Tooling News No.527

SUMITOMO
CARBIDE - CBN - DIAMOND
Global Support, Global Solutions.

Coated Carbide Drills for Stainless Steel

MULTIDRILL MDM series

An evolution in drilling of stainless steel and exotic alloy

Innovative bean-shaped oil holes and new coating are ideal for machining stainless steel and exotic alloy!
Stable in a wide range of conditions for a long tool life!

New **Bean Jet Cooling**

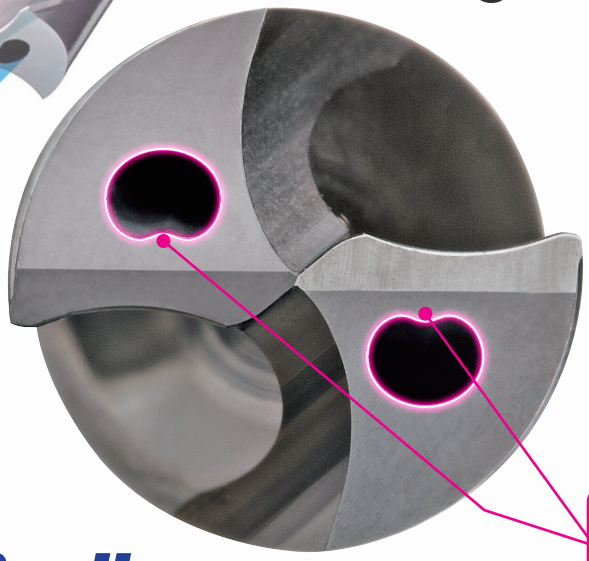
P M K N S H

SUMITOMO ELECTRIC GROUP

MULTIDRILL

MDMseries The newly developed oil hole shape

Effectively cools the cutting edge Reduced breakage through adhesion

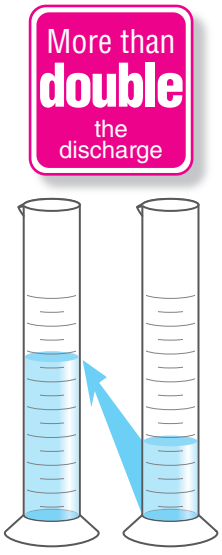


New Bean Jet Cooling

*Ideal for drill diameters of ø4.1 and above

Due to the unique oil hole shape (bean shape), the cutting edge positions are cooled effectively!

● Releases more coolant to effectively cool the cutting edge!

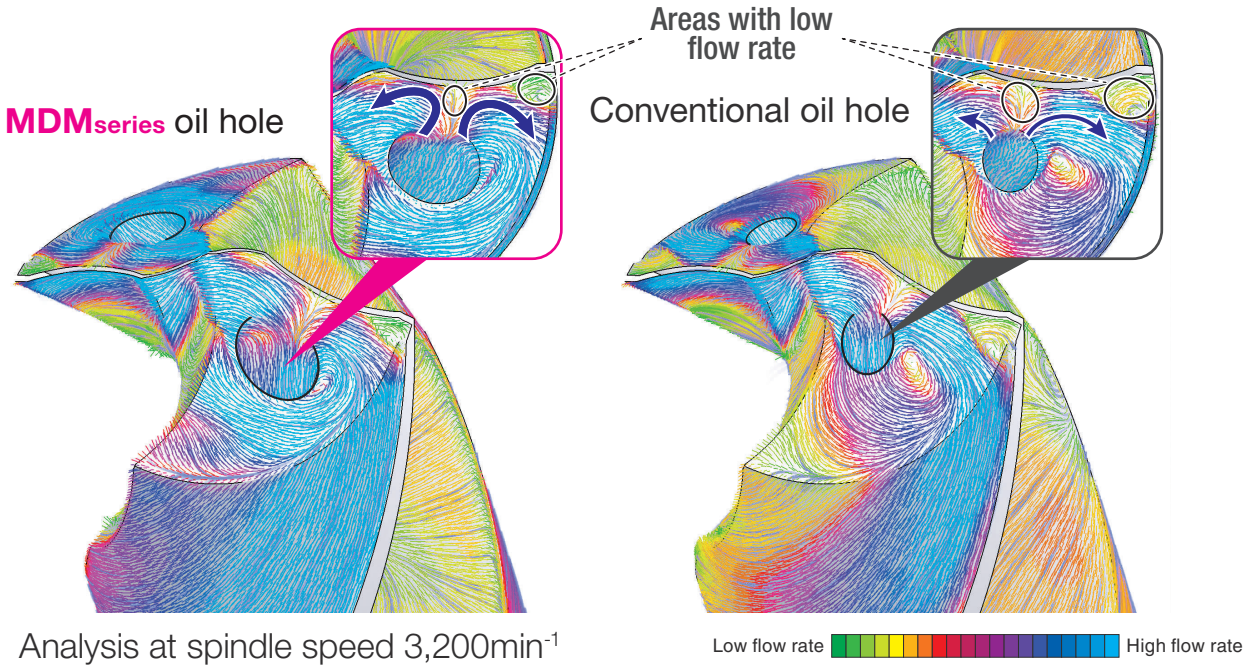


MDMseries

Conventional

provides excellent cooling for longer tool life!

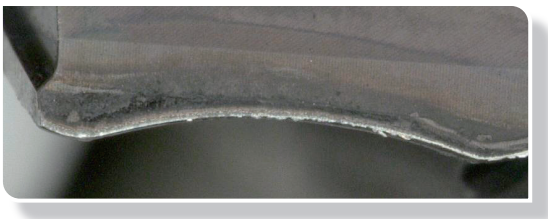
● **Uses new technology developed from fluid analysis to effectively cool the cutting edge!**



Analysis at spindle speed 3,200min^{-1}

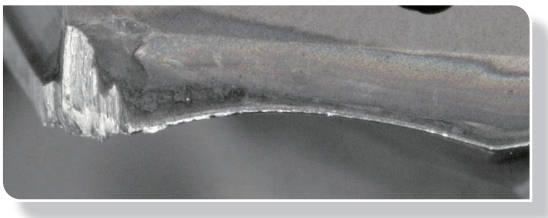
● **Dramatically reduces adhesion to the cutting edge, preventing adhesion-induced breakage**

MDMseries



Less adhesion for sustainable use

Competitor

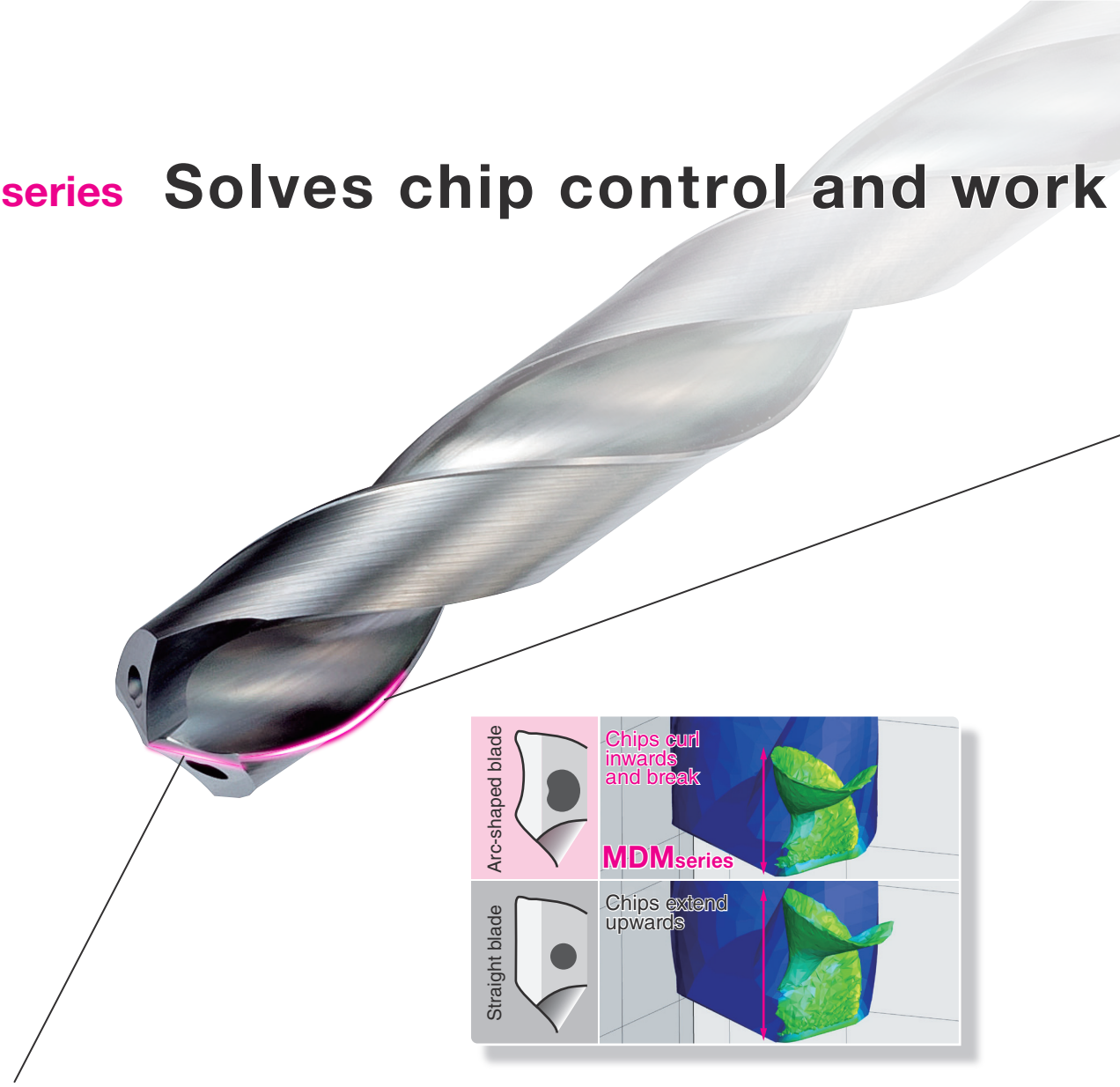


Breakage caused by adhesion at outer edge

Work Material: SUS304, Machine: BT30 vertical M/C
Tool: MDM 0800S08H05 (ø8 mm × 5D)
Cutting Conditions: v_c=80 m/min, f=0.25 mm/rev, H=40 mm (through hole)
Internal Coolant supply (Water Soluble)
Cutting Distance: 40 m

MULTIDRILL

MDMseries Solves chip control and work



● Sharp blade design for excellent chip control

MDMseries

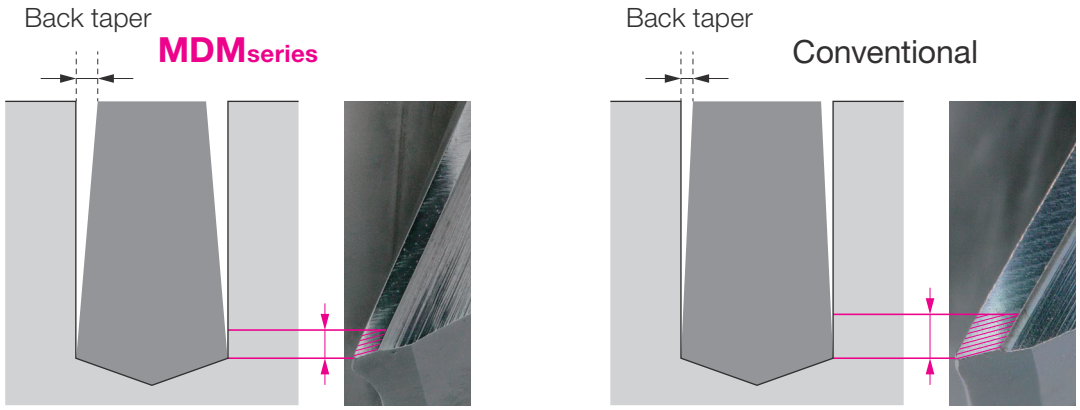
Competitor A

Work Material: SUS304, Machine: BT30 vertical M/C
Tool: MDM 0400S04H05 (ø4.0 mm × 5D)
Cutting Conditions: v_c=80 m/min, f=0.10 mm/rev,
Internal Coolant supply (Water Soluble)

hardening problems all in one!

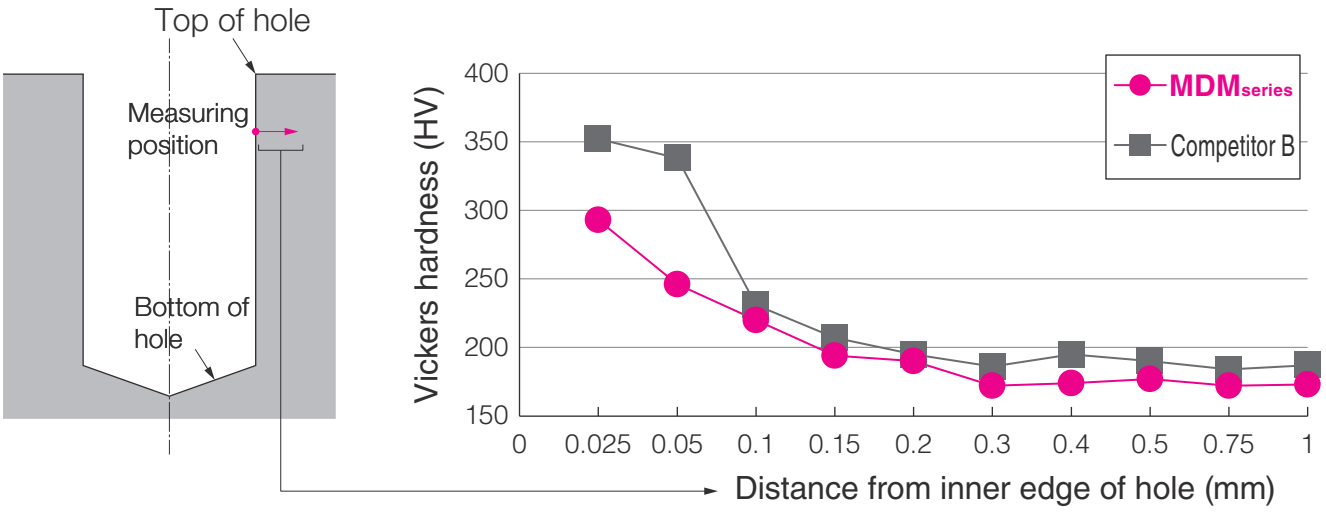
● Narrow margin and large back taper

Reduces the contact area with the work materials, suppressing the temperature rise at the margin



● Suppresses work hardening on the inner edge of the hole

Reducing the cutting load not only reduces damage to the drill, but also contributes to long life of reamers and taps used in post processing



Work Material: SUS304, Machine: BT30 vertical M/C
Tool: MDM 0800S08H05 (ø8.0 mm × 5D)
Cutting Conditions: v_c=80 m/min, f=0.20 mm/rev, H=40 mm (through hole)
Internal Coolant supply (Water Soluble)

MULTIDRILL

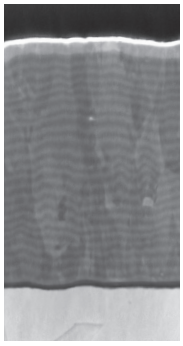
MDMseries Boasts exceptional stability when

New material ideal for machining stainless steel and exotic alloy

ACT70

NX coating

Achieving superior wear and thermal resistance as well as high quality, high hardness, and high strength through the use of Absotech® coating technologies!

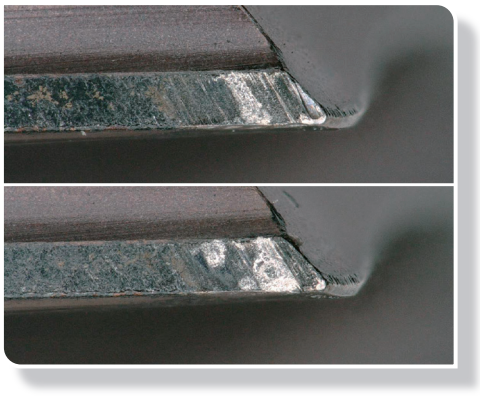


TiAlCrSi Super Multi-Layer
Hardness HV: 46GPa
Oxidation starting temperature: 1,100°C

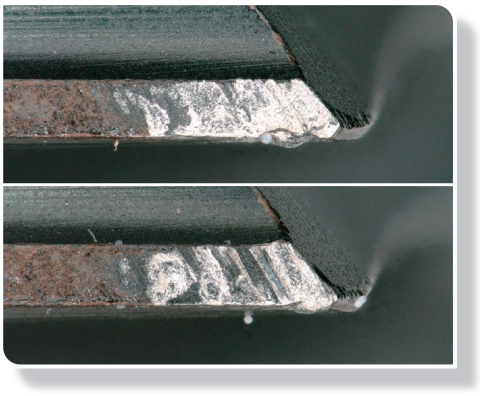
Highly Adhesive Coating Layer

● New coating reduces wear at the margin

MDMseries

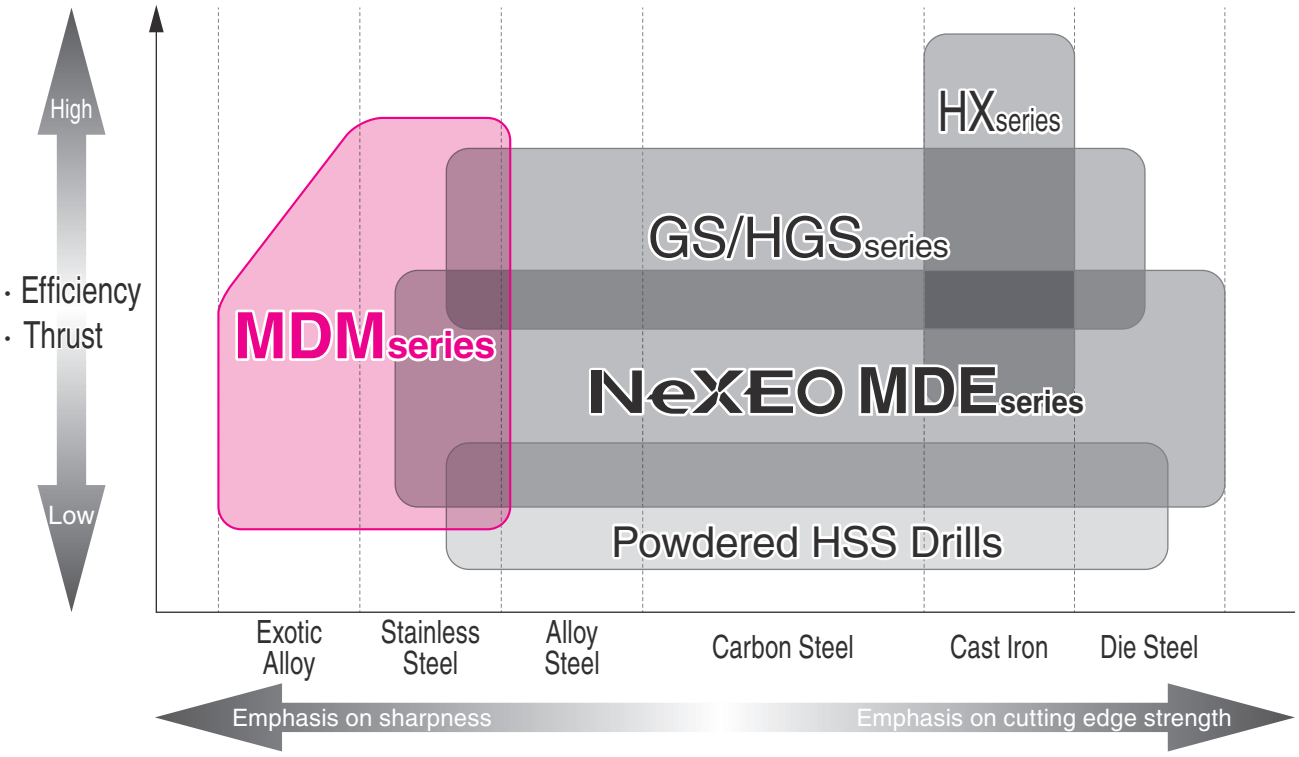


Conventional

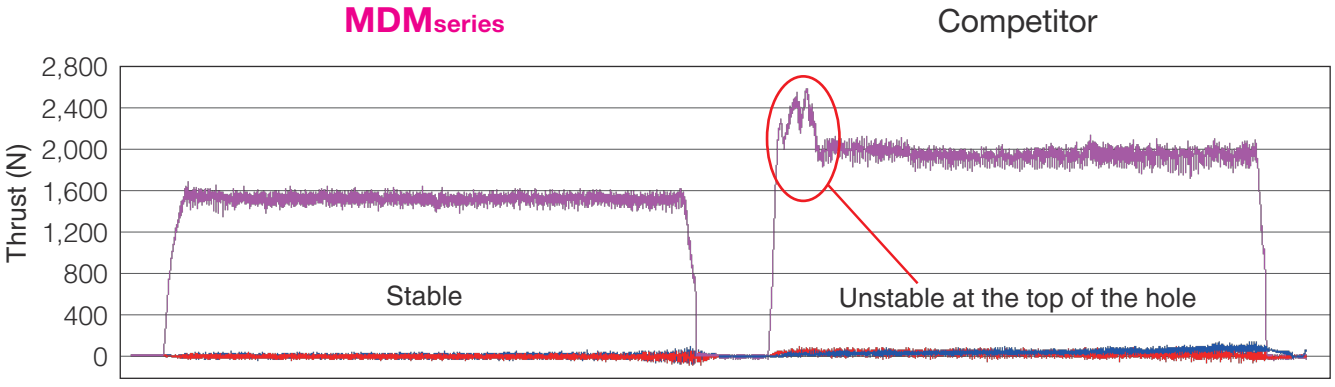


Work Material: SUS304, Machine: BT30 vertical M/C
Tool: MDM 0800S08H05 (ø8.0 mm × 5D)
Cutting Conditions: v_c=80 m/min, f=0.20 mm/rev, H=40 mm (through hole)
Internal Coolant supply (Water Soluble)

machining stainless steel and exotic alloy!

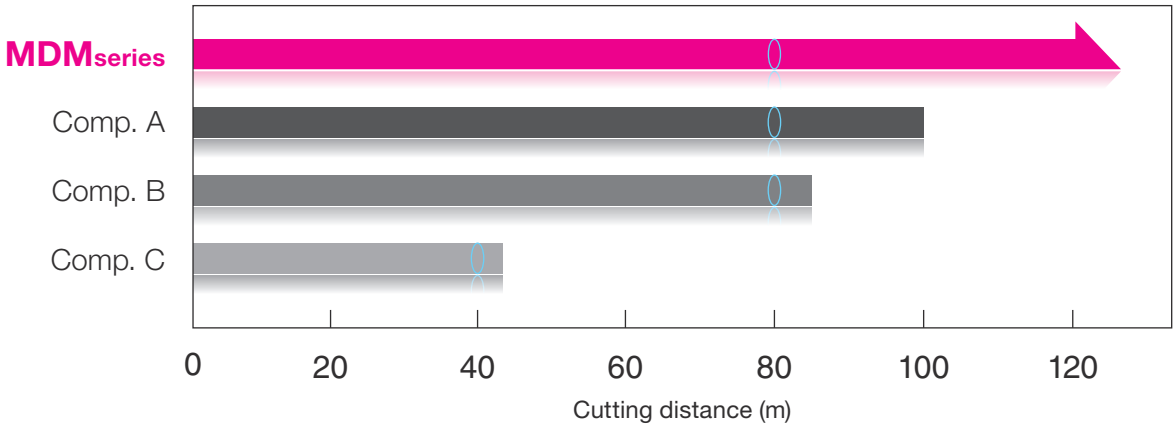


● Reduced thrust enables stable machining from the top of the hole to the bottom



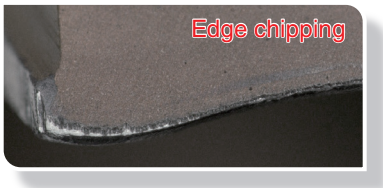
Work Material: SUS304, Machine: BT30 vertical M/C
Tool: MDM 0800S08H05 (ø8.0 mm × 5D)
Cutting Conditions: v_c=80 m/min, f=0.20 mm/rev, H=40 mm (through hole)
Internal Coolant supply (Water Soluble)

● Application Example: Austenitic Stainless Steel (machining center)



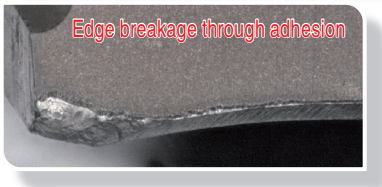
MDMseries
After machining 80 m

Comp. A
After machining 80 m



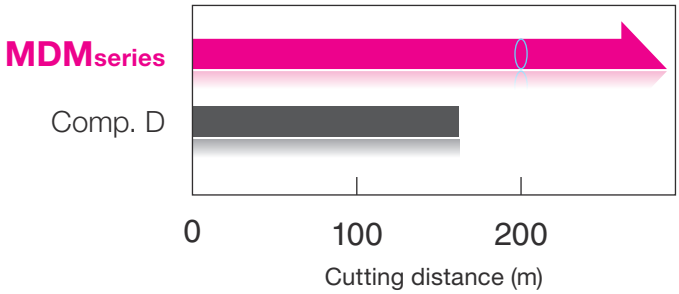
Comp. B
After machining 80 m

Comp. C
After machining 40 m



Work Material: SUS304, Machine: BT30 vertical M/C
Tool: MDM 0800S08H05 (ø8 mm × 5D)
Cutting Conditions: v_c=80 m/min, f=0.20 mm/rev, H=40 mm (through hole)
Internal Coolant supply (Water Soluble)

● Application Example: Austenitic Stainless Steel (small lathe)

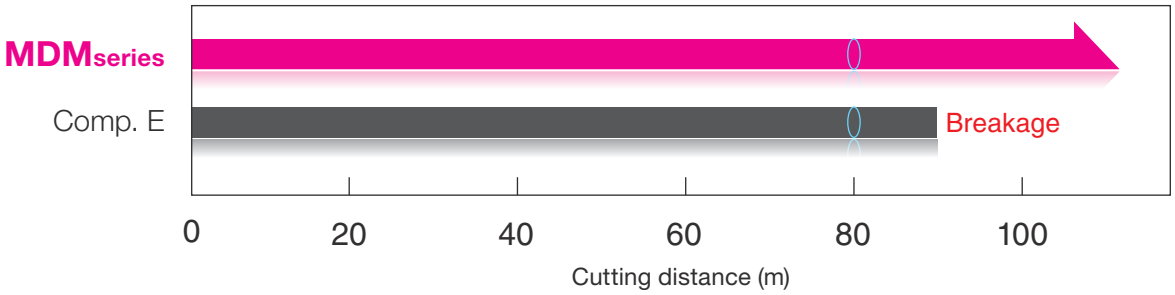


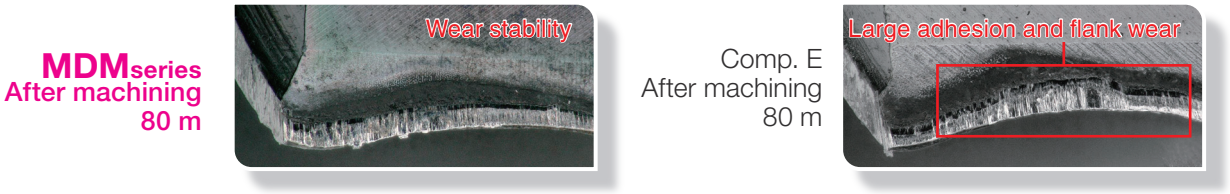
MDMseries

After machining 200 m

Work Material: SUS304, Machine: CNC Automatic Lathe (Workpiece rotation)
Tool: MDM 0540S06H03 (ø5.4 mm × 3D)
Cutting Conditions: v_c=47 m/min, f=0.12 mm/rev, H=25 mm (blind hole)
Internal Coolant supply (Non-Water Soluble)

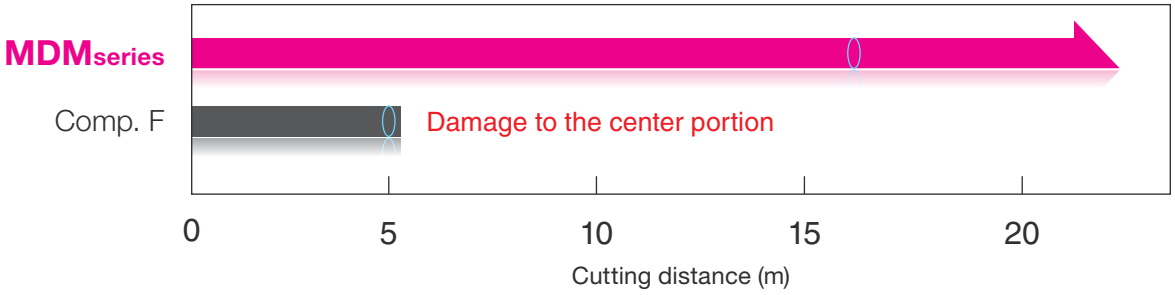
● Application Example: Precipitation Hardening Stainless Steel

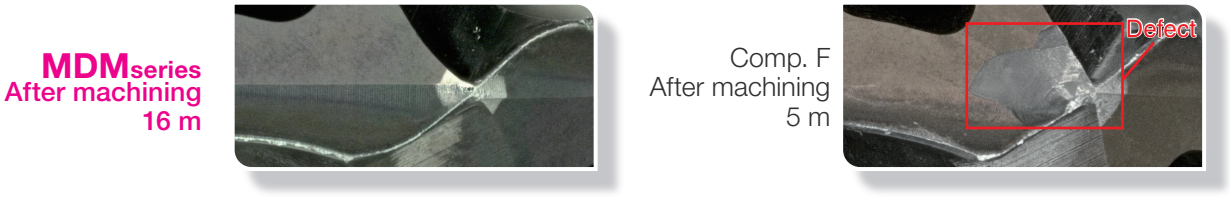




Work Material: SUS630, Machine: BT30 vertical M/C
Tool: MDM 0400S04H05 (ø4 mm × 5D)
Cutting Conditions: v_c=50 m/min, f=0.10 mm/rev, H=14 mm (blind hole)
Internal Coolant supply (Water Soluble)

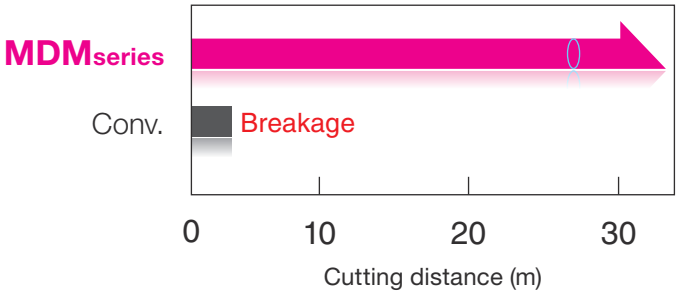
● Application Example: Duplex Stainless Steel



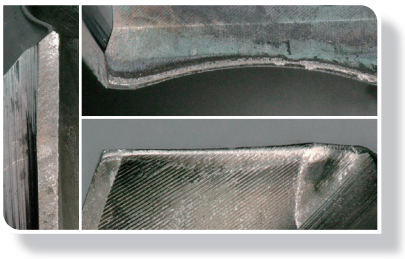


Work Material: SUS329J4L, Machine: BT30 vertical M/C
Tool: MDM 0800S05H05 (ø8 mm × 5D)
Cutting Conditions: v_c=60 m/min, f=0.20 mm/rev, H=30 mm (through hole)
Internal Coolant supply (Water Soluble)

● Application Example: Titanium Alloy



MDMseries



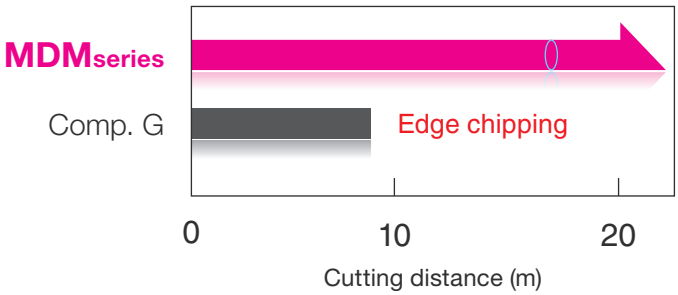
After machining 27 m

MDMseries

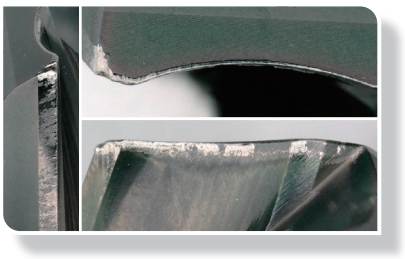
Conventional

Work Material: Ti-6Al-4V, Machine: BT50 vertical M/C
Tool: MDM 0500S05H05 (ø5 mm × 5D)
Cutting Conditions: v_c=40 m/min, f=0.12 mm/rev, H=19 mm (blind hole)
Internal Coolant supply (Water Soluble)

● Application Example: Heat-Resistant Steel



MDMseries



After machining 17.1 m

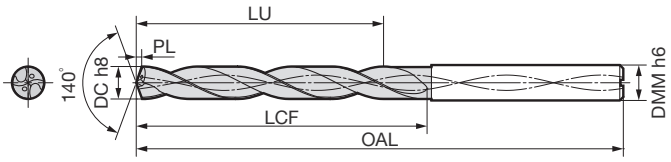
Work Material: SCH13X equivalent, Machine: BT50 vertical M/C
Tool: MDM 0880S09H03 (ø8.8 mm × 3D)
Cutting Conditions: v_c=50 m/min, f=0.11 mm/rev, H=18 mm (blind hole, through hole)
Internal Coolant supply (Water Soluble)

● MDM series (Internal Coolant)

Carbon Steel, Alloy Steel (Up to 0.28% / From 0.29%) | Tempered Steel | Hardened Steel (Up to 45HRC / From 46HRC) | Stainless Steel ◎ | Ti Alloy ◎ | Heat-resistant Steel ○ | Cast Iron | Ductile Cast Iron | Aluminum Alloy | Copper Alloy | Composite CFRP

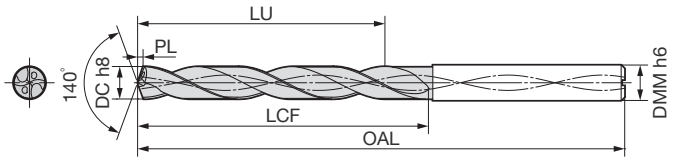
NX Coat | 3D | 5D

● Diameter below ø4.1



● Diameter ø4.1 and above

Bean Jet Cooling



● Diameter ø3.0 to 4.9 mm

Diameter DC (mm)	Hole Depth (L/D)	Stock	Cat. No.	Dimensions (mm) Effective Length LU	Flute Length LCF	Total Length OAL	Tip PL	Shank DMM
3.0	3	●	MDM 0300S03H03	14.0	18.5	68.5	0.5	3.0
	5	●	0300S03H05	24.0	28.5	78.5	0.5	3.0
3.1	3	●	MDM 0310S04H03	16.0	20.6	72.6	0.6	4.0
	5	●	0310S04H05	28.0	32.6	86.6	0.6	4.0
3.2	3	●	MDM 0320S04H03	15.8	20.6	72.6	0.6	4.0
	5	●	0320S04H05	27.8	32.6	86.6	0.6	4.0
3.3	3	●	MDM 0330S04H03	15.7	20.6	72.6	0.6	4.0
	5	●	0330S04H05	27.7	32.6	86.6	0.6	4.0
3.4	3	●	MDM 0340S04H03	15.5	20.6	72.6	0.6	4.0
	5	●	0340S04H05	27.5	32.6	86.6	0.6	4.0
3.5	3	●	MDM 0350S04H03	15.4	20.6	72.6	0.6	4.0
	5	●	0350S04H05	27.4	32.6	86.6	0.6	4.0
3.6	3	●	MDM 0360S04H03	17.8	23.2	72.7	0.7	4.0
	5	●	0360S04H05	31.3	36.7	86.7	0.7	4.0
3.7	3	●	MDM 0370S04H03	17.7	23.2	72.7	0.7	4.0
	5	●	0370S04H05	31.2	36.7	86.7	0.7	4.0
3.8	3	●	MDM 0380S04H03	17.5	23.2	72.7	0.7	4.0
	5	●	0380S04H05	31.0	36.7	86.7	0.7	4.0
3.9	3	●	MDM 0390S04H03	17.4	23.2	72.7	0.7	4.0
	5	●	0390S04H05	30.9	36.7	86.7	0.7	4.0
4.0	3	●	MDM 0400S04H03	17.2	23.2	72.7	0.7	4.0
	5	●	0400S04H05	30.7	36.7	86.7	0.7	4.0
4.1	3	●	MDM 0410S05H03	19.6	25.7	80.7	0.7	5.0
	5	●	0410S05H05	34.6	40.7	98.7	0.7	5.0
4.2	3	●	MDM 0420S05H03	19.5	25.8	80.8	0.8	5.0
	5	●	0420S05H05	34.5	40.8	98.8	0.8	5.0
4.3	3	●	MDM 0430S05H03	19.4	25.8	80.8	0.8	5.0
	5	●	0430S05H05	34.4	40.8	98.8	0.8	5.0
4.4	3	●	MDM 0440S05H03	19.2	25.8	80.8	0.8	5.0
	5	●	0440S05H05	34.2	40.8	98.8	0.8	5.0
4.5	3	●	MDM 0450S05H03	19.1	25.8	80.8	0.8	5.0
	5	●	0450S05H05	34.1	40.8	98.8	0.8	5.0
4.6	3	●	MDM 0460S05H03	21.4	28.3	80.8	0.8	5.0
	5	●	0460S05H05	37.9	44.8	98.8	0.8	5.0
4.7	3	●	MDM 0470S05H03	21.4	28.4	80.9	0.9	5.0
	5	●	0470S05H05	37.9	44.9	98.9	0.9	5.0
4.8	3	●	MDM 0480S05H03	21.2	28.4	80.9	0.9	5.0
	5	●	0480S05H05	37.7	44.9	98.9	0.9	5.0
4.9	3	●	MDM 0490S05H03	21.1	28.4	80.9	0.9	5.0
	5	●	0490S05H05	37.6	44.9	98.9	0.9	5.0

● Diameter ø5.0 to 6.9 mm

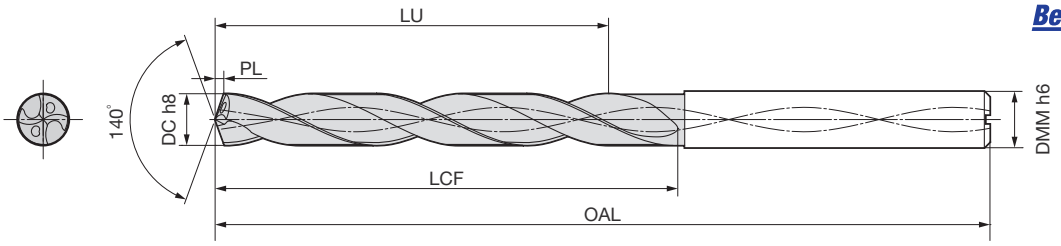
Diameter DC (mm)	Hole Depth (L/D)	Stock	Cat. No.	Dimensions (mm) Effective Length LU	Flute Length LCF	Total Length OAL	Tip PL	Shank DMM
5.0	3	●	MDM 0500S05H03	20.9	28.4	80.9	0.9	5.0
	5	●	0500S05H05	37.4	44.9	98.9	0.9	5.0
5.1	3	●	MDM 0510S06H03	20.8	28.4	82.9	0.9	6.0
	5	●	0510S06H05	37.3	44.9	100.9	0.9	6.0
5.2	3	●	MDM 0520S06H03	20.6	28.4	82.9	0.9	6.0
	5	●	0520S06H05	37.1	44.9	100.9	0.9	6.0
5.3	3	●	MDM 0530S06H03	20.6	28.5	83.0	1.0	6.0
	5	●	0530S06H05	37.1	45.0	101.0	1.0	6.0
5.4	3	●	MDM 0540S06H03	20.4	28.5	83.0	1.0	6.0
	5	●	0540S06H05	36.9	45.0	101.0	1.0	6.0
5.5	3	●	MDM 0550S06H03	20.3	28.5	83.0	1.0	6.0
	5	●	0550S06H05	36.8	45.0	101.0	1.0	6.0
5.6	3	●	MDM 0560S06H03	22.6	31.0	83.0	1.0	6.0
	5	●	0560S06H05	40.6	49.0	101.0	1.0	6.0
5.7	3	●	MDM 0570S06H03	22.5	31.0	83.0	1.0	6.0
	5	●	0570S06H05	40.5	49.0	101.0	1.0	6.0
5.8	3	●	MDM 0580S06H03	22.4	31.1	83.1	1.1	6.0
	5	●	0580S06H05	40.4	49.1	101.1	1.1	6.0
5.9	3	●	MDM 0590S06H03	22.3	31.1	83.1	1.1	6.0
	5	●	0590S06H05	40.3	49.1	101.1	1.1	6.0
6.0	3	●	MDM 0600S06H03	22.1	31.1	83.1	1.1	6.0
	5	●	0600S06H05	40.1	49.1	101.1	1.1	6.0
6.1	3	●	MDM 0610S07H03	24.5	33.6	89.1	1.1	7.0
	5	●	0610S07H05	44.0	53.1	110.1	1.1	7.0
6.2	3	●	MDM 0620S07H03	24.3	33.6	89.1	1.1	7.0
	5	●	0620S07H05	43.8	53.1	110.1	1.1	7.0
6.3	3	●	MDM 0630S07H03	24.2	33.6	89.1	1.1	7.0
	5	●	0630S07H05	43.7	53.1	110.1	1.1	7.0
6.4	3	●	MDM 0640S07H03	24.1	33.7	89.2	1.2	7.0
	5	●	0640S07H05	43.6	53.2	110.2	1.2	7.0
6.5	3	●	MDM 0650S07H03	24.0	33.7	89.2	1.2	7.0
	5	●	0650S07H05	43.5	53.2	110.2	1.2	7.0
6.6	3	●	MDM 0660S07H03	26.3	36.2	89.2	1.2	7.0
	5	●	0660S07H05	47.3	57.2	110.2	1.2	7.0
6.7	3	●	MDM 0670S07H03	26.2	36.2	89.2	1.2	7.0
	5	●	0670S07H05	47.2	57.2	110.2	1.2	7.0
6.8	3	●	MDM 0680S07H03	26.0	36.2	89.2	1.2	7.0
	5	●	0680S07H05	47.0	57.2	110.2	1.2	7.0
6.9	3	●	MDM 0690S07H03	26.0	36.3	89.3	1.3	7.0
	5	●	0690S07H05	47.0	57.3	110.3	1.3	7.0

● symbo : standard in-stock items

● MDM series (Internal Coolant)

Carbon Steel, Alloy Steel		Tempered Steel	Hardened Steel		Stainless Steel	Ti Alloy	Heat-resistant Steel	Cast Iron	Ductile Cast Iron	Aluminum Alloy	Copper Alloy	Composite CFRP
Up to 0.28%	From 0.29%		Up to 45HRC	From 46HRC								
					◎	◎	○					

NX Coat | 3D | 5D



Bean Jet Cooling

● Diameter ø7.0 to 8.9 mm

Diameter DC (mm)	Hole Depth (L/D)	Stock	Cat. No.	Dimensions (mm) Effective Length LU	Flute Length LCF	Total Length OAL	Tip PL	Shank DMM
7.0	3	●	MDM 0700S07H03	25.8	36.3	89.3	1.3	7.0
	5	●	0700S07H05	46.8	57.3	110.3	1.3	7.0
7.1	3	●	MDM 0710S08H03	28.2	38.8	95.3	1.3	8.0
	5	●	0710S08H05	50.7	61.3	119.3	1.3	8.0
7.2	3	●	MDM 0720S08H03	28.0	38.8	95.3	1.3	8.0
	5	●	0720S08H05	50.5	61.3	119.3	1.3	8.0
7.3	3	●	MDM 0730S08H03	27.9	38.8	95.3	1.3	8.0
	5	●	0730S08H05	50.4	61.3	119.3	1.3	8.0
7.4	3	●	MDM 0740S08H03	27.7	38.8	95.3	1.3	8.0
	5	●	0740S08H05	50.2	61.3	119.3	1.3	8.0
7.5	3	●	MDM 0750S08H03	27.7	38.9	95.4	1.4	8.0
	5	●	0750S08H05	50.2	61.4	119.4	1.4	8.0
7.6	3	●	MDM 0760S08H03	30.0	41.4	95.4	1.4	8.0
	5	●	0760S08H05	54.0	65.4	119.4	1.4	8.0
7.7	3	●	MDM 0770S08H03	29.9	41.4	95.4	1.4	8.0
	5	●	0770S08H05	53.9	65.4	119.4	1.4	8.0
7.8	3	●	MDM 0780S08H03	29.7	41.4	95.4	1.4	8.0
	5	●	0780S08H05	53.7	65.4	119.4	1.4	8.0
7.9	3	●	MDM 0790S08H03	29.6	41.4	95.4	1.4	8.0
	5	●	0790S08H05	53.6	65.4	119.4	1.4	8.0
8.0	3	●	MDM 0800S08H03	29.5	41.5	95.5	1.5	8.0
	5	●	0800S08H05	53.5	65.5	119.5	1.5	8.0
8.1	3	●	MDM 0810S09H03	31.9	44.0	101.5	1.5	9.0
	5	●	0810S09H05	57.4	69.5	128.5	1.5	9.0
8.2	3	●	MDM 0820S09H03	31.7	44.0	101.5	1.5	9.0
	5	●	0820S09H05	57.2	69.5	128.5	1.5	9.0
8.3	3	●	MDM 0830S09H03	31.6	44.0	101.5	1.5	9.0
	5	●	0830S09H05	57.1	69.5	128.5	1.5	9.0
8.4	3	●	MDM 0840S09H03	31.4	44.0	101.5	1.5	9.0
	5	●	0840S09H05	56.9	69.5	128.5	1.5	9.0
8.5	3	●	MDM 0850S09H03	31.3	44.0	101.5	1.5	9.0
	5	●	0850S09H05	56.8	69.5	128.5	1.5	9.0
8.6	3	●	MDM 0860S09H03	33.7	46.6	101.6	1.6	9.0
	5	●	0860S09H05	60.7	73.6	128.6	1.6	9.0
8.7	3	●	MDM 0870S09H03	33.6	46.6	101.6	1.6	9.0
	5	●	0870S09H05	60.6	73.6	128.6	1.6	9.0
8.8	3	●	MDM 0880S09H03	33.4	46.6	101.6	1.6	9.0
	5	●	0880S09H05	60.4	73.6	128.6	1.6	9.0
8.9	3	●	MDM 0890S09H03	33.3	46.6	101.6	1.6	9.0
	5	●	0890S09H05	60.3	73.6	128.6	1.6	9.0

● Diameter ø9.0 to 10.9 mm

Diameter DC (mm)	Hole Depth (L/D)	Stock	Cat. No.	Dimensions (mm) Effective Length LU	Flute Length LCF	Total Length OAL	Tip PL	Shank DMM
9.0	3	●	MDM 0900S09H03	33.1	46.6	101.6	1.6	9.0
	5	●	0900S09H05	60.1	73.6	128.6	1.6	9.0
9.1	3	●	MDM 0910S10H03	35.6	49.2	107.7	1.7	10.0
	5	●	0910S10H05	64.1	77.7	137.7	1.7	10.0
9.2	3	●	MDM 0920S10H03	35.4	49.2	107.7	1.7	10.0
	5	●	0920S10H05	63.9	77.7	137.7	1.7	10.0
9.3	3	●	MDM 0930S10H03	35.3	49.2	107.7	1.7	10.0
	5	●	0930S10H05	63.8	77.7	137.7	1.7	10.0
9.4	3	●	MDM 0940S10H03	35.1	49.2	107.7	1.7	10.0
	5	●	0940S10H05	63.6	77.7	137.7	1.7	10.0
9.5	3	●	MDM 0950S10H03	35.0	49.2	107.7	1.7	10.0
	5	●	0950S10H05	63.5	77.7	137.7	1.7	10.0
9.6	3	●	MDM 0960S10H03	37.3	51.7	107.7	1.7	10.0
	5	●	0960S10H05	67.3	81.7	137.7	1.7	10.0
9.7	3	●	MDM 0970S10H03	37.3	51.8	107.8	1.8	10.0
	5	●	0970S10H05	67.3	81.8	137.8	1.8	10.0
9.8	3	●	MDM 0980S10H03	37.1	51.8	107.8	1.8	10.0
	5	●	0980S10H05	67.1	81.8	137.8	1.8	10.0
9.9	3	●	MDM 0990S10H03	37.0	51.8	107.8	1.8	10.0
	5	●	0990S10H05	67.0	81.8	137.8	1.8	10.0
10.0	3	●	MDM 1000S10H03	36.8	51.8	107.8	1.8	10.0
	5	●	1000S10H05	66.8	81.8	137.8	1.8	10.0
10.1	3	●	MDM 1010S11H03	39.2	54.3	117.8	1.8	11.0
	5	●	1010S11H05	70.7	85.8	150.8	1.8	11.0
10.2	3	●	MDM 1020S11H03	39.1	54.4	117.9	1.9	11.0
	5	●	1020S11H05	70.6	85.9	150.9	1.9	11.0
10.3	3	●	MDM 1030S11H03	39.0	54.4	117.9	1.9	11.0
	5	●	1030S11H05	70.5	85.9	150.9	1.9	11.0
10.4	3	●	MDM 1040S11H03	38.8	54.4	117.9	1.9	11.0
	5	●	1040S11H05	70.3	85.9	150.9	1.9	11.0
10.5	3	●	MDM 1050S11H03	38.7	54.4	117.9	1.9	11.0
	5	●	1050S11H05	70.2	85.9	150.9	1.9	11.0
10.6	3	●	MDM 1060S11H03	41.0	56.9	117.9	1.9	11.0
	5	●	1060S11H05	74.0	89.9	150.9	1.9	11.0
10.7	3	●	MDM 1070S11H03	40.9	56.9	117.9	1.9	11.0
	5	●	1070S11H05	73.9	89.9	150.9	1.9	11.0
10.8	3	●	MDM 1080S11H03	40.8	57.0	118.0	2.0	11.0
	5	●	1080S11H05	73.8	90.0	151.0	2.0	11.0
10.9	3	●	MDM 1090S11H03	40.7	57.0	118.0	2.0	11.0
	5	●	1090S11H05	73.7	90.0	151.0	2.0	11.0

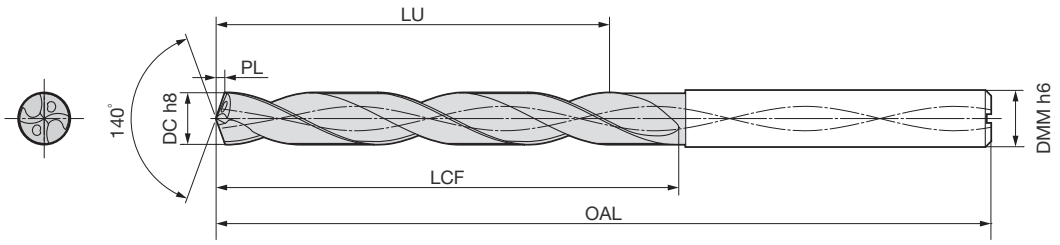
● symbol: standard in-stock items

● MDM series (Internal Coolant)

Carbon Steel, Alloy Steel		Tempered Steel	Hardened Steel		Stainless Steel	Ti Alloy	Heat-resistant Steel	Cast Iron	Ductile Cast Iron	Aluminum Alloy	Copper Alloy	Composite CFRP
Up to 0.28%	From 0.29%		Up to 43HRC	From 48HRC								
					◎	◎	○					

NX Coat | 3D | 5D

Bean Jet Cooling



● Diameter ø11.0 to 12.9 mm

Diameter DC (mm)	Hole Depth (L/D)	Stock	Cat. No.	Dimensions (mm) Effective Length LU	Flute Length LCF	Total Length OAL	Tip PL	Shank DMM
11.0	3	●	MDM 1100S11H03	40.5	57.0	118.0	2.0	11.0
	5	●	1100S11H05	73.5	90.0	151.0	2.0	11.0
11.1	3	●	MDM 1110S12H03	42.9	59.5	124.0	2.0	12.0
	5	●	1110S12H05	77.4	94.0	160.0	2.0	12.0
11.2	3	●	MDM 1120S12H03	42.7	59.5	124.0	2.0	12.0
	5	●	1120S12H05	77.2	94.0	160.0	2.0	12.0
11.3	3	●	MDM 1130S12H03	42.7	59.6	124.1	2.1	12.0
	5	●	1130S12H05	77.2	94.1	160.1	2.1	12.0
11.4	3	●	MDM 1140S12H03	42.5	59.6	124.1	2.1	12.0
	5	●	1140S12H05	77.0	94.1	160.1	2.1	12.0
11.5	3	●	MDM 1150S12H03	42.4	59.6	124.1	2.1	12.0
	5	●	1150S12H05	76.9	94.1	160.1	2.1	12.0
11.6	3	●	MDM 1160S12H03	44.7	62.1	124.1	2.1	12.0
	5	●	1160S12H05	80.7	98.1	160.1	2.1	12.0
11.7	3	●	MDM 1170S12H03	44.6	62.1	124.1	2.1	12.0
	5	●	1170S12H05	80.6	98.1	160.1	2.1	12.0
11.8	3	●	MDM 1180S12H03	44.4	62.1	124.1	2.1	12.0
	5	●	1180S12H05	80.4	98.1	160.1	2.1	12.0
11.9	3	●	MDM 1190S12H03	44.4	62.2	124.2	2.2	12.0
	5	●	1190S12H05	80.4	98.2	160.2	2.2	12.0
12.0	3	●	MDM 1200S12H03	44.2	62.2	124.2	2.2	12.0
	5	●	1200S12H05	57.2	75.2	160.2	2.2	12.0
12.1	3	●	MDM 1210S13H03	46.6	64.7	130.2	2.2	13.0
	5	●	1210S13H05	84.1	102.2	169.2	2.2	13.0
12.2	3	●	MDM 1220S13H03	46.4	64.7	130.2	2.2	13.0
	5	●	1220S13H05	83.9	102.2	169.2	2.2	13.0
12.3	3	●	MDM 1230S13H03	46.3	64.7	130.2	2.2	13.0
	5	●	1230S13H05	83.8	102.2	169.2	2.2	13.0
12.4	3	●	MDM 1240S13H03	46.2	64.8	130.3	2.3	13.0
	5	●	1240S13H05	83.7	102.3	169.3	2.3	13.0
12.5	3	●	MDM 1250S13H03	46.1	64.8	130.3	2.3	13.0
	5	●	1250S13H05	83.6	102.3	169.3	2.3	13.0
12.6	3	●	MDM 1260S13H03	48.4	67.3	130.3	2.3	13.0
	5	●	1260S13H05	87.4	106.3	169.3	2.3	13.0
12.7	3	●	MDM 1270S13H03	48.3	67.3	130.3	2.3	13.0
	5	●	1270S13H05	87.3	106.3	169.3	2.3	13.0
12.8	3	●	MDM 1280S13H03	48.1	67.3	130.3	2.3	13.0
	5	●	1280S13H05	87.1	106.3	169.3	2.3	13.0
12.9	3	●	MDM 1290S13H03	48.0	67.3	130.3	2.3	13.0
	5	●	1290S13H05	87.0	106.3	169.3	2.3	13.0

● Diameter ø13.0 to 14.9 mm

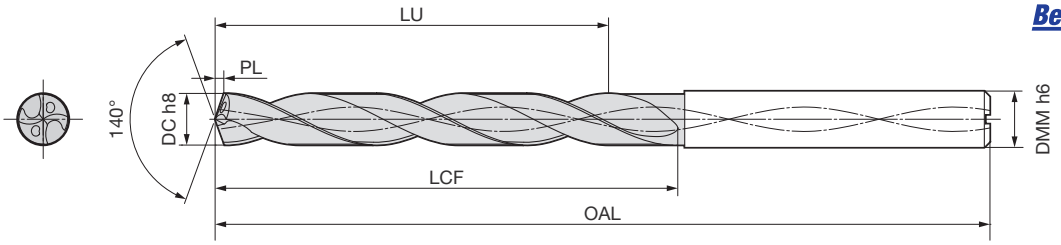
Diameter DC (mm)	Hole Depth (L/D)	Stock	Cat. No.	Dimensions (mm) Effective Length LU	Flute Length LCF	Total Length OAL	Tip PL	Shank DMM
13.0	3	●	MDM 1300S13H03	47.9	67.4	130.4	2.4	13.0
	5	●	1300S13H05	86.9	106.4	169.4	2.4	13.0
13.1	3	●	MDM 1310S14H03	50.3	69.9	136.4	2.4	14.0
	5	●	1310S14H05	90.8	110.4	178.4	2.4	14.0
13.2	3	●	MDM 1320S14H03	50.1	69.9	136.4	2.4	14.0
	5	●	1320S14H05	90.6	110.4	178.4	2.4	14.0
13.3	3	●	MDM 1330S14H03	50.0	69.9	136.4	2.4	14.0
	5	●	1330S14H05	90.5	110.4	178.4	2.4	14.0
13.4	3	●	MDM 1340S14H03	49.8	69.9	136.4	2.4	14.0
	5	●	1340S14H05	90.3	110.4	178.4	2.4	14.0
13.5	3	●	MDM 1350S14H03	49.8	70.0	136.5	2.5	14.0
	5	●	1350S14H05	90.3	110.5	178.5	2.5	14.0
13.6	3	●	MDM 1360S14H03	52.1	72.5	136.5	2.5	14.0
	5	●	1360S14H05	94.1	114.5	178.5	2.5	14.0
13.7	3	●	MDM 1370S14H03	52.0	72.5	136.5	2.5	14.0
	5	●	1370S14H05	94.0	114.5	178.5	2.5	14.0
13.8	3	●	MDM 1380S14H03	51.8	72.5	136.5	2.5	14.0
	5	●	1380S14H05	93.8	114.5	178.5	2.5	14.0
13.9	3	●	MDM 1390S14H03	51.7	72.5	136.5	2.5	14.0
	5	●	1390S14H05	93.7	114.5	178.5	2.5	14.0
14.0	3	●	MDM 1400S14H03	51.5	72.5	136.5	2.5	14.0
	5	●	1400S14H05	93.5	114.5	178.5	2.5	14.0
14.1	3	●	MDM 1410S15H03	54.0	75.1	142.6	2.6	15.0
	5	●	1410S15H05	97.5	118.6	187.6	2.6	15.0
14.2	3	●	MDM 1420S15H03	53.8	75.1	142.6	2.6	15.0
	5	●	1420S15H05	97.3	118.6	187.6	2.6	15.0
14.3	3	●	MDM 1430S15H03	53.7	75.1	142.6	2.6	15.0
	5	●	1430S15H05	97.2	118.6	187.6	2.6	15.0
14.4	3	●	MDM 1440S15H03	53.5	75.1	142.6	2.6	15.0
	5	●	1440S15H05	97.0	118.6	187.6	2.6	15.0
14.5	3	●	MDM 1450S15H03	53.4	75.1	142.6	2.6	15.0
	5	●	1450S15H05	96.9	118.6	187.6	2.6	15.0
14.6	3	●	MDM 1460S15H03	55.8	77.7	142.7	2.7	15.0
	5	●	1460S15H05	100.8	122.7	187.7	2.7	15.0
14.7	3	●	MDM 1470S15H03	55.7	77.7	142.7	2.7	15.0
	5	●	1470S15H05	100.7	122.7	187.7	2.7	15.0
14.8	3	●	MDM 1480S15H03	55.5	77.7	142.7	2.7	15.0
	5	●	1480S15H05	100.5	122.7	187.7	2.7	15.0
14.9	3	●	MDM 1490S15H03	55.4	77.7	142.7	2.7	15.0
	5	●	1490S15H05	100.4	122.7	187.7	2.7	15.0

● symbol: standard in-stock items

● MDM series (Internal Coolant)

Carbon Steel, Alloy Steel		Tempered Steel	Hardened Steel		Stainless Steel	Ti Alloy	Heat-resistant Steel	Cast Iron	Ductile Cast Iron	Aluminum Alloy	Copper Alloy	Composite CFRP
Up to 0.28%	From 0.29%		Up to 45HRC	From 46HRC								
					◎	◎	○					

NX Coat 3D 5D



Bean Jet Cooling

● Diameter ø15.0 to 16.0 mm

Diameter DC (mm)	Hole Depth (L/D)	Stock	Cat. No.	Dimensions (mm) Effective Length LU	Flute Length LCF	Total Length OAL	Tip PL	Shank DMM
15.0	3	●	MDM 1500S15H03	55.2	77.7	142.7	2.7	15.0
	5	●	1500S15H05	100.2	122.7	187.7	2.7	15.0
15.1	3	●	MDM 1510S16H03	57.6	80.2	148.7	2.7	16.0
	5	●	1510S16H05	104.1	126.7	196.7	2.7	16.0
15.2	3	●	MDM 1520S16H03	57.5	80.3	148.8	2.8	16.0
	5	●	1520S16H05	104.0	126.8	196.8	2.8	16.0
15.3	3	●	MDM 1530S16H03	57.4	80.3	148.8	2.8	16.0
	5	●	1530S16H05	103.9	126.8	196.8	2.8	16.0
15.4	3	●	MDM 1540S16H03	57.2	80.3	148.8	2.8	16.0
	5	●	1540S16H05	103.7	126.8	196.8	2.8	16.0
15.5	3	●	MDM 1550S16H03	57.1	80.3	148.8	2.8	16.0
	5	●	1550S16H05	103.6	126.8	196.8	2.8	16.0
15.6	3	●	MDM 1560S16H03	59.4	82.8	148.8	2.8	16.0
	5	●	1560S16H05	107.4	130.8	196.8	2.8	16.0
15.7	3	●	MDM 1570S16H03	59.4	82.9	148.9	2.9	16.0
	5	●	1570S16H05	107.4	130.9	196.9	2.9	16.0
15.8	3	●	MDM 1580S16H03	59.2	82.9	148.9	2.9	16.0
	5	●	1580S16H05	107.2	130.9	196.9	2.9	16.0
15.9	3	●	MDM 1590S16H03	59.1	82.9	148.9	2.9	16.0
	5	●	1590S16H05	107.1	130.9	196.9	2.9	16.0
16.0	3	●	MDM 1600S16H03	58.9	82.9	148.9	2.9	16.0
	5	●	1600S16H05	106.9	130.9	196.9	2.9	16.0

● symbol: standard in-stock items

● Recommended Cutting Conditions

Work Material	Ferritic and Martensitic Stainless Steel				Austenitic Stainless Steel			
	≦200HB		>200HB		≦200HB		>200HB	
Cutting Speed	60 to 100m/min		40 to 80m/min		60 to 100m/min		40 to 80m/min	
Diameter DC (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/rev)	Spindle Speed (min^{-1})	Feed Rate (mm/rev)	Spindle Speed (min^{-1})	Feed Rate (mm/rev)	Spindle Speed (min^{-1})	Feed Rate (mm/rev)
3	8,500	0.06 to 0.12	6,400	0.06 to 0.12	8,500	0.06 to 0.12	6,400	0.06 to 0.12
4	6,400	0.08 to 0.17	4,800	0.08 to 0.17	6,400	0.08 to 0.17	4,800	0.08 to 0.17
5	5,100	0.08 to 0.20	3,900	0.08 to 0.20	5,100	0.08 to 0.20	3,900	0.08 to 0.20
6	4,300	0.10 to 0.20	3,200	0.10 to 0.20	4,300	0.10 to 0.20	3,200	0.10 to 0.20
7	3,700	0.12 to 0.23	2,800	0.12 to 0.23	3,700	0.12 to 0.23	2,800	0.12 to 0.23
8	3,200	0.15 to 0.25	2,400	0.15 to 0.25	3,200	0.15 to 0.25	2,400	0.15 to 0.25
9	2,900	0.17 to 0.25	2,200	0.17 to 0.25	2,900	0.17 to 0.25	2,200	0.17 to 0.25
10	2,600	0.18 to 0.28	2,000	0.18 to 0.28	2,600	0.18 to 0.28	2,000	0.18 to 0.28
11	2,400	0.20 to 0.30	1,800	0.20 to 0.30	2,400	0.20 to 0.30	1,800	0.20 to 0.30
12	2,200	0.20 to 0.30	1,600	0.20 to 0.30	2,200	0.20 to 0.30	1,600	0.20 to 0.30
13	2,000	0.20 to 0.30	1,500	0.20 to 0.30	2,000	0.20 to 0.30	1,500	0.20 to 0.30
14	1,900	0.20 to 0.30	1,400	0.20 to 0.30	1,900	0.20 to 0.30	1,400	0.20 to 0.30
15	1,700	0.20 to 0.30	1,300	0.20 to 0.30	1,700	0.20 to 0.30	1,300	0.20 to 0.30
16	1,600	0.20 to 0.30	1,200	0.20 to 0.30	1,600	0.20 to 0.30	1,200	0.20 to 0.30

Work Material	Precipitation Hardening Stainless Steel ≦340HB		Duplex Stainless Steel ≦310HB		Titanium Alloy 260HB to 340HB		Ni-based Heat-resisting Alloy (Inconel 718) 38 to 45 HRC	
Cutting Speed	40 to 60m/min		40 to 60m/min		30 to 50m/min		10 to 30m/min	
Diameter DC (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/rev)	Spindle Speed (min^{-1})	Feed Rate (mm/rev)	Spindle Speed (min^{-1})	Feed Rate (mm/rev)	Spindle Speed (min^{-1})	Feed Rate (mm/rev)
3	5,300	0.06 to 0.12	5,300	0.06 to 0.12	4,200	0.06 to 0.12	4,200	0.05 to 0.08
4	4,000	0.08 to 0.17	4,000	0.08 to 0.17	3,200	0.08 to 0.17	3,200	0.06 to 0.10
5	3,200	0.08 to 0.20	3,200	0.08 to 0.20	2,500	0.08 to 0.20	2,500	0.07 to 0.12
6	2,700	0.10 to 0.20	2,700	0.10 to 0.20	2,100	0.10 to 0.20	2,100	0.08 to 0.15
7	2,300	0.12 to 0.23	2,300	0.12 to 0.23	1,800	0.12 to 0.23	1,800	0.08 to 0.15
8	2,000	0.15 to 0.25	2,000	0.15 to 0.25	1,600	0.15 to 0.25	1,600	0.10 to 0.18
9	1,800	0.17 to 0.25	1,800	0.17 to 0.25	1,400	0.17 to 0.25	1,400	0.12 to 0.18
10	1,600	0.18 to 0.28	1,600	0.18 to 0.28	1,300	0.18 to 0.28	1,300	0.12 to 0.18
11	1,400	0.20 to 0.30	1,400	0.20 to 0.30	1,200	0.20 to 0.30	1,200	0.15 to 0.20
12	1,300	0.20 to 0.30	1,300	0.20 to 0.30	1,100	0.20 to 0.30	1,100	0.15 to 0.20
13	1,200	0.20 to 0.30	1,200	0.20 to 0.30	1,000	0.20 to 0.30	1,000	0.15 to 0.20
14	1,100	0.20 to 0.30	1,100	0.20 to 0.30	900	0.20 to 0.30	900	0.15 to 0.20
15	1,050	0.20 to 0.30	1,050	0.20 to 0.30	850	0.20 to 0.30	850	0.15 to 0.20
16	1,000	0.20 to 0.30	1,000	0.20 to 0.30	800	0.20 to 0.30	800	0.15 to 0.20

1. The above Recommended Cutting Conditions are for cases where a water soluble cutting fluid and internal coolant are used.
2. If using a non-water soluble cutting fluid, reduce the cutting speed by 20–30% and ensure a sufficient supply of coolant.
3. When mounting the drill set to a clamp, set the peripheral runout to 0.02 mm or less.
4. Avoid clamping the flute.
5. When drilling irregularly shaped parts of workpieces (sloped, uneven, etc.), reduce the feedrate to around half.
   *If you are still unable to ensure stable machining, it is recommended to carry out flat surface pre-stage machining using the Flat MULTIDRILL MDF series.
6. If drilling a through hole during interrupted machining, reduce the feedrate to around half before drilling the through hole.

● International Standards

Work Material	Hardness	Japanese Industrial Standards JIS	International Standards ISO 15510	European Standards EN	American Standards AISI
Ferritic and Martensitic Stainless Steel	≦200HB	SUS405	X6CrAl13	1.4002	405
		SUS410	X12Cr13	1.4006	410
		SUS410S	X6Cr13	1.4000	—
		SUS430	X6Cr17	1.4016	430
		SUS434	X6CrMo17-1	1.4113	434
	>200HB	SUS420J1	X20Cr13	1.4021	420
		SUS420J2	X30Cr13	1.4028	420
		SUS431	X17CrNi16-2	1.4057	431
Austenitic Stainless Steel	≦200HB	SUS304	X5CrNi18-10	1.4301	304
		SUS305	X6CrNi18-12	1.4303	305
		SUS303	X10CrNiS18-9	1.4305	303
		SUS304L	X2CrNi18-9	1.4307	304L
		SUS316	X5CrNiMo17-12-2	1.4401	316
		SUS316L	X2CrNiMo17-12-2	1.4404	316L
		SUS317L	X2CrNiMo19-14-4	1.4438	317L
		SUS321	X6CrNiTi18-10	1.4541	321
		SUS347	X6CrNiNb18-10	1.4550	347
		SUS316Ti	X6CrNiMoTi17-12-2	1.4571	—
		SUS309S	X6CrNi23-13	1.4950	309S
		SUS310S	X6CrNi25-20	1.4951	310S
	>200HB	SUS304N1	X5CrNiN19-9	1.4315	304N
		SUS301	X5CrNi17-7	1.4319	301
		SUS301L	X2CrNiN18-7	1.4318	—
Precipitation Hardening Stainless Steel	≦340HB	SUS630	X5CrNiCuNb16-4	1.4542	17-4PH (S17400)
		—	—	—	15-5PH (S15500)
		SUS631	X7CrNiAl17-7	1.4568	17-7PH (S17700)
Duplex Stainless Steel	≦310HB	SUS329J1	X6CrNiMo26-4-2	—	329
		SUS329J3L	X2CrNiMoN22-5-3	1.4462	—
		SUS329J4L	X2CrNiMoN25-7-3	—	—

< SAFETY NOTES >

- Very hot or lengthy chips may be discharged while the machine is in operation. Therefore, machine guards, safety goggles or other protective covers must be used. Fire safety precautions must also be considered.
- Please handle with care as this product has sharp edges.
- Improper cutting conditions or mis-handling of the tool may result in breakages or projectiles. Therefore, please use the tool within its recommended conditions.
- When using non-water soluble cutting oil, precautions against fire must be taken and please ensure that a fire extinguisher is placed near the machine.

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