DIA EDGE

TOOL NEWS

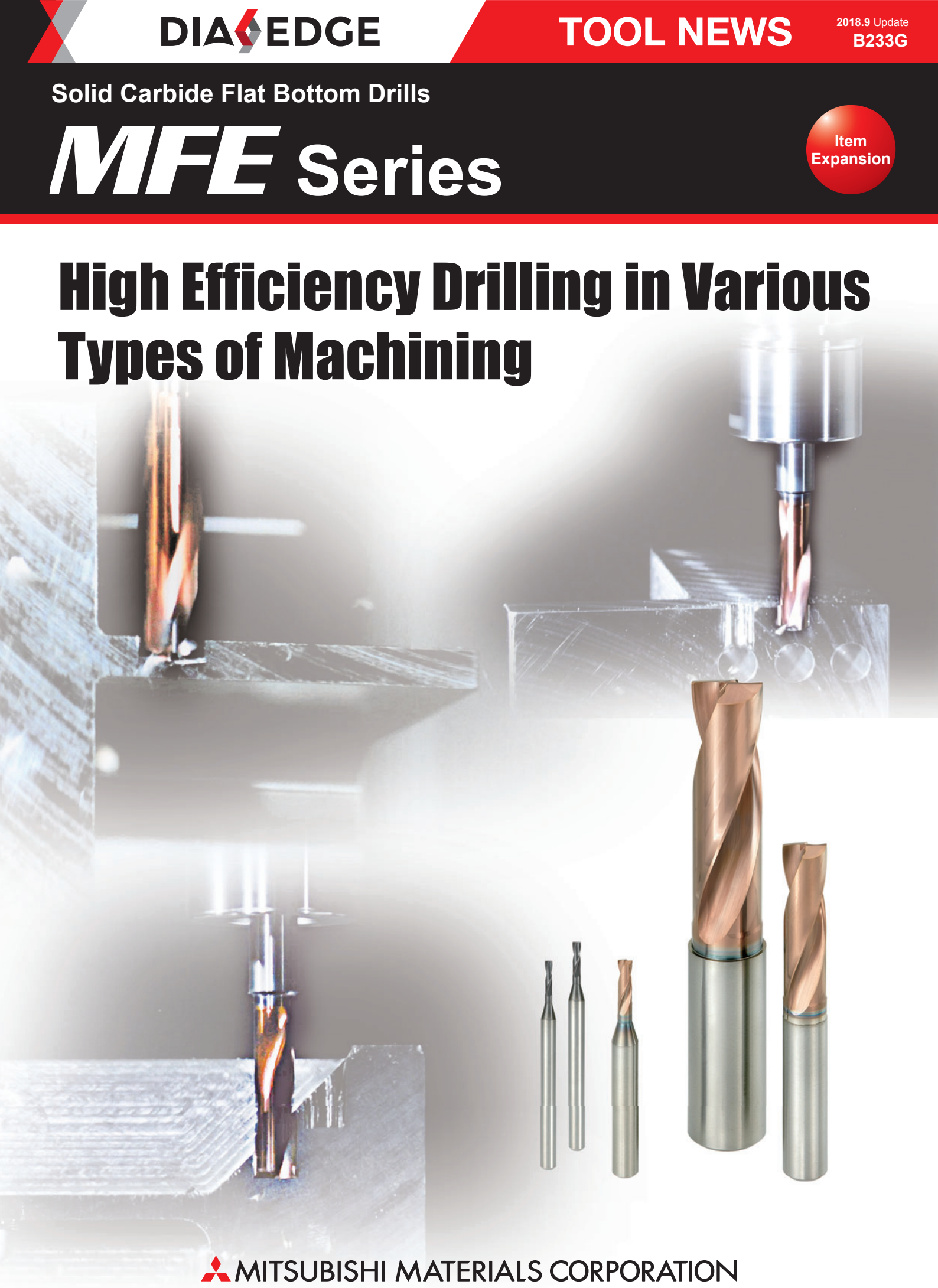
2018.9 Update
B233G

Solid Carbide Flat Bottom Drills

MFE Series

Item Expansion

High Efficiency Drilling in Various Types of Machining



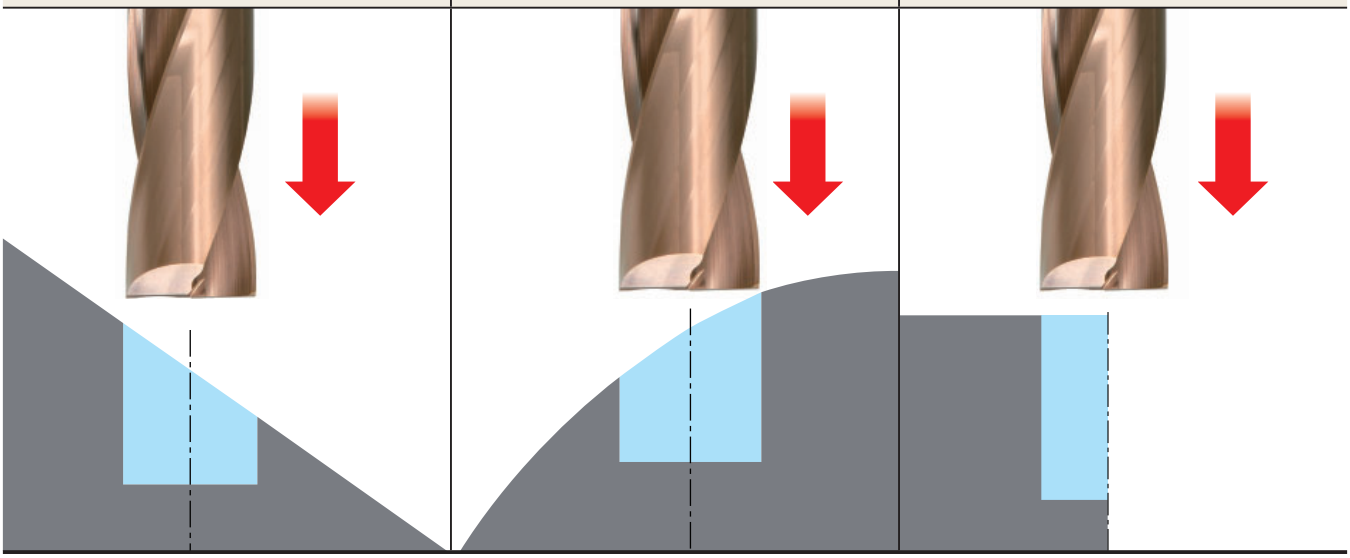
MITSUBISHI MATERIALS CORPORATION

Solid Carbide Flat Bottom Drills

MFE Series

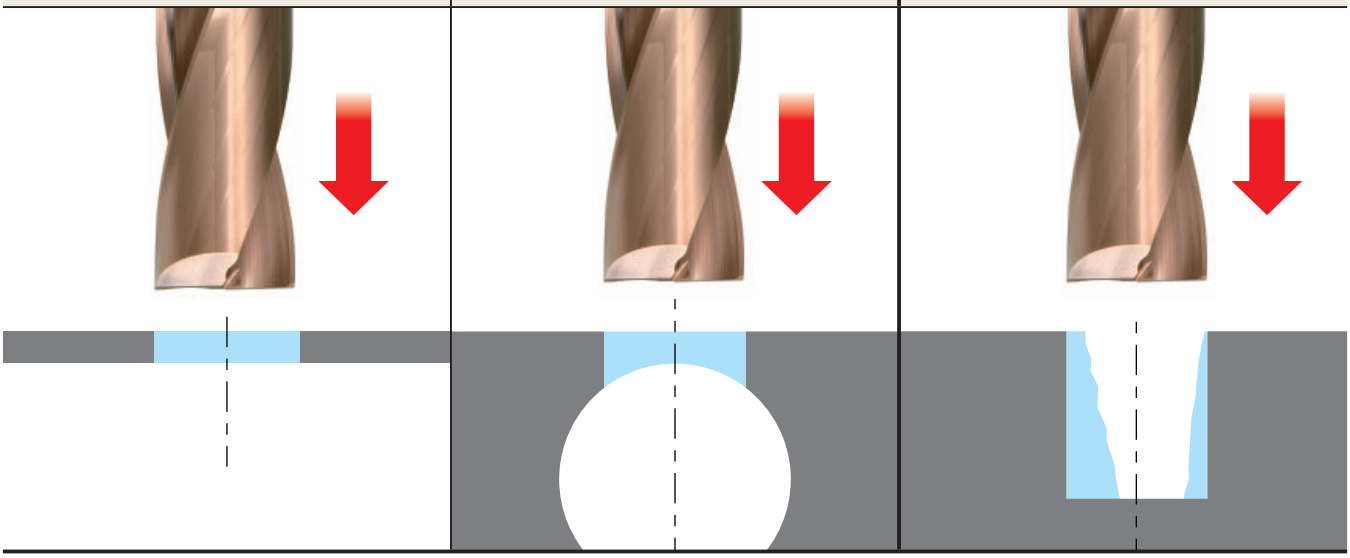
High Efficiency Drilling in Various Types of Machining

Spot Facing and Pilot Drilling		
Angled Surface	Offset Circular Surface	Shoulder



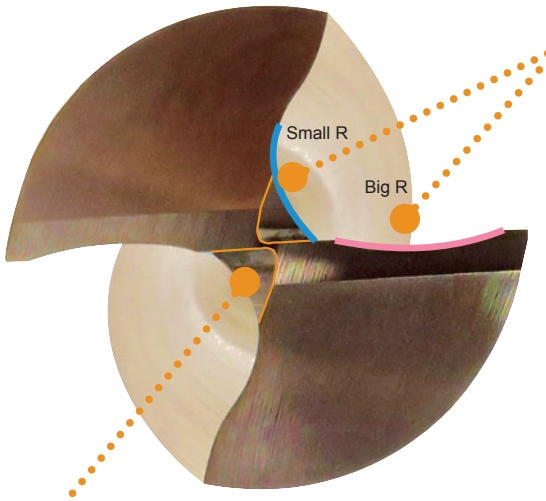
High efficiency counter boring in various types of machining with excellent chipping resistance.

Drilling		Reform
Thin Plate	Intersecting Hole	Eccentric Hole and Cast Hole



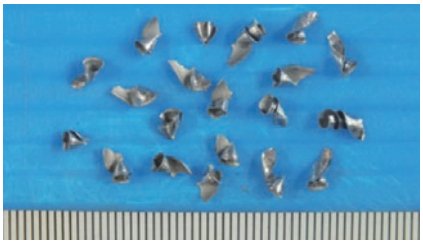
Low cutting force provides less burr.
Excellent performance in correction of eccentric hole and cast hole due to high position accuracy.

Features DC≥3mm



Excellent Chip Control

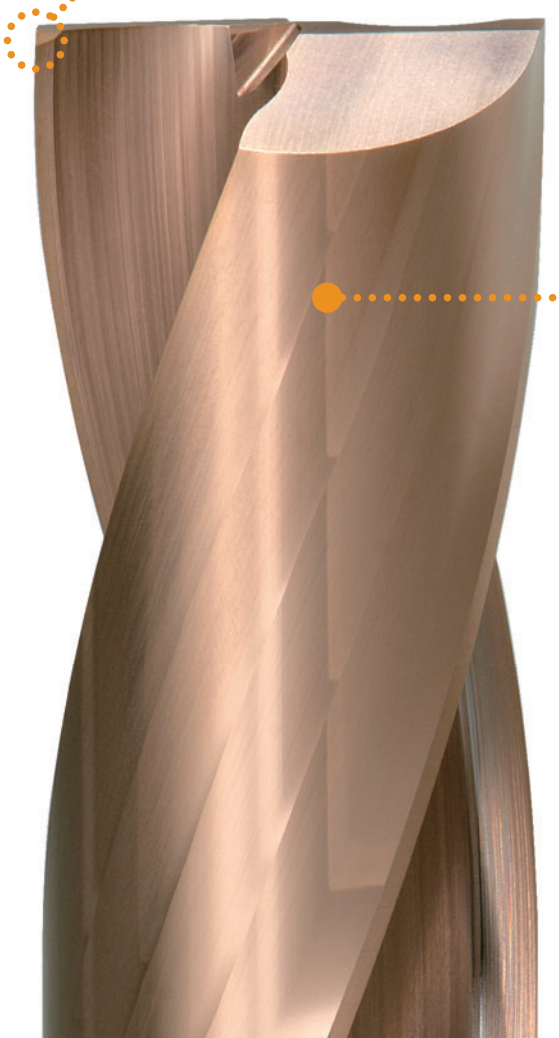
Combination of different radius sizes provides strong cutting edge and excellent chip control.



<Cutting Conditions>
Work Material : AISI 1050
Cutting Speed : **vc**=50 m/min
Feed per Rev. : **fr**=0.07 mm/rev

New “Z” Thinning with Lower Thrust Force

New thinning provides excellent chip evacuation.

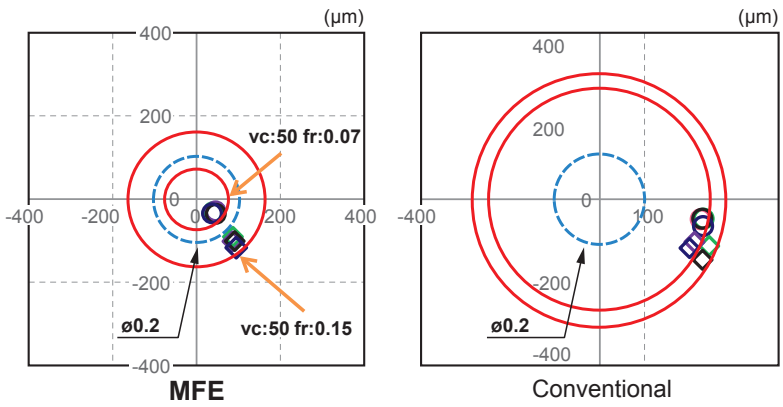


Gash Land for Stronger Corner

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

ZERO-μ Surface

Smooth surface clearance provides reduced deflection and excellent position accuracy.

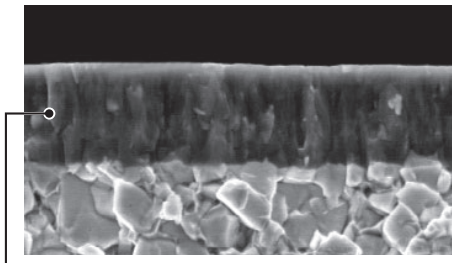


AISI 1050 45° angled surface DC×2

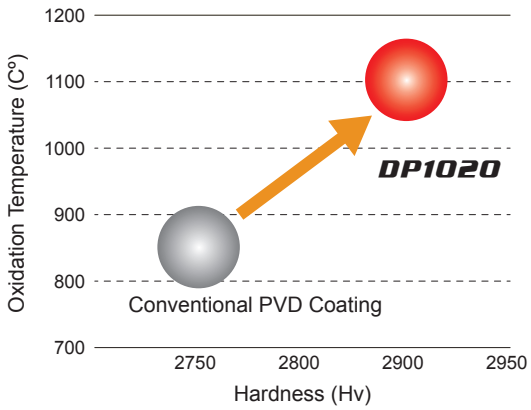
Longer Tool Life with Stable Cutting

Coated Grade DP1020

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



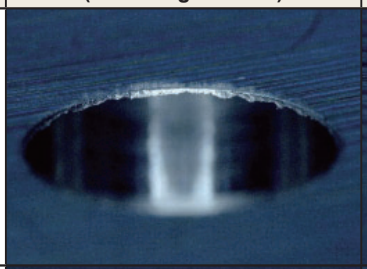
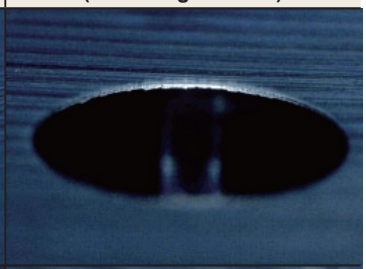
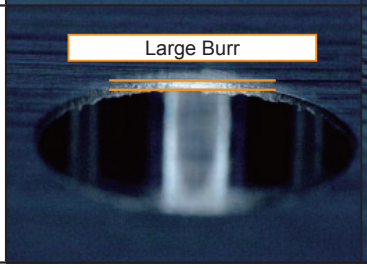
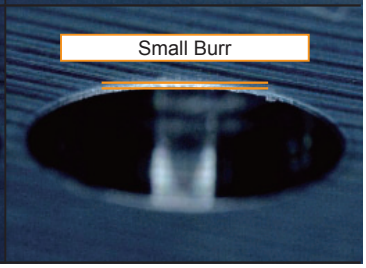
Multi-layer Accumulated Al-Ti-Cr-N Based PVD Coating



Cutting Performance

Comparison of Thin Plate Machining in AISI 4140

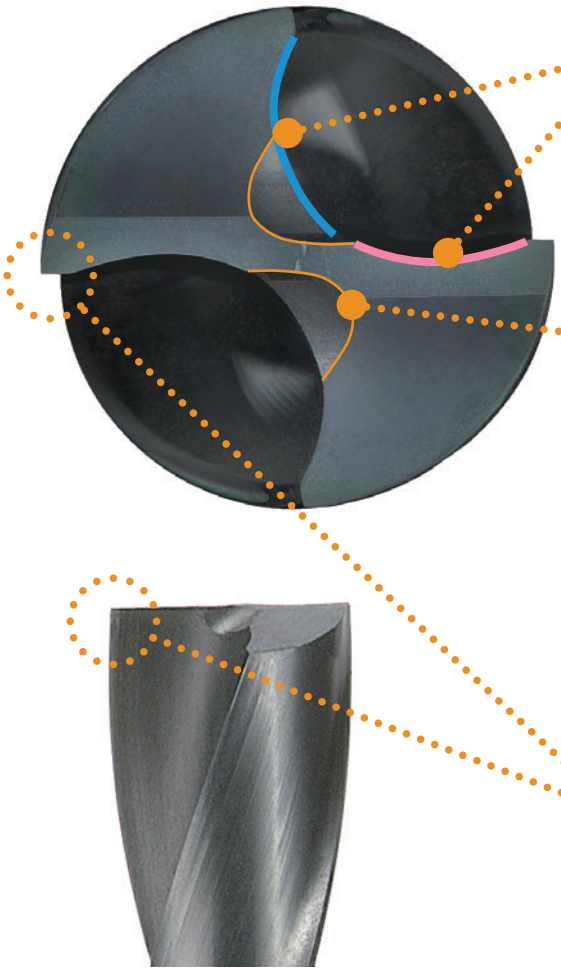
Flat tip geometry prevents burr formation in various types of applications.

	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		

<Cutting Conditions>
Drill : MFE0600X02S060
Work Material : AISI 4140
Hole Depth : 10 mm (Thin Plate)
Cutting Mode : Wet Cutting
External Coolant
(Water-soluble)
Machine : Vertical MC (BT40)

Features Small Dia. DC<3mm

NEW



Excellent Chip Control

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

Thinning with Lower Thrust Force

Ideal chip shape formed by the radius form, securing the chip pocket on the center part, thereby dramatically reducing the cutting resistance.

MFE

Conventional

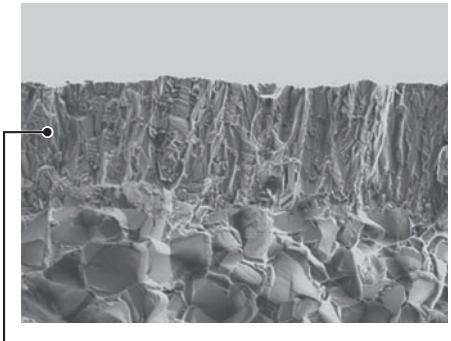
Unique Sharp Cutting Edges

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

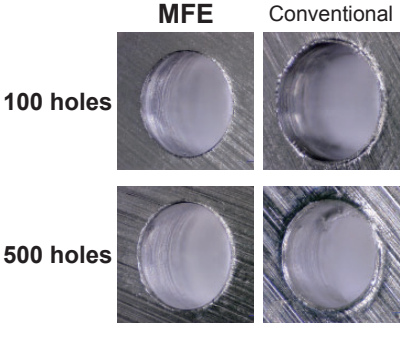
Sharp Cutting Edges with Long Tool Life

Coated Grade DP102A

DP102A is a PVD coated cemented carbide grade specialized for small diameter drills, with greatly improved wear resistance when drilling small-diameter holes at low speeds and low feed conditions. This provides high adhesion and stability even with sharp cutting edges.



Al-Cr-N Based PVD Coating



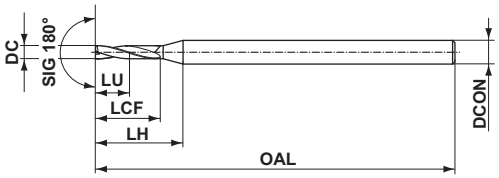
<Cutting Conditions>
Drill : MFE0100X02S030
Work Material : AISI 304
Hole Depth : 2mm
Cutting Speed : **vc**=25m/min
Feed per Rev. : **fr**=0.007mm/rev
Machine : Vertical MC (BT40)

Solid Carbide Flat Bottom Drills

MFE NEW for Small Diameter

UWC DP1 180° SIG XR Thinning

P M K N S H



Type1

	0.75≤DC≤2.95			
	0 −0.014			
	DCON=3	DCON=4		
h6	0 −0.006	0 −0.008		

External Coolant

(mm)

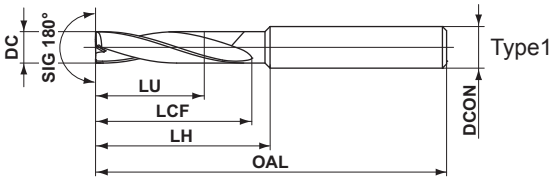
DC	Hole Depth (L/D)	Stock DP102A	Order Number	LU	LCF	LH	OAL	DCON	Type
0.75	2	●	MFE0075X02S030	1.5	3	7.7	45	3	1
0.8	2	●	MFE0080X02S030	1.6	3.2	7.8	45	3	1
0.85	2	●	MFE0085X02S030	1.7	3.4	7.9	45	3	1
0.9	2	●	MFE0090X02S030	1.8	3.6	8	45	3	1
0.95	2	●	MFE0095X02S030	1.9	3.8	8.1	45	3	1
1	2	●	MFE0100X02S030	2	4	8.2	45	3	1
1.05	2	●	MFE0105X02S030	2.1	4.2	8.3	45	3	1
1.1	2	●	MFE0110X02S030	2.2	4.4	8.4	45	3	1
1.15	2	●	MFE0115X02S030	2.3	4.6	8.6	45	3	1
1.2	2	●	MFE0120X02S030	2.4	4.8	8.7	45	3	1
1.25	2	●	MFE0125X02S030	2.5	5	8.8	45	3	1
1.3	2	●	MFE0130X02S030	2.6	5.2	8.9	45	3	1
1.35	2	●	MFE0135X02S030	2.7	5.4	9	45	3	1
1.4	2	●	MFE0140X02S030	2.8	5.6	9.1	45	3	1
1.45	2	●	MFE0145X02S030	2.9	5.8	9.2	45	3	1
1.5	2	●	MFE0150X02S030	3	6	9.3	45	3	1
1.55	2	●	MFE0155X02S030	3.1	6.2	9.4	45	3	1
1.6	2	●	MFE0160X02S030	3.2	6.4	9.5	45	3	1
1.65	2	●	MFE0165X02S030	3.3	6.6	9.6	45	3	1
1.7	2	●	MFE0170X02S030	3.4	6.8	9.7	45	3	1
1.75	2	●	MFE0175X02S030	3.5	7	9.8	45	3	1
1.8	2	●	MFE0180X02S030	3.6	7.2	9.9	45	3	1
1.85	2	●	MFE0185X02S030	3.7	7.4	10	45	3	1
1.9	2	●	MFE0190X02S030	3.8	7.6	10.2	45	3	1
1.95	2	●	MFE0195X02S030	3.9	7.8	10.3	45	3	1
2	2	●	MFE0200X02S040	4	8	12.2	50	4	1
2.05	2	●	MFE0205X02S040	4.1	8.2	12.3	50	4	1
2.1	2	●	MFE0210X02S040	4.2	8.4	12.4	50	4	1
2.15	2	●	MFE0215X02S040	4.3	8.6	12.6	50	4	1
2.2	2	●	MFE0220X02S040	4.4	8.8	12.7	50	4	1
2.25	2	●	MFE0225X02S040	4.5	9	12.8	50	4	1
2.3	2	●	MFE0230X02S040	4.6	9.2	12.9	50	4	1
2.35	2	●	MFE0235X02S040	4.7	9.4	13	50	4	1
2.4	2	●	MFE0240X02S040	4.8	9.6	13.1	50	4	1
2.45	2	●	MFE0245X02S040	4.9	9.8	13.2	50	4	1
2.5	2	●	MFE0250X02S040	5	10	13.3	50	4	1
2.55	2	●	MFE0255X02S040	5.1	10.2	13.4	50	4	1
2.6	2	●	MFE0260X02S040	5.2	10.4	13.5	50	4	1
2.65	2	●	MFE0265X02S040	5.3	10.6	13.6	50	4	1
2.7	2	●	MFE0270X02S040	5.4	10.8	13.7	50	4	1
2.75	2	●	MFE0275X02S040	5.5	11	13.8	50	4	1
2.8	2	●	MFE0280X02S040	5.6	11.2	13.9	50	4	1
2.85	2	●	MFE0285X02S040	5.7	11.4	14	50	4	1
2.9	2	●	MFE0290X02S040	5.8	11.6	14.2	50	4	1
2.95	2	●	MFE0295X02S040	5.9	11.8	14.3	50	4	1

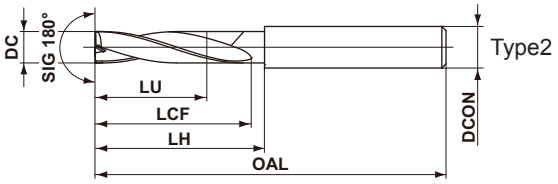
● : Inventory maintained in Japan.

MFE

UWC DP1 180° SIG Z Thinning

P M K N S H





3≤DC≤6	6 < DC≤10	10 < DC≤18	18 < DC≤20
0 −0.012	0 −0.015	0 −0.018	0 −0.021
DCON=6	DCON=8, 10	DCON=12, 14, 16, 18	DCON=20
0 −0.008	0 −0.009	0 −0.011	0 −0.013

h6

External Coolant

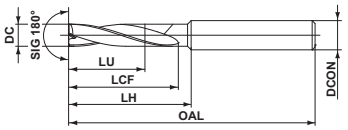
(mm)

DC	Hole Depth (L/D)	Stock DP1020	Order Number	LU	LCF	LH	OAL	DCON	Type
3	2	●	MFE0300X02S060	6	12	19.6	55	6	1
3.1	2	●	MFE0310X02S060	6.2	14	21.4	55	6	1
3.2	2	●	MFE0320X02S060	6.4	14	21.2	55	6	1
3.3	2	●	MFE0330X02S060	6.6	14	21	55	6	1
3.4	2	●	MFE0340X02S060	6.8	14	20.9	55	6	1
3.5	2	●	MFE0350X02S060	7	14	20.7	55	6	1
3.6	2	●	MFE0360X02S060	7.2	16	22.5	55	6	1
3.7	2	●	MFE0370X02S060	7.4	16	22.3	55	6	1
3.8	2	●	MFE0380X02S060	7.6	16	22.1	55	6	1
3.9	2	●	MFE0390X02S060	7.8	16	21.9	55	6	1
4	2	●	MFE0400X02S060	8	16	21.7	55	6	1
4.1	2	●	MFE0410X02S060	8.2	18	23.5	62	6	1
4.2	2	●	MFE0420X02S060	8.4	18	23.4	62	6	1
4.3	2	●	MFE0430X02S060	8.6	18	23.2	62	6	1
4.4	2	●	MFE0440X02S060	8.8	18	23	62	6	1
4.5	2	●	MFE0450X02S060	9	18	22.8	62	6	1
4.6	2	●	MFE0460X02S060	9.2	20	23.7	62	6	1
4.7	2	●	MFE0470X02S060	9.4	20	23.7	62	6	1
4.8	2	●	MFE0480X02S060	9.6	20	23.6	62	6	1
4.9	2	●	MFE0490X02S060	9.8	20	23.6	62	6	1
5	2	●	MFE0500X02S060	10	20	23.5	62	6	1
5.1	2	●	MFE0510X02S060	10.2	22	25.5	62	6	1
5.2	2	●	MFE0520X02S060	10.4	22	25.4	62	6	1
5.3	2	●	MFE0530X02S060	10.6	22	25.4	62	6	1
5.4	2	●	MFE0540X02S060	10.8	22	25.3	62	6	1
5.5	2	●	MFE0550X02S060	11	22	25.3	62	6	1
5.6	2	●	MFE0560X02S060	11.2	24	27.2	62	6	1
5.7	2	●	MFE0570X02S060	11.4	24	27.2	62	6	1
5.8	2	●	MFE0580X02S060	11.6	24	27.1	62	6	1
5.9	2	●	MFE0590X02S060	11.8	24	27.1	62	6	1
6	2	●	MFE0600X02S060	12	24	27	62	6	1
NEW 6.1	2	●	MFE0610X02S070	12.2	26	29.5	74	7	1
6.1	2	●	MFE0610X02S080	12.2	26	30	74	8	1
NEW 6.2	2	●	MFE0620X02S070	12.4	26	29.4	74	7	1
6.2	2	●	MFE0620X02S080	12.4	26	29.9	74	8	1
NEW 6.3	2	●	MFE0630X02S070	12.6	26	29.4	74	7	1
6.3	2	●	MFE0630X02S080	12.6	26	29.9	74	8	1
NEW 6.4	2	●	MFE0640X02S070	12.8	26	29.3	74	7	1

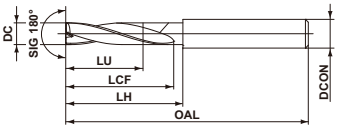
Solid Carbide Flat Bottom Drills

MFE

External Coolant



Type1



Type2

(mm)

DC	Hole Depth (L/D)	Stock DP1020	Order Number	LU	LCF	LH	OAL	DCON	Type
6.4	2	●	MFE0640X02S080	12.8	26	29.8	74	8	1
NEW 6.5	2	●	MFE0650X02S070	13	26	29.3	74	7	1
6.5	2	●	MFE0650X02S080	13	26	29.8	74	8	1
NEW 6.6	2	●	MFE0660X02S070	13.2	28	31.2	74	7	1
6.6	2	●	MFE0660X02S080	13.2	28	31.7	74	8	1
NEW 6.7	2	●	MFE0670X02S070	13.4	28	31.2	74	7	1
6.7	2	●	MFE0670X02S080	13.4	28	31.7	74	8	1
NEW 6.8	2	●	MFE0680X02S070	13.6	28	31.1	74	7	1
6.8	2	●	MFE0680X02S080	13.6	28	31.6	74	8	1
NEW 6.9	2	●	MFE0690X02S070	13.8	28	31.1	74	7	1
6.9	2	●	MFE0690X02S080	13.8	28	31.6	74	8	1
NEW 7	2	●	MFE0700X02S070	14	28	31	74	7	1
7	2	●	MFE0700X02S080	14	28	31.5	74	8	1
7.1	2	●	MFE0710X02S080	14.2	30	33.5	74	8	1
7.2	2	●	MFE0720X02S080	14.4	30	33.4	74	8	1
7.3	2	●	MFE0730X02S080	14.6	30	33.4	74	8	1
7.4	2	●	MFE0740X02S080	14.8	30	33.3	74	8	1
7.5	2	●	MFE0750X02S080	15	30	33.3	74	8	1
7.6	2	●	MFE0760X02S080	15.2	32	35.2	74	8	1
7.7	2	●	MFE0770X02S080	15.4	32	35.2	74	8	1
7.8	2	●	MFE0780X02S080	15.6	32	35.1	74	8	1
7.9	2	●	MFE0790X02S080	15.8	32	35.1	74	8	1
8	2	●	MFE0800X02S080	16	32	35	74	8	1
8.1	2	●	MFE0810X02S100	16.2	34	38	84	10	1
8.2	2	●	MFE0820X02S100	16.4	34	37.9	84	10	1
8.3	2	●	MFE0830X02S100	16.6	34	37.9	84	10	1
8.4	2	●	MFE0840X02S100	16.8	34	37.8	84	10	1
8.5	2	●	MFE0850X02S100	17	34	37.8	84	10	1
8.6	2	●	MFE0860X02S100	17.2	36	39.7	84	10	1
8.7	2	●	MFE0870X02S100	17.4	36	39.7	84	10	1
8.8	2	●	MFE0880X02S100	17.6	36	39.6	84	10	1
8.9	2	●	MFE0890X02S100	17.8	36	39.6	84	10	1
9	2	●	MFE0900X02S100	18	36	39.5	84	10	1
9.1	2	●	MFE0910X02S100	18.2	38	41.5	84	10	1
9.2	2	●	MFE0920X02S100	18.4	38	41.4	84	10	1
9.3	2	●	MFE0930X02S100	18.6	38	41.4	84	10	1
9.4	2	●	MFE0940X02S100	18.8	38	41.3	84	10	1
9.5	2	●	MFE0950X02S100	19	38	41.3	84	10	1
9.6	2	●	MFE0960X02S100	19.2	40	43.2	84	10	1
9.7	2	●	MFE0970X02S100	19.4	40	43.2	84	10	1
9.8	2	●	MFE0980X02S100	19.6	40	43.1	84	10	1
9.9	2	●	MFE0990X02S100	19.8	40	43.1	84	10	1
10	2	●	MFE1000X02S100	20	40	43	84	10	1
10.1	2	●	MFE1010X02S120	20.2	42	46	95	12	1
10.2	2	●	MFE1020X02S120	20.4	42	45.9	95	12	1
10.3	2	●	MFE1030X02S120	20.6	42	45.9	95	12	1
10.4	2	●	MFE1040X02S120	20.8	42	45.8	95	12	1
10.5	2	●	MFE1050X02S120	21	42	45.8	95	12	1
10.6	2	●	MFE1060X02S120	21.2	44	47.7	95	12	1
10.7	2	●	MFE1070X02S120	21.4	44	47.7	95	12	1

● : Inventory maintained in Japan.

External Coolant

(mm)

DC	Hole Depth (L/D)	Stock DP1020	Order Number	LU	LCF	LH	OAL	DCON	Type
10.8	2	●	**MFE1080X02S120**	21.6	44	47.6	95	12	1
10.9	2	●	**MFE1090X02S120**	21.8	44	47.6	95	12	1
11	2	●	**MFE1100X02S120**	22	44	47.5	95	12	1
11.1	2	●	**MFE1110X02S120**	22.2	46	49.5	95	12	1
11.2	2	●	**MFE1120X02S120**	22.4	46	49.4	95	12	1
11.3	2	●	**MFE1130X02S120**	22.6	46	49.4	95	12	1
11.4	2	●	**MFE1140X02S120**	22.8	46	49.3	95	12	1
11.5	2	●	**MFE1150X02S120**	23	46	49.3	95	12	1
11.6	2	●	**MFE1160X02S120**	23.2	48	51.2	95	12	1
11.7	2	●	**MFE1170X02S120**	23.4	48	51.2	95	12	1
11.8	2	●	**MFE1180X02S120**	23.6	48	51.1	95	12	1
11.9	2	●	**MFE1190X02S120**	23.8	48	51.1	95	12	1
12	2	●	**MFE1200X02S120**	24	48	51	95	12	1
12.5	2	●	**MFE1250X02S140**	25	50	53	102	14	2
13	2	●	**MFE1300X02S140**	26	52	55	102	14	2
13.5	2	●	**MFE1350X02S140**	27	54	57	102	14	2
14	2	●	**MFE1400X02S140**	28	56	59	102	14	2
14.5	2	●	**MFE1450X02S160**	29	58	61	111	16	2
15	2	●	**MFE1500X02S160**	30	60	63	111	16	2
15.5	2	●	**MFE1550X02S160**	31	62	65	111	16	2
16	2	●	**MFE1600X02S160**	32	64	67	111	16	2
16.5	2	●	**MFE1650X02S180**	33	66	69	119	18	2
17	2	●	**MFE1700X02S180**	34	68	71	119	18	2
17.5	2	●	**MFE1750X02S180**	35	70	73	119	18	2
18	2	●	**MFE1800X02S180**	36	72	75	119	18	2
18.5	2	●	**MFE1850X02S200**	37	74	77	127	20	2
19	2	●	**MFE1900X02S200**	38	76	79	127	20	2
19.5	2	●	**MFE1950X02S200**	39	78	81	127	20	2
20	2	●	**MFE2000X02S200**	40	80	83	127	20	2

DC = Cutting Diameter
LU = Usable Length
LCF = Length Chip Flute
LH = Neck Length
OAL = Overall Length
DCON = Connection Diameter
SIG = Point Angle

MFE

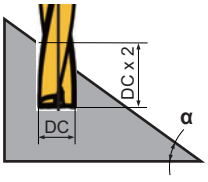
Recommended Cutting Conditions

(mm)

Work Material		Mild Steels (≤180HB) AISI 1010 etc.		Carbon Steels, Alloy Steels (180—280HB) AISI 1045, 4140 etc.		Carbon Steels, Alloy Steels (280—350HB) AISI 4340 etc.	
DC	**L/D**	**n** (min^{-1})	α=0° **fr** (Min.—Max.) (mm/rev)	**n** (min^{-1})	α=0° **fr** (Min.—Max.) (mm/rev)	**n** (min^{-1})	α=0° **fr** (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)

Work Material		Austenitic Stainless Steels (≤200HB) AISI 304, 316 etc.		Gray Cast Irons (≤350MPa) AISI No45B etc.		Ductile Cast Irons (≤450MPa) AISI 60-40-18 etc.	
DC	**L/D**	**n** (min^{-1})	α=0° **fr** (Min.—Max.) (mm/rev)	**n** (min^{-1})	α=0° **fr** (Min.—Max.) (mm/rev)	**n** (min^{-1})	α=0° **fr** (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)

Work Material		Aluminum Alloys (Si<5%) AISI A6061, 7075 etc.	
DC	**L/D**	**n** (min^{-1})	α=0° **fr** (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 work material when machining on an angled surface. (Refer to diagram)

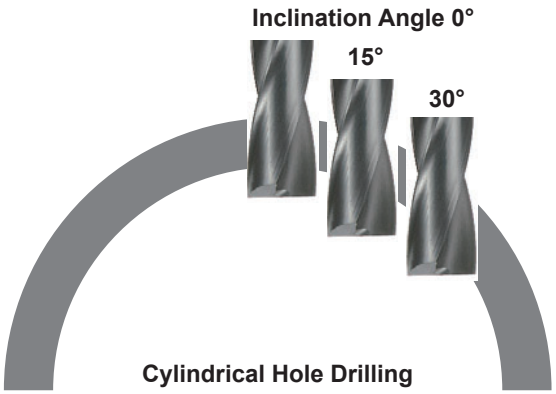
(Note 2) The above cutting table assumes drilling on a flat surface.
For hole drilling on an angled surface, adjust the feed rate in accordance with the inclination angle.
When the inclination angle α is 30° or less, adjust the feed rate to 70% or lower as a guideline.
When the inclination angle α is greater than 30°, adjust the feed rate to 50% or lower as a guideline.

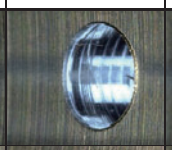
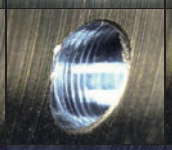
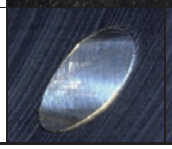
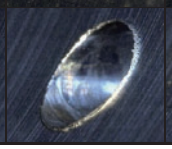
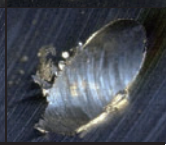
(Note 3) This product is a tool intended for hole drilling. It cannot be used for cross-feed machining or helical machining.

Cutting Performance

Comparison of Exit Burrs Generated in AISI 304

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

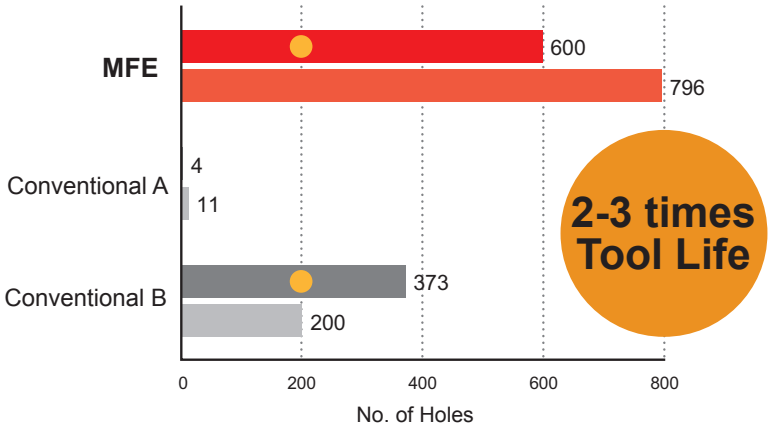


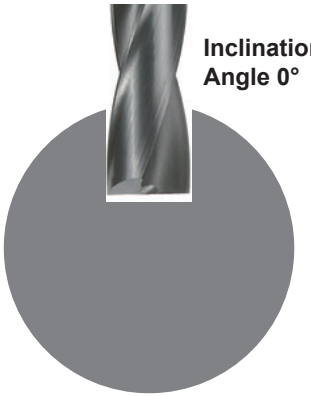
	MFE	Conventional A	Conventional B
Inclination Angle 0° Hole Depth=4mm			
Inclination Angle 15° Hole Depth≒5mm			
Inclination Angle 30° Hole Depth≒7mm			

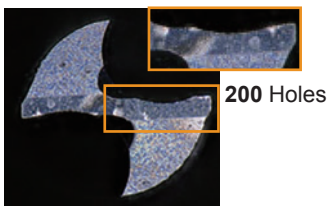
<Cutting Conditions>
Drill : MFE0200X02S040
Work Material : AISI 304
Cutting Speed : **vc**=30m/min
Feed per Rev. : **fr**=0.01mm/rev
Cutting Mode : Wet Cutting
External Coolant (Water-soluble)
Machine : Vertical MC (BT40)

Comparison of Tool Life when Used on AISI 304

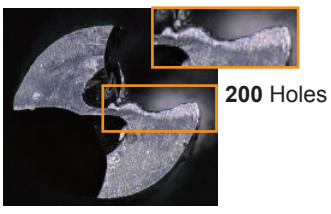
Excellent fracture resistance is achieved even when hole drilling cylindrical surfaces using small automatic lathes.







MFE



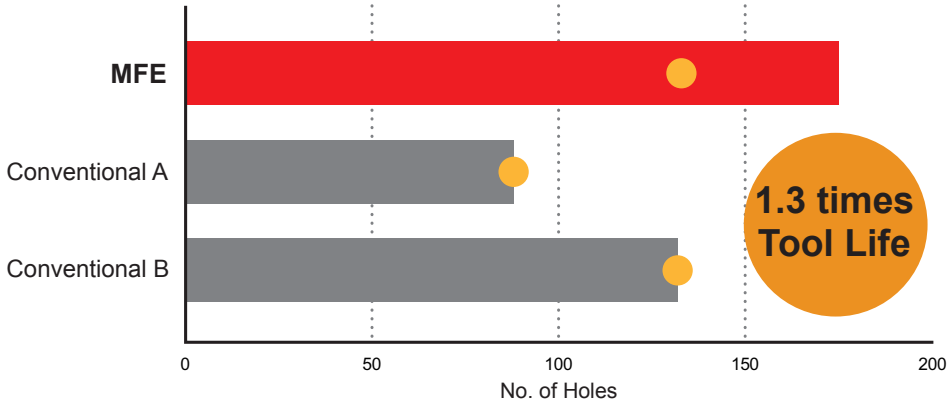
Conventional B

<Cutting Conditions>
Drill : MFE0080X02S030
Work Material : AISI 304
Cutting Speed : **vc**=15m/min
Feed per Rev. : **fr**=0.01mm/rev
Cutting Mode : Wet Cutting
External Coolant (Water-insoluble)
Machine : Small Automatic Lathes

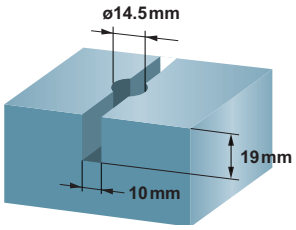
Cutting Performance

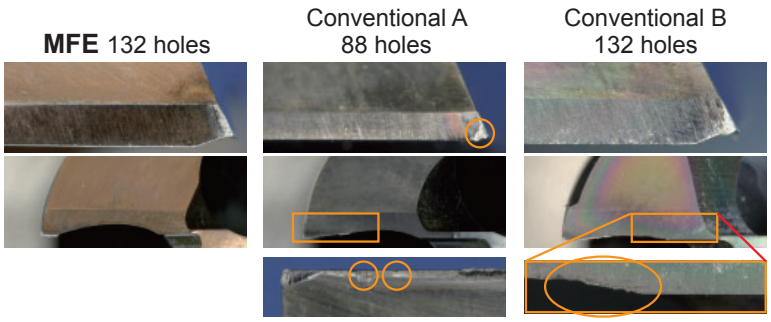
Comparison of Fracture Resistance in AISI 1050

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



Cutting Mode
Drilling of ø14.5mm in groove with a width of 10mm.

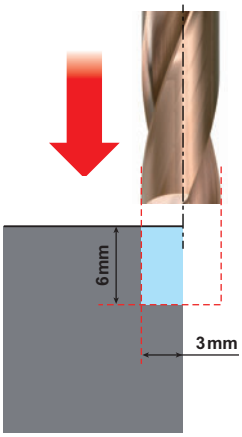


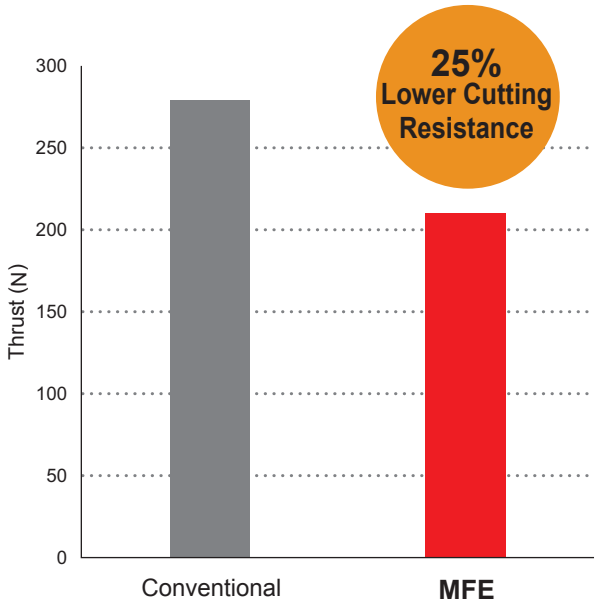


<Cutting Conditions>
Drill : MFE1450X02S160
Work Material : AISI 1050
Hole Depth : 24mm
Cutting Speed : **vc**=35m/min
Feed per Rev. : **fr**=0.025mm/rev
Cutting Mode : Wet Cutting
External Coolant
(Water-soluble)
Machine : Vertical MC (BT50)

Thrust Force Comparison in Shoulder Drilling

New “Z” thinning with lower thrust force.

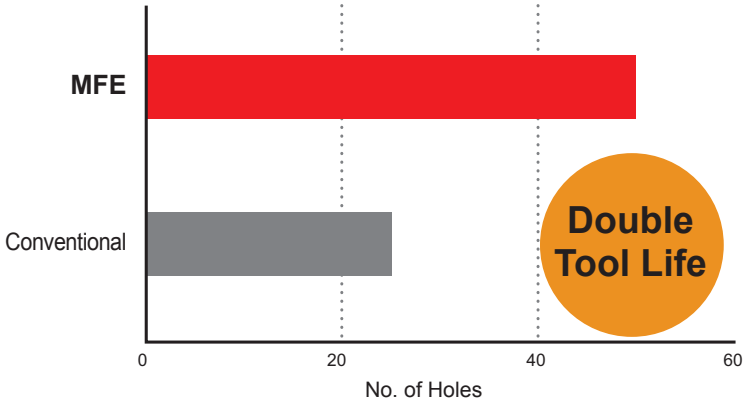




<Cutting Conditions>
Drill : MFE0600X02S060
Work Material : AISI 1050
Hole Depth : 6mm (l=DC×1)
Cutting Speed : **vc**=50m/min
Feed per Rev. : **fr**=0.07mm/rev

Comparison of Fracture Resistance in AISI 304

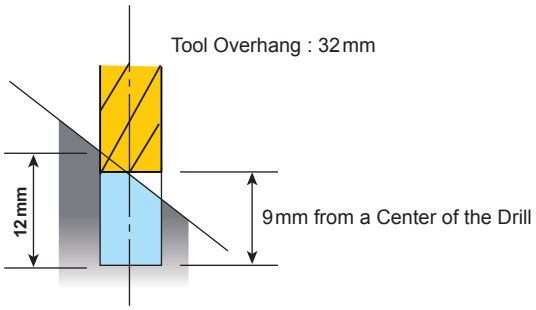
Achieved double tool life compared to conventional products because of the outstanding fracture resistance properties.



<Cutting Conditions>
Drill : MFE0600X02S060
Work Material : AISI 304
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

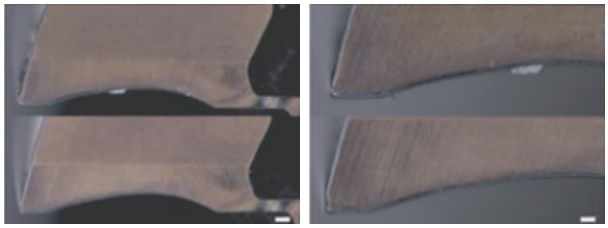


Comparison of Machining for Angled Surface with 45° Angle in AISI 1045

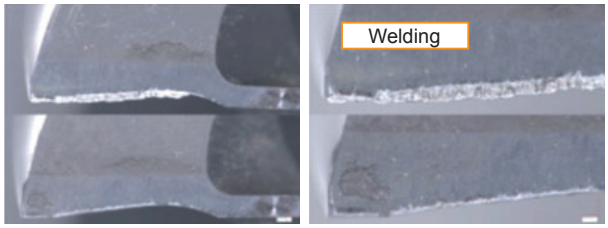
Controlled abnormal fracturing because of the excellent welding resistance properties.

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

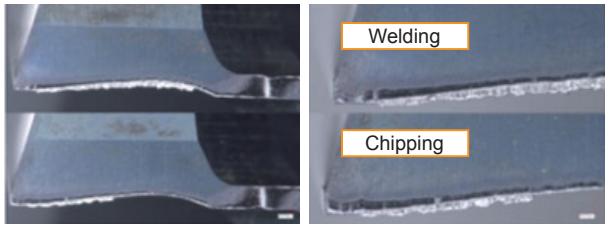
MFE



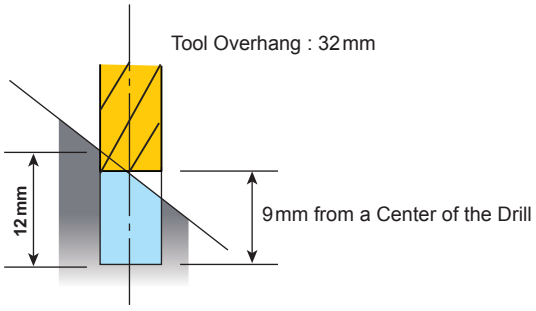
Conventional A



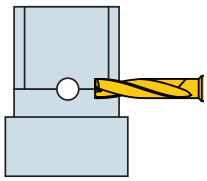
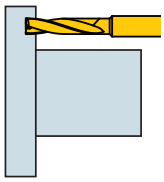
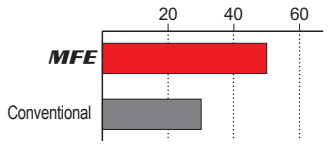
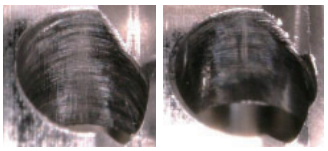
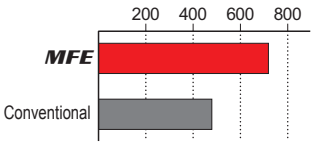
Conventional B



<Cutting Conditions>
Drill : MFE0600X02S060
Work Material : AISI 1045
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

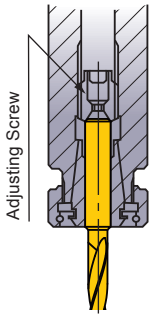
Drill		MFE1010X02S120	MFE0180X02S030	MFE0160X02S030
Workpiece		JIS SCM415 No Image	AISI 303 	AISI 440 Pilot Drilling 
Component		Ball Nut	Bolt	Nut
Cutting Conditions	Cutting Speed **vc** (m/min)	63	22	40
	Feed per Rev. **fr** (mm/rev)	0.04	0.015	0.01 – 0.012
	Hole Depth (mm)	–	–	5
Cutting Mode		Wet Cutting Extarnal Coolant (Water-soluble)	Wet Cutting Extarnal Coolant	Wet Cutting Extarnal Coolant
Machine		Vertical MC	Small Automatic Lathes	Horizontal MC
Results		Number of Workpieces  The amount of hole curving has been reduced from 0.13 mm to 0.03 mm compared to conventional products, with a tool life which is 1.5 or more times longer.	Large Burr  MFE Conventional With the MFE, there will be no accuracy errors even if used for continuous hole drilling on small automatic lathes, and the tool life will be double or more times longer.	Number of Workpieces  The MFE is excellent at maintaining accuracy and the tool life becomes 1.5 times longer than conventional products.

The above application examples are customer's applications, so it can be different from the recommended conditions.

Memo

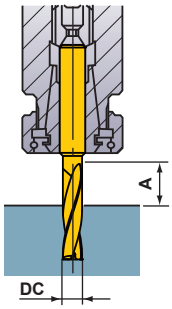
Operational Guidance

Drill Holding



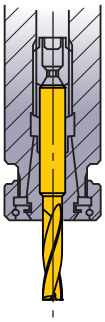
Thrust bearing type collet chuck holds the drill securely.

Drill Length



A > DC x 1.5

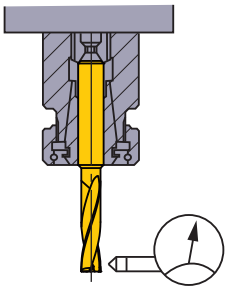
Drill Installation



NG

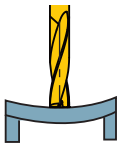
Do not clamp on the flutes.

Installation Tolerance



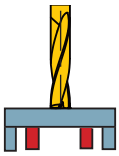
Run-out ≤ 0.03mm

Thin Workpiece



NG

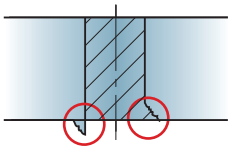
If Bending Occurs



OK

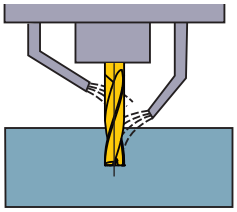
Support the Workpiece

Burring and Workpiece Chipping



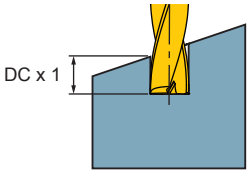
①Lower the feed rate by 50% at the end of through cutting.
②Add a chamfer.

Coolant Method (*MFE*)



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

Inclined Face Drilling



① When machining a deep hole into an inclined surface, use MFE drill (L/D=2) as a drill for a guide hole.
② Set the drill depth at approx. DC x 1 to obtain anaccurate guide hole.

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 driver. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

MITSUBISHI MATERIALS CORPORATION

MMC HARDMETAL INDIA PVT LTD
Head Office
Prasad Enclave, #118/119, 1st Floor, 2nd Stage BBMP Ward #11,
(New #38),Industrial Suburb,Yeshwanthpura, Bengaluru-560 022
Karnataka, India, Tel : +91 80 2204 3600
E-mail : mb-mmci@mmc.co.jp

REGIONAL OFFICES

Pune Office
Plot No, A-27 & A-28, H-Block,
Pimpri Waghere,Pimpri Industrial Area MIDC,
Pune – 411018,Maharashtra,India
Tel :: +91 020-27456959

Gurugram Office
#407, 4th Floor,JMD Galleria, Sohna Road,
Opposite Malibu Town, Sector-48,
Gurgaon-122 001 Haryana, India.
Tel : +91 124 4089163

Chennai Office
MM Complex,2Nd Floor,Part 30/10 Hopman 2nd Street, 100 Feet Main Road,Alandur,
Chennai – 600 016 Tamilnadu, India.
Tel: +91 44 4550 7006

Ahmedabad Office
210, Sigma Arcade, 2nd Floor, Visat Circle,
Ahmedabad-Mehsana Road, Chandkheda,
Ahmedabad – 382 424, Gujarat, India.
Tel : +91 79 2329 9300

http://www.mitsubishicarbide.com/en/
(Tools specifications subject to change without notice.)

EXP-16-E011
2018.9.E(-)