DIA EDGE

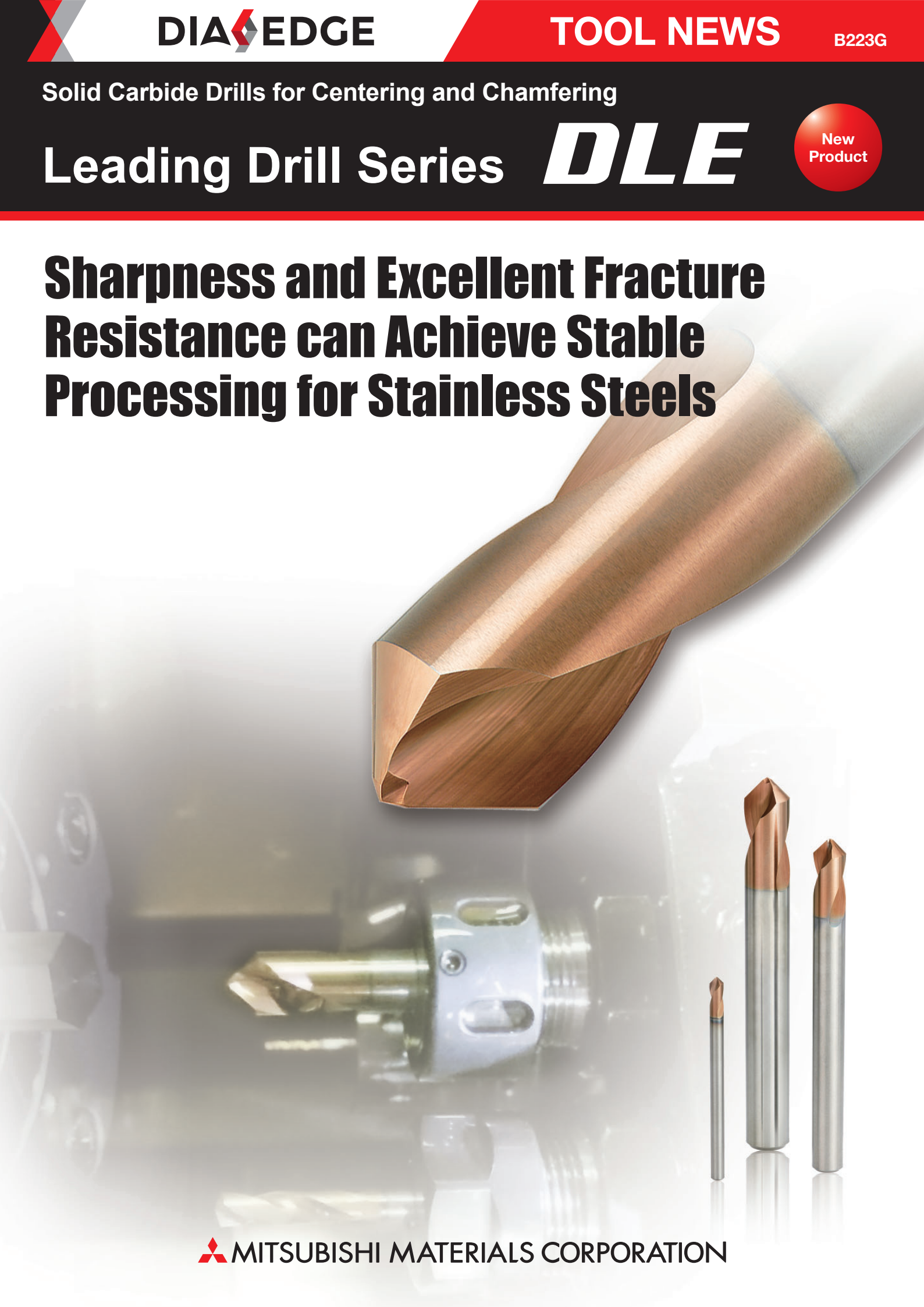
TOOL NEWS B223G

Solid Carbide Drills for Centering and Chamfering

Leading Drill Series DLE

New Product

Sharpness and Excellent Fracture Resistance can Achieve Stable Processing for Stainless Steels

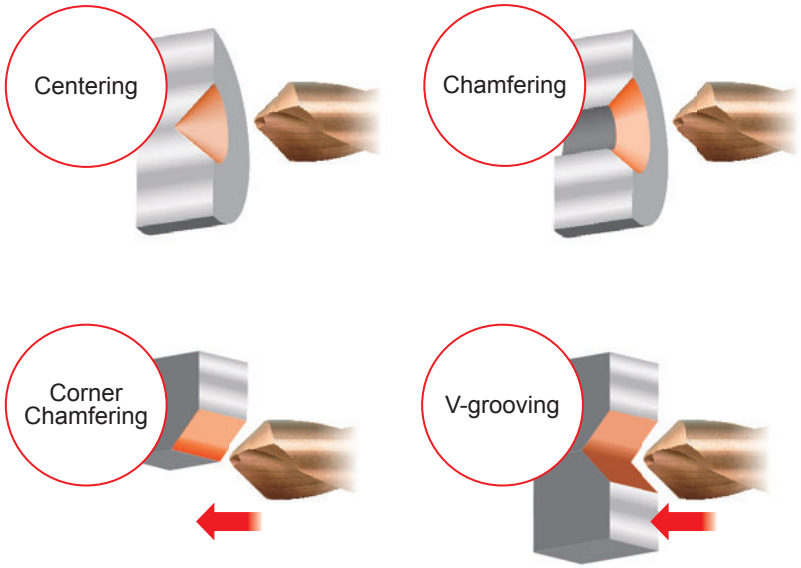


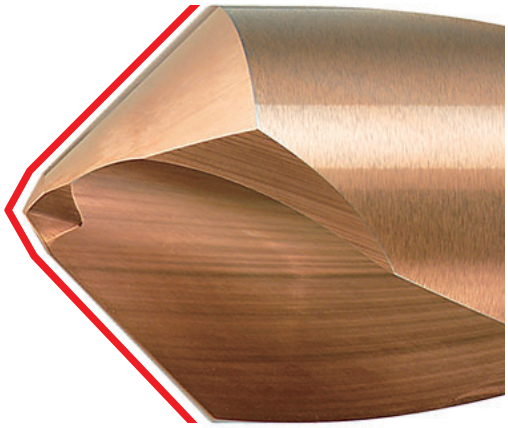
MITSUBISHI MATERIALS CORPORATION

Solid Carbide Drills for Centering and Chamfering

Leading Drill Series DLE

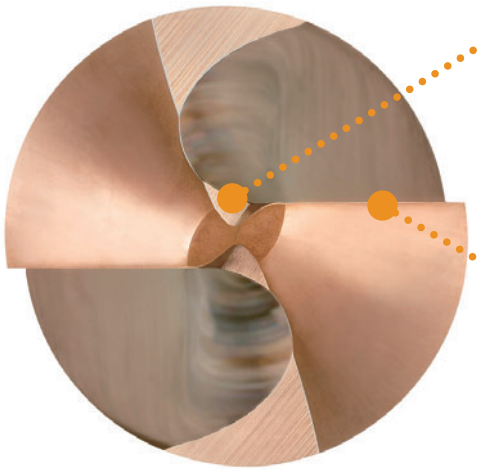
Completes strict standards for centering and chamfering.





Range of Use

Features



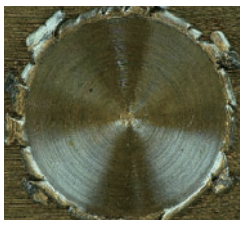
Thinning Geometry

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

Sharp Cutting Edge and High Fracture Resistance

A cutting edge shape with sharp and high fracture resistance, stable cutting and burr prevention are possible.

DLE



Conventional

Two-step Point Angles

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

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

DLE

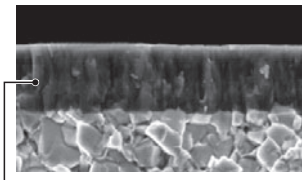
High Strength of Center

Conventional

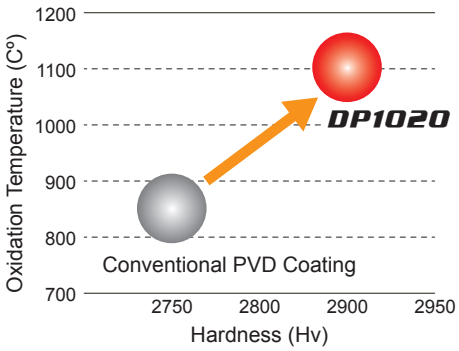
Fractures of Center

Coated Grade DP1020

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



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



Extensive Support for CNC Automatic Lathes

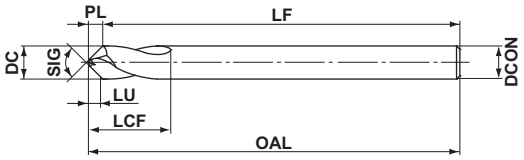
Diverse lineup of shanks compatible with ER collets.

DCON(Connection Diameter)	5mm＝ER8
DCON	7mm＝ER11

Solid Carbide Drills for Centering and Chamfering

DLE
Leading Drill Series

P M K N S H



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

External Coolant (mm)

DC	SIG	DP1020	Order Number	LU	LCF	OAL	LF	PL	DCON
3	90°	●	**DLE0300S030P090**	1.2	9	45	43.7	1.3	3
4	90°	●	**DLE0400S040P090**	1.6	12	50	48.3	1.7	4
5	90°	●	**DLE0500S050P090**	2.0	14	60	57.9	2.1	5
6	90°	●	**DLE0600S060P090**	2.4	15	66	63.4	2.6	6
7	90°	●	**DLE0700S070P090**	2.8	18	74	71.0	3.0	7
8	90°	●	**DLE0800S080P090**	3.2	20	74	70.6	3.4	8
10	90°	●	**DLE1000S100P090**	4.1	24	84	79.7	4.3	10
12	90°	●	**DLE1200S120P090**	4.9	28	95	89.9	5.1	12
16	90°	●	**DLE1600S160P090**	6.6	35	113	106.2	6.8	16

(Note 1) In the region of roughly **DC**/4, which is the region of the two-step point angles, the central area will not have a 90° hole bottom. Chamfering will also not be possible in this region.
(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.

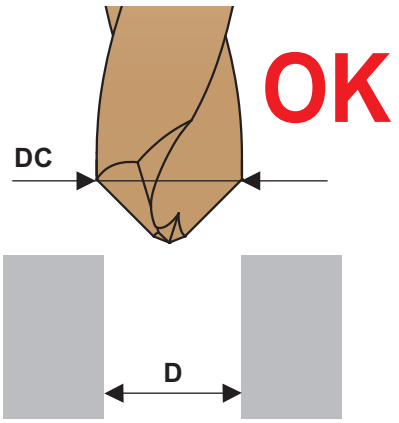
DC = Cutting Diameter
LU = Usable Length
LCF = Length Chip Flute
OAL = Overall Length
LF = Functional Length
PL = Point Length
DCON = Connection Diameter
SIG = Point Angle

● : Inventory maintained in Japan.

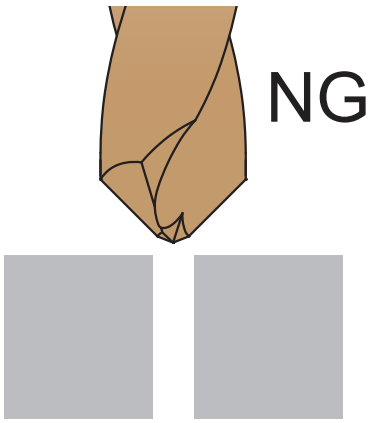
Drill Diameter Selection

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**.

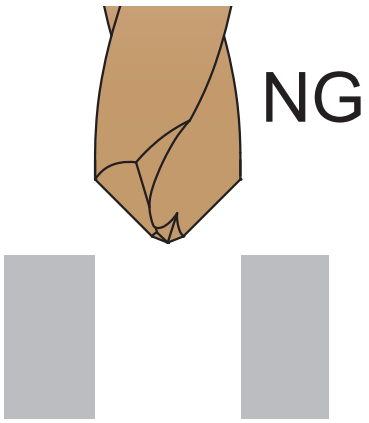


Example) If guide hole diameter **D** is 5 mm: Drill diameter **DC** should be equal to or greater than 6 mm but less than 10 mm. Select a **DC** of 6 mm, 7 mm, or 8 mm.



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.

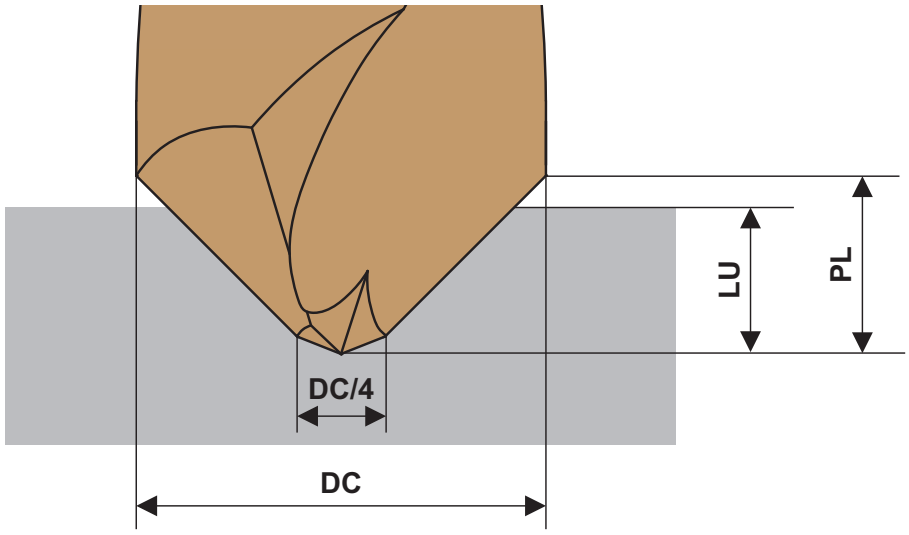


If DC is a drill diameter equal to D:

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

When Centering

The tool cannot be used for processing if the centering diameter has the same guide hole diameter as drill diameter **DC**. Refer to the usable length **LU** (page 3) as a guideline.
In the region of roughly **DC**/4, which is the region of the two-step point angles, the central area will not have a 90° hole bottom.



Recommended Cutting Conditions

(mm)

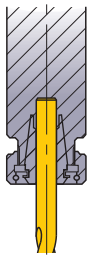
Work Material	Mild Steels (≤180HB) AISI 1010 etc.		Carbon Steels, Alloy Steels (180−280HB) AISI 1045, 4140 etc.		Carbon Steels, Alloy Steels (280−350HB) AISI 4340 etc.	
DC	**n** (min^{-1})	**fr** (Min.−Max.) (mm/rev)	**n** (min^{-1})	**fr** (Min.−Max.) (mm/rev)	**n** (min^{-1})	**fr** (Min.−Max.) (mm/rev)
3	7900	0.06 (0.04−0.08)	6800	0.06 (0.04−0.08)	6300	0.05 (0.03−0.07)
4	5900	0.06 (0.04−0.08)	5100	0.06 (0.04−0.08)	4700	0.05 (0.03−0.07)
5	5000	0.07 (0.05−0.09)	4400	0.07 (0.05−0.09)	4100	0.06 (0.04−0.08)
6	4200	0.07 (0.05−0.09)	3700	0.07 (0.05−0.09)	3400	0.06 (0.04−0.08)
7	3600	0.08 (0.05−0.10)	3100	0.08 (0.05−0.10)	2900	0.06 (0.04−0.08)
8	3100	0.08 (0.05−0.10)	2700	0.08 (0.05−0.10)	2500	0.06 (0.04−0.08)
10	2700	0.09 (0.05−0.11)	2300	0.09 (0.05−0.11)	2200	0.07 (0.04−0.09)
12	2200	0.09 (0.05−0.11)	1900	0.09 (0.05−0.11)	1800	0.07 (0.04−0.09)
16	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) AISI 304, 316 etc.		Gray Cast Irons (≤350MPa) AISI No45B etc.		Ductile Cast Irons (≤450MPa) AISI 60-40-18 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	0.04 (0.02−0.06)	7900	0.06 (0.04−0.08)	5800	0.06 (0.04−0.08)
4	1100	0.04 (0.02−0.06)	5900	0.06 (0.04−0.08)	4300	0.06 (0.04−0.08)
5	1200	0.06 (0.04−0.08)	5000	0.07 (0.05−0.09)	3800	0.07 (0.05−0.09)
6	1000	0.06 (0.04−0.08)	4200	0.07 (0.05−0.09)	3100	0.07 (0.05−0.09)
7	900	0.06 (0.04−0.08)	3600	0.08 (0.05−0.10)	2700	0.07 (0.05−0.09)
8	790	0.06 (0.04−0.08)	3100	0.08 (0.05−0.10)	2300	0.07 (0.05−0.09)
10	630	0.06 (0.04−0.08)	2700	0.09 (0.05−0.11)	1900	0.08 (0.05−0.10)
12	530	0.06 (0.04−0.08)	2200	0.09 (0.05−0.11)	1500	0.08 (0.05−0.10)
16	390	0.08 (0.06−0.10)	1700	0.12 (0.10−0.14)	1100	0.11 (0.09−0.13)

(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 V-grooving and chamfering, please reduce cutting conditions.

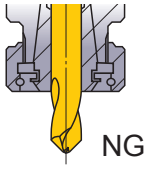
Operational Guidance

Drill Holding



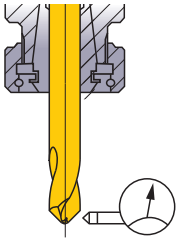
Collet chuck holds the drill securely.

Drill Length



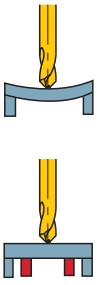
Do not clamp on the flutes.

Installation Tolerance

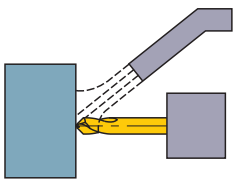


Run-out ≤ 0.03mm

Thin Workpiece



Coolant Method

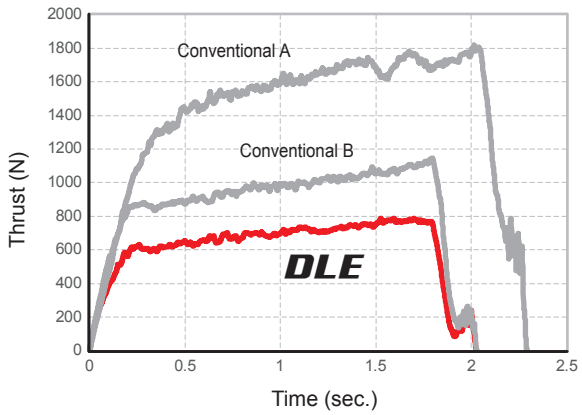


Coolant positions,at the end at the center are ideal.

Cutting Performance

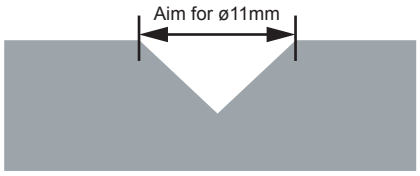
Comparison of Cutting Performance during Centering

Ideal for processing at low power, when compared to conventional products.



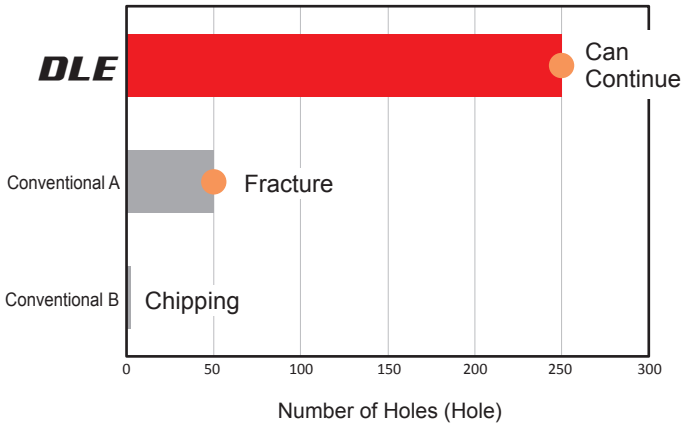
*Differences along the time axis are a result of differences in processing depth.

<Cutting Conditions>
Work Material : AISI 1045
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

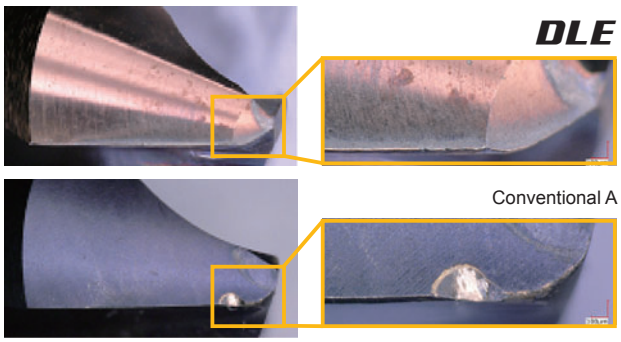


Comparison of Centering Life when Processing AISI 304

The two-step point angles, together with the negative cutting edge shape and cutting edge treatment of the thinning pocket, provide outstanding durability with no abnormal damage.

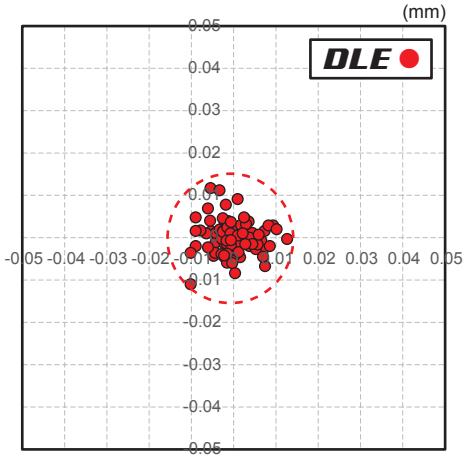


<Cutting Conditions>
Work Material : AISI 304
Drill : DLE0600S060P090
Cutting Speed : vc = 25 m/min
Feed per Rev. : fr = 0.06 mm/rev
Hole Depth : Aim for hole dia. ø5 mm
Cutting Mode : Wet Cutting
External Coolant
(Water-insoluble Coolants)
Machine : Small Automatic Lathes



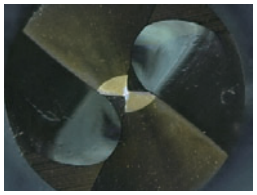
Centering Hole Position Precision for JIS SUS420J2

Stainless steels are likely to experience abnormal damage from build-up edge. Compared to conventional products which often suffered early fractures, the DLE has a long tool life.



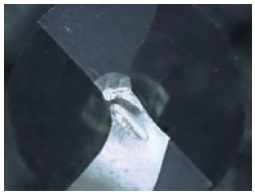
<Cutting Conditions>
Work Material : JIS SUS420J2
Drill : DLE0600S060P090
Cutting Speed : vc = 15 m/min
Feed per Rev. : fr = 0.04 mm/rev
Hole Depth : Aim for hole dia. ø5.5mm
Cutting Mode : Wet Cutting
External Coolant
(Chlorine Free Emulsion)
Machine : Vertical MC

DLE



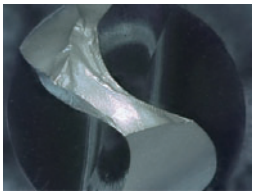
After 90 Holes

Conventional A



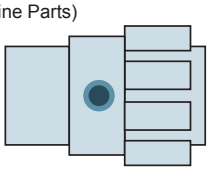
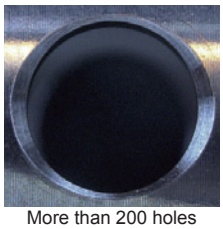
Measurement impossible due to early fracture

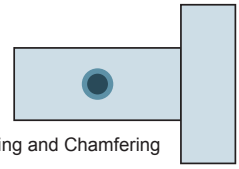
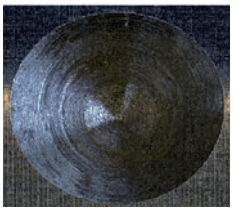
Conventional B



Measurement impossible due to early fracture

Application Example

Drill		DLE0400S040P090	DLE0600S060P090
Workpiece		AISI 1010 (Equipment Parts)  Centerring and Chamfering	AISI 304 (Machine Parts)  Centerring 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 Extarnal Coolant (Chlorine Free Emulsion)	Wet Cutting Extarnal Coolant (Water-insoluble)
Machine		NC Lathe, Tool Rotation	CNC Automatic Lathe
Results		 Burrs are suppressed Compared to conventional products, the DLE has smaller burrs and a longer expected life.	 More than 200 holes Good surface finishes and no tool damage While conventional products often caused chipping to occur, the DLE is more stable and has been used to complete drilling of 200 holes with no damage on the cutting edge.

Drill		DLE0300S030P090
Workpiece		AISI 303 (Engine Parts)  Centerring and Chamfering 
Cutting Conditions	Cutting Speed **vc**(m/min)	25
	Feed per Rev. **fr**(mm/rev)	0.04
	Guide Hole Dia. (mm)	ø2.0
Cutting Mode		Wet Cutting Extarnal Coolant (Water-insoluble) Curved Surface
Machine		CNC Automatic Lathe
Results		***DLE***  After 60 Holes Conventional  After 1 Hole While conventional products generated burrs during the first hole drilling, the DLE achieved 60 hole drilling without notable damage and burr generation, and provides outstanding surface quality.

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

MITSUBISHI MATERIALS CORPORATION

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(Tools specifications subject to change without notice.)

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