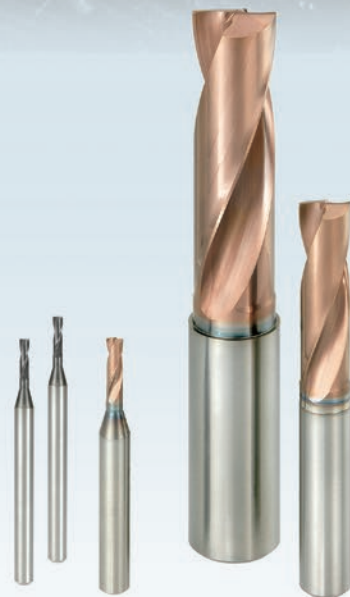


Solid Carbide Flat Bottom Drills

DFAS/MFE

Series
Expansion

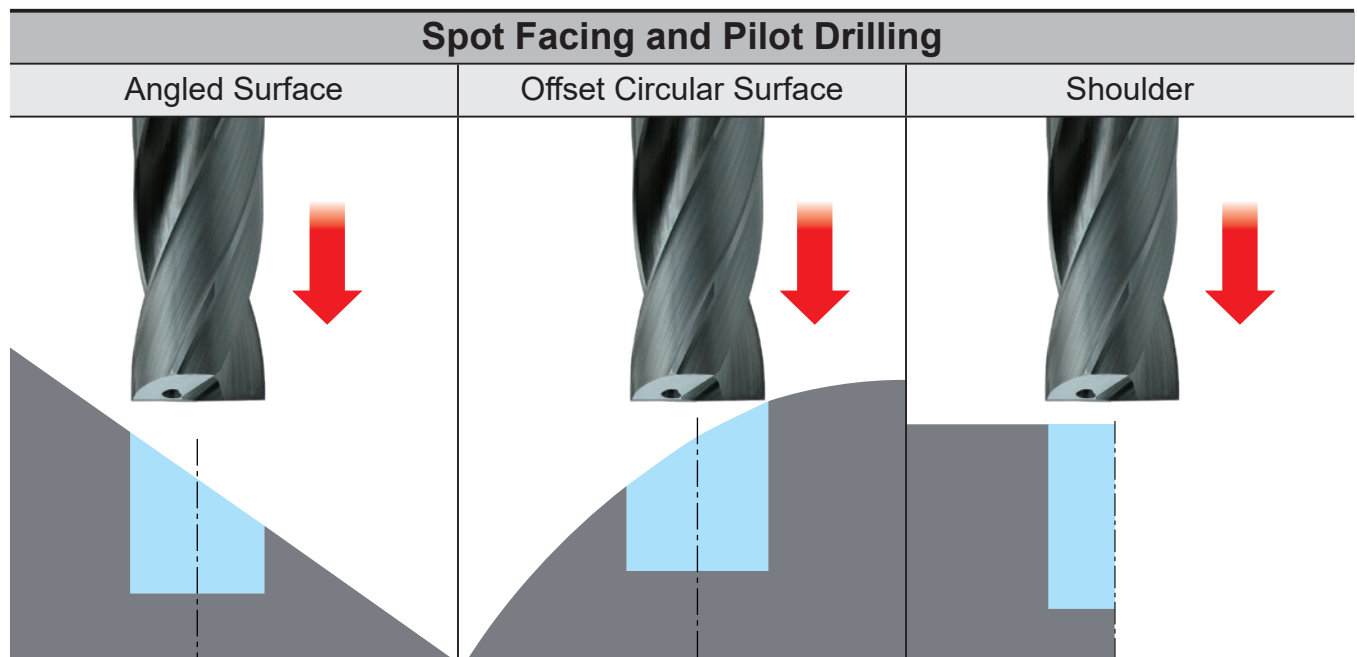
High Efficiency Drilling Over a Wide Range of Applications

**NEW****DFAS****MFE**

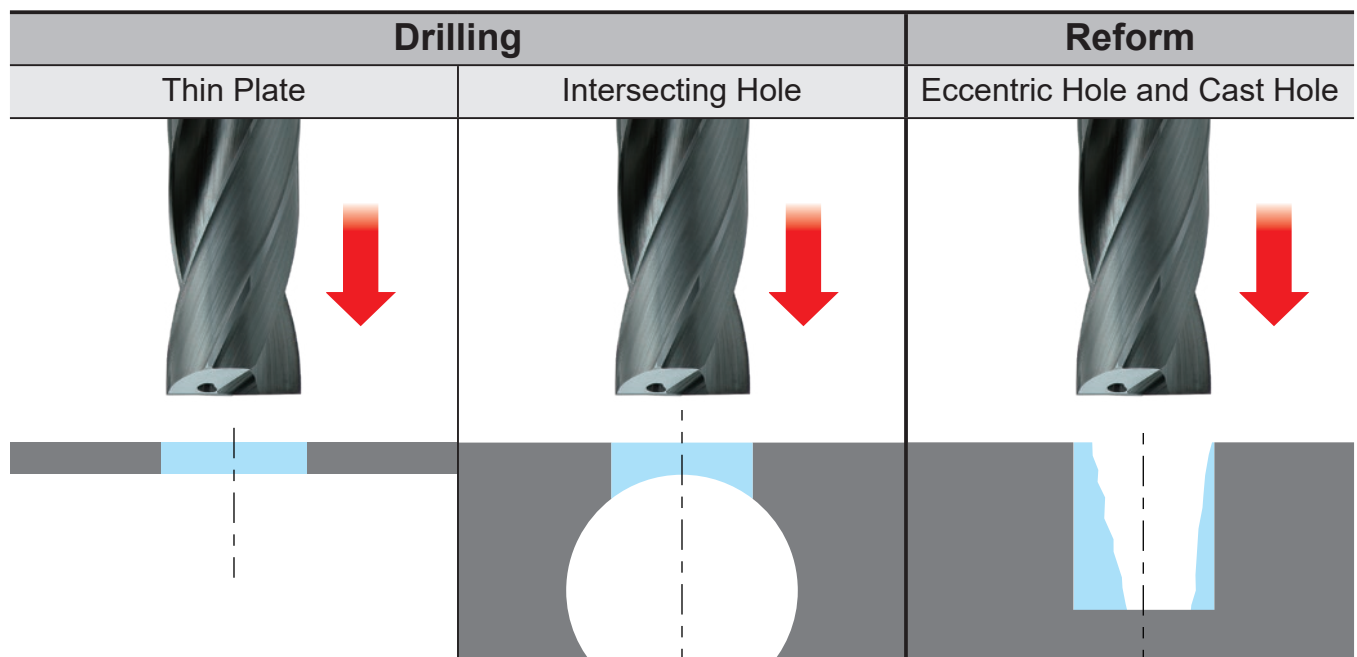
Solid Carbide Flat Bottom Drills

DFAS/MFE

High Efficiency Drilling Over a Wide Range of Applications



High efficiency counter boring in various types of applications with excellent chipping resistance.



Low cutting forces reduces burrs.

Due to its unique shape, it is possible to correct eccentric holes and cast holes with high accuracy.

Features

“XR” Point Thinning

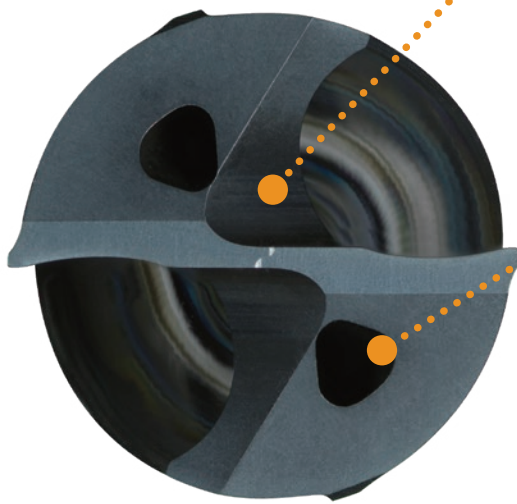
Optimised chip control and load reduction

The thinned centre cutting edge generates a low resistance and thereby creates an optimum chip geometry for a smoother chip flow.

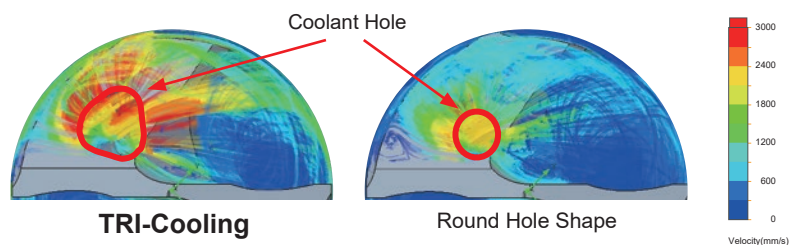
TRI-Cooling Technology for All Dia.

For machining stainless steel and titanium

Coolant flow is increased without reducing the rigidity of the drill. The extra coolant flow dramatically improves chip evacuation and dissipates cutting heat. This enables stable machining of stainless steel and titanium alloys.



Coolant
Flow Speed
Increase

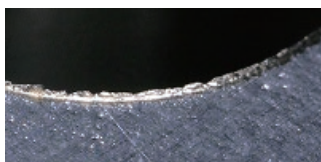


Original Sharp Cutting Edge Shape

Suppression of Burrs

Strength is ensured by providing a flat land (gash) at the corner of the cutting edge, and by adopting a sharp cutting edge over the cutting edge, burrs are suppressed.

Comparison of burrs when machining titanium alloy



DFAS 0.08mm



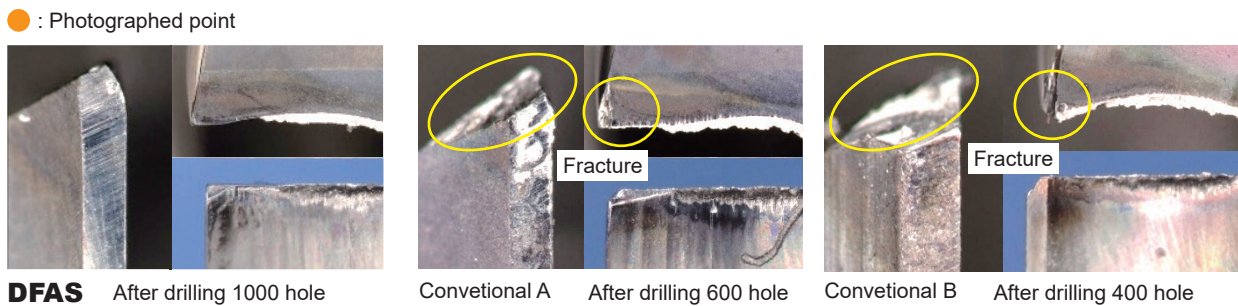
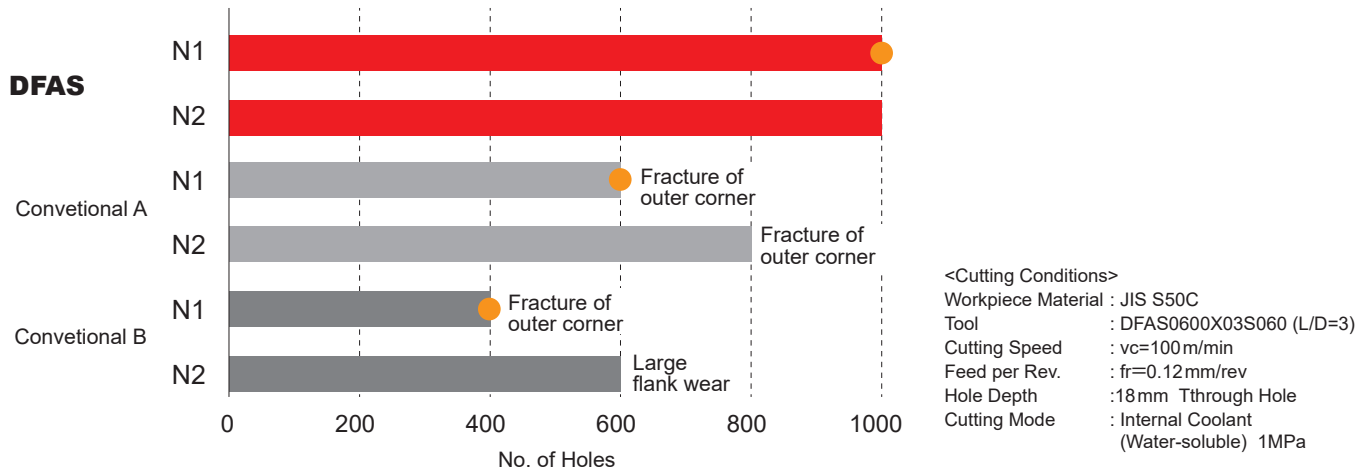
Conventional 0.12mm



Cutting Performance

Tool Life Comparison When Machining Carbon Steel S50C

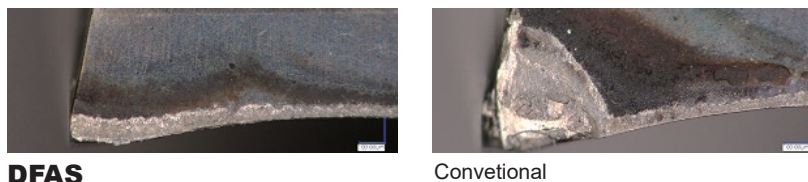
20% more holes machined than conventional tools.



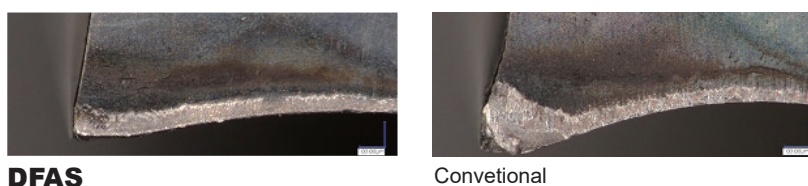
Cutting Edge Comparison When Machining Titanium Alloy Ti-6Al-4V

Provides stability even during high efficiency, continuous machining.

Continuous Machining
 Assessment after drilling 100 holes



High Efficiency Machining
 Assessment after drilling 30 holes

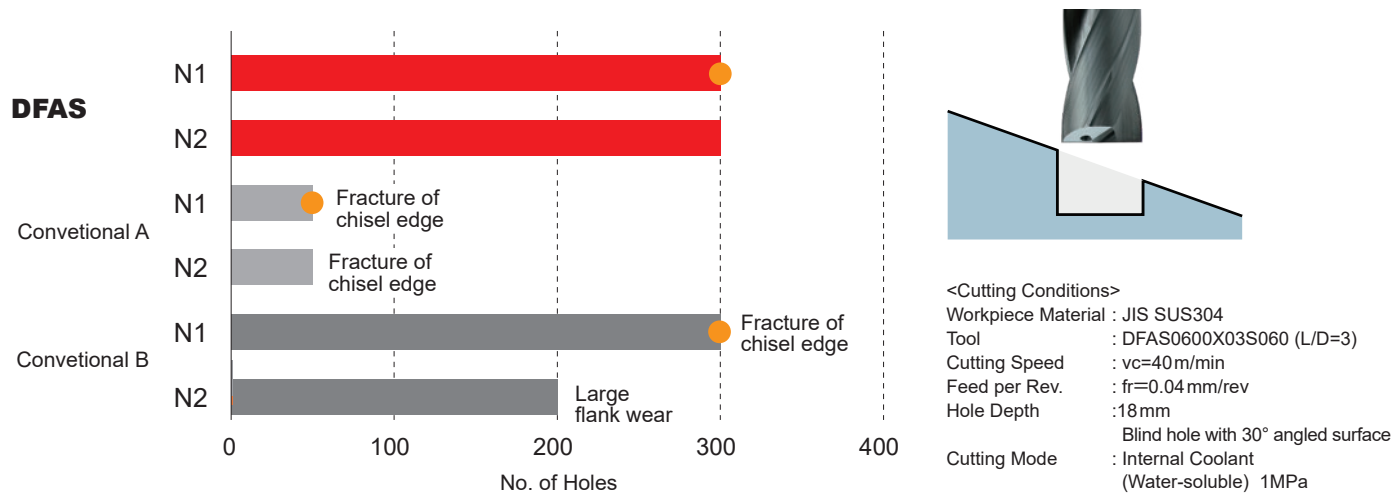


<Cutting Conditions>
 Workpiece Material : Ti-6Al-4V
 Tool : DFAS0600X03S060 (L/D=3)
 Cutting Speed : $vc=35$ m/min
 Feed per Rev. : $fr=0.06$ mm/rev
 Hole Depth : 18mm Through Hole
 Cutting Mode : Internal Coolant (Water-soluble) 1MPa

<Cutting Conditions>
 Workpiece Material : Ti-6Al-4V
 Tool : DFAS0600X03S060 (L/D=3)
 Cutting Speed : $vc=50$ m/min
 Feed per Rev. : $fr=0.10$ mm/rev
 Hole Depth : 18mm Through Hole
 Cutting Mode : Internal Coolant (Water-soluble) 1MPa

Comparison of Quantity of Holes on an Inclined Surface When Machining Stainless Steel SUS304

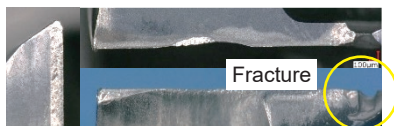
No tool wear even in the centre where the cutting speed is low. Tool life can be extended.



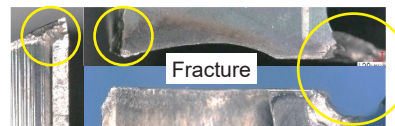
● : Photographed point



DFAS After drilling 300 holes



Conventional A After drilling 50 holes



Conventional B After drilling 300 holes

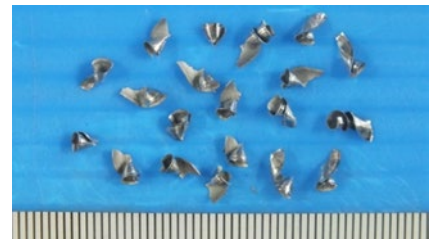
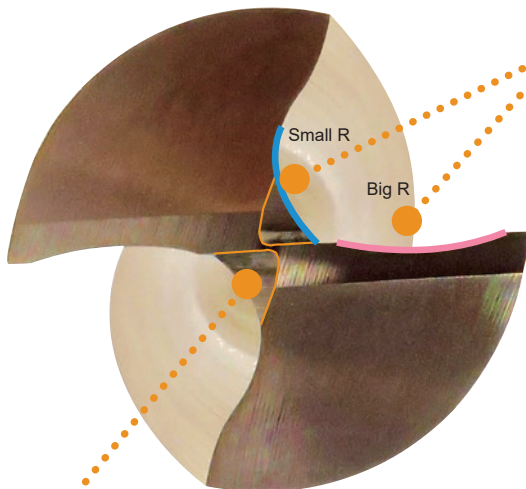
External Coolant

MFE

Features DC $\geq$ 3mm

Excellent Chip Control

Combination of different radius sizes provides strong cutting edge and excellent chip control.



<Cutting Conditions>
Workpiece Material : JIS S50C
Cutting Speed : **vc**=50m/min
Feed per Rev. : **fr**=0.07 mm/rev

New “Z” Point Thinning with Lower Thrust Force

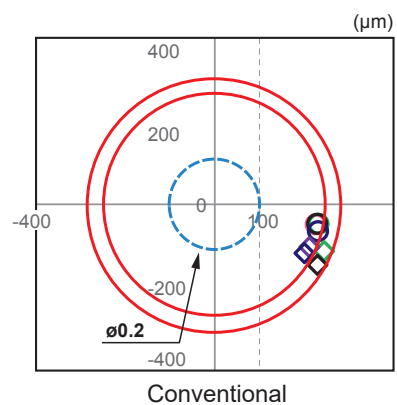
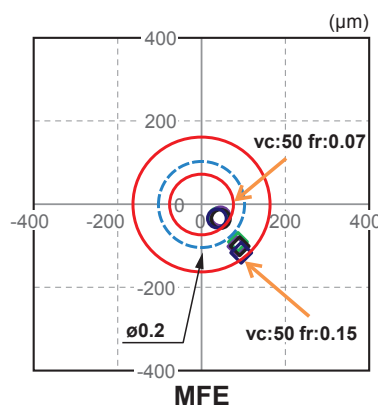
New point thinning provides excellent chip evacuation.

Gash Land for a Stronger Corner

Gash land (0 degree rake) provides excellent chipping resistance.

ZERO- μ Surface

Smooth surface provides reduced deflection and excellent positional accuracy.



JIS S50C 45° angled surface DC $\times$ 2

External Coolant

MFE

Micro Size DC<1.0mm

Mini Size 1.0mm≤DC<3.0mm

Features

Excellent Chip Control

Combination of different radius sizes provides strong cutting edge and excellent chip control.

Point Thinning with Lower Thrust Force

Ideal chips are formed by the radius geometry, thereby feeding chips away from the centre to dramatically reduce cutting resistance.



MFE



Conventional

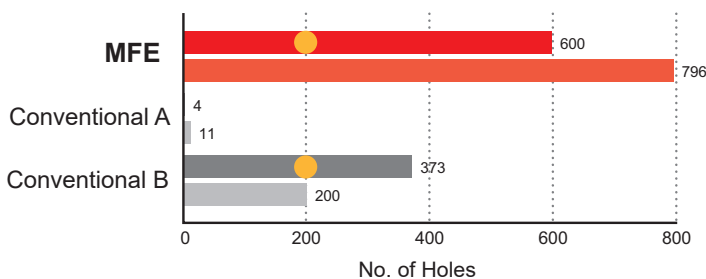
Unique Sharp Cutting Edges

The flat gash lands on the cutting edge corners provide greater strength and sharpness, which can substantially reduce the formation of burrs.

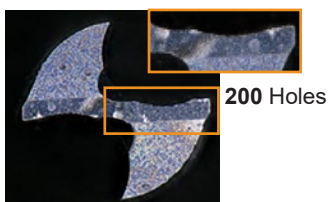
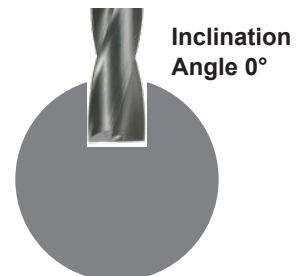
Cutting Performance

Comparison of Tool Life when Machining on JIS SUS304

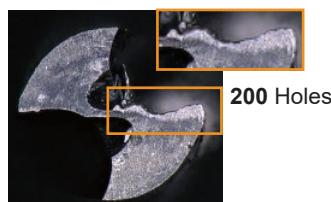
Excellent fracture resistance is achieved even when drilling cylindrical surfaces on small automatic lathes.



**2-3 times
Tool Life**



MFE



Conventional B

<Cutting Conditions>

Drill : MFE0080X02S030

Workpiece Material : JIS SUS304

Cutting Speed : **vc** = 15m/min

Feed per Rev. : **fr** = 0.01 mm/rev

Cutting Mode : Wet Cutting

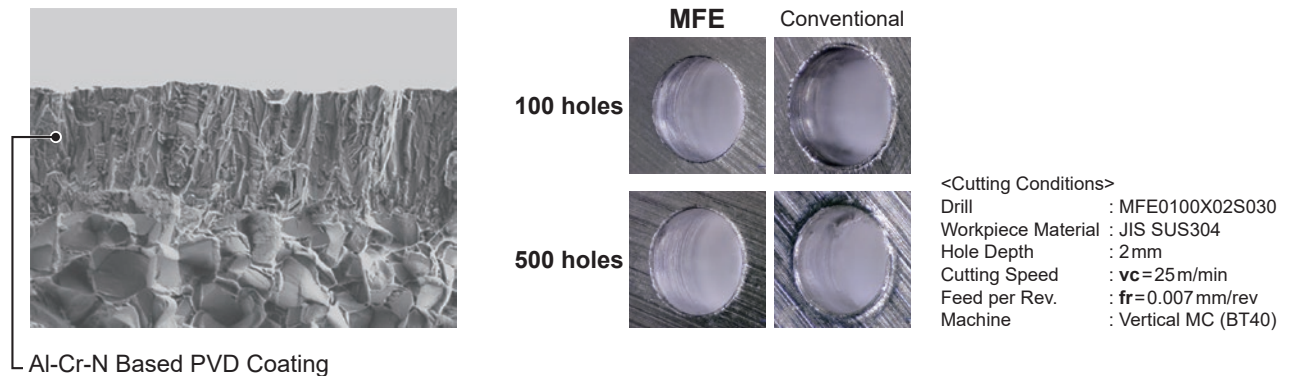
External Coolant (Water-insoluble)

Machine : Small Automatic Lathe

Sharp Cutting Edges with Long Tool Life

Coated Grade **DP102A**

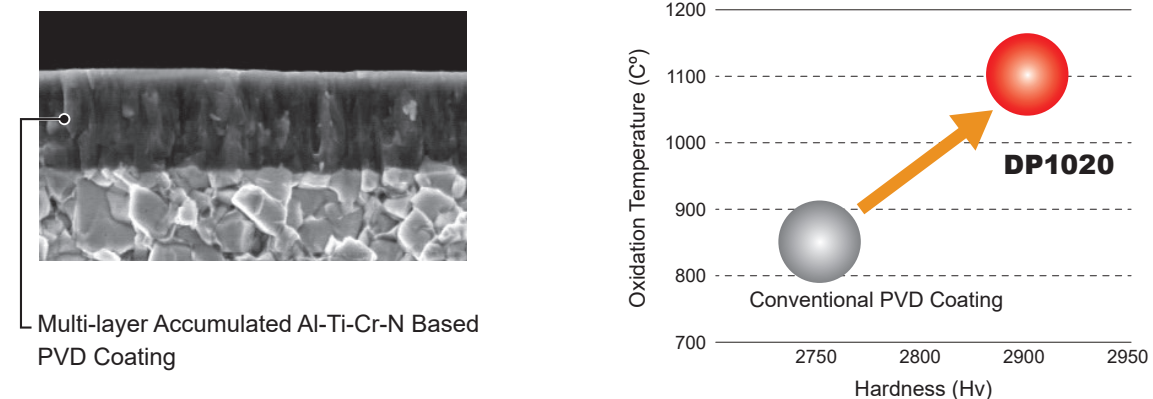
DP102A is a special grade for drills that has excellent lubricity, heat resistance and greatly improved wear resistance, especially under low to medium speed cutting conditions. It realizes stable machining with high adhesion strength of the coating to the substrate, even when the cutting edge is sharp.



Longer Tool Life with Stable Cutting

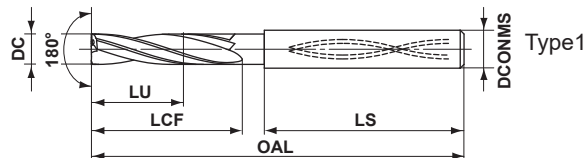
Coated Grade **DP1020**

Newly developed coating for drills provides excellent wear resistance with low friction properties, resulting in excellent versatility and extended tool life.



P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal	Heat Resistant Alloy	

Internal Coolant



	DC=3	3 < DC ≤ 6	6 < DC ≤ 10	10 < DC ≤ 14
	$\begin{smallmatrix} 0 \\ -0.014 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.018 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.022 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.027 \end{smallmatrix}$
	4 < DCONMS ≤ 6	6 < DCONMS ≤ 10	10 < DCONMS ≤ 14	
	$\begin{smallmatrix} 0 \\ -0.008 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.009 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.011 \end{smallmatrix}$	

DC (mm)	Hole Depth (L/D)	DP102A	Order Number	Dimensions (mm)					Type
				LU	LCF	LS	OAL	DCONMS	
3.0	3	●	DFAS0300X03S040	9.0	14	39.0	55	4	1
3.1	3	●	DFAS0310X03S040	9.3	16	37.0	55	4	1
3.2	3	●	DFAS0320X03S040	9.6	16	37.0	55	4	1
3.3	3	●	DFAS0330X03S040	9.9	16	37.0	55	4	1
3.4	3	●	DFAS0340X03S040	10.2	16	37.0	55	4	1
3.5	3	●	DFAS0350X03S040	10.5	16	37.0	55	4	1
3.6	3	●	DFAS0360X03S040	10.8	18	35.0	55	4	1
3.7	3	●	DFAS0370X03S040	11.1	18	35.0	55	4	1
3.8	3	●	DFAS0380X03S040	11.4	18	35.0	55	4	1
3.9	3	●	DFAS0390X03S040	11.7	18	35.0	55	4	1
4.0	3	●	DFAS0400X03S040	12.0	18	35.0	55	4	1
4.1	3	●	DFAS0410X03S050	12.3	20	40.0	62	5	1
4.2	3	●	DFAS0420X03S050	12.6	20	40.0	62	5	1
4.3	3	●	DFAS0430X03S050	12.9	20	40.0	62	5	1
4.4	3	●	DFAS0440X03S050	13.2	20	40.0	62	5	1
4.5	3	●	DFAS0450X03S050	13.5	20	40.0	62	5	1
4.6	3	●	DFAS0460X03S050	13.8	23	37.0	62	5	1
4.7	3	●	DFAS0470X03S050	14.1	23	37.0	62	5	1
4.8	3	●	DFAS0480X03S050	14.4	23	37.0	62	5	1
4.9	3	●	DFAS0490X03S050	14.7	23	37.0	62	5	1
5.0	3	●	DFAS0500X03S050	15.0	23	37.0	62	5	1
5.1	3	●	DFAS0510X03S060	15.3	25	39.0	66	6	1
5.2	3	●	DFAS0520X03S060	15.6	25	39.0	66	6	1
5.3	3	●	DFAS0530X03S060	15.9	25	39.0	66	6	1
5.4	3	●	DFAS0540X03S060	16.2	25	39.0	66	6	1
5.5	3	●	DFAS0550X03S060	16.5	25	39.0	66	6	1
5.6	3	●	DFAS0560X03S060	16.8	27	37.0	66	6	1
5.7	3	●	DFAS0570X03S060	17.1	27	37.0	66	6	1
5.8	3	●	DFAS0580X03S060	17.4	27	37.0	66	6	1
5.9	3	●	DFAS0590X03S060	17.7	27	37.0	66	6	1

DC = Cutting Dia.
LU = Usable Length

LCF = Length Chip Flute
LS = Shank Length

OAL = Overall Length
DCONMS = Connection Dia. Machine Side

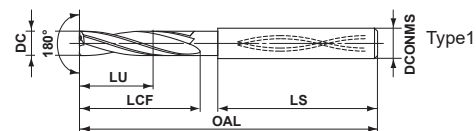
● : Inventory maintained in Japan.

DFAS

SOLID CARBIDE FLAT BOTTOM DRILLS

DC (mm)	Hole Depth (L/D)	DP102A	Order Number	Dimensions (mm)					Type
				LU	LCF	LS	OAL	DCONMS	
6.0	3	●	DFAS0600X03S060	18.0	27	37.0	66	6	1
6.1	3	●	DFAS0610X03S070	18.3	29	44.0	75	7	1
6.2	3	●	DFAS0620X03S070	18.6	29	44.0	75	7	1
6.3	3	●	DFAS0630X03S070	18.9	29	44.0	75	7	1
6.4	3	●	DFAS0640X03S070	19.2	29	44.0	75	7	1
6.5	3	●	DFAS0650X03S070	19.5	29	44.0	75	7	1
6.6	3	●	DFAS0660X03S070	19.8	32	41.0	75	7	1
6.7	3	●	DFAS0670X03S070	20.1	32	41.0	75	7	1
6.8	3	●	DFAS0680X03S070	20.4	32	41.0	75	7	1
6.9	3	●	DFAS0690X03S070	20.7	32	41.0	75	7	1
7.0	3	●	DFAS0700X03S070	21.0	32	41.0	75	7	1
7.1	3	●	DFAS0710X03S080	21.3	34	44.0	80	8	1
7.2	3	●	DFAS0720X03S080	21.6	34	44.0	80	8	1
7.3	3	●	DFAS0730X03S080	21.9	34	44.0	80	8	1
7.4	3	●	DFAS0740X03S080	22.2	34	44.0	80	8	1
7.5	3	●	DFAS0750X03S080	22.5	34	44.0	80	8	1
7.6	3	●	DFAS0760X03S080	22.8	36	42.0	80	8	1
7.7	3	●	DFAS0770X03S080	23.1	36	42.0	80	8	1
7.8	3	●	DFAS0780X03S080	23.4	36	42.0	80	8	1
7.9	3	●	DFAS0790X03S080	23.7	36	42.0	80	8	1
8.0	3	●	DFAS0800X03S080	24.0	36	42.0	80	8	1
8.1	3	●	DFAS0810X03S090	24.3	38	45.0	85	9	1
8.2	3	●	DFAS0820X03S090	24.6	38	45.0	85	9	1
8.3	3	●	DFAS0830X03S090	24.9	38	45.0	85	9	1
8.4	3	●	DFAS0840X03S090	25.2	38	45.0	85	9	1
8.5	3	●	DFAS0850X03S090	25.5	38	45.0	85	9	1
8.6	3	●	DFAS0860X03S090	25.8	41	42.0	85	9	1
8.7	3	●	DFAS0870X03S090	26.1	41	42.0	85	9	1
8.8	3	●	DFAS0880X03S090	26.4	41	42.0	85	9	1
8.9	3	●	DFAS0890X03S090	26.7	41	42.0	85	9	1
9.0	3	●	DFAS0900X03S090	27.0	41	42.0	85	9	1
9.1	3	●	DFAS0910X03S100	27.3	43	45.0	90	10	1
9.2	3	●	DFAS0920X03S100	27.6	43	45.0	90	10	1
9.3	3	●	DFAS0930X03S100	27.9	43	45.0	90	10	1
9.4	3	●	DFAS0940X03S100	28.2	43	45.0	90	10	1
9.5	3	●	DFAS0950X03S100	28.5	43	45.0	90	10	1
9.6	3	●	DFAS0960X03S100	28.8	45	43.0	90	10	1
9.7	3	●	DFAS0970X03S100	29.1	45	43.0	90	10	1
9.8	3	●	DFAS0980X03S100	29.4	45	43.0	90	10	1
9.9	3	●	DFAS0990X03S100	29.7	45	43.0	90	10	1

● : Inventory maintained in Japan.



DC (mm)	Hole Depth (L/D)	DP102A	Order Number	Dimensions (mm)					Type
				LU	LCF	LS	OAL	DCONMS	
10.0	3	●	DFAS1000X03S100	30.0	45	43.0	90	10	1
10.1	3	●	DFAS1010X03S110	30.3	47	52.0	101	11	1
10.2	3	●	DFAS1020X03S110	30.6	47	52.0	101	11	1
10.3	3	●	DFAS1030X03S110	30.9	47	52.0	101	11	1
10.4	3	●	DFAS1040X03S110	31.2	47	52.0	101	11	1
10.5	3	●	DFAS1050X03S110	31.5	47	52.0	101	11	1
10.6	3	●	DFAS1060X03S110	31.8	50	49.0	101	11	1
10.7	3	●	DFAS1070X03S110	32.1	50	49.0	101	11	1
10.8	3	●	DFAS1080X03S110	32.4	50	49.0	101	11	1
10.9	3	●	DFAS1090X03S110	32.7	50	49.0	101	11	1
11.0	3	●	DFAS1100X03S110	33.0	50	49.0	101	11	1
11.1	3	●	DFAS1110X03S120	33.3	52	51.0	105	12	1
11.2	3	●	DFAS1120X03S120	33.6	52	51.0	105	12	1
11.3	3	●	DFAS1130X03S120	33.9	52	51.0	105	12	1
11.4	3	●	DFAS1140X03S120	34.2	52	51.0	105	12	1
11.5	3	●	DFAS1150X03S120	34.5	52	51.0	105	12	1
11.6	3	●	DFAS1160X03S120	34.8	54	49.0	105	12	1
11.7	3	●	DFAS1170X03S120	35.1	54	49.0	105	12	1
11.8	3	●	DFAS1180X03S120	35.4	54	49.0	105	12	1
11.9	3	●	DFAS1190X03S120	35.7	54	49.0	105	12	1
12.0	3	●	DFAS1200X03S120	36.0	54	49.0	105	12	1
12.5	3	●	DFAS1250X03S130	37.5	56	52.0	110	13	1
13.0	3	●	DFAS1300X03S130	39.0	59	49.0	110	13	1
13.5	3	●	DFAS1350X03S140	40.5	61	51.0	114	14	1
14.0	3	●	DFAS1400X03S140	42.0	63	49.0	114	14	1

DC = Cutting Dia.
LU = Usable Length

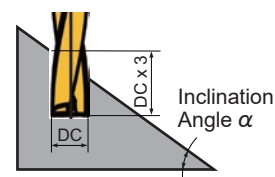
LCF = Length Chip Flute
LS = Shank Length

OAL = Overall Length
DCONMS = Connection Dia. Machine Side

RECOMMENDED CUTTING CONDITIONS

Workpiece Material		Mild Steel, Carbon Steel, Alloy Steel		Stainless Steel, Precipitation-Hardening Stainless Steel		Gray Cast Iron, Ductile Cast Iron	
		JIS SS400, S10C, SCM440, SNCM439		JIS SUS304, SUS316, SUS630, SUS631		JIS FC300, FCD450	
Dia. DC (mm)	Hole Depth (L/D)	Revolution (min ⁻¹)	Flat Surface $\alpha=0^\circ$ Feed rate (Min.—Max.) (mm/rev)	Revolution (min ⁻¹)	Flat Surface $\alpha=0^\circ$ Feed rate (Min.—Max.) (mm/rev)	Revolution (min ⁻¹)	Flat Surface $\alpha=0^\circ$ Feed rate (Min.—Max.) (mm/rev)
3.0	≤3	10610	0.07 (0.04—0.10)	3180	0.05 (0.04—0.06)	10610	0.04 (0.02—0.07)
4.0	≤3	7960	0.08 (0.04—0.11)	2390	0.06 (0.05—0.08)	7960	0.05 (0.03—0.09)
5.0	≤3	6370	0.10 (0.05—0.14)	1910	0.08 (0.06—0.10)	6370	0.07 (0.03—0.11)
6.0	≤3	5310	0.12 (0.06—0.17)	1590	0.10 (0.08—0.12)	5310	0.08 (0.04—0.13)
7.0	≤3	4550	0.13 (0.07—0.20)	1360	0.11 (0.09—0.14)	4550	0.09 (0.05—0.15)
8.0	≤3	3980	0.16 (0.08—0.23)	1190	0.13 (0.10—0.16)	3980	0.11 (0.05—0.17)
9.0	≤3	3540	0.17 (0.09—0.26)	1060	0.15 (0.12—0.18)	3540	0.12 (0.06—0.20)
10.0	≤3	3180	0.20 (0.10—0.29)	950	0.16 (0.13—0.20)	3180	0.13 (0.07—0.22)
11.0	≤3	2890	0.22 (0.11—0.32)	870	0.18 (0.14—0.22)	2890	0.15 (0.07—0.24)
12.0	≤3	2650	0.24 (0.12—0.35)	800	0.20 (0.16—0.24)	2650	0.16 (0.08—0.26)
13.0	≤3	2450	0.26 (0.13—0.39)	730	0.22 (0.17—0.26)	2450	0.17 (0.09—0.28)
14.0	≤3	2270	0.28 (0.14—0.42)	680	0.23 (0.19—0.28)	2270	0.19 (0.09—0.30)

Workpiece Material		Aluminium Alloys		Titanium Alloys	
		A6061, A7075		Ti-6Al-4V, Ti-5Al-5V-5Mo-3Cr	
Dia. DC (mm)	Hole Depth (L/D)	Revolution (min ⁻¹)	Flat Surface $\alpha=0^\circ$ Feed rate (Min.—Max.) (mm/rev)	Revolution (min ⁻¹)	Flat Surface $\alpha=0^\circ$ Feed rate (Min.—Max.) (mm/rev)
3.0	≤3	13790	0.04 (0.02—0.07)	3710	0.03 (0.01—0.05)
4.0	≤3	10350	0.05 (0.03—0.09)	2790	0.04 (0.01—0.07)
5.0	≤3	8280	0.07 (0.03—0.11)	2230	0.05 (0.02—0.08)
6.0	≤3	6900	0.08 (0.04—0.13)	1860	0.06 (0.02—0.10)
7.0	≤3	5910	0.09 (0.05—0.15)	1590	0.07 (0.02—0.12)
8.0	≤3	5170	0.11 (0.05—0.17)	1390	0.08 (0.03—0.13)
9.0	≤3	4600	0.12 (0.06—0.20)	1240	0.09 (0.03—0.15)
10.0	≤3	4140	0.13 (0.07—0.22)	1110	0.10 (0.03—0.17)
11.0	≤3	3760	0.15 (0.07—0.24)	1010	0.11 (0.04—0.18)
12.0	≤3	3450	0.16 (0.08—0.26)	930	0.12 (0.04—0.20)
13.0	≤3	3180	0.17 (0.09—0.28)	860	0.13 (0.04—0.22)
14.0	≤3	2960	0.19 (0.09—0.30)	800	0.14 (0.05—0.23)



Note 1) The recommended hole depth is DCx3. This should be the depth from the uppermost surface of the workpiece material when machining on an angled surface. (Refer to diagram)

Note 2) The cutting table above assumes drilling on a flat surface.

For hole drilling on an angled surface, adjust the feed rate in accordance with the inclination angle.

When the inclination angle α is 30° or less, reduce the feed rate by 30% or more as a guideline.

When the inclination angle α is greater than 30°, reduce the feed rate by 50% or more as a guideline.

Note 3) For flat surface machining of stainless steel, first drill a pilot hole with the same diameter or machine a countersink.

Note 4) This product is a tool intended for hole drilling. It cannot be used for cross-feed or helical machining.

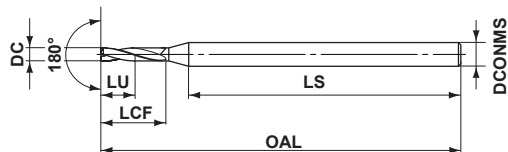
MFE

Micro Size DC<1.0mm
Mini Size 1.0mm≤DC<3.0mm
SOLID CARBIDE FLAT BOTTOM DRILLS



P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal		

External Coolant



Type1

0.75≤DC≤2.95	
$\begin{matrix} 0 \\ -0.014 \end{matrix}$	
DCONMS=3	DCONMS=4
$\begin{matrix} 0 \\ -0.006 \end{matrix}$	$\begin{matrix} 0 \\ -0.008 \end{matrix}$

DC (mm)	Hole Depth (L/D)	DP102A	Order Number	Dimensions (mm)					Type
				LU	LCF	LS	OAL	DCONMS	
0.75	2	●	MFE0075X02S030	1.5	3.0	37.3	45	3	1
0.80	2	●	MFE0080X02S030	1.6	3.2	37.2	45	3	1
0.85	2	●	MFE0085X02S030	1.7	3.4	37.1	45	3	1
0.90	2	●	MFE0090X02S030	1.8	3.6	37.0	45	3	1
0.95	2	●	MFE0095X02S030	1.9	3.8	36.9	45	3	1
1.00	2	●	MFE0100X02S030	2.0	4.0	36.8	45	3	1
1.05	2	●	MFE0105X02S030	2.1	4.2	36.7	45	3	1
1.10	2	●	MFE0110X02S030	2.2	4.4	36.6	45	3	1
1.15	2	●	MFE0115X02S030	2.3	4.6	36.4	45	3	1
1.20	2	●	MFE0120X02S030	2.4	4.8	36.3	45	3	1
1.25	2	●	MFE0125X02S030	2.5	5.0	36.2	45	3	1
1.30	2	●	MFE0130X02S030	2.6	5.2	36.1	45	3	1
1.35	2	●	MFE0135X02S030	2.7	5.4	36.0	45	3	1
1.40	2	●	MFE0140X02S030	2.8	5.6	35.9	45	3	1
1.45	2	●	MFE0145X02S030	2.9	5.8	35.8	45	3	1
1.50	2	●	MFE0150X02S030	3.0	6.0	35.7	45	3	1
1.55	2	●	MFE0155X02S030	3.1	6.2	35.6	45	3	1
1.60	2	●	MFE0160X02S030	3.2	6.4	35.5	45	3	1
1.65	2	●	MFE0165X02S030	3.3	6.6	35.4	45	3	1
1.70	2	●	MFE0170X02S030	3.4	6.8	35.3	45	3	1
1.75	2	●	MFE0175X02S030	3.5	7.0	35.2	45	3	1
1.80	2	●	MFE0180X02S030	3.6	7.2	35.1	45	3	1
1.85	2	●	MFE0185X02S030	3.7	7.4	35.0	45	3	1
1.90	2	●	MFE0190X02S030	3.8	7.6	34.8	45	3	1
1.95	2	●	MFE0195X02S030	3.9	7.8	34.7	45	3	1
2.00	2	●	MFE0200X02S040	4.0	8.0	37.8	50	4	1
2.05	2	●	MFE0205X02S040	4.1	8.2	37.7	50	4	1
2.10	2	●	MFE0210X02S040	4.2	8.4	37.6	50	4	1
2.15	2	●	MFE0215X02S040	4.3	8.6	37.4	50	4	1
2.20	2	●	MFE0220X02S040	4.4	8.8	37.3	50	4	1
2.25	2	●	MFE0225X02S040	4.5	9.0	37.2	50	4	1
2.30	2	●	MFE0230X02S040	4.6	9.2	37.1	50	4	1
2.35	2	●	MFE0235X02S040	4.7	9.4	37.0	50	4	1
2.40	2	●	MFE0240X02S040	4.8	9.6	36.9	50	4	1
2.45	2	●	MFE0245X02S040	4.9	9.8	36.8	50	4	1
2.50	2	●	MFE0250X02S040	5.0	10.0	36.7	50	4	1
2.55	2	●	MFE0255X02S040	5.1	10.2	36.6	50	4	1
2.60	2	●	MFE0260X02S040	5.2	10.4	36.5	50	4	1
2.65	2	●	MFE0265X02S040	5.3	10.6	36.4	50	4	1
2.70	2	●	MFE0270X02S040	5.4	10.8	36.3	50	4	1
2.75	2	●	MFE0275X02S040	5.5	11.0	36.2	50	4	1
2.80	2	●	MFE0280X02S040	5.6	11.2	36.1	50	4	1
2.85	2	●	MFE0285X02S040	5.7	11.4	36.0	50	4	1
2.90	2	●	MFE0290X02S040	5.8	11.6	35.8	50	4	1
2.95	2	●	MFE0295X02S040	5.9	11.8	35.7	50	4	1

● : Inventory maintained in Japan.

Solid Carbide Flat Bottom Drills

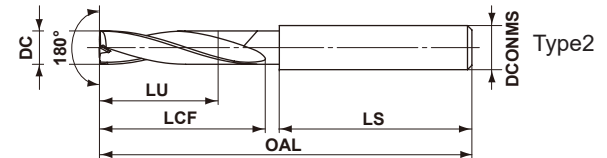
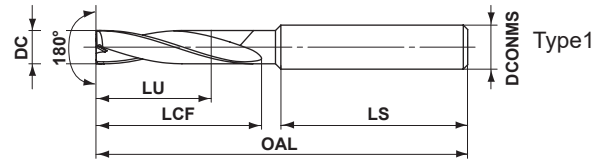
MFE

SOLID CARBIDE FLAT BOTTOM DRILLS



P	M	K	N	S	H
Steel	Stainless Steel	Cast Iron	Non-ferrous Metal		

External Coolant



	3 ≤ DC ≤ 6	6 < DC ≤ 10	10 < DC ≤ 18	18 < DC ≤ 20
	$\begin{smallmatrix} 0 \\ -0.012 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.018 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.021 \end{smallmatrix}$
	DCONMS=6	6 < DCONMS ≤ 10	10 < DCONMS ≤ 18	DCONMS=20
	$\begin{smallmatrix} 0 \\ -0.008 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.009 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.011 \end{smallmatrix}$	$\begin{smallmatrix} 0 \\ -0.013 \end{smallmatrix}$

DC (mm)	Hole Depth (L/D)	DP1020	Order Number	Dimensions (mm)					Type
				LU	LCF	LS	OAL	DCONMS	
3.0	2	●	MFE0300X02S060	6.0	12	35.4	55	6	1
3.1	2	●	MFE0310X02S060	6.2	14	33.6	55	6	1
3.2	2	●	MFE0320X02S060	6.4	14	33.8	55	6	1
3.3	2	●	MFE0330X02S060	6.6	14	34.0	55	6	1
3.4	2	●	MFE0340X02S060	6.8	14	34.1	55	6	1
3.5	2	●	MFE0350X02S060	7.0	14	34.3	55	6	1
3.6	2	●	MFE0360X02S060	7.2	16	32.5	55	6	1
3.7	2	●	MFE0370X02S060	7.4	16	32.7	55	6	1
3.8	2	●	MFE0380X02S060	7.6	16	32.9	55	6	1
3.9	2	●	MFE0390X02S060	7.8	16	33.1	55	6	1
4.0	2	●	MFE0400X02S060	8.0	16	33.3	55	6	1
4.1	2	●	MFE0410X02S060	8.2	18	38.5	62	6	1
4.2	2	●	MFE0420X02S060	8.4	18	38.6	62	6	1
4.3	2	●	MFE0430X02S060	8.6	18	38.8	62	6	1
4.4	2	●	MFE0440X02S060	8.8	18	39.0	62	6	1
4.5	2	●	MFE0450X02S060	9.0	18	39.2	62	6	1
4.6	2	●	MFE0460X02S060	9.2	20	38.3	62	6	1
4.7	2	●	MFE0470X02S060	9.4	20	38.3	62	6	1
4.8	2	●	MFE0480X02S060	9.6	20	38.4	62	6	1
4.9	2	●	MFE0490X02S060	9.8	20	38.4	62	6	1
5.0	2	●	MFE0500X02S060	10.0	20	38.5	62	6	1
5.1	2	●	MFE0510X02S060	10.2	22	36.5	62	6	1
5.2	2	●	MFE0520X02S060	10.4	22	36.6	62	6	1
5.3	2	●	MFE0530X02S060	10.6	22	36.6	62	6	1
5.4	2	●	MFE0540X02S060	10.8	22	36.7	62	6	1
5.5	2	●	MFE0550X02S060	11.0	22	36.7	62	6	1
5.6	2	●	MFE0560X02S060	11.2	24	34.8	62	6	1
5.7	2	●	MFE0570X02S060	11.4	24	34.8	62	6	1
5.8	2	●	MFE0580X02S060	11.6	24	34.9	62	6	1
5.9	2	●	MFE0590X02S060	11.8	24	34.9	62	6	1

● : Inventory maintained in Japan.

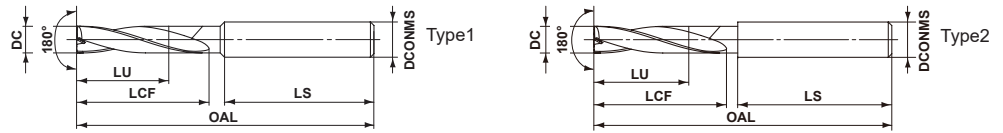
DC (mm)	Hole Depth (L/D)	DP1020	Order Number	Dimensions (mm)					Type
				LU	LCF	LS	OAL	DCONMS	
6.0	2	●	MFE0600X02S060	12.0	24	35.0	62	6	1
6.1	2	●	MFE0610X02S070	12.2	26	44.5	74	7	1
6.1	2	●	MFE0610X02S080	12.2	26	44.0	74	8	1
6.2	2	●	MFE0620X02S070	12.4	26	44.6	74	7	1
6.2	2	●	MFE0620X02S080	12.4	26	44.1	74	8	1
6.3	2	●	MFE0630X02S070	12.6	26	44.6	74	7	1
6.3	2	●	MFE0630X02S080	12.6	26	44.1	74	8	1
6.4	2	●	MFE0640X02S070	12.8	26	44.7	74	7	1
6.4	2	●	MFE0640X02S080	12.8	26	44.2	74	8	1
6.5	2	●	MFE0650X02S070	13.0	26	44.7	74	7	1
6.5	2	●	MFE0650X02S080	13.0	26	44.2	74	8	1
6.6	2	●	MFE0660X02S070	13.2	28	42.8	74	7	1
6.6	2	●	MFE0660X02S080	13.2	28	42.3	74	8	1
6.7	2	●	MFE0670X02S070	13.4	28	42.8	74	7	1
6.7	2	●	MFE0670X02S080	13.4	28	42.3	74	8	1
6.8	2	●	MFE0680X02S070	13.6	28	42.9	74	7	1
6.8	2	●	MFE0680X02S080	13.6	28	42.4	74	8	1
6.9	2	●	MFE0690X02S070	13.8	28	42.9	74	7	1
6.9	2	●	MFE0690X02S080	13.8	28	42.4	74	8	1
7.0	2	●	MFE0700X02S070	14.0	28	43.0	74	7	1
7.0	2	●	MFE0700X02S080	14.0	28	42.5	74	8	1
7.1	2	●	MFE0710X02S080	14.2	30	40.5	74	8	1
7.2	2	●	MFE0720X02S080	14.4	30	40.6	74	8	1
7.3	2	●	MFE0730X02S080	14.6	30	40.6	74	8	1
7.4	2	●	MFE0740X02S080	14.8	30	40.7	74	8	1
7.5	2	●	MFE0750X02S080	15.0	30	40.7	74	8	1
7.6	2	●	MFE0760X02S080	15.2	32	38.8	74	8	1
7.7	2	●	MFE0770X02S080	15.4	32	38.8	74	8	1
7.8	2	●	MFE0780X02S080	15.6	32	38.9	74	8	1
7.9	2	●	MFE0790X02S080	15.8	32	38.9	74	8	1
8.0	2	●	MFE0800X02S080	16.0	32	39.0	74	8	1
8.1	2	●	MFE0810X02S100	16.2	34	46.0	84	10	1
8.2	2	●	MFE0820X02S100	16.4	34	46.1	84	10	1
8.3	2	●	MFE0830X02S100	16.6	34	46.1	84	10	1
8.4	2	●	MFE0840X02S100	16.8	34	46.2	84	10	1
8.5	2	●	MFE0850X02S100	17.0	34	46.2	84	10	1
8.6	2	●	MFE0860X02S100	17.2	36	44.3	84	10	1
8.7	2	●	MFE0870X02S100	17.4	36	44.3	84	10	1
8.8	2	●	MFE0880X02S100	17.6	36	44.4	84	10	1
8.9	2	●	MFE0890X02S100	17.8	36	44.4	84	10	1
9.0	2	●	MFE0900X02S100	18.0	36	44.5	84	10	1
9.1	2	●	MFE0910X02S100	18.2	38	42.5	84	10	1
9.2	2	●	MFE0920X02S100	18.4	38	42.6	84	10	1
9.3	2	●	MFE0930X02S100	18.6	38	42.6	84	10	1
9.4	2	●	MFE0940X02S100	18.8	38	42.7	84	10	1
9.5	2	●	MFE0950X02S100	19.0	38	42.7	84	10	1
9.6	2	●	MFE0960X02S100	19.2	40	40.8	84	10	1
9.7	2	●	MFE0970X02S100	19.4	40	40.8	84	10	1

DC = Cutting Dia.
LU = Usable Length

LCF = Length Chip Flute
LS = Shank Length

OAL = Overall Length
DCONMS = Connection Dia. Machine Side

Solid Carbide Flat Bottom Drills



DC (mm)	Hole Depth (L/D)	DP1020	Order Number	Dimensions (mm)					Type
				LU	LCF	LS	OAL	DCONMS	
9.8	2	●	MFE0980X02S100	19.6	40	40.9	84	10	1
9.9	2	●	MFE0990X02S100	19.8	40	40.9	84	10	1
10.0	2	●	MFE1000X02S100	20.0	40	41.0	84	10	1
10.1	2	●	MFE1010X02S120	20.2	42	49.0	95	12	1
10.2	2	●	MFE1020X02S120	20.4	42	49.1	95	12	1
10.3	2	●	MFE1030X02S120	20.6	42	49.1	95	12	1
10.4	2	●	MFE1040X02S120	20.8	42	49.2	95	12	1
10.5	2	●	MFE1050X02S120	21.0	42	49.2	95	12	1
10.6	2	●	MFE1060X02S120	21.2	44	47.3	95	12	1
10.7	2	●	MFE1070X02S120	21.4	44	47.3	95	12	1
10.8	2	●	MFE1080X02S120	21.6	44	47.4	95	12	1
10.9	2	●	MFE1090X02S120	21.8	44	47.4	95	12	1
11.0	2	●	MFE1100X02S120	22.0	44	47.5	95	12	1
11.1	2	●	MFE1110X02S120	22.2	46	45.5	95	12	1
11.2	2	●	MFE1120X02S120	22.4	46	45.6	95	12	1
11.3	2	●	MFE1130X02S120	22.6	46	45.6	95	12	1
11.4	2	●	MFE1140X02S120	22.8	46	45.7	95	12	1
11.5	2	●	MFE1150X02S120	23.0	46	45.7	95	12	1
11.6	2	●	MFE1160X02S120	23.2	48	43.8	95	12	1
11.7	2	●	MFE1170X02S120	23.4	48	43.8	95	12	1
11.8	2	●	MFE1180X02S120	23.6	48	43.9	95	12	1
11.9	2	●	MFE1190X02S120	23.8	48	43.9	95	12	1
12.0	2	●	MFE1200X02S120	24.0	48	44.0	95	12	1
12.5	2	●	MFE1250X02S140	25.0	50	49.0	102	14	2
13.0	2	●	MFE1300X02S140	26.0	52	47.0	102	14	2
13.5	2	●	MFE1350X02S140	27.0	54	45.0	102	14	2
14.0	2	●	MFE1400X02S140	28.0	56	43.0	102	14	2
14.5	2	●	MFE1450X02S160	29.0	58	50.0	111	16	2
15.0	2	●	MFE1500X02S160	30.0	60	48.0	111	16	2
15.5	2	●	MFE1550X02S160	31.0	62	46.0	111	16	2
16.0	2	●	MFE1600X02S160	32.0	64	44.0	111	16	2
16.5	2	●	MFE1650X02S180	33.0	66	50.0	119	18	2
17.0	2	●	MFE1700X02S180	34.0	68	48.0	119	18	2
17.5	2	●	MFE1750X02S180	35.0	70	46.0	119	18	2
18.0	2	●	MFE1800X02S180	36.0	72	44.0	119	18	2
18.5	2	●	MFE1850X02S200	37.0	74	50.0	127	20	2
19.0	2	●	MFE1900X02S200	38.0	76	48.0	127	20	2
19.5	2	●	MFE1950X02S200	39.0	78	46.0	127	20	2
20.0	2	●	MFE2000X02S200	40.0	80	44.0	127	20	2

DC = Cutting Dia.
LU = Usable Length

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LS = Shank Length

OAL = Overall Length
DCONMS = Connection Dia. Machine Side

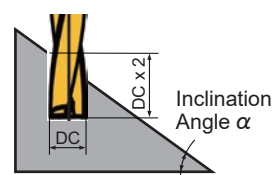
● : Inventory maintained in Japan.

RECOMMENDED CUTTING CONDITIONS

Workpiece Material		Mild Steel ($\leq 180\text{HB}$)		Carbon Steel, Alloy Steel (180–280HB)		Carbon Steel, Alloy Steel (280–350HB)	
		JIS SS400, S10C		JIS S45C, SCM440		JIS SNCM439	
Dia. DC (mm)	Hole Depth (L/D)	Revolution (min ⁻¹)	Flat Surface $\alpha=0^\circ$ Feed rate (Min.—Max.) (mm/rev)	Revolution (min ⁻¹)	Flat Surface $\alpha=0^\circ$ Feed rate (Min.—Max.) (mm/rev)	Revolution (min ⁻¹)	Flat Surface $\alpha=0^\circ$ Feed rate (Min.—Max.) (mm/rev)
0.75	≤ 2	23300	0.030 (0.010–0.050)	19000	0.030 (0.010–0.050)	16900	0.030 (0.010–0.050)
1.0	≤ 2	17500	0.030 (0.010–0.050)	14300	0.030 (0.010–0.050)	12700	0.030 (0.010–0.050)
1.5	≤ 2	12200	0.035 (0.015–0.055)	10000	0.035 (0.015–0.055)	8400	0.035 (0.015–0.050)
2.0	≤ 2	9500	0.040 (0.020–0.060)	7900	0.040 (0.020–0.060)	6700	0.040 (0.020–0.060)
2.5	≤ 2	7900	0.050 (0.030–0.070)	6600	0.050 (0.030–0.070)	5700	0.050 (0.030–0.070)
3.0	≤ 2	7900	0.060 (0.040–0.080)	7900	0.060 (0.040–0.080)	6800	0.060 (0.040–0.080)
4.0	≤ 2	5900	0.080 (0.060–0.100)	5900	0.080 (0.060–0.100)	5100	0.080 (0.060–0.100)
5.0	≤ 2	4700	0.100 (0.080–0.130)	4700	0.100 (0.080–0.130)	4100	0.100 (0.080–0.130)
6.0	≤ 2	3900	0.130 (0.100–0.150)	3900	0.130 (0.100–0.150)	3400	0.130 (0.100–0.150)
8.0	≤ 2	2900	0.150 (0.130–0.170)	2900	0.150 (0.130–0.170)	2500	0.150 (0.130–0.170)
10.0	≤ 2	2300	0.170 (0.150–0.200)	2300	0.170 (0.150–0.200)	2000	0.170 (0.150–0.200)
12.0	≤ 2	1900	0.200 (0.170–0.250)	1900	0.200 (0.170–0.250)	1700	0.200 (0.170–0.250)
16.0	≤ 2	1400	0.250 (0.200–0.300)	1400	0.250 (0.200–0.300)	1200	0.250 (0.200–0.300)
20.0	≤ 2	1100	0.300 (0.250–0.350)	1100	0.300 (0.250–0.350)	1000	0.300 (0.250–0.350)

Workpiece Material		Austenitic Stainless Steel ($\leq 200\text{HB}$)		Gray Cast Iron ($\leq 350\text{MPa}$)		Ductile Cast Iron ($\leq 450\text{MPa}$)	
		JIS SUS304, SUS316		JIS FC300		JIS FCD450	
Dia. DC (mm)	Hole Depth (L/D)	Revolution (min ⁻¹)	Flat Surface $\alpha=0^\circ$ Feed rate (Min.—Max.) (mm/rev)	Revolution (min ⁻¹)	Flat Surface $\alpha=0^\circ$ Feed rate (Min.—Max.) (mm/rev)	Revolution (min ⁻¹)	Flat Surface $\alpha=0^\circ$ Feed rate (Min.—Max.) (mm/rev)
0.75	≤ 2	10600	0.007 (0.003–0.011)	23300	0.030 (0.010–0.050)	16900	0.010 (0.005–0.015)
1.0	≤ 2	7900	0.007 (0.003–0.011)	17500	0.030 (0.010–0.050)	12700	0.010 (0.005–0.015)
1.5	≤ 2	5300	0.010 (0.005–0.015)	12200	0.035 (0.015–0.055)	10000	0.020 (0.010–0.030)
2.0	≤ 2	4700	0.015 (0.010–0.020)	9500	0.040 (0.020–0.060)	8700	0.030 (0.015–0.045)
2.5	≤ 2	3800	0.015 (0.010–0.020)	7900	0.050 (0.030–0.070)	7300	0.045 (0.025–0.065)
3.0	≤ 2	3100	0.020 (0.010–0.030)	7900	0.060 (0.040–0.080)	6800	0.050 (0.040–0.060)
4.0	≤ 2	2300	0.030 (0.020–0.040)	5900	0.080 (0.060–0.100)	5500	0.060 (0.050–0.080)
5.0	≤ 2	1900	0.040 (0.030–0.050)	4700	0.100 (0.080–0.120)	4400	0.080 (0.060–0.100)
6.0	≤ 2	1500	0.050 (0.040–0.060)	3900	0.120 (0.100–0.140)	3700	0.100 (0.080–0.120)
8.0	≤ 2	1100	0.060 (0.050–0.080)	2900	0.140 (0.120–0.160)	2700	0.120 (0.100–0.150)
10.0	≤ 2	950	0.080 (0.060–0.100)	2300	0.160 (0.140–0.180)	2200	0.150 (0.120–0.180)
12.0	≤ 2	790	0.100 (0.080–0.120)	1900	0.180 (0.160–0.200)	1800	0.180 (0.150–0.200)
16.0	≤ 2	590	0.120 (0.100–0.150)	1400	0.200 (0.180–0.240)	1300	0.200 (0.180–0.250)
20.0	≤ 2	470	0.150 (0.120–0.200)	1100	0.240 (0.200–0.280)	1100	0.250 (0.200–0.300)

Workpiece Material		Aluminium Alloys (Si<5%)	
		A6061, A7075	
Dia. DC (mm)	Hole Depth (L/D)	Revolution (min ⁻¹)	Flat Surface $\alpha=0^\circ$ Feed rate (Min.—Max.) (mm/rev)
0.75	≤ 2	42400	0.020 (0.010–0.030)
1.0	≤ 2	31800	0.020 (0.010–0.030)
1.5	≤ 2	21200	0.020 (0.010–0.030)
2.0	≤ 2	17500	0.050 (0.030–0.070)
2.5	≤ 2	14000	0.060 (0.040–0.090)
3.0	≤ 2	11600	0.060 (0.040–0.090)
4.0	≤ 2	8700	0.080 (0.060–0.100)
5.0	≤ 2	7000	0.100 (0.080–0.130)
6.0	≤ 2	5800	0.130 (0.100–0.160)
8.0	≤ 2	4300	0.160 (0.130–0.200)
10.0	≤ 2	3500	0.200 (0.160–0.240)
12.0	≤ 2	2900	0.240 (0.200–0.280)
16.0	≤ 2	2100	0.280 (0.240–0.320)
20.0	≤ 2	1700	0.320 (0.280–0.360)



Note 1) The recommended hole depth is DCx2. This should be the depth from the uppermost surface of the workpiece material when machining on an angled surface. (Refer to diagram)

Note 2) The cutting table above assumes drilling on a flat surface.

For hole drilling on an angled surface, adjust the feed rate in accordance with the inclination angle.

When the inclination angle α is 30° or less, reduce the feed rate by 30% or more as a guideline.

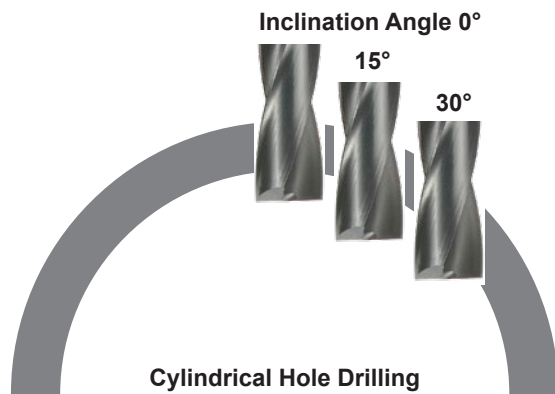
When the inclination angle α is greater than 30° , reduce the feed rate by 50% or more as a guideline.

Note 3) This product is a tool intended for hole drilling. It cannot be used for cross-feed or helical machining.

Cutting Performance

Comparison of Exit Burrs Generated when machining JIS SUS304

The unique cutting edge shape suppresses the formation of exit burrs.



Inclination Angle	MFE	Conventional A	Conventional B
Inclination Angle 0° Hole Depth=4mm			
Inclination Angle 15° Hole Depth≒5mm			
Inclination Angle 30° Hole Depth≒7mm			

<Cutting Conditions>

Drill : MFE0200X02S040
 Workpiece Material : JIS SUS304
 Cutting Speed : $vc=30$ m/min
 Feed per Rev. : $fr=0.01$ mm/rev
 Cutting Mode : Wet Cutting
 External Coolant (Water-soluble)
 Machine : Vertical MC (BT40)

Comparison When Machining Thin Plates in JIS SCM440

Flat tip geometry prevents burr formation in various types of applications.

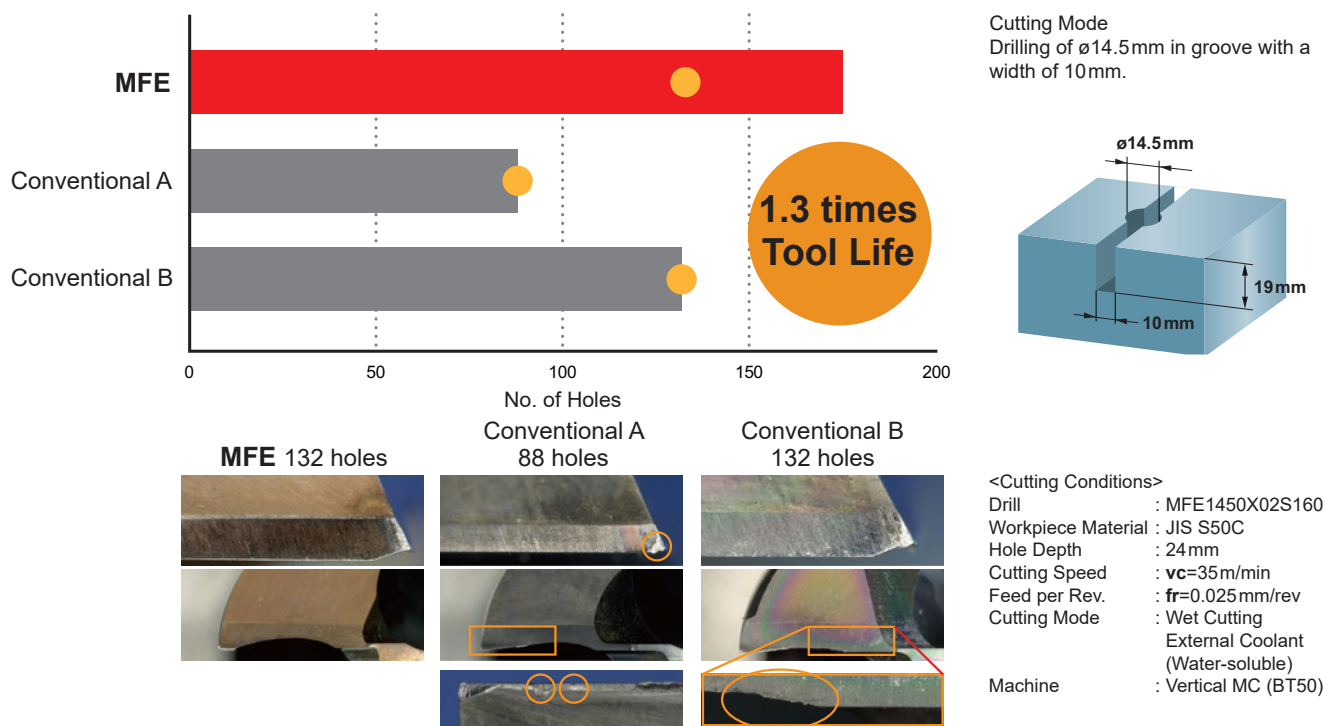
	Conventional (Point Angle = 140°)	MFE (Point Angle = 180°)
$vc = 50$ m/min $fr = 0.05$ mm/rev		
$vc = 80$ m/min $fr = 0.15$ mm/rev	Large Burr	Small Burr

<Cutting Conditions>

Drill : MFE0600X02S060
 Workpiece Material : JIS SCM440
 Hole Depth : 10mm (Thin Plate)
 Cutting Mode : Wet Cutting
 External Coolant (Water-soluble)
 Machine : Vertical MC (BT40)

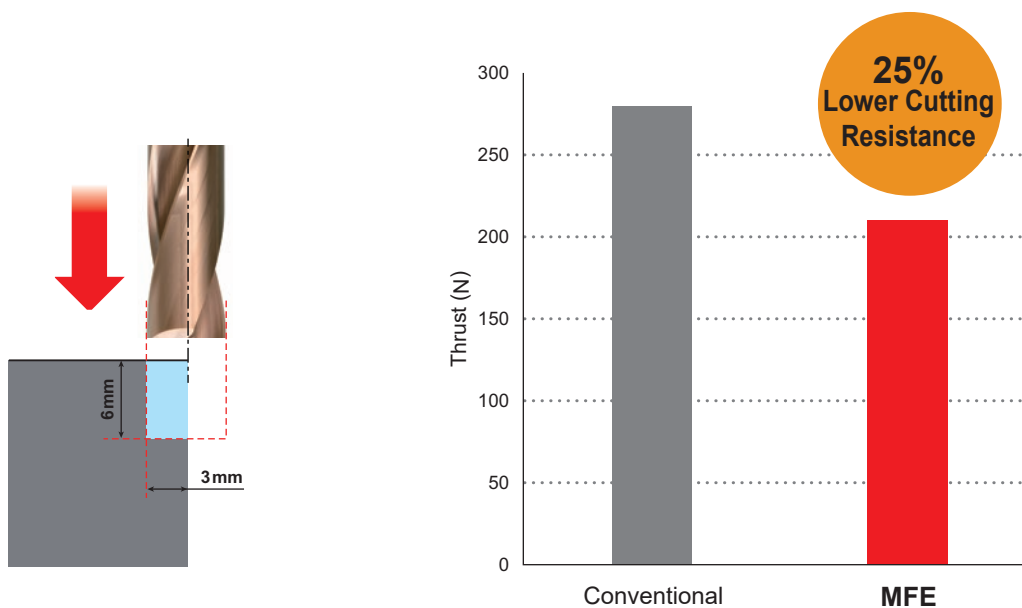
Comparison of Fracture Resistance When Machining JIS S50C

Achieved 1.3 times longer tool life compared to conventional products because of increased stability.



Thrust Force Comparison When Shoulder Drilling

New "Z" point thinning with lower thrust force.

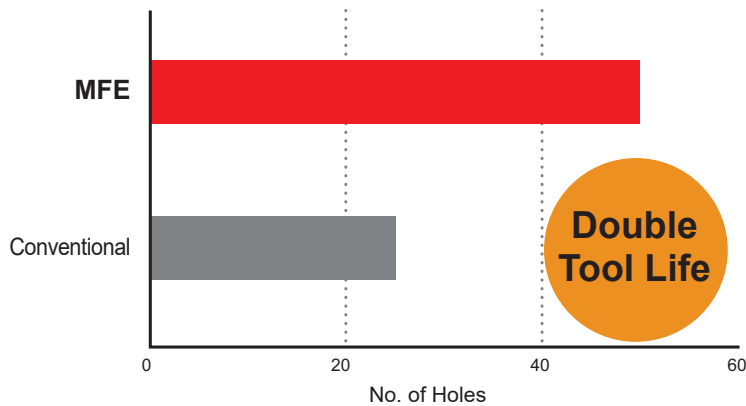


<Cutting Conditions>
 Drill : MFE0600X02S060
 Workpiece Material : JIS S50C
 Hole Depth : 6mm ($l=DC \times 1$)
 Cutting Speed : $vc=50\text{m/min}$
 Feed per Rev. : $fr=0.07\text{mm/rev}$

Cutting Performance

Comparison of Fracture Resistance When Machining JIS SUS304

Achieved double tool life compared to conventional products because of the outstanding fracture resistance properties.



<Cutting Conditions>

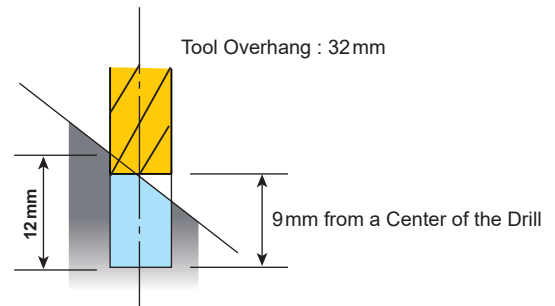
Drill : MFE0600X02S060
 Workpiece Material : JIS SUS304
 Hole Depth : 12mm (l=DC×2)
 Cutting Speed : **vc**=35m/min
 Feed per Rev. : **fr**=0.025mm/rev
 Cutting Mode : Wet Cutting
 External Coolant (Water-soluble)
 Machine : Vertical MC (BT50)



MFE After 50 holes Machining



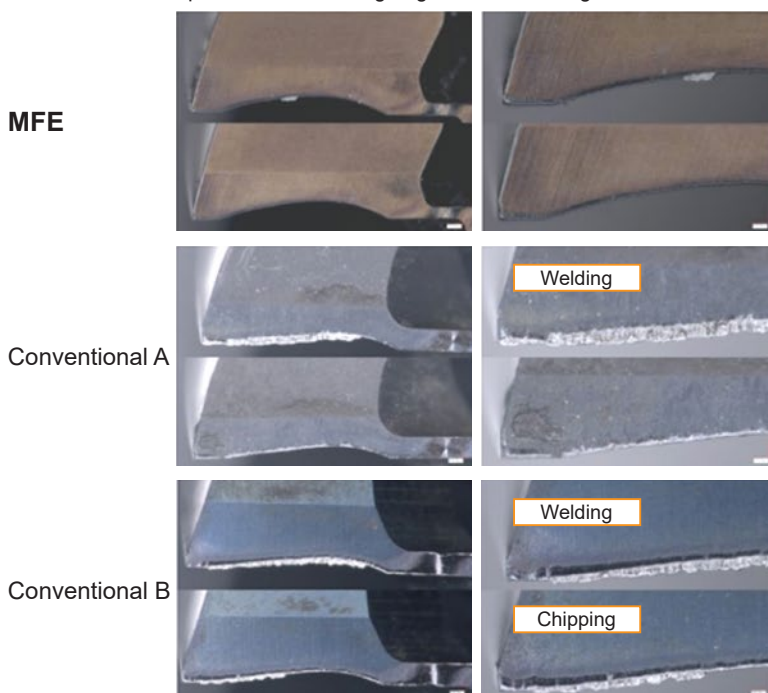
Conventional After 25 holes Machining



Comparison When the Surface Angle is 45° and Machining JIS S45C

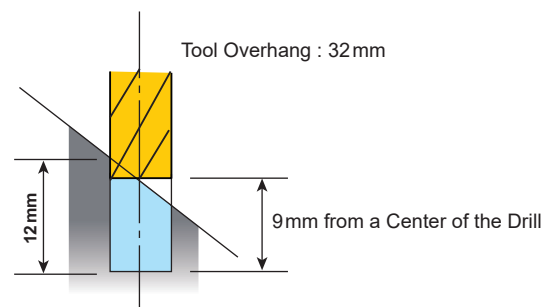
Abnormal fracturing is controlled because of the excellent welding resistance properties.

No. of Holes : Comparison of the cutting edge after machining 200 holes.

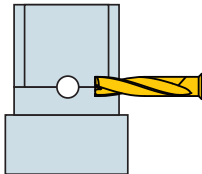
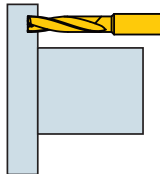
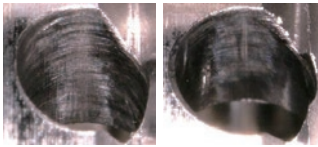
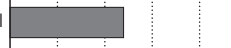


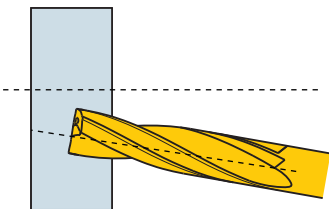
<Cutting Conditions>

Drill : MFE0600X02S060
 Workpiece Material : JIS S45C
 Hole Depth : 12mm (l=DC×2)
 Cutting Speed : **vc**=50m/min
 Feed per Rev. : **fr**=0.07mm/rev
 Cutting Mode : Wet Cutting
 External Coolant (Water-soluble)



Application Example

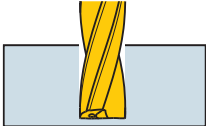
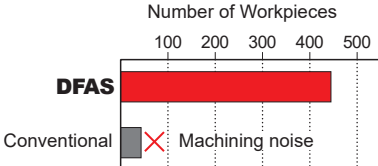
Drill		MFE1010X02S120	MFE0180X02S030	MFE0160X02S030
Workpiece	JIS SCM415		JIS SUS303	JIS SUS440 Pilot Drilling
	No Image			
Component		Ball Nut	Bolt	Nut
Cutting Conditions	Cutting Speed vc (m/min)	63	22	40
	Feed per Rev. fr (mm/rev)	0.04	0.015	0.01 – 0.012
	Hole Depth (mm)	–	–	5
Cutting Mode		Wet Cutting External Coolant (Water-soluble)	Wet Cutting External Coolant	Wet Cutting External Coolant
Machine		Vertical MC	Small Automatic Lathes	Horizontal MC
Results	Number of Workpieces 20 40 60 MFE  Conventional  The wandering of the hole was reduced from 0.13 mm to 0.03 mm when compared to conventional products. Tool life also extended by a factor of at least 1.5.		Large Burr  MFE Conventional With the MFE drill on a small automatic lathe, there were no inaccuracies and it gave double the tool life during continuous machining.	Number of Workpieces 200 400 600 800 MFE  Conventional  The MFE is excellent at maintaining accuracy and the tool life becomes 1.5 times longer than conventional products.

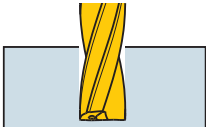
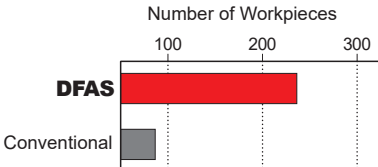
Drill		DFAS0830X03S090
Workpiece	JIS FC250	
		
Component		Machine Parts
Cutting Conditions	Cutting Speed vc (m/min)	30
	Feed per Rev. fr (mm/rev)	0.05
	Hole Depth (mm)	1.5
Cutting Mode		Wet Cutting Internal Coolant (Water-soluble) Blind hole with 10° angled surface
Machine		Horizontal MC
Results	After drilling the same number of holes (1230) as the conventional product, the wear damage was minimal thereby allowing machining to continue. After drilling 1230 holes  Flank wear amount 0.10 mm or less Wear condition	

The above are customer's application examples, so can differ from the recommended conditions.

Solid Carbide Flat Bottom Drills

Application Example

Drill		DFAS0800X03S080						
Workpiece	JIS S50C							
								
Component		Machine Parts						
Cutting Conditions	Cutting Speed vc (m/min)	100						
	Feed per Rev. fr (mm/rev)	0.12						
	Hole Depth (mm)	4.5						
Cutting Mode		Wet Cutting Internal Coolant (Water-soluble) Step						
Machine		MC						
Results		Cutting noise was reduced and the number of holes drilled was increased by 700% when compared to a conventional product. The quality of the machined surface finish was also improved.  <table><caption>Number of Workpieces Comparison</caption><thead><tr><th>Drill Type</th><th>Number of Workpieces</th></tr></thead><tbody><tr><td>DFAS</td><td>~450</td></tr><tr><td>Conventional</td><td>~50</td></tr></tbody></table>	Drill Type	Number of Workpieces	DFAS	~450	Conventional	~50
Drill Type	Number of Workpieces							
DFAS	~450							
Conventional	~50							

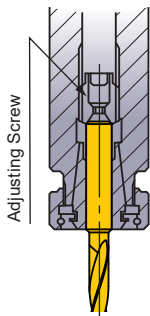
Drill		DFAS1100X03S110						
Workpiece	JIS SS400							
								
Component		Machine Parts						
Cutting Conditions	Cutting Speed vc (m/min)	104						
	Feed per Rev. fr (mm/rev)	0.12						
	Hole Depth (mm)	27						
Cutting Mode		Wet Cutting Internal Coolant (Water-soluble)						
Machine		MC						
Results		Cutting noise was reduced and the number of holes drilled was increased by 300% when compared to a conventional product. The quality of the machined surface finish was also improved.  <table><caption>Number of Workpieces Comparison</caption><thead><tr><th>Drill Type</th><th>Number of Workpieces</th></tr></thead><tbody><tr><td>DFAS</td><td>~250</td></tr><tr><td>Conventional</td><td>~50</td></tr></tbody></table>	Drill Type	Number of Workpieces	DFAS	~250	Conventional	~50
Drill Type	Number of Workpieces							
DFAS	~250							
Conventional	~50							

The above are customer's application examples, so can differ from the recommended conditions.

This image shows a full page of a document template designed as a memo or notebook page. At the top left, the word "Memo" is written in a large, bold, black sans-serif font. A thick, solid black horizontal line runs across the entire width of the page immediately below the title. The remainder of the page is filled with thin, light gray horizontal lines spaced evenly apart, providing a guide for writing. There are no vertical margins, sidebars, or other graphical elements present.

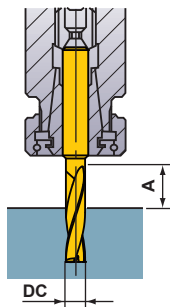
Operational Guidance

Drill Holding



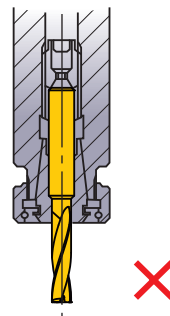
Thrust bearing type collet chuck holds the drill securely.

Drill Length



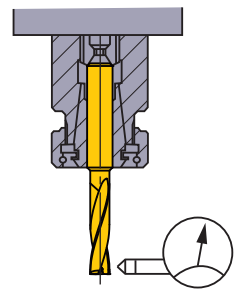
$$A > DC \times 1.5$$

Drill Installation



Do not clamp on the flutes.

Installation Tolerance



Run-out $\leq 0.03\text{mm}$

Thin Workpiece

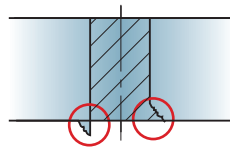


If Bending Occurs



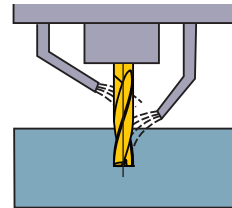
OK
Support the Workpiece

Burring and Workpiece Chipping



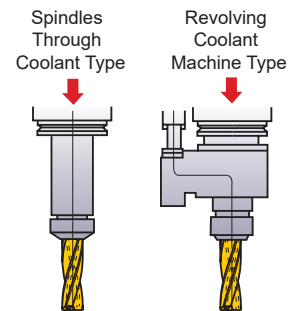
- ① Lower the feed rate by 50% at the end of through cutting.
- ② Add a chamfer.

External Coolant Method



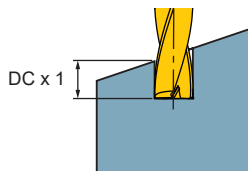
Two coolant positions, at the end and at the center are ideal.

Internal Coolant Method



More than $\phi 3\text{mm}$: 0.5MPa-7MPa
More than 3MPa is recommended.

Inclined Face Drilling



- ① When machining a deep hole into an inclined surface, use DFAS and MFE drill as a drill for a guide hole.
- ② Set the drill depth at approx. $DC \times 1$ to obtain an accurate guide hole.

Coolant Handling

<Internal Coolant Method>

- 1) Small particles of swarf will jam in the oil hole of small diameter drills. Always use a fine mesh filter as a preventative measure.
- 2) Dirt and dust particles adhere to the oil in old coolant and prevent an efficient flow. Regular coolant exchange is recommended.

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.

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(Tools specifications subject to change without notice.)

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