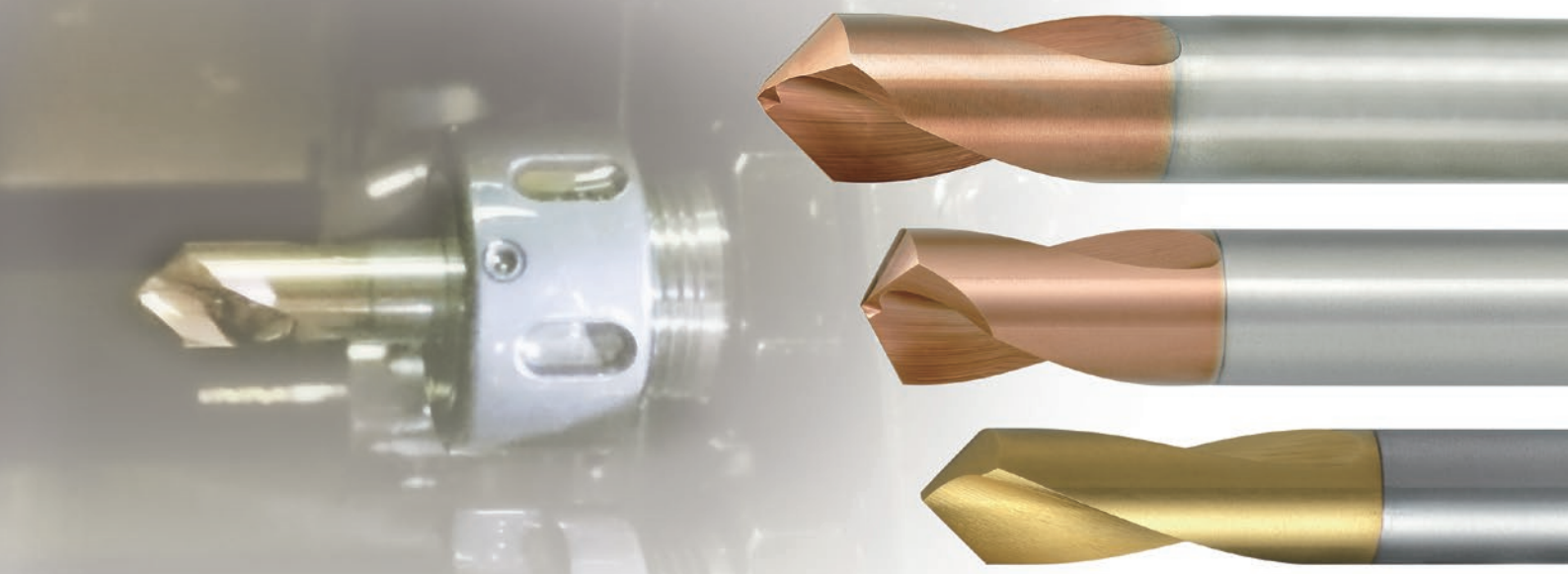
DIA EDGE
TOOL NEWS
2021.2 Update
B223G

Solid Drills for Centering and Chamfering

Leading Drill Series

Item Expansion

Excellent Fracture Resistance and Sharp Cutting Edge. Ideal for Machining Stainless Steels.



Solid Carbide Drills **DLE**

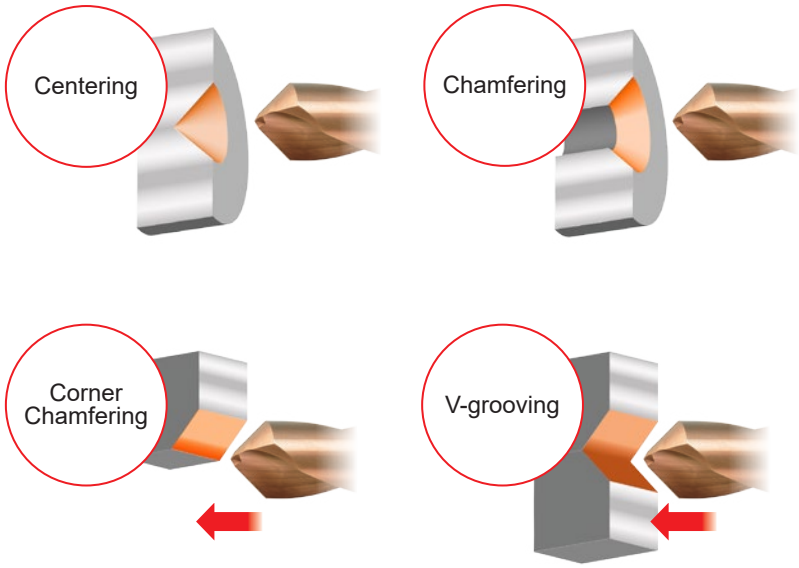
Cobalt HSS Solid Drill **GKCD**

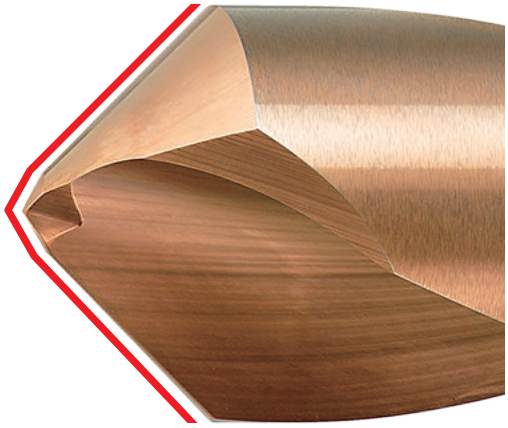
MITSUBISHI MATERIALS CORPORATION

Solid Carbide Drills for Centering and Chamfering

Leading Drill Series DLE

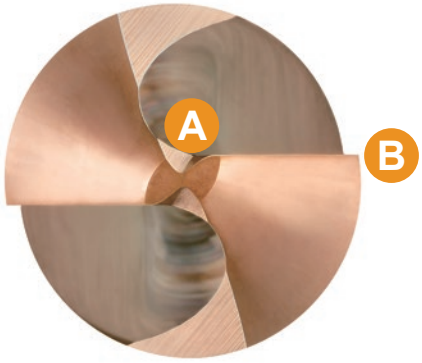
The ultimate multi-functional performance for centering and chamfering.



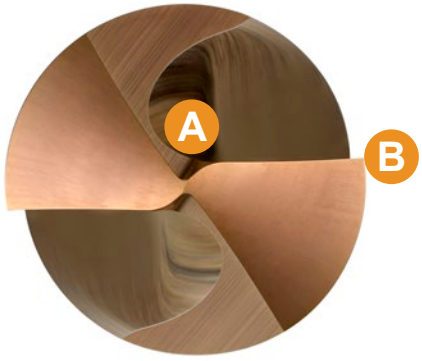


Range of Use

Features



Point Angles SIG 60° 90°



Point Angles SIG 120° 145°

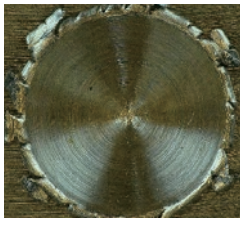
A Thinned Point Geometry

Point thinning promotes smooth chip discharge and brings excellent hole position accuracy. Additionally, the negative cutting edge of the drill point offers high cutting edge strength.

B Sharp Cutting Edge and High Fracture Resistance

Straight cutting edge geometry with sharpness and fracture resistance. Providing a stable cutting action and reduction of burrs.

DLE



Conventional

Two-step Point Angles 60°, 90°

Two-step point angles ensure strength at the centre and prevent sudden fracturing.

*The central area will not have a 60°, 90° hole bottom.

DLE

High Strength Centre

Conventional

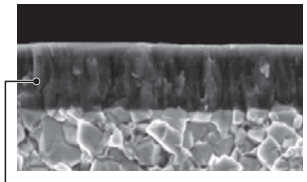
Fractured Centre Point

Single Step Point Angles 120°, 145°

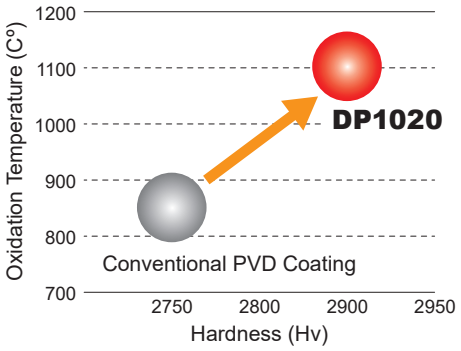
Single step point angle provides accuracy and good entry for the drill in the hole machining process.

Coated Grade DP1020

DP1020 grade offers excellent wear resistance and reduced friction for longer tool life over a wide range of applications.



With Accumulated Al-Ti-Cr-N Based PVD Coating



Designed Especially for CNC Automatic Lathes

Diverse lineup of shanks compatible with ER collets.

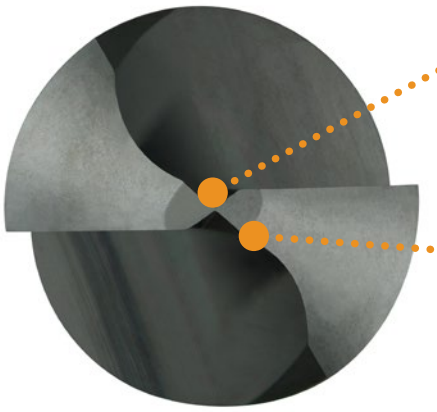
DCON(Connection Diameter)	ø5mm＝ER8
DCON	ø7mm＝ER11

Solid Carbide Drills for Centering and Chamfering

Leading Drill Series

DLE

SIG 90° Mini Size ø1.0 mm—ø2.5 mm



Point Thinning Geometry

The chip evacuation space in the centre improves the initial bite and ensures good finished hole positional accuracy.

Two-step Point Angles

Two-step point angles ensure strength at the centre and prevent sudden fracturing.

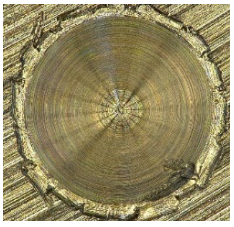
*The central area will not have a 90° hole bottom.

Unique Cutting Edge Shape

Large rake angle and sharp cutting edges can minimize the generation of burrs.

SUS304
Cutting Example

DLE



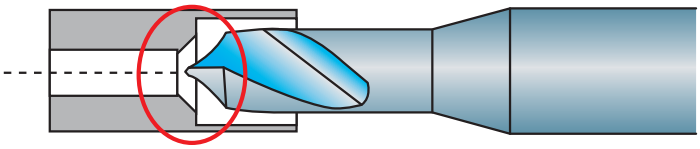
Conventional

New **DP102A** Carbide Grade Excellent Lubricity and Heat Resistance

The PVD-coated carbide grade DP102A has excellent lubricity and heat resistance. It displays outstanding wear resistance especially at low to medium cutting speeds.

Long-neck Design

Long neck permits chamfering inside deep holes.



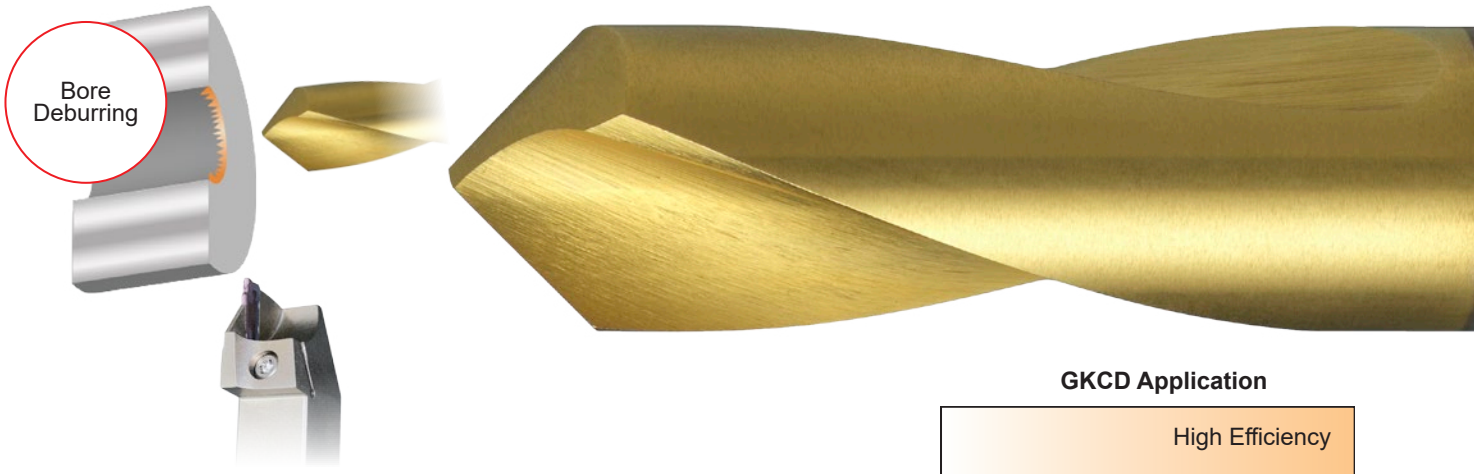
Cobalt HSS Solid Drills for Centering and Chamfering

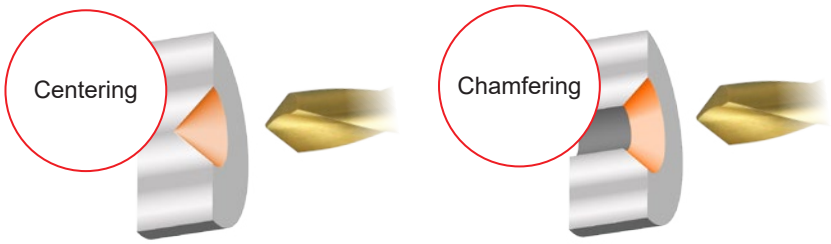
Leading Drill Series

GKCD

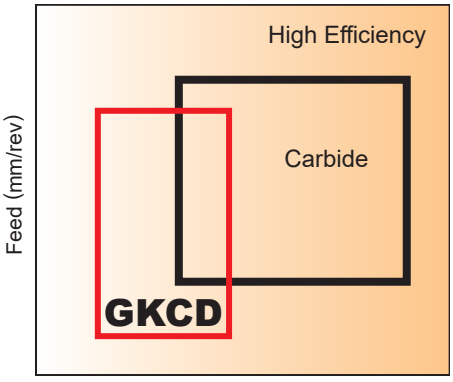
HSS Cobalt material is used for its excellent heat, wear and chipping resistance and is ideal for use over a wide range of materials, from carbon through to stainless steels. Achieves an excellent cost performance ratio on low feed and speed applications.

Point Angle SIG 60° 90° 120°

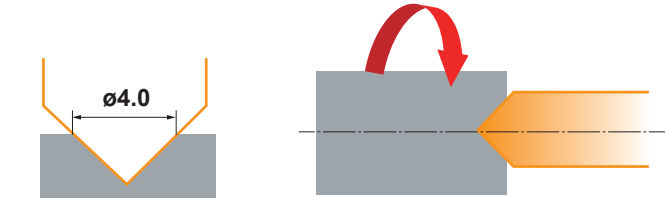




GKCD Application

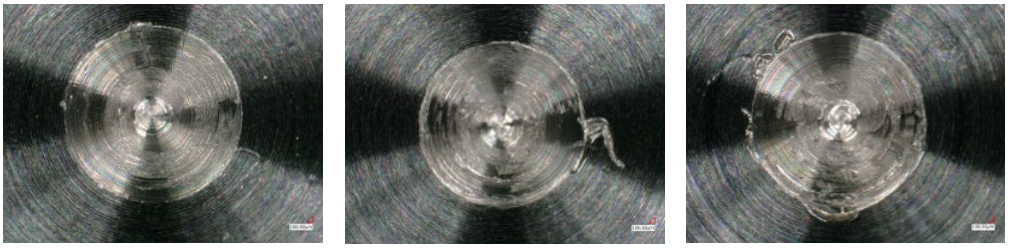


Cutting Performance



Cutting Speed : 12.6m/min

<Cutting Conditions>
Work Material : JIS SUS304
Drill : GKCDD060P090 (ø6x90°)
Revolution : n= 1000 min^{-1}
Feed : vf= 50mm/min
Cutting Depth : 4.0mm
Cutting Mode : Wet Cutting
External Coolant (Oil)
Machine : Small Lathe



GKCD Conventional A Conventional B

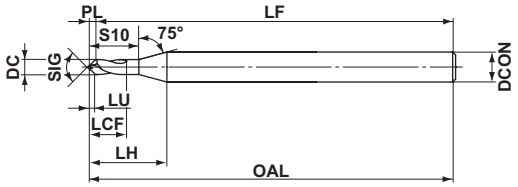
Solid Drills for Centering and Chamfering

DLE

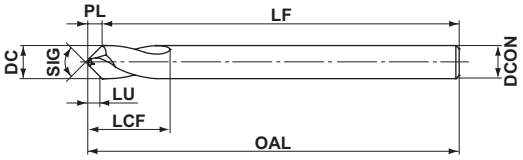
Leading Drill Series, Cemented Carbide, Point Angle 60° 90°

P M K N S H

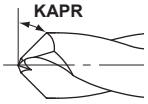
External Coolant



Type1



Type2



h7	DCON=3	3 < DCON ≤ 6	6 < DCON ≤ 10	10 < DCON ≤ 16
	0 −0.010	0 −0.012	0 −0.015	0 −0.018

(mm)

	DC	SIG	DP1020	DP102A	Order Number	LU	LCF	LH	S10	OAL	LF	PL	KAPR	DCON	Fig.
	3.0	60°	●		**DLE0300S030P060**	2.0	9	—	—	45	42.9	2.1	60°	3	2
	4.0	60°	●		**DLE0400S040P060**	2.7	12	—	—	50	47.2	2.8	60°	4	2
	5.0	60°	●		**DLE0500S050P060**	3.4	14	—	—	60	56.5	3.5	60°	5	2
	6.0	60°	●		**DLE0600S060P060**	4.0	15	—	—	66	61.8	4.2	60°	6	2
	7.0	60°	●		**DLE0700S070P060**	4.7	18	—	—	74	69.1	4.9	60°	7	2
	8.0	60°	●		**DLE0800S080P060**	5.4	20	—	—	74	68.4	5.6	60°	8	2
	10.0	60°	●		**DLE1000S100P060**	6.8	24	—	—	84	77.0	7.0	60°	10	2
	12.0	60°	●		**DLE1200S120P060**	8.1	28	—	—	95	86.6	8.4	60°	12	2
NEW	1.0	90°		●	**DLE0100S030P090**	0.35	2	6.7	3.0	45	44.6	0.4	45°	3	1
NEW	1.5	90°		●	**DLE0150S030P090**	0.55	3	7.3	4.5	45	44.4	0.6	45°	3	1
NEW	2.0	90°		●	**DLE0200S030P090**	0.80	4	7.9	6.1	45	44.1	0.9	45°	3	1
NEW	2.5	90°		●	**DLE0250S030P090**	1.00	5	7.9	7.1	45	43.9	1.1	45°	3	1
	3.0	90°	●		**DLE0300S030P090**	1.2	9	—	—	45	43.7	1.3	45°	3	2
	4.0	90°	●		**DLE0400S040P090**	1.6	12	—	—	50	48.3	1.7	45°	4	2
	5.0	90°	●		**DLE0500S050P090**	2.0	14	—	—	60	57.9	2.1	45°	5	2
	6.0	90°	●		**DLE0600S060P090**	2.4	15	—	—	66	63.4	2.6	45°	6	2
	7.0	90°	●		**DLE0700S070P090**	2.8	18	—	—	74	71.0	3.0	45°	7	2
	8.0	90°	●		**DLE0800S080P090**	3.2	20	—	—	74	70.6	3.4	45°	8	2
	10.0	90°	●		**DLE1000S100P090**	4.1	24	—	—	84	79.7	4.3	45°	10	2
	12.0	90°	●		**DLE1200S120P090**	4.9	28	—	—	95	89.9	5.1	45°	12	2
	16.0	90°	●		**DLE1600S160P090**	6.6	35	—	—	113	106.2	6.8	45°	16	2

Note 1) The central area of holes (approx 25% of the full diameter) formed by two step point angles will not have their respective 60º and 90º angles. Chamfering is also not possible in the centre areas.

Note 2) The centering diameter should be less than the drill diameter (processing diameter) **DC** and the usable length **LU** should be referred to as a guideline.

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

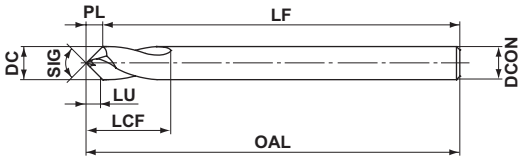
● : **Inventory maintained in Japan.**

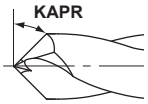
DLE

Leading Drill Series, Cemented Carbide, Point Angle 120° 145°

P M K N S H

External Coolant





h7	DCON=3	3 < DCON ≤ 6	6 < DCON ≤ 10	10 < DCON ≤ 16
	0 −0.010	0 −0.012	0 −0.015	0 −0.018

(mm)

	DC	SIG	DP1020	Order Number	LU	LCF	OAL	LF	PL	KAPR	DCON
	3.0	120°	●	**DLE0300S030P120**	0.8	9	45	44.1	0.9	30°	3
	4.0	120°	●	**DLE0400S040P120**	1.1	12	50	48.8	1.2	30°	4
	5.0	120°	●	**DLE0500S050P120**	1.3	14	60	58.6	1.4	30°	5
	6.0	120°	●	**DLE0600S060P120**	1.6	15	66	64.3	1.7	30°	6
	7.0	120°	●	**DLE0700S070P120**	1.9	18	74	72.0	2.0	30°	7
	8.0	120°	●	**DLE0800S080P120**	2.2	20	74	71.7	2.3	30°	8
	10.0	120°	●	**DLE1000S100P120**	2.8	24	84	81.1	2.9	30°	10
	12.0	120°	●	**DLE1200S120P120**	3.3	28	95	91.5	3.5	30°	12
	3.0	145°	●	**DLE0300S030P145**	0.4	9	45	44.5	0.5	17.5°	3
	4.0	145°	●	**DLE0400S040P145**	0.5	12	50	49.4	0.6	17.5°	4
	5.0	145°	●	**DLE0500S050P145**	0.7	14	60	59.2	0.8	17.5°	5
	6.0	145°	●	**DLE0600S060P145**	0.8	15	66	65.1	0.9	17.5°	6
	7.0	145°	●	**DLE0700S070P145**	1.0	18	74	72.9	1.1	17.5°	7
	8.0	145°	●	**DLE0800S080P145**	1.1	20	74	72.7	1.3	17.5°	8
NEW	10.0	145°	●	**DLE1000S100P145**	1.4	24	84	82.4	1.6	17.5°	10
NEW	12.0	145°	●	**DLE1200S120P145**	1.7	28	95	93.1	1.9	17.5°	12

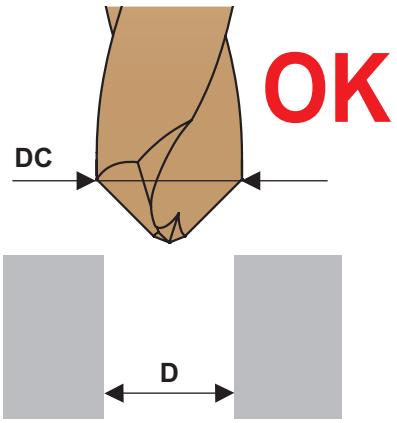
Note 1) The centering diameter should be less than the drill diameter (processing diameter) **DC** and the usable length **LU** should be referred to as a guideline.

DC = Cutting Diameter
LU = Usable Length
LCF = Length Chip Flute
OAL = Overall Length
LF = Functional Length
PL = Point Length
DCON = Connection Diameter
SIG = Point Angle

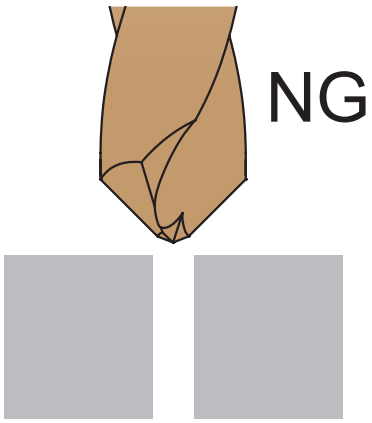
Drill Diameter Selection

When Chamfering

With respect to guide hole diameter **D**, select the drill diameter (cutting diameter) **DC** to be within the range of **D** < **DC** < 2**D**.

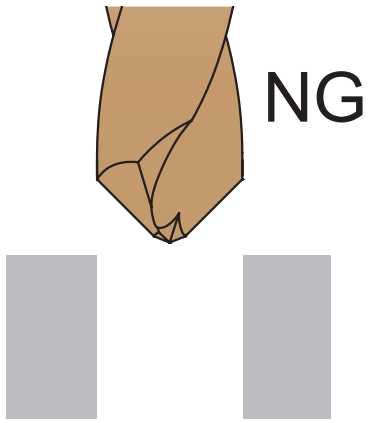


Example) If guide hole diameter **D** is 5 mm: Drill diameter **DC** should be greater than 6 mm but less than 10 mm. Select a **DC** of 6 mm, 7 mm, or 8 mm.



If DC is equal to or greater than 2D:

If drill diameter **DC** is too large compared to guide hole diameter **D** (equal to or greater than 2**D**), chamfering cannot be performed.

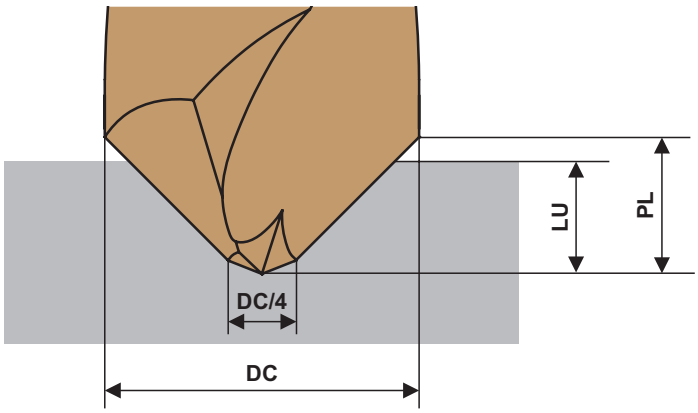


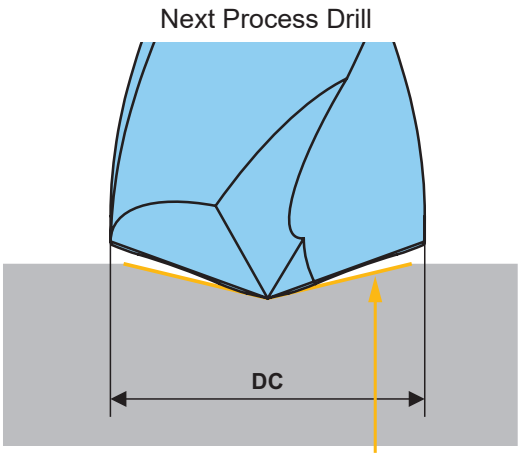
If DC is a drill diameter equal to D:

Chamfering cannot be performed if drill diameter **DC** is the same as guide hole diameter **D**.

When Centering

The centering diameter should be less than the drill diameter (processing diameter) **DC** and the usable length **LU** should be referred to as a guideline.
The central area of holes (approx 25% of the full diameter) formed by two step point angles will not have their respective 60º and 90º angles. Chamfering is also not possible in the centre areas.
Select a centering drill with a larger point angle than the final hole drill if is desired to make initial contact with the centre.

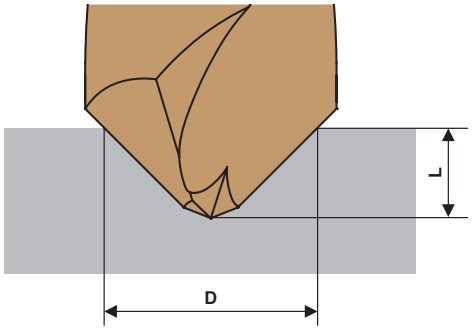




Centering of Point Angle SIG145°

DLE

Drilling Depth (L) Chart by Tool Diameter



DC	SIG 90°			
	Min.		Max.	
	D	L	D	L
1.0	0.5	0.18	0.8	0.33
1.5	0.8	0.29	1.3	0.54
2.0	1.0	0.35	1.9	0.80
2.5	1.3	0.47	2.4	1.00
3.0	1.5	0.5	2.8	1.2
4.0	2.0	0.7	3.8	1.6
5.0	2.5	0.9	4.7	2.0
6.0	3.0	1.1	5.7	2.4
7.0	3.5	1.2	6.6	2.8
8.0	4.0	1.4	7.6	3.2
10.0	5.0	1.8	9.7	4.1
12.0	6.0	2.1	11.6	4.9
16.0	8.0	2.8	15.5	6.6

DC	SIG 60°				SIG 120°				SIG 145°			
	Min.		Max.		Min.		Max.		Min.		Max.	
	D	L	D	L	D	L	D	L	D	L	D	L
3.0	1.5	0.8	2.9	2.0	1.5	0.4	2.8	0.8	1.5	0.2	2.5	0.4
4.0	2.0	1.1	3.9	2.7	2.0	0.6	3.8	1.1	2.0	0.3	3.2	0.5
5.0	2.5	1.3	4.9	3.4	2.5	0.7	4.5	1.3	2.5	0.4	4.4	0.7
6.0	3.0	1.6	5.8	4.0	3.0	0.9	5.5	1.6	3.0	0.5	5.1	0.8
7.0	3.5	1.9	6.8	4.7	3.5	1.0	6.6	1.9	3.5	0.6	6.3	1.0
8.0	4.0	2.1	7.8	5.4	4.0	1.2	7.6	2.2	4.0	0.6	7.0	1.1
10.0	5.0	2.7	9.8	6.8	5.0	1.4	9.7	2.8	5.0	0.8	8.9	1.4
12.0	6.0	3.2	11.6	8.1	6.0	1.7	11.4	3.3	6.0	0.9	10.8	1.7

Point Angle SIG 60°

Recommended Cutting Conditions

(mm)

Work Material	Mild Steels (≤180HB) JIS SS400, S10C etc.		Carbon Steels, Alloy Steels (180−280HB) JIS S45C, SCM440 etc.		Carbon Steels, Alloy Steels (280−350HB) JIS SNCM439 etc.	
DC	**n** (min^{-1})	**fr** (Min.−Max.) (mm/rev)	**n** (min^{-1})	**fr** (Min.−Max.) (mm/rev)	**n** (min^{-1})	**fr** (Min.−Max.) (mm/rev)
3	7900	0.05(0.03−0.07)	6800	0.05 (0.03−0.07)	6300	0.04 (0.02−0.06)
4	5900	0.05(0.03−0.07)	5100	0.05 (0.03−0.07)	4700	0.04 (0.02−0.06)
5	5000	0.06(0.04−0.08)	4400	0.06 (0.04−0.08)	4100	0.05 (0.03−0.07)
6	4200	0.06(0.04−0.08)	3700	0.06 (0.04−0.08)	3400	0.05 (0.03−0.07)
7	3600	0.07(0.04−0.09)	3100	0.07 (0.04−0.09)	2900	0.05 (0.03−0.07)
8	3100	0.07(0.04−0.09)	2700	0.07 (0.04−0.09)	2500	0.05 (0.03−0.07)
10	2700	0.08(0.04−0.10)	2300	0.08 (0.04−0.10)	2200	0.06 (0.03−0.08)
12	2200	0.08(0.04−0.10)	1900	0.08 (0.04−0.10)	1800	0.06 (0.03−0.08)

Work Material	Austenitic Stainless Steels (≤200HB) JIS SUS304, SUS316 etc.		Gray Cast Irons (≤350MPa) JIS FC300 etc.		Ductile Cast Irons (≤450MPa) JIS FCD450 etc.	
DC	**n** (min^{-1})	**fr** (Min.−Max.) (mm/rev)	**n** (min^{-1})	**fr** (Min.−Max.) (mm/rev)	**n** (min^{-1})	**fr** (Min.−Max.) (mm/rev)
3	1500	0.03 (0.01−0.05)	7900	0.05 (0.03−0.07)	5800	0.05 (0.03−0.07)
4	1100	0.03 (0.01−0.05)	5900	0.05 (0.03−0.07)	4300	0.05 (0.03−0.07)
5	1200	0.04 (0.02−0.06)	5000	0.06 (0.04−0.08)	3800	0.06 (0.04−0.08)
6	1000	0.04 (0.02−0.06)	4200	0.06 (0.04−0.08)	3100	0.06 (0.04−0.08)
7	900	0.04 (0.02−0.06)	3600	0.07 (0.04−0.09)	2700	0.06 (0.04−0.08)
8	790	0.04 (0.02−0.06)	3100	0.07 (0.04−0.09)	2300	0.06 (0.04−0.08)
10	630	0.04 (0.02−0.06)	2700	0.08 (0.04−0.10)	1900	0.07 (0.04−0.09)
12	530	0.04 (0.02−0.06)	2200	0.08 (0.04−0.10)	1500	0.07 (0.04−0.09)

Note 1) Use a tool larger (**DC**) than the centre hole required but less than 2 x **DC**.
Note 2) When centering into curved or inclined surfaces, please reduce the feed rate.
Note 3) When V-grooving and chamfering, please reduce cutting conditions.
Note 4) When chatter vibration or abnormal noise is generated, please shorten the dwell time or reduce the revolutions.
Note 5) When centering, please do not exceed the **LU** (usable length).

■ Operational Guidance

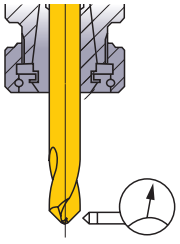
Drill Holding

Collet chuck holds the drill securely.

Drill Length

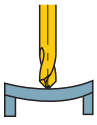
Do not clamp on the flutes.

Installation Tolerance

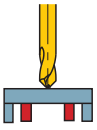


Run-out ≤ 0.03mm

Thin Workpiece

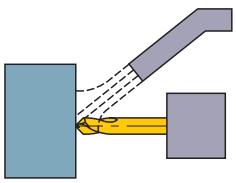


NG
If Bending Occurs



OK
Support the Workpiece

Coolant Method



Coolant positions,at the end at the centre are ideal.

Point Angle SIG 90°, 120° and 145°

Recommended Cutting Conditions

(mm)

Work Material	Mild Steels (≤180HB) JIS SS400, S10C etc.		Carbon Steels, Alloy Steels (180−280HB) JIS S45C, SCM440 etc.		Carbon Steels, Alloy Steels (280−350HB) JIS SNCM439 etc.	
DC	**n** (min^{-1})	**fr** (Min.−Max.) (mm/rev)	**n** (min^{-1})	**fr** (Min.−Max.) (mm/rev)	**n** (min^{-1})	**fr** (Min.−Max.) (mm/rev)
1.0	9500	0.02 (0.01−0.03)	6300	0.02 (0.01−0.03)	4700	0.02 (0.01−0.03)
1.5	9500	0.02 (0.01−0.03)	7400	0.02 (0.01−0.03)	6300	0.02 (0.01−0.03)
2.0	9500	0.04 (0.03−0.05)	7900	0.04 (0.03−0.05)	7100	0.04 (0.03−0.05)
2.5	9500	0.04 (0.03−0.05)	8200	0.04 (0.03−0.05)	7600	0.04 (0.03−0.05)
3.0	7900	0.06 (0.04−0.08)	6800	0.06 (0.04−0.08)	6300	0.05 (0.03−0.07)
4.0	5900	0.06 (0.04−0.08)	5100	0.06 (0.04−0.08)	4700	0.05 (0.03−0.07)
5.0	5000	0.07 (0.05−0.09)	4400	0.07 (0.05−0.09)	4100	0.06 (0.04−0.08)
6.0	4200	0.07 (0.05−0.09)	3700	0.07 (0.05−0.09)	3400	0.06 (0.04−0.08)
7.0	3600	0.08 (0.05−0.10)	3100	0.08 (0.05−0.10)	2900	0.06 (0.04−0.08)
8.0	3100	0.08 (0.05−0.10)	2700	0.08 (0.05−0.10)	2500	0.06 (0.04−0.08)
10.0	2700	0.09 (0.05−0.11)	2300	0.09 (0.05−0.11)	2200	0.07 (0.04−0.09)
12.0	2200	0.09 (0.05−0.11)	1900	0.09 (0.05−0.11)	1800	0.07 (0.04−0.09)
16.0	1700	0.12 (0.10−0.14)	1500	0.12 (0.10−0.14)	1400	0.08 (0.06−0.10)

Work Material	Austenitic Stainless Steels (≤200HB) JIS SUS304, SUS316 etc.		Gray Cast Irons (≤350MPa) JIS FC300 etc.		Ductile Cast Irons (≤450MPa) JIS FCD450 etc.	
DC	**n** (min^{-1})	**fr** (Min.−Max.) (mm/rev)	**n** (min^{-1})	**fr** (Min.−Max.) (mm/rev)	**n** (min^{-1})	**fr** (Min.−Max.) (mm/rev)
1.0	6300	0.01 (0.005−0.015)	9500	0.02 (0.01−0.03)	3100	0.02 (0.01−0.03)
1.5	4200	0.01 (0.005−0.015)	9500	0.02 (0.01−0.03)	5300	0.02 (0.01−0.03)
2.0	3100	0.04 (0.03−0.05)	9500	0.04 (0.03−0.05)	6300	0.04 (0.03−0.05)
2.5	2500	0.04 (0.03−0.05)	9500	0.04 (0.03−0.05)	7000	0.04 (0.03−0.05)
3.0	2100	0.04 (0.02−0.06)	7900	0.06 (0.04−0.08)	5800	0.06 (0.04−0.08)
4.0	1600	0.04 (0.02−0.06)	5900	0.06 (0.04−0.08)	4300	0.06 (0.04−0.08)
5.0	1200	0.06 (0.04−0.08)	5000	0.07 (0.05−0.09)	3800	0.07 (0.05−0.09)
6.0	1000	0.06 (0.04−0.08)	4200	0.07 (0.05−0.09)	3100	0.07 (0.05−0.09)
7.0	900	0.06 (0.04−0.08)	3600	0.08 (0.05−0.10)	2700	0.07 (0.05−0.09)
8.0	790	0.06 (0.04−0.08)	3100	0.08 (0.05−0.10)	2300	0.07 (0.05−0.09)
10.0	630	0.06 (0.04−0.08)	2700	0.09 (0.05−0.11)	1900	0.08 (0.05−0.10)
12.0	530	0.06 (0.04−0.08)	2200	0.09 (0.05−0.11)	1500	0.08 (0.05−0.10)
16.0	390	0.08 (0.06−0.10)	1700	0.12 (0.10−0.14)	1100	0.11 (0.09−0.13)

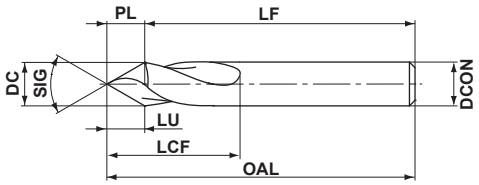
Note 1) Use a tool larger (**DC**) than the centre hole required but less than 2 x **DC**.
Note 2) When centering into curved or inclined surfaces, please reduce the feed rate.
Note 3) When V-grooving and chamfering, please reduce cutting conditions.
Note 4) When chatter vibration or abnormal noise is generated, please shorten the dwell time or reduce the revolutions.
Note 5) When centering, please do not exceed the **LU** (usable length).

Solid Drills for Centering and Chamfering

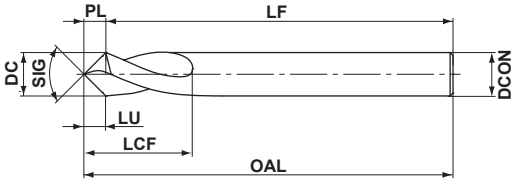
GKCD NEW

Leading Drill Series, Cobalt HSS, Point Angle 60° 90° 120°

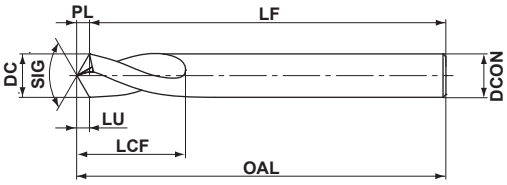
P M K N S H



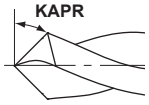
Type1



Type2



Type3



(mm)

DC	SIG	Stock	Order Number	LU	LCF	OAL	LF	PL	KAPR	DCON	Fig.
3.0	60°	●	**GKCDD030P060**	2.4	10	50	47.4	2.6	60°	3	1
4.0	60°	●	**GKCDD040P060**	3.3	12	52	48.5	3.4	60°	4	1
5.0	60°	●	**GKCDD050P060**	4.1	15	60	55.6	4.3	60°	5	1
6.0	60°	●	**GKCDD060P060**	4.9	20	66	60.8	5.2	60°	6	1
8.0	60°	●	**GKCDD080P060**	6.6	25	79	72.0	6.9	60°	8	1
10.0	60°	●	**GKCDD100P060**	8.3	25	89	80.3	8.6	60°	10	1
12.0	60°	●	**GKCDD120P060**	9.9	30	102	91.6	10.4	60°	12	1
3.0	90°	●	**GKCDD030P090**	1.4	10	50	48.5	1.5	45°	3	2
4.0	90°	●	**GKCDD040P090**	1.9	12	52	50.0	2.0	45°	4	2
5.0	90°	●	**GKCDD050P090**	2.4	15	60	57.5	2.5	45°	5	2
6.0	90°	●	**GKCDD060P090**	2.8	20	66	63.0	3.0	45°	6	2
8.0	90°	●	**GKCDD080P090**	3.8	25	79	75.0	4.0	45°	8	2
10.0	90°	●	**GKCDD100P090**	4.8	25	89	84.0	5.0	45°	10	2
12.0	90°	●	**GKCDD120P090**	5.7	30	102	96.0	6.0	45°	12	2
16.0	90°	●	**GKCDD160P090**	7.7	35	115	107.0	8.0	45°	16	2
20.0	90°	●	**GKCDD200P090**	9.6	40	131	121.0	10.0	45°	20	2
3.0	120°	●	**GKCDD030P120**	0.8	10	50	49.1	0.8	30°	3	3
4.0	120°	●	**GKCDD040P120**	1.1	12	52	50.8	1.1	30°	4	3
6.0	120°	●	**GKCDD060P120**	1.6	20	66	64.2	1.7	30°	6	3
8.0	120°	●	**GKCDD080P120**	2.2	25	79	76.7	2.3	30°	8	3
10.0	120°	●	**GKCDD100P120**	2.7	25	89	86.2	2.8	30°	10	3
12.0	120°	●	**GKCDD120P120**	3.3	30	102	98.6	3.4	30°	12	3

DC = Cutting Diameter
LU = Usable Length
LCF = Length Chip Flute
OAL = Overall Length
LF = Functional Length
PL = Point Length
DCON = Connection Diameter
SIG = Point Angle

● : **Inventory maintained in Japan.**

Recommended Cutting Conditions

(mm)

Work Material	Mild Steels (≤180HB) JIS SS400, S10C etc.		Carbon Steels, Alloy Steels (180−280HB) JIS S45C, SCM440 etc.		Carbon Steels, Alloy Steels (280−350HB) JIS SNCM439 etc.	
DC	**n** (min^{-1})	**fr** (mm/rev)	**n** (min^{-1})	**fr** (mm/rev)	**n** (min^{-1})	**fr** (mm/rev)
3.0	3800	0.06	2400	0.06	1200	0.04
4.0	2900	0.08	1800	0.08	910	0.05
5.0	2300	0.10	1400	0.10	730	0.05
6.0	1900	0.10	1200	0.10	610	0.06
8.0	1400	0.12	900	0.12	450	0.08
10.0	1100	0.15	710	0.15	360	0.10
12.0	950	0.15	600	0.15	300	0.12
16.0	720	0.20	450	0.20	220	0.16
20.0	560	0.25	360	0.20	180	0.20

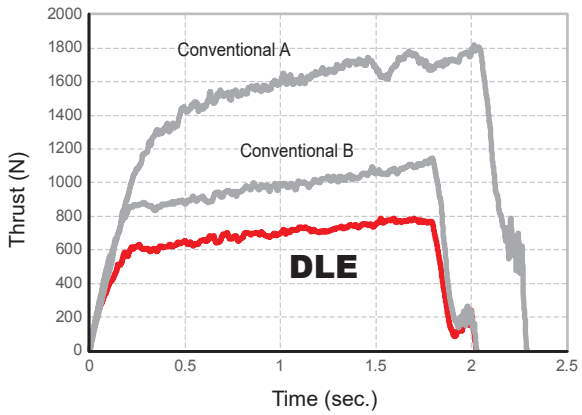
Work Material	Austenitic Stainless Steels (≤200HB) JIS SUS304, SUS316 etc.		Gray Cast Irons (≤350MPa) JIS FC300 etc.		Ductile Cast Irons (≤450MPa) JIS FCD450 etc.	
DC	**n** (min^{-1})	**fr** (mm/rev)	**n** (min^{-1})	**fr** (mm/rev)	**n** (min^{-1})	**fr** (mm/rev)
3.0	1100	0.06	3800	0.06	2600	0.06
4.0	800	0.08	2900	0.08	1900	0.08
5.0	640	0.10	2300	0.10	1500	0.08
6.0	530	0.10	1900	0.10	1300	0.08
8.0	400	0.12	1400	0.12	990	0.10
10.0	320	0.15	1100	0.15	790	0.13
12.0	270	0.15	950	0.15	660	0.13
16.0	200	0.20	720	0.20	490	0.18
20.0	160	0.25	560	0.25	390	0.22

Note 1) When chamfering a circumference of a guide hole, make sure that the tool diameter(**DC**) is **D** <**DC** <2**D**.
Note 2) When centering into curved or inclined surfaces, please reduce the feed rate.
Note 3) When chamfering, please reduce cutting conditions.
Note 4) When chatter vibration or abnormal noise is generated, please shorten the dwell time or reduce the revolutions.
Note 5) When centering, please do not exceed the **LU** (usable length).
Note 6) When chamfering with a large diameter tool, please select cutting speed according to actual cutting diameter.

Cutting Performance

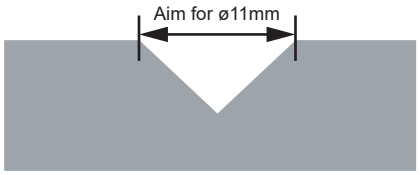
Comparison of Cutting Performance during Centering

Ideal for low power applications.



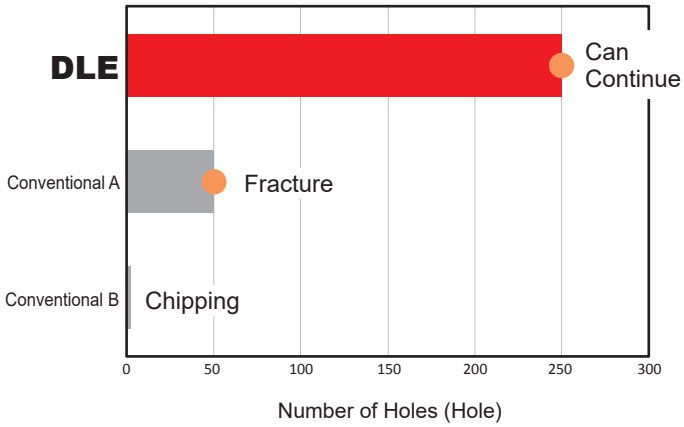
*Differences along the time axis are a result of differences in processing depth.

<Cutting Conditions>
Work Material : JIS S45C
Drill : DLE1200S120P090 ø12
Cutting Speed : vc = 60 m/min
Feed per Rev. : fr = 0.06 mm/rev
Cutting Mode : Wet Cutting
External Coolant
(Chlorine Free Emulsion)
Machine : Vertical MC

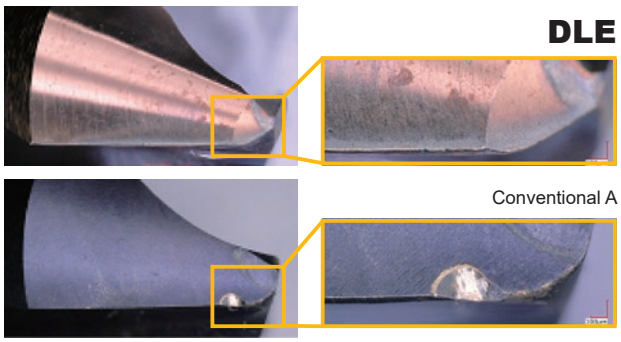


Comparison of Tool Life when Machining JIS SUS304

The two step point angles together with the negative cutting edge and thinned point provide outstanding durability with no abnormal wear.

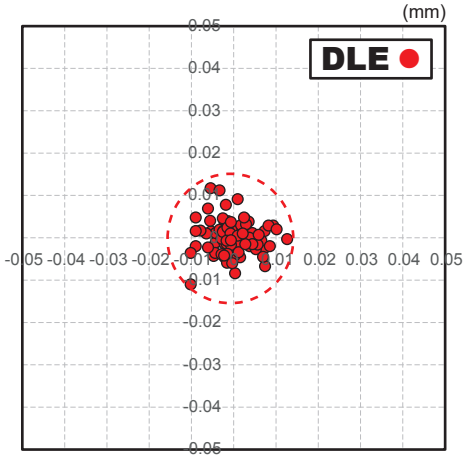


<Cutting Conditions>
Work Material : JIS SUS304
Drill : DLE0600S060P090
Cutting Speed : vc = 25 m/min
Feed per Rev. : fr = 0.06 mm/rev
Hole Depth : Aim for hole dia. ø5 mm
Cutting Mode : Wet Cutting
External Coolant
(Water-insoluble Coolants)
Machine : Small Automatic Lathes



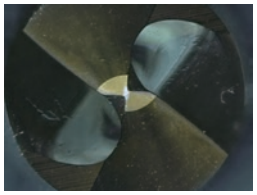
Precise Centre Hole Positioning in JIS SUS420J2

Machining stainless steels is likely to create abnormal damage caused by a built up edge. DLE displayed a longer tool life compared to conventional products.



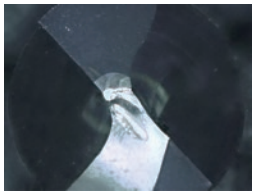
<Cutting Conditions>
Work Material : JIS SUS420J2
Drill : DLE0600S060P090
Cutting Speed : vc = 15 m/min
Feed per Rev. : fr = 0.04 mm/rev
Hole Depth : Aim for hole dia. ø5.5mm
Cutting Mode : Wet Cutting
External Coolant
(Chlorine Free Emulsion)
Machine : Vertical MC

DLE



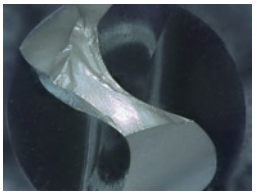
After 90 Holes

Conventional A



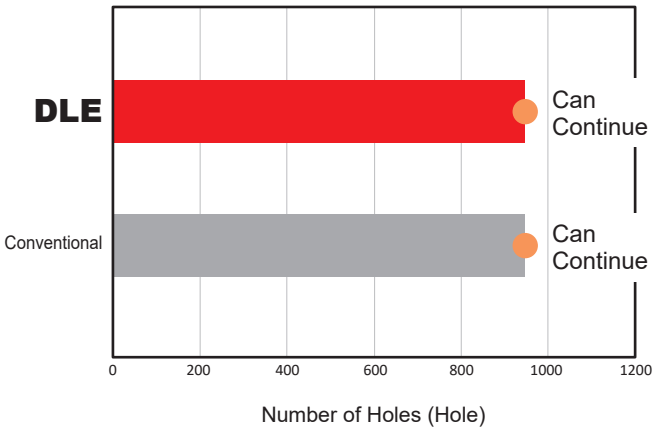
Measurement impossible due to early fracture

Conventional B



Measurement impossible due to early fracture

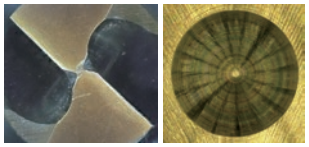
Comparison of Tool Life when Machining JIS SUS304 : Point Angle 120°



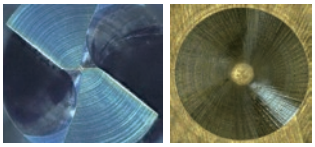
<Cutting Conditions>
Work Material : JIS SUS304
Drill : DLE0600S060P120
Cutting Speed : vc=20m/min
Feed per Rev. : fr=0.06mm/rev

Hole Depth : Aim for hole dia. ø5.5mm
Cutting Mode : Wet Cutting
External Coolant
(Water-insoluble Coolants)
Machine : Vertical MC

DLE

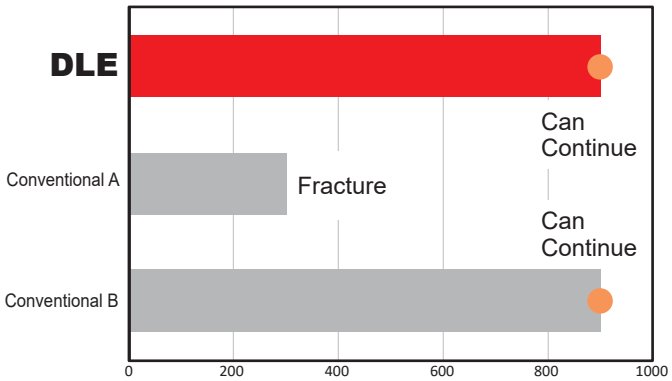


Conventional



Vibration occurred.
Poor surface quality
(Rough surface).

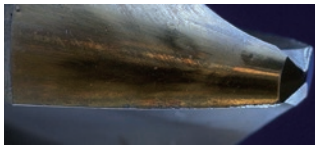
Comparison of Tool Life when Machining JIS SUS304 : Point Angle 60°



<Cutting Conditions>
Work Material : JIS SUS304
Drill : DLE0600S060P060
Cutting Speed : vc=15m/min
Feed per Rev. : fr=0.02mm/rev

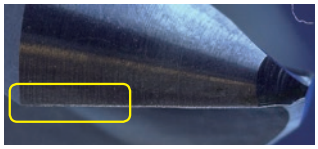
Hole Depth : Aim for hole dia. ø5.5mm
Cutting Mode : Wet Cutting
External Coolant
(Chlorine Free Emulsion)
Machine : Vertical MC

DLE



Initial Wear

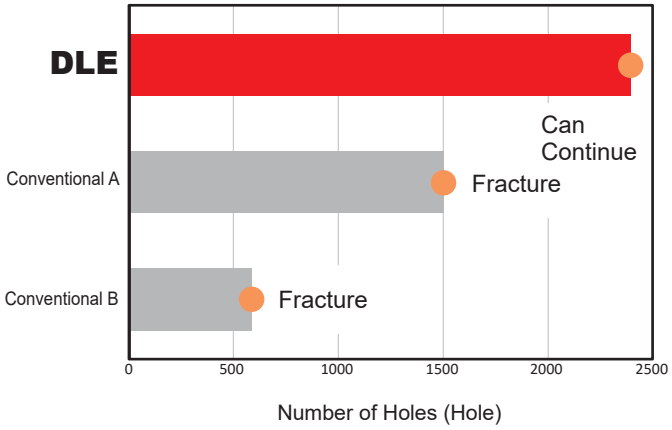
Conventional B



Fine chipping on the outer cutting edge.

Comparison of Tool Life when Machining JIS SUS304 : Point Angle 90° (small-diameter ø2mm)

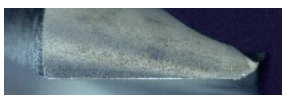
When machining stainless steel, DLE drills gave longer tool life due to excellent heat and boundary wear resistance.



<Cutting Conditions>
Work Material : JIS SUS304
Drill : DLE0200S030P090
Cutting Speed : vc=30m/min
Feed per Rev. : fr=0.045mm/rev

Cutting Mode : Wet Cutting
External Coolant
(Water-soluble Coolants)
Machine : Vertical MC

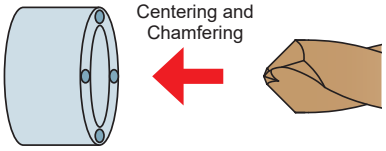
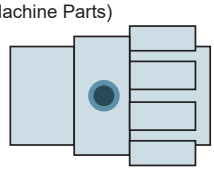
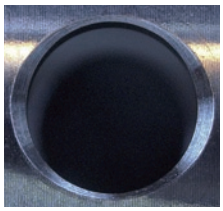
DLE
After 2400 holes machining

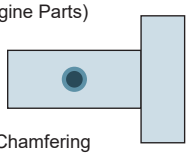
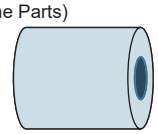
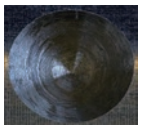


Conventional A
After 1500 holes drilling

Conventional B
After 600 holes drilling

Application Example

Drill		DLE0400S040P090	DLE0600S060P090
Workpiece		JIS S10C (Equipment Parts)  	JIS SUS304 (Machine Parts)  Centering and Chamfering
Cutting Conditions	Cutting Speed **vc**(m/min)	30	25
	Feed per Rev. **fr**(mm/rev)	0.045	0.05
	Guide Hole Dia. (mm)	ø3	ø5
Cutting Mode		Wet Cutting External Coolant (Chlorine Free Emulsion)	Wet Cutting External Coolant (Water-insoluble)
Machine		NC Lathe, With Driven Tooling	CNC Automatic Lathe
Results		 Burrs are suppressed Compared to conventional products, DLE gave a longer than expected tool life and created less burrs.	 More than 200 holes Good surface finishes and no tool damage Conventional products tended to chip, DLE was more stable and machined 200 holes with no cutting edge damage.

Drill		DLE0300S030P090	DLE0200S030P090
Workpiece		JIS SUS303 (Engine Parts)  Centering and Chamfering	JIS SUS303 (Engine Parts)  Centering of ø0.6 mm hole
Cutting Conditions	Cutting Speed **vc**(m/min)	25	38
	Feed per Rev. **fr**(mm/rev)	0.04	0.02
	Guide Hole Dia. (mm)	ø2.0	ø0.6
Cutting Mode		Wet Cutting External Coolant (Water-insoluble) Curved Surface	Wet Cutting External Coolant (Water-insoluble)
Machine		CNC Automatic Lathe	CNC Automatic Lathe
Results		**DLE**  Conventional  After 60 Holes　After 1 Hole While the conventional product generated burrs after drilling 1 hole, DLE achieved good surface quality with no sudden fractures even after drilling 60 holes.	Comparison of Rake Faces after centering **DLE** Conventional   60000 holes　30000 holes DLE had a tool life twice as long as the conventional product, and was able to carry out cutting with no fractures.

The details above are customer samples and therefore can differ from the recommended conditions.

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.

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(Tools specifications subject to change without notice.)

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