

AURORA Coat Drills for Non-Ferrous Metal**Super MULTIDRILL NHGS Series**

Rev. 9

Aurora-Coat
DLC CoatingLow-resistance, High-efficiency Drilling
of Aluminum Alloy Parts

High-efficiency drilling with cutting resistance 1/2
or lower and feed rate 2 to 4 times higher.

Uses new **"J flute"** groove shape and
"WL thinning" dedicated for high feed.

Wide double margin design enables efficient
pre-cast drilling.

"AURORA Coat" (DLC) enables stable
drilling and long tool life.

Super MULTIDRILL

NHGS
SeriesSize: ϕ 3.0mm - ϕ 16.0mm**3D 5D 10D** For Non-ferrous Metal



● High-efficiency drilling

AURORA Coat (DLC Coat) and low resistance WL (Wide L) thinning drastically reduce cutting force.

● Stable drilling performance

Special cutting edge design and WW (Wide W) margin improve hole quality.

● Long tool life

With AURORA Coat coupled with the cutting edge shape, a long and stable tool life is achieved.

● Deep hole drilling

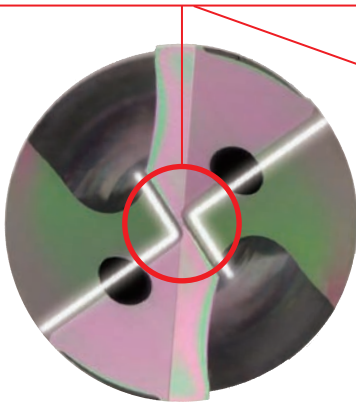
Drills for deep hole drilling can be made to order.

(Production range: Drill diameters: ϕ 3.0 to ϕ 16.0mm

Overall length: Available on inquiry)

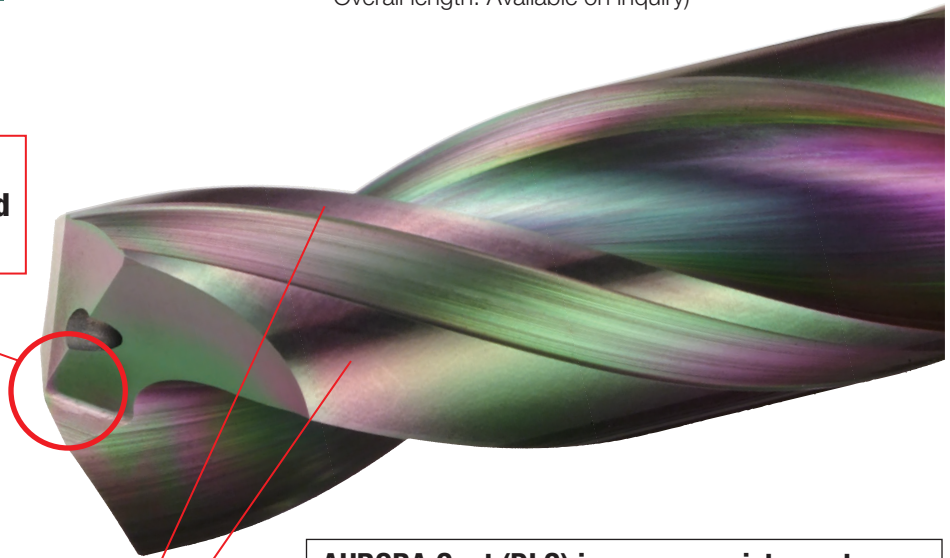
WLL Double L Thinning

Large center pocket discharges chips smoothly and reduces cutting resistance.

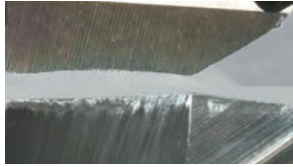
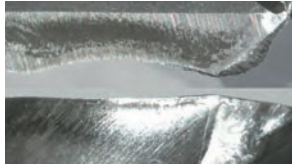


Wide double margin improves drill guide performance for high-quality drilling.

WWW Double Margin



AURORA Coat (DLC) improves resistance to adhesion and wear.

NHGS Series (After drilling 100 holes)	Competitor's helix angle 30° (After drilling 20 holes)
No adhesion even after 5x competitors' drilling	Very severe adhesion
	
Drill: ϕ 8 (for 5D) Work Material: ADC12 Cutting Conditions: $v_c=200$ m/min $f=1.0$ mm/rev $H=32$ mm Coolant: Internal supply (emulsion 1.5MPa)	

■ Product Range (Stocked Sizes)

Coolant Supply	Cat. No.	Diameter Range (mm)	Hole Depth (L/D)
Internal	MDW □□□□ NHGS3	ϕ 3.0 to 16.0	up to 3
	MDW □□□□ NHGS5		up to 5
	MDW □□□□ NHGS10	ϕ 3.0 to 13.0	up to 10

■ Recommended Cutting Conditions

(v_c : Cutting Speed m/min f : Feed Rate mm/rev)

Dia. DC (mm)	Cutting Conditions	Aluminum Alloy Castings/ Aluminum Alloy Die Castings	Wrought Aluminum Alloy
		v_c	80 - 140 - 200
ϕ 6.0	f	0.2 - 0.4 - 0.6	0.2 - 0.3 - 0.4
	v_c	100 - 180 - 250	100 - 150 - 250
ϕ 10.0	f	0.4 - 0.6 - 0.8	0.2 - 0.35 - 0.5
	v_c	120 - 200 - 250	120 - 180 - 250
ϕ 16.0	f	0.4 - 0.7 - 1.0	0.3 - 0.45 - 0.6

Min. - Optimum - Max.

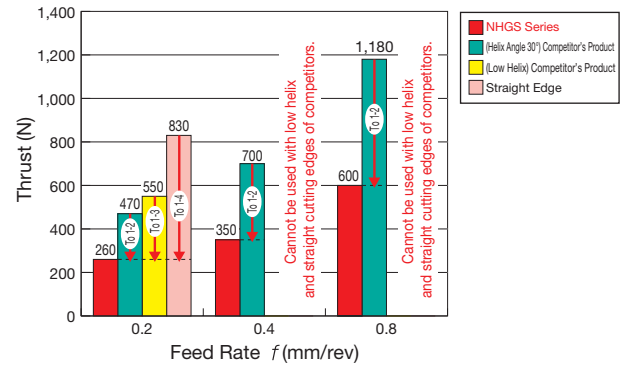
Performance

Cutting force

Low cutting force, achieving 2 to 4 times the feed rate

The cutting force of the NHGS Series is
 1/2 that of competitors' 30° helix drills ⇒ double the feed rate!
 1/3 that of competitors' light helix drills ⇒ 3x the feed rate!
 1/4 that of straight-blade drills ⇒ 4x the feed rate!

Tool: MDW 0800NHGS5 (DL1300) Work Material: ADC12
 Cutting Conditions: $v_c=200\text{m/min}$ Machine: Vertical machining centre (BT30)
 Coolant: Internal supply (1.5MPa) Coolant: Emulsion (dilute to around 25x)

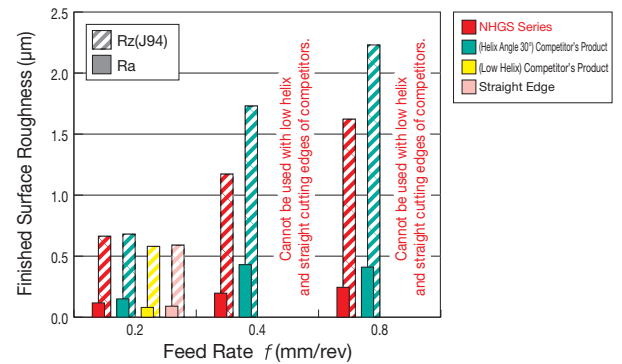


Machined surface quality

Achieves good surface roughness over a wide range of feed rates

Good surface roughness from low to high feed rates:
 Ra 0.11 to 0.25
 Rz (J94) 0.66 to 1.62

Tool: MDW 0800NHGS5 (DL1300) Work Material: ADC12
 Cutting Conditions: $v_c=200\text{m/min}$ Machine: Vertical machining centre (BT30)
 Coolant: Internal supply (1.5MPa) Coolant: Emulsion (dilute to around 25x)

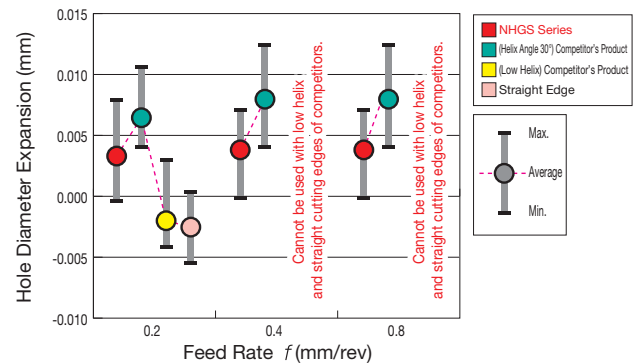


Machined hole accuracy (hole expansion)

Stable hole accuracy with hole expansion within 0.01mm

Achieves minimal expansion and stable machining from low to high feed rates

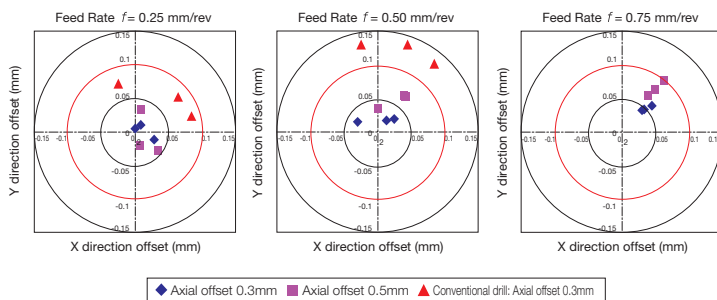
Tool: MDW 0800NHGS5 (DL1300) Work Material: ADC12
 Cutting Conditions: $v_c=200\text{m/min}$ Machine: Vertical machining centre (BT30)
 Coolant: Internal supply (1.5MPa) Coolant: Emulsion (dilute to around 25x)



Machined hole accuracy (hole position accuracy)

Pre-cast hole accuracy within ±1/10 to ±1/5 of axial offset

Pre-cast drilling performance (hole position accuracy)



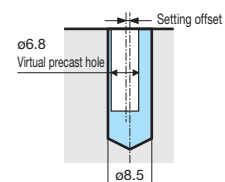
Tool: MDW 0850NHGS5 (DL1300) Work Material: ADC12
 Cutting Conditions: $v_c=200\text{m/min}$ ($n=7,489\text{min}^{-1}$) Machine: Vertical machining centre (BT30)
 Coolant: Internal supply

Pre-cast hole accuracy (hole position accuracy)

Offset	Feed Rate	0.25mm/rev	0.50mm/rev	0.75mm/rev
0.3mm		±0.03mm	±0.04mm	±0.06mm
0.5mm		±0.05mm	±0.07mm	±0.10mm
Conventional drill: 0.3mm		±0.09mm	±0.19mm	

Test method

An axial offset of 0.3mm to 0.5mm is set for a virtual pre-cast hole ($\phi 6.8$) and a hole is drilled with an $\phi 8.5$ drill before measuring the deviation from the target position.





*For fitting tolerances, refer to the General Catalog [Chapter N References].

Fig. 1 (NHGS3/5 Type, ø3.0 to 16.0mm)

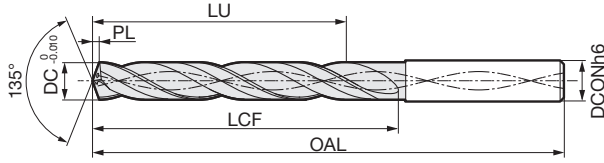
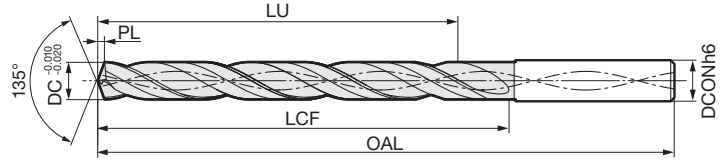


Fig. 2 (NHGS10 Type, ø3.0 to 16.0mm)



Diameter ø3.0 to 4.5mm

Dimensions (mm)

Dia. DC	Hole Depth (L/D)	Stock	Cat. No.	Effective Length			Tip PL	Shank Dia. DCON	Fig
				LU	LCF	OAL			
3.0	3	●	MDW 0300NHGS3	13.6	18.1	68.6	0.6	3.0	1
	5	●	0300NHGS5	24.1	28.6	78.6			
	10	●	0300NHGS10	38.1	42.6	92.6			
3.1	3	●	MDW 0310NHGS3	16.0	20.6	72.6	0.6	4.0	1
	5	●	0310NHGS5	28.0	32.6	86.6			
	10	●	0310NHGS10	45.0	49.6	106.6			
3.2	3	●	MDW 0320NHGS3	15.9	20.7	72.7	0.7	4.0	1
	5	●	0320NHGS5	27.9	32.7	86.7			
	10	●	0320NHGS10	44.9	49.7	106.7			
3.3	3	●	MDW 0330NHGS3	15.8	20.7	72.7	0.7	4.0	1
	5	●	0330NHGS5	27.8	32.7	86.7			
	10	●	0330NHGS10	44.8	49.7	106.7			
3.4	3	●	MDW 0340NHGS3	15.6	20.7	72.7	0.7	4.0	1
	5	●	0340NHGS5	27.6	32.7	86.7			
	10	●	0340NHGS10	44.6	49.7	106.7			
3.5	3	●	MDW 0350NHGS3	15.5	20.7	72.7	0.7	4.0	1
	5	●	0350NHGS5	27.5	32.7	86.7			
	10	●	0350NHGS10	44.5	49.7	106.7			
3.6	3	●	MDW 0360NHGS3	17.8	23.2	72.7	0.7	4.0	1
	5	●	0360NHGS5	31.3	36.7	86.7			
	10	●	0360NHGS10	51.3	56.7	106.7			
3.65	3	●	MDW 0365NHGS3	17.8	23.3	72.8	0.8	4.0	1
	5	●	0365NHGS5	31.3	36.8	86.8			
	10	●	0365NHGS10	51.3	56.8	106.8			
3.66	3	●	MDW 0366NHGS3	17.8	23.3	72.8	0.8	4.0	1
	5	●	0366NHGS5	31.3	36.8	86.8			
	10	●	0366NHGS10	51.3	56.8	106.8			
3.7	3	●	MDW 0370NHGS3	17.8	23.3	72.8	0.8	4.0	1
	5	●	0370NHGS5	31.3	36.8	86.8			
	10	●	0370NHGS10	51.3	56.8	106.8			
3.8	3	●	MDW 0380NHGS3	17.6	23.3	72.8	0.8	4.0	1
	5	●	0380NHGS5	31.1	36.8	86.8			
	10	●	0380NHGS10	51.1	56.8	106.8			
3.9	3	●	MDW 0390NHGS3	17.5	23.3	72.8	0.8	4.0	1
	5	●	0390NHGS5	31.0	36.8	86.8			
	10	●	0390NHGS10	51.0	56.8	106.8			
4.0	3	●	MDW 0400NHGS3	17.3	23.3	72.8	0.8	4.0	1
	5	●	0400NHGS5	30.8	36.8	86.8			
	10	●	0400NHGS10	50.8	56.8	106.8			
4.1	3	●	MDW 0410NHGS3	19.7	25.8	80.8	0.8	5.0	1
	5	●	0410NHGS5	34.7	40.8	98.8			
	10	●	0410NHGS10	57.7	63.8	121.8			
4.2	3	●	MDW 0420NHGS3	19.6	25.9	80.9	0.9	5.0	1
	5	●	0420NHGS5	34.6	40.9	98.9			
	10	●	0420NHGS10	57.6	63.9	121.9			
4.3	3	●	MDW 0430NHGS3	19.5	25.9	80.9	0.9	5.0	1
	5	●	0430NHGS5	34.5	40.9	98.9			
	10	●	0430NHGS10	57.5	63.9	121.9			
4.4	3	●	MDW 0440NHGS3	19.3	25.9	80.9	0.9	5.0	1
	5	●	0440NHGS5	34.3	40.9	98.9			
	10	●	0440NHGS10	57.3	63.9	121.9			
4.5	3	●	MDW 0450NHGS3	19.2	25.9	80.9	0.9	5.0	1
	5	●	0450NHGS5	34.2	40.9	98.9			
	10	●	0450NHGS10	57.2	63.9	121.9			

Grade: DL1300

Diameter ø4.6 to 6.3mm

Dimensions (mm)

Dia. DC	Hole Depth (L/D)	Stock	Cat. No.	Effective Length			Tip PL	Shank Dia. DCON	Fig
				LU	LCF	OAL			
4.6	3	●	MDW 0460NHGS3	21.6	28.5	81.0	1.0	5.0	1
	5	●	0460NHGS5	38.1	45.0	99.0			
	10	●	0460NHGS10	64.1	71.0	122.0			
4.7	3	●	MDW 0470NHGS3	21.5	28.5	81.0	1.0	5.0	1
	5	●	0470NHGS5	38.0	45.0	99.0			
	10	●	0470NHGS10	64.0	71.0	122.0			
4.8	3	●	MDW 0480NHGS3	21.3	28.5	81.0	1.0	5.0	1
	5	●	0480NHGS5	37.8	45.0	99.0			
	10	●	0480NHGS10	63.8	71.0	122.0			
4.9	3	●	MDW 0490NHGS3	21.2	28.5	81.0	1.0	5.0	1
	5	●	0490NHGS5	37.7	45.0	99.0			
	10	●	0490NHGS10	63.7	71.0	122.0			
5.0	3	●	MDW 0500NHGS3	21.0	28.5	81.0	1.0	5.0	1
	5	●	0500NHGS5	37.5	45.0	99.0			
	10	●	0500NHGS10	63.5	71.0	122.0			
5.1	3	●	MDW 0510NHGS3	21.0	28.6	83.1	1.1	6.0	1
	5	●	0510NHGS5	37.5	45.1	101.1			
	10	●	0510NHGS10	70.5	78.1	137.1			
5.2	3	●	MDW 0520NHGS3	20.8	28.6	83.1	1.1	6.0	1
	5	●	0520NHGS5	37.3	45.1	101.1			
	10	●	0520NHGS10	70.3	78.1	137.1			
5.3	3	●	MDW 0530NHGS3	20.7	28.6	83.1	1.1	6.0	1
	5	●	0530NHGS5	37.2	45.1	101.1			
	10	●	0530NHGS10	70.2	78.1	137.1			
5.4	3	●	MDW 0540NHGS3	20.5	28.6	83.1	1.1	6.0	1
	5	●	0540NHGS5	37.0	45.1	101.1			
	10	●	0540NHGS10	70.0	78.1	137.1			
5.5	3	●	MDW 0550NHGS3	20.4	28.6	83.1	1.1	6.0	1
	5	●	0550NHGS5	36.9	45.1	101.1			
	10	●	0550NHGS10	69.9	78.1	137.1			
5.6	3	●	MDW 0560NHGS3	22.8	31.2	83.2	1.2	6.0	1
	5	●	0560NHGS5	40.8	49.2	101.2			
	10	●	0560NHGS10	76.8	85.2	137.2			
5.7	3	●	MDW 0570NHGS3	22.7	31.2	83.2	1.2	6.0	1
	5	●	0570NHGS5	40.7	49.2	101.2			
	10	●	0570NHGS10	76.7	85.2	137.2			
5.8	3	●	MDW 0580NHGS3	22.5	31.2	83.2	1.2	6.0	1
	5	●	0580NHGS5	40.5	49.2	101.2			
	10	●	0580NHGS10	76.5	85.2	137.2			
5.9	3	●	MDW 0590NHGS3	22.4	31.2	83.2	1.2	6.0	1
	5	●	0590NHGS5	40.4	49.2	101.2			
	10	●	0590NHGS10	76.4	85.2	137.2			
6.0	3	●	MDW 0600NHGS3	22.2	31.2	83.2	1.2	6.0	1
	5	●	0600NHGS5	40.2	49.2	101.2			
	10	●	0600NHGS10	76.2	85.2	137.2			
6.1	3	●	MDW 0610NHGS3	24.7	33.8	89.3	1.3	7.0	1
	5	●	0610NHGS5	44.2	53.3	110.3			
	10	●	0610NHGS10	83.2	92.3	152.3			
6.2	3	●	MDW 0620NHGS3	24.5	33.8	89.3	1.3	7.0	1
	5	●	0620NHGS5	44.0	53.3	110.3			
	10	●	0620NHGS10	83.0	92.3	152.3			
6.3	3	●	MDW 0630NHGS3	24.4	33.8	89.3	1.3	7.0	1
	5	●	0630NHGS5	43.9	53.3	110.3			
	10	●	0630NHGS10	82.9	92.3	152.3			

Grade: DL1300



*For fitting tolerances, refer to the General Catalog [Chapter N References].

Fig. 1 (NHGS3/5 Type, ø3.0 to 16.0mm)

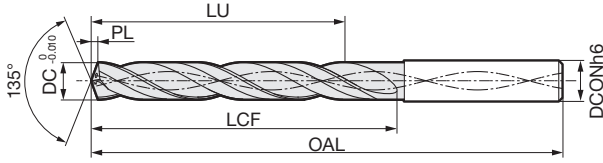
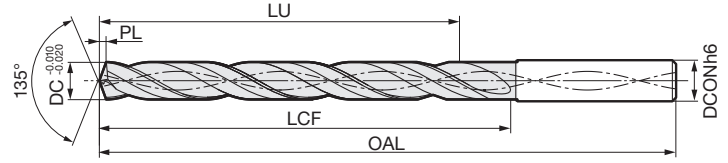


Fig. 2 (NHGS10 Type, ø3.0 to 16.0mm)



Diameter ø6.4 to 8.0mm

Dimensions (mm)

Dia. DC	Hole Depth (L/D)	Stock	Cat. No.	Effective Length LU	Flute Length LCF	Overall Length OAL	Tip PL	Shank Dia. DCON	Fig
6.4	3	●	MDW 0640NHGS3	24.2	33.8	89.3			1
	5	●	0640NHGS5	43.7	53.3	110.3	1.3	7.0	1
	10	●	0640NHGS10	82.7	92.3	152.3			2
6.5	3	●	MDW 0650NHGS3	24.1	33.8	89.3			1
	5	●	0650NHGS5	43.6	53.3	110.3	1.3	7.0	1
	10	●	0650NHGS10	82.6	92.3	152.3			2
6.6	3	●	MDW 0660NHGS3	26.5	36.4	89.4			1
	5	●	0660NHGS5	47.5	57.4	110.4	1.4	7.0	1
	10	●	0660NHGS10	89.5	99.4	152.4			2
6.7	3	●	MDW 0670NHGS3	26.4	36.4	89.4			1
	5	●	0670NHGS5	47.4	57.4	110.4	1.4	7.0	1
	10	●	0670NHGS10	89.4	99.4	152.4			2
6.8	3	●	MDW 0680NHGS3	26.2	36.4	89.4			1
	5	●	0680NHGS5	47.2	57.4	110.4	1.4	7.0	1
	10	●	0680NHGS10	89.2	99.4	152.4			2
6.9	3	●	MDW 0690NHGS3	26.1	36.4	89.4			1
	5	●	0690NHGS5	47.1	57.4	110.4	1.4	7.0	1
	10	●	0690NHGS10	89.1	99.4	152.4			2
7.0	3	●	MDW 0700NHGS3	25.9	36.4	89.4			1
	5	●	0700NHGS5	46.9	57.4	110.4	1.4	7.0	1
	10	●	0700NHGS10	88.9	99.4	152.4			2
7.1	3	●	MDW 0710NHGS3	28.4	39.0	95.5			1
	5	●	0710NHGS5	50.9	61.5	119.5	1.5	8.0	1
	10	●	0710NHGS10	95.9	106.5	167.5			2
7.2	3	●	MDW 0720NHGS3	28.2	39.0	95.5			1
	5	●	0720NHGS5	50.7	61.5	119.5	1.5	8.0	1
	10	●	0720NHGS10	95.7	106.5	167.5			2
7.3	3	●	MDW 0730NHGS3	28.1	39.0	95.5			1
	5	●	0730NHGS5	50.6	61.5	119.5	1.5	8.0	1
	10	●	0730NHGS10	95.6	106.5	167.5			2
7.35	3	●	MDW 0735NHGS3	28.0	39.0	95.5			1
	5	●	0735NHGS5	50.5	61.5	119.5	1.5	8.0	1
	10	●	0735NHGS10	95.5	106.5	167.5			2
7.4	3	●	MDW 0740NHGS3	27.9	39.0	95.5			1
	5	●	0740NHGS5	50.4	61.5	119.5	1.5	8.0	1
	10	●	0740NHGS10	95.4	106.5	167.5			2
7.5	3	●	MDW 0750NHGS3	27.9	39.1	95.6			1
	5	●	0750NHGS5	50.4	61.6	119.6	1.6	8.0	1
	10	●	0750NHGS10	95.4	106.6	167.6			2
7.6	3	●	MDW 0760NHGS3	30.2	41.6	95.6			1
	5	●	0760NHGS5	54.2	65.6	119.6	1.6	8.0	1
	10	●	0760NHGS10	102.2	113.6	167.6			2
7.7	3	●	MDW 0770NHGS3	30.1	41.6	95.6			1
	5	●	0770NHGS5	54.1	65.6	119.6	1.6	8.0	1
	10	●	0770NHGS10	102.1	113.6	167.6			2
7.8	3	●	MDW 0780NHGS3	29.9	41.6	95.6			1
	5	●	0780NHGS5	53.9	65.6	119.6	1.6	8.0	1
	10	●	0780NHGS10	101.9	113.6	167.6			2
7.9	3	●	MDW 0790NHGS3	29.8	41.6	95.6			1
	5	●	0790NHGS5	53.8	65.6	119.6	1.6	8.0	1
	10	●	0790NHGS10	101.8	113.6	167.6			2
8.0	3	●	MDW 0800NHGS3	29.7	41.7	95.7			1
	5	●	0800NHGS5	53.7	65.7	119.7	1.7	8.0	1
	10	●	0800NHGS10	101.7	113.7	167.7			2

Grade: DL1300

Diameter ø8.1 to 9.7mm

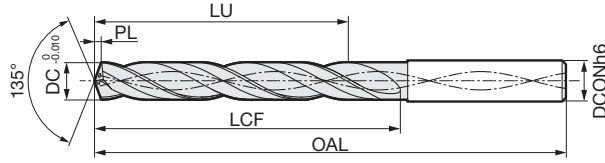
Dimensions (mm)

Dia. DC	Hole Depth (L/D)	Stock	Cat. No.	Effective Length LU	Flute Length LCF	Overall Length OAL	Tip PL	Shank Dia. DCON	Fig
8.1	3	●	MDW 0810NHGS3	32.1	44.2	101.7			1
	5	●	0810NHGS5	57.6	69.7	128.7	1.7	9.0	1
	10	●	0810NHGS10	108.6	120.7	182.7			2
8.2	3	●	MDW 0820NHGS3	31.9	44.2	101.7			1
	5	●	0820NHGS5	57.4	69.7	128.7	1.7	9.0	1
	10	●	0820NHGS10	108.4	120.7	182.7			2
8.3	3	●	MDW 0830NHGS3	31.8	44.2	101.7			1
	5	●	0830NHGS5	57.3	69.7	128.7	1.7	9.0	1
	10	●	0830NHGS10	108.3	120.7	182.7			2
8.4	3	●	MDW 0840NHGS3	31.6	44.2	101.7			1
	5	●	0840NHGS5	57.1	69.7	128.7	1.7	9.0	1
	10	●	0840NHGS10	108.1	120.7	182.7			2
8.5	3	●	MDW 0850NHGS3	31.6	44.3	101.8			1
	5	●	0850NHGS5	57.1	69.8	128.8	1.8	9.0	1
	10	●	0850NHGS10	108.1	120.8	182.8			2
8.6	3	●	MDW 0860NHGS3	33.9	46.8	101.8			1
	5	●	0860NHGS5	60.9	73.8	128.8	1.8	9.0	1
	10	●	0860NHGS10	114.9	127.8	182.8			2
8.7	3	●	MDW 0870NHGS3	33.8	46.8	101.8			1
	5	●	0870NHGS5	60.8	73.8	128.8	1.8	9.0	1
	10	●	0870NHGS10	114.8	127.8	182.8			2
8.8	3	●	MDW 0880NHGS3	33.6	46.8	101.8			1
	5	●	0880NHGS5	60.6	73.8	128.8	1.8	9.0	1
	10	●	0880NHGS10	114.6	127.8	182.8			2
8.9	3	●	MDW 0890NHGS3	33.5	46.8	101.8			1
	5	●	0890NHGS5	60.5	73.8	128.8	1.8	9.0	1
	10	●	0890NHGS10	114.5	127.8	182.8			2
9.0	3	●	MDW 0900NHGS3	33.4	46.9	101.9			1
	5	●	0900NHGS5	60.4	73.9	128.9	1.9	9.0	1
	10	●	0900NHGS10	114.4	127.9	182.9			2
9.1	3	●	MDW 0910NHGS3	35.8	49.4	107.9			1
	5	●	0910NHGS5	64.3	77.9	137.9	1.9	10.0	1
	10	●	0910NHGS10	121.3	134.9	197.9			2
9.2	3	●	MDW 0920NHGS3	35.6	49.4	107.9			1
	5	●	0920NHGS5	64.1	77.9	137.9	1.9	10.0	1
	10	●	0920NHGS10	121.1	134.9	197.9			2
9.21	3	●	MDW 0921NHGS3	35.6	49.4	107.9			1
	5	●	0921NHGS5	64.1	77.9	137.9	1.9	10.0	1
	10	●	0921NHGS10	121.1	134.9	197.9			2
9.3	3	●	MDW 0930NHGS3	35.5	49.4	107.9			1
	5	●	0930NHGS5	64.0	77.9	137.9	1.9	10.0	1
	10	●	0930NHGS10	121.0	134.9	197.9			2
9.4	3	●	MDW 0940NHGS3	35.3	49.4	107.9			1
	5	●	0940NHGS5	63.8	77.9	137.9	1.9	10.0	1
	10	●	0940NHGS10	120.8	134.9	197.9			2
9.5	3	●	MDW 0950NHGS3	35.3	49.5	108.0			1
	5	●	0950NHGS5	63.8	78.0	138.0	2.0	10.0	1
	10	●	0950NHGS10	120.8	135.0	198.0			2
9.6	3	●	MDW 0960NHGS3	37.6	52.0	108.0			1
	5	●	0960NHGS5	67.6	82.0	138.0	2.0	10.0	1
	10	●	0960NHGS10	127.6	142.0	198.0			2
9.7	3	●	MDW 0970NHGS3	37.5	52.0	108.0			1
	5	●	0970NHGS5	67.5	82.0	138.0	2.0	10.0	1
	10	●	0970NHGS10	127.5	142.0	198.0			2

Grade: DL1300

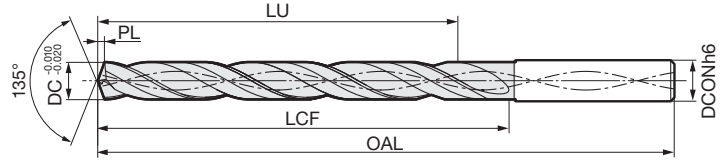


Fig. 1 (NHGS3/5 Type, ø3.0 to 16.0mm)



*For fitting tolerances, refer to the General Catalog [Chapter N References].

Fig. 2 (NHGS10 Type, ø3.0 to 16.0mm)



Diameter ø9.8 to 11.4mm

Dimensions (mm)

Dia. DC	Hole Depth (L/D)	Stock	Cat. No.	Effective Length LU	Flute Length LCF	Overall Length OAL	Tip PL	Shank Dia. DCON	Fig
9.8	3	●	MDW 0980NHGS3	37.3	52.0	108.0	2.0	10.0	1
	5	●	0980NHGS5	67.3	82.0	138.0			2
	10	●	0980NHGS10	127.3	142.0	198.0			2
9.9	3	●	MDW 0990NHGS3	37.2	52.0	108.0	2.0	10.0	1
	5	●	0990NHGS5	67.2	82.0	138.0			2
	10	●	0990NHGS10	127.2	142.0	198.0			2
10.0	3	●	MDW 1000NHGS3	37.1	52.1	108.1	2.1	10.0	1
	5	●	1000NHGS5	67.1	82.1	138.1			2
	10	●	1000NHGS10	127.1	142.1	198.1			2
10.1	3	●	MDW 1010NHGS3	39.5	54.6	118.1	2.1	11.0	1
	5	●	1010NHGS5	71.0	86.1	151.1			2
	10	●	1010NHGS10	134.0	149.1	217.1			2
10.2	3	●	MDW 1020NHGS3	39.3	54.6	118.1	2.1	11.0	1
	5	●	1020NHGS5	70.8	86.1	151.1			2
	10	●	1020NHGS10	133.8	149.1	217.1			2
10.3	3	●	MDW 1030NHGS3	39.2	54.6	118.1	2.1	11.0	1
	5	●	1030NHGS5	70.7	86.1	151.1			2
	10	●	1030NHGS10	133.7	149.1	217.1			2
10.4	3	●	MDW 1040NHGS3	39.1	54.7	118.2	2.2	11.0	1
	5	●	1040NHGS5	70.6	86.2	151.2			2
	10	●	1040NHGS10	133.6	149.2	217.2			2
10.5	3	●	MDW 1050NHGS3	39.0	54.7	118.2	2.2	11.0	1
	5	●	1050NHGS5	70.5	86.2	151.2			2
	10	●	1050NHGS10	133.5	149.2	217.2			2
10.6	3	●	MDW 1060NHGS3	41.3	57.2	118.2	2.2	11.0	1
	5	●	1060NHGS5	74.3	90.2	151.2			2
	10	●	1060NHGS10	140.3	156.2	217.2			2
10.7	3	●	MDW 1070NHGS3	41.2	57.2	118.2	2.2	11.0	1
	5	●	1070NHGS5	74.2	90.2	151.2			2
	10	●	1070NHGS10	140.2	156.2	217.2			2
10.8	3	●	MDW 1080NHGS3	41.0	57.2	118.2	2.2	11.0	1
	5	●	1080NHGS5	74.0	90.2	151.2			2
	10	●	1080NHGS10	140.0	156.2	217.2			2
10.9	3	●	MDW 1090NHGS3	41.0	57.3	118.3	2.3	11.0	1
	5	●	1090NHGS5	74.0	90.3	151.3			2
	10	●	1090NHGS10	140.0	156.3	217.3			2
11.0	3	●	MDW 1100NHGS3	40.8	57.3	118.3	2.3	11.0	1
	5	●	1100NHGS5	73.8	90.3	151.3			2
	10	●	1100NHGS10	139.8	156.3	217.3			2
11.08	3	●	MDW 1108NHGS3	43.2	59.8	124.3	2.3	12.0	1
	5	●	1108NHGS5	77.7	94.3	160.3			2
	10	●	1108NHGS10	146.7	163.3	232.3			2
11.1	3	●	MDW 1110NHGS3	43.2	59.8	124.3	2.3	12.0	1
	5	●	1110NHGS5	77.7	94.3	160.3			2
	10	●	1110NHGS10	146.7	163.3	232.3			2
11.2	3	●	MDW 1120NHGS3	43.0	59.8	124.3	2.3	12.0	1
	5	●	1120NHGS5	77.5	94.3	160.3			2
	10	●	1120NHGS10	146.5	163.3	232.3			2
11.3	3	●	MDW 1130NHGS3	42.9	59.8	124.3	2.3	12.0	1
	5	●	1130NHGS5	77.4	94.3	160.3			2
	10	●	1130NHGS10	146.4	163.3	232.3			2
11.4	3	●	MDW 1140NHGS3	42.8	59.9	124.4	2.4	12.0	1
	5	●	1140NHGS5	77.3	94.4	160.4			2
	10	●	1140NHGS10	146.3	163.4	232.4			2

Grade: DL1300

Diameter ø11.5 to 13.1mm

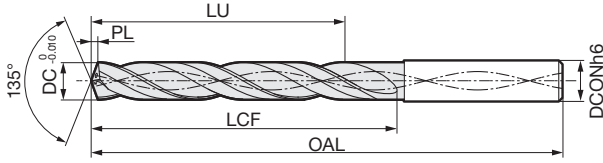
Dimensions (mm)

Dia. DC	Hole Depth (L/D)	Stock	Cat. No.	Effective Length LU	Flute Length LCF	Overall Length OAL	Tip PL	Shank Dia. DCON	Fig
11.5	3	●	MDW 1150NHGS3	42.7	59.9	124.4	2.4	12.0	1
	5	●	1150NHGS5	77.2	94.4	160.4			2
	10	●	1150NHGS10	146.2	163.4	232.4			2
11.6	3	●	MDW 1160NHGS3	45.0	62.4	124.4	2.4	12.0	1
	5	●	1160NHGS5	81.0	98.4	160.4			2
	10	●	1160NHGS10	153.0	170.4	232.4			2
11.7	3	●	MDW 1170NHGS3	44.9	62.4	124.4	2.4	12.0	1
	5	●	1170NHGS5	80.9	98.4	160.4			2
	10	●	1170NHGS10	152.9	170.4	232.4			2
11.8	3	●	MDW 1180NHGS3	44.7	62.4	124.4	2.4	12.0	1
	5	●	1180NHGS5	80.7	98.4	160.4			2
	10	●	1180NHGS10	152.7	170.4	232.4			2
11.9	3	●	MDW 1190NHGS3	44.7	62.5	124.5	2.5	12.0	1
	5	●	1190NHGS5	80.7	98.5	160.5			2
	10	●	1190NHGS10	152.7	170.5	232.5			2
12.0	3	●	MDW 1200NHGS3	44.5	62.5	124.5	2.5	12.0	1
	5	●	1200NHGS5	80.5	98.5	160.5			2
	10	●	1200NHGS10	152.5	170.5	232.5			2
12.1	3	●	MDW 1210NHGS3	46.9	65.0	130.5	2.5	13.0	1
	5	●	1210NHGS5	84.4	102.5	169.5			2
	10	●	1210NHGS10	159.4	177.5	247.5			2
12.2	3	●	MDW 1220NHGS3	46.7	65.0	130.5	2.5	13.0	1
	5	●	1220NHGS5	84.2	102.5	169.5			2
	10	●	1220NHGS10	159.2	177.5	247.5			2
12.3	3	●	MDW 1230NHGS3	46.6	65.0	130.5	2.5	13.0	1
	5	●	1230NHGS5	84.1	102.5	169.5			2
	10	●	1230NHGS10	159.1	177.5	247.5			2
12.4	3	●	MDW 1240NHGS3	46.5	65.1	130.6	2.6	13.0	1
	5	●	1240NHGS5	84.0	102.6	169.6			2
	10	●	1240NHGS10	159.0	177.6	247.6			2
12.5	3	●	MDW 1250NHGS3	46.4	65.1	130.6	2.6	13.0	1
	5	●	1250NHGS5	83.9	102.6	169.6			2
	10	●	1250NHGS10	158.9	177.6	247.6			2
12.6	3	●	MDW 1260NHGS3	48.7	67.6	130.6	2.6	13.0	1
	5	●	1260NHGS5	87.7	106.6	169.6			2
	10	●	1260NHGS10	165.7	184.6	247.6			2
12.7	3	●	MDW 1270NHGS3	48.6	67.6	130.6	2.6	13.0	1
	5	●	1270NHGS5	87.6	106.6	169.6			2
	10	●	1270NHGS10	165.6	184.6	247.6			2
12.8	3	●	MDW 1280NHGS3	48.4	67.6	130.6	2.6	13.0	1
	5	●	1280NHGS5	87.4	106.6	169.6			2
	10	●	1280NHGS10	165.4	184.6	247.6			2
12.9	3	●	MDW 1290NHGS3	48.4	67.7	130.7	2.7	13.0	1
	5	●	1290NHGS5	87.4	106.7	169.7			2
	10	●	1290NHGS10	165.4	184.7	247.7			2
12.96	3	●	MDW 1296NHGS3	48.3	67.7	130.7	2.7	13.0	1
	5	●	1296NHGS5	87.3	106.7	169.7			2
	10	●	1296NHGS10	165.3	184.7	247.7			2
13.0	3	●	MDW 1300NHGS3	48.2	67.7	130.7	2.7	13.0	1
	5	●	1300NHGS5	87.2	106.7	169.7			2
	10	●	1300NHGS10	165.2	184.7	247.7			2
13.1	3	●	MDW 1310NHGS3	50.6	70.2	136.7	2.7	14.0	1
	5	●	1310NHGS5	91.1	110.7	178.7			2
	10	●	1310NHGS10	172.1	191.7	262.7			2

Grade: DL1300

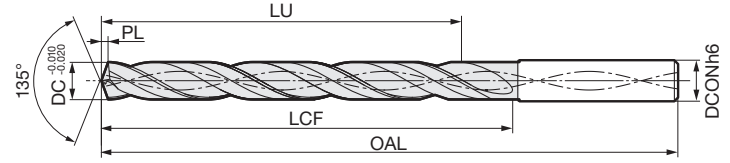


Fig. 1 (NHGS3/5 Type, ø3.0 to 16.0mm)



*For fitting tolerances, refer to the General Catalog [Chapter N References].

Fig. 2 (NHGS10 Type, ø3.0 to 16.0mm)



Diameter ø13.2 to 14.9mm

Dimensions (mm)

Dia. DC	Hole Depth (L/D)	Stock	Cat. No.	Effective Length LU	Flute Length LCF	Overall Length OAL	Tip PL	Shank Dia. DCON	Fig
13.2	3		MDW 1320NHGS3	50.4	70.2	136.7	2.7	14.0	1
	5		1320NHGS5	90.9	110.7	178.7			1
	10		1320NHGS10	171.9	191.7	262.7			2
13.3	3		MDW 1330NHGS3	50.4	70.3	136.8	2.8	14.0	1
	5		1330NHGS5	90.9	110.8	178.8			1
	10		1330NHGS10	171.9	191.8	262.8			2
13.4	3		MDW 1340NHGS3	50.2	70.3	136.8	2.8	14.0	1
	5		1340NHGS5	90.7	110.8	178.8			1
	10		1340NHGS10	171.7	191.8	262.8			2
13.5	3	●	MDW 1350NHGS3	50.1	70.3	136.8	2.8	14.0	1
	5	●	1350NHGS5	90.6	110.8	178.8			1
	10		1350NHGS10	171.6	191.8	262.8			2
13.6	3		MDW 1360NHGS3	52.4	72.8	136.8	2.8	14.0	1
	5		1360NHGS5	94.4	114.8	178.8			1
	10		1360NHGS10	178.4	198.8	262.8			2
13.7	3		MDW 1370NHGS3	52.3	72.8	136.8	2.8	14.0	1
	5		1370NHGS5	94.3	114.8	178.8			1
	10		1370NHGS10	178.3	198.8	262.8			2
13.8	3		MDW 1380NHGS3	52.2	72.9	136.9	2.9	14.0	1
	5		1380NHGS5	94.2	114.9	178.9			1
	10		1380NHGS10	178.2	198.9	262.9			2
13.9	3		MDW 1390NHGS3	52.1	72.9	136.9	2.9	14.0	1
	5		1390NHGS5	94.1	114.9	178.9			1
	10		1390NHGS10	178.1	198.9	262.9			2
14.0	3	●	MDW 1400NHGS3	51.9	72.9	136.9	2.9	14.0	1
	5	●	1400NHGS5	93.9	114.9	178.9			1
	10		1400NHGS10	177.9	198.9	262.9			2
14.1	3	●	MDW 1410NHGS3	54.3	75.4	142.9	2.9	15.0	1
	5	●	1410NHGS5	97.8	118.9	187.9			1
	10		1410NHGS10	184.8	205.9	277.9			2
14.2	3		MDW 1420NHGS3	54.1	75.4	142.9	2.9	15.0	1
	5		1420NHGS5	97.6	118.9	187.9			1
	10		1420NHGS10	184.6	205.9	277.9			2
14.3	3		MDW 1430NHGS3	54.1	75.5	143.0	3.0	15.0	1
	5		1430NHGS5	97.6	119.0	188.0			1
	10		1430NHGS10	184.6	206.0	278.0			2
14.4	3		MDW 1440NHGS3	53.9	75.5	143.0	3.0	15.0	1
	5		1440NHGS5	97.4	119.0	188.0			1
	10		1440NHGS10	184.4	206.0	278.0			2
14.5	3	●	MDW 1450NHGS3	53.8	75.5	143.0	3.0	15.0	1
	5	●	1450NHGS5	97.3	119.0	188.0			1
	10		1450NHGS10	184.3	206.0	278.0			2
14.6	3		MDW 1460NHGS3	56.1	78.0	143.0	3.0	15.0	1
	5		1460NHGS5	101.1	123.0	188.0			1
	10		1460NHGS10	191.1	213.0	278.0			2
14.7	3		MDW 1470NHGS3	56.0	78.0	143.0	3.0	15.0	1
	5		1470NHGS5	101.0	123.0	188.0			1
	10		1470NHGS10	191.0	213.0	278.0			2
14.8	3		MDW 1480NHGS3	55.9	78.1	143.1	3.1	15.0	1
	5		1480NHGS5	100.9	123.1	188.1			1
	10		1480NHGS10	190.9	213.1	278.1			2
14.9	3	●	MDW 1490NHGS3	55.8	78.1	143.1	3.1	15.0	1
	5	●	1490NHGS5	100.8	123.1	188.1			1
	10		1490NHGS10	190.8	213.1	278.1			2

Grade: DL1300

Diameter ø14.96 to 16.0mm

Dimensions (mm)

Dia. DC	Hole Depth (L/D)	Stock	Cat. No.	Effective Length LU	Flute Length LCF	Overall Length OAL	Tip PL	Shank Dia. DCON	Fig
14.96	3	●	MDW 1496NHGS3	55.7	78.1	143.1	3.1	15.0	1
	5	●	1496NHGS5	100.7	123.1	188.1			1
	10		1496NHGS10	190.7	213.1	278.1			2
15.0	3	●	MDW 1500NHGS3	55.6	78.1	143.1	3.1	15.0	1
	5	●	1500NHGS5	100.6	123.1	188.1			1
	10		1500NHGS10	190.6	213.1	278.1			2
15.1	3		MDW 1510NHGS3	58.0	80.6	149.1	3.1	16.0	1
	5		1510NHGS5	104.5	127.1	197.1			1
	10		1510NHGS10	197.5	220.1	293.1			2
15.2	3		MDW 1520NHGS3	57.8	80.6	149.1	3.1	16.0	1
	5		1520NHGS5	104.3	127.1	197.1			1
	10		1520NHGS10	197.3	220.1	293.1			2
15.3	3		MDW 1530NHGS3	57.8	80.7	149.2	3.2	16.0	1
	5		1530NHGS5	104.3	127.2	197.2			1
	10		1530NHGS10	197.3	220.2	293.2			2
15.4	3		MDW 1540NHGS3	57.6	80.7	149.2	3.2	16.0	1
	5		1540NHGS5	104.1	127.2	197.2			1
	10		1540NHGS10	197.1	220.2	293.2			2
15.5	3	●	MDW 1550NHGS3	57.5	80.7	149.2	3.2	16.0	1
	5	●	1550NHGS5	104.0	127.2	197.2			1
	10		1550NHGS10	197.0	220.2	293.2			2
15.6	3		MDW 1560NHGS3	59.8	83.2	149.2	3.2	16.0	1
	5		1560NHGS5	107.8	131.2	197.2			1
	10		1560NHGS10	203.8	227.2	293.2			2
15.7	3		MDW 1570NHGS3	59.7	83.2	149.2	3.2	16.0	1
	5		1570NHGS5	107.7	131.2	197.2			1
	10		1570NHGS10	203.7	227.2	293.2			2
15.8	3		MDW 1580NHGS3	59.6	83.3	149.3	3.3	16.0	1
	5		1580NHGS5	107.6	131.3	197.3			1
	10		1580NHGS10	203.6	227.3	293.3			2
15.9	3		MDW 1590NHGS3	59.5	83.3	149.3	3.3	16.0	1
	5		1590NHGS5	107.5	131.3	197.3			1
	10		1590NHGS10	203.5	227.3	293.3			2
16.0	3	●	MDW 1600NHGS3	59.3	83.3	149.3	3.3	16.0	1
	5	●	1600NHGS5	107.3	131.3	197.3			1
	10		1600NHGS10	203.3	227.3	293.3			2

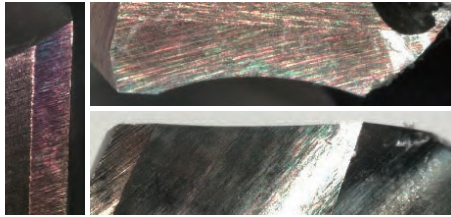
Grade: DL1300

Application Examples

ADC12 Automotive Parts

Description: The limit for a conventional drill was 0.3mm/rev, due to the workpiece rigidity.
 Results: Excellent results showing no workpiece deformation even at 1.0mm/rev, with good chip size.

Tool life: 200,000 holes (disposable)
 After drilling 1,000 pcs/C ($f = 1.0\text{mm/rev}$)



NHGS Series

Conventional

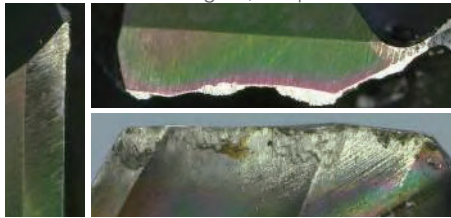
$v_c = 150\text{m/min}$ ($n = 8,681\text{min}^{-1}$)		
$f = 0.3\text{mm/rev}$ ($v_f = 2,604\text{mm/min}$)	$f = 0.6\text{mm/rev}$ ($v_f = 5,209\text{mm/min}$)	$f = 1.0\text{mm/rev}$ ($v_f = 8,681\text{mm/min}$)

Tool: Special MDW0550NHGS ($\phi 5.5 \times \phi 9$ stepped drill, internal coolant supply [emulsion 2MPa] DL1300)

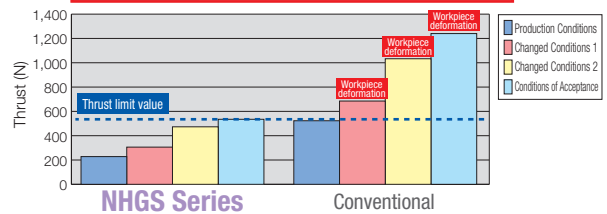
ADC12 Automotive Parts (5mm wall thickness pipe-shaped low-rigidity work material)

Description: The limit for a conventional drill was 0.2mm/rev, due to the workpiece rigidity.
 Results: Excellent results showing no workpiece deformation even at 1.0mm/rev.

Results with actual machine
 After drilling 20,000 pcs/C



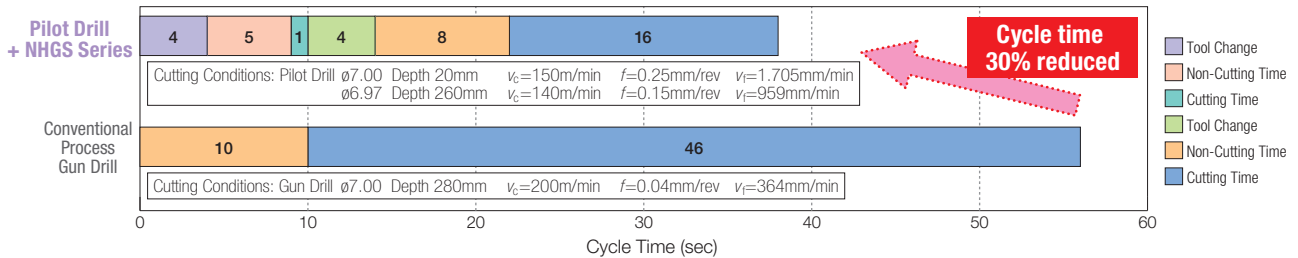
	n (min^{-1})	v_c (m/min)	v_f (mm/min)	f (mm/rev)	Efficiency
Production Conditions	11,177	230	2,235	0.2	1.0
Changed Conditions 1	12,149	250	3,645	0.3	1.6
Changed Conditions 2	12,149	250	7,289	0.6	3.3
Conditions of Acceptance	12,149	250	12,149	1.0	5.4



Tool: Special MDW0655NHGS ($\phi 6.55 \times \phi 9$ stepped drill, external coolant supply DL1300)

AC2C-T6 Automotive Parts (cylinder block)

Description: Reduced cycle time for deep drilling at L/D = 40 (280mm)
 Results: Cycle time reduced 30% with NHGS Series in two processes (horizontal machining centre) compared with a conventional gun drill (dedicated machine).



Tool: Special MDW0697NHGS ($\phi 6.97 \times \phi 9$, internal coolant supply [emulsion 2MPa] DL1300)

< 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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