS430 etc			
Drill Dia. (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed (mm/rev)	Feed rate (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed (mm/rev)	Feed rate (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed (mm/rev)	Feed rate (mm/min)
0.5	24	15000	0.02	300	18	11250	0.01	110	13	8000	0.01	80
0.65	28	13700	0.03	410	22	10700	0.02	210	14	6800	0.02	135
0.8	33	13100	0.04	520	27	10700	0.03	320	14	5500	0.03	165
1.0	38	12000	0.05	600	31	10000	0.05	500	16	5000	0.05	250
1.2	38	10000	0.06	600	31	8200	0.06	490	17	4500	0.05	225
1.6	40	8000	0.08	640	33	6500	0.08	520	18	3500	0.06	210
2.0	40	6400	0.09	575	35	5500	0.09	495	18	2900	0.06	170
2.5	40	5100	0.11	560	35	4400	0.11	480	18	2300	0.08	180
3.2	40	4000	0.13	520	34	3400	0.13	440	18	1800	0.09	160
4.0	40	3200	0.15	480	35	2800	0.15	420	18	1400	0.10	140

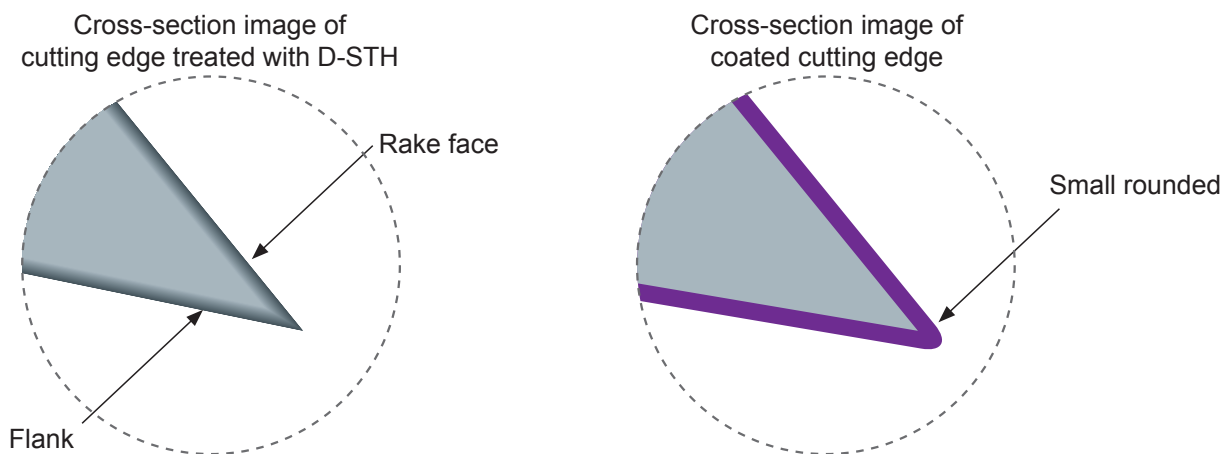
Work material	Austenitic Stainless Steel ($\leq 200\text{HB}$)				Alloy Steel, Tool Steel ($\leq 30\text{HRC}$)			
	SUS304, SUS316 etc				SKD61, SKT4 etc			
Drill Dia. (mm)	Cutting speed (m/min)	Revolution (min^{-1})	Feed (mm/rev)	Feed rate (mm/min)	Cutting speed (m/min)	Revolution (min^{-1})	Feed (mm/rev)	Feed rate (mm/min)
0.5	10	6600	0.01	65	10	6600	0.01	65
0.65	11	5300	0.012	60	11	5300	0.012	60
0.8	11	4300	0.015	60	11	4300	0.015	60
1.0	12	3800	0.02	75	12	3800	0.02	75
1.2	12	3100	0.025	75	12	3100	0.023	70
1.6	14	2700	0.03	80	14	2700	0.03	80
2.0	15	2400	0.04	95	15	2400	0.04	95
2.5	15	1900	0.05	95	15	1900	0.04	75
3.2	15	1500	0.07	105	15	1500	0.05	75
4.0	15	1200	0.09	105	15	1200	0.07	80

- 1) Please reduce the revolution and feed rate depending on the drilling situation when the installation of workpiece or machine lacks rigidity.
- 2) Please use a collet type drill chuck or a milling chuck.
- 3) Use sufficient cutting fluid.
- 4) VAPDS, VAPDM is recommended for the workpiece whose hardness is over 30HRC.
- 5) WSTAR drill(NEW, MWS) are recommended for Precipitation hardening stainless steel (JIS-SUS630/ISO-L-No58X5CrNiCuNb16-4/ASTM-S17400, JIS-SUS631/DIN-X7CrNiAl177/ASTM-S17700)
- 6) When drilling holes greater than 4 x drill diameter hole depths, please use a peck feed.
- 7) The above-mentioned cutting condition is standard when using water-soluble cutting fluid.
Please reduce the revolution when using water-insoluble cutting fluid.
- 8) For the spindle revolution of diameters not shown in the table, please adjust to the conditions of larger and closest diameter, or calculate from the cutting speed of the closest diameter. For the feed rate per revolution, please set up within the recommended feed rate of the closest diameter appropriately.

What is D-STH treatment?

Geometry of sharp cutting edge

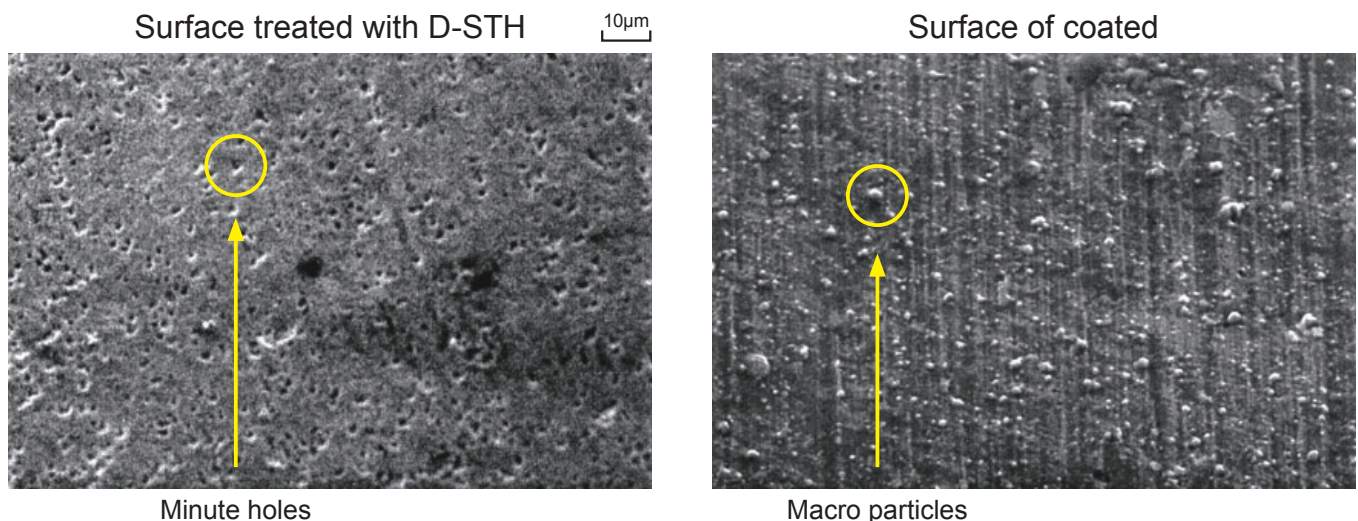
Proprietary D-STH surface treatment maintains sharp cutting edge even after drilling because D-STH treatment is a surface treatment that hardens the surface of tool substrate unlike a coating.



Excellent welding resistance and smooth chip disposal due to better condition of tool surface

Minute holes on a tool surface helps coolant penetrate into the holes, which result in the superior lubricity. The lubricity provides excellent welding resistance and chip disposal.
(The difference of welding resistance can be seen significantly when machining aluminum alloy)
Meanwhile the coated product has small grains (macro particles) on the tool surface, and it leads to the problem of welding.

The surface properties compared by SEM photos



Method of selection with coated drills (Drill diameter is set up ø4 or below)

Please refer to the following table for recommendation of milling shank drill series (precision drill)

Work material	Burr	Welding	Chip disposal	Wearing	Fracture, Chipping	Tool cost
Mild Steel Carbon Steel	SEPD	SEPD	SEPD	VAPD VAPD○SUS	VAPD VAPD○SUS	SEPD
Stainless Steel Austenitic, Martensite	SEPD	SEPD	SEPD	VAPD○SUS	VAPD○SUS	SEPD
Aluminum Alloy	SEPD	SEPD	SEPD	SEPD	SEPD	SEPD
Alloy Steel (—30HRC)	SEPD	SEPD	SEPD	VAPD	VAPD	SEPD
Alloy Steel (30—40HRC)	VAPD	VAPD	VAPD	VAPD	VAPD	VAPD

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 using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc. ●Grinding or heating of cutting tools produces dust and mist. Inhaling large amount of dust or contacting with eyes and skins may harm your body.

MITSUBISHI MATERIALS CORPORATION

MITSUBISHI MATERIALS CORPORATION

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(Tools specifications subject to change without notice.)