DIA EDGE

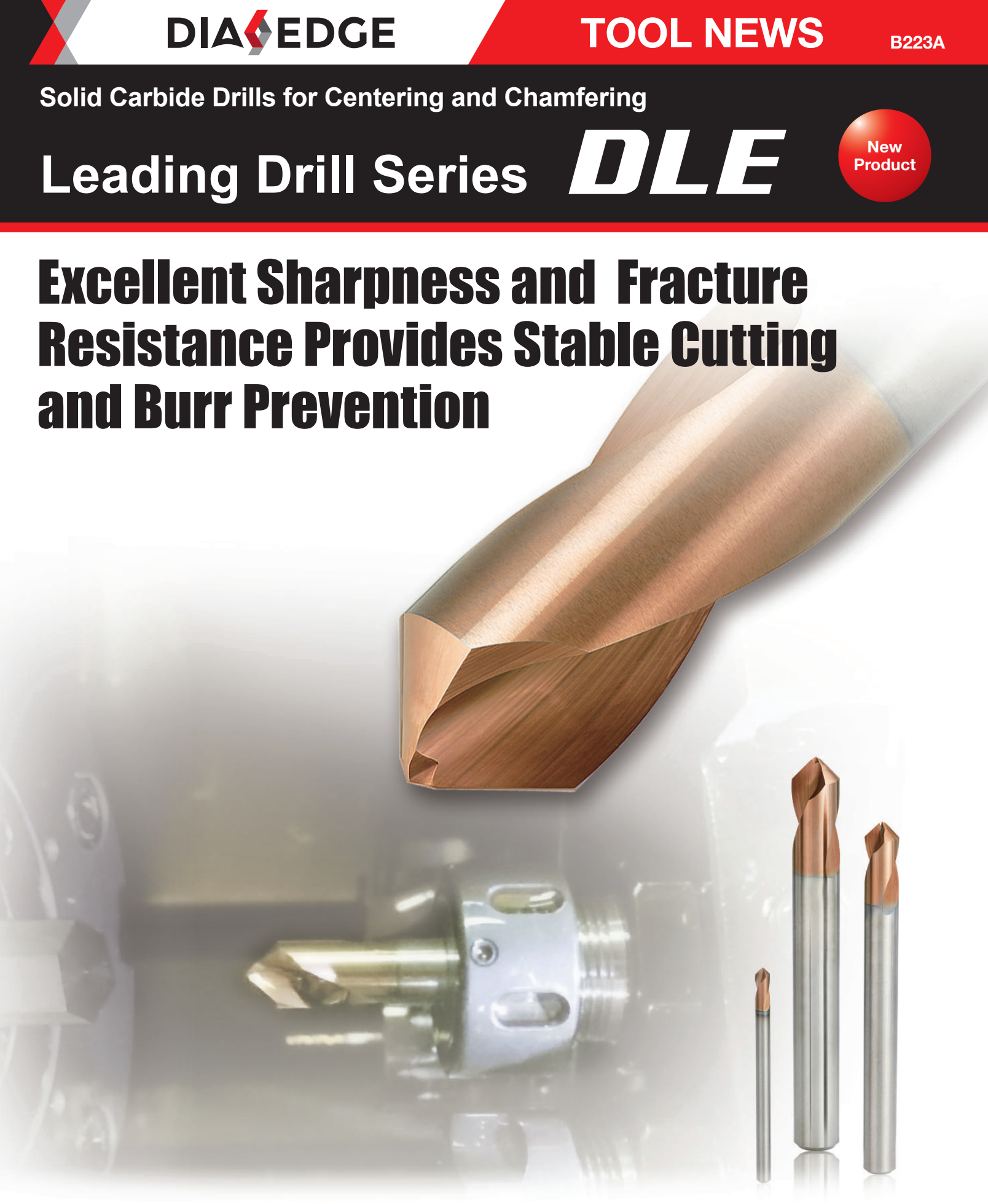
TOOL NEWS B223A

Solid Carbide Drills for Centering and Chamfering

Leading Drill Series DLE

New Product

Excellent Sharpness and Fracture Resistance Provides Stable Cutting and Burr Prevention

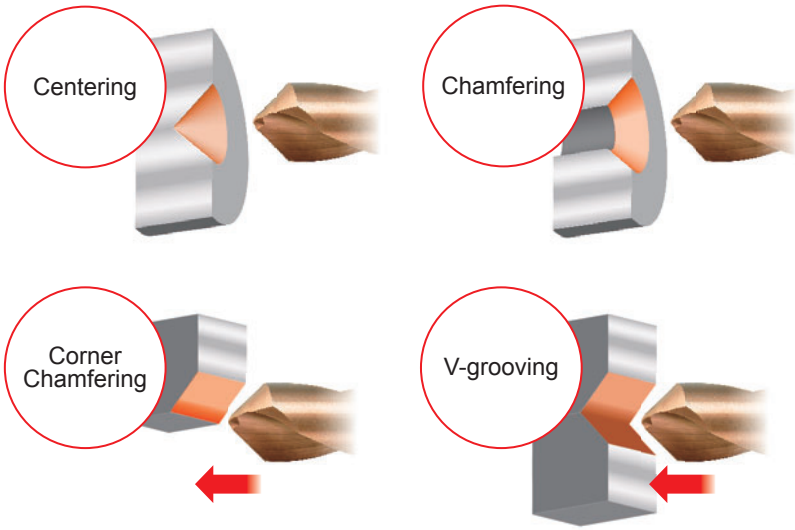


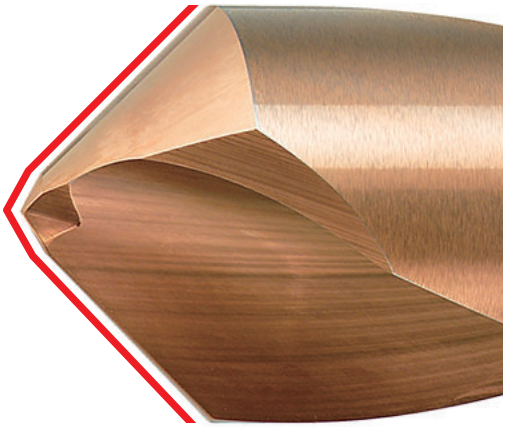
MITSUBISHI MATERIALS CORPORATION

Solid Carbide Drills for Centering and Chamfering

Leading Drill Series DLE

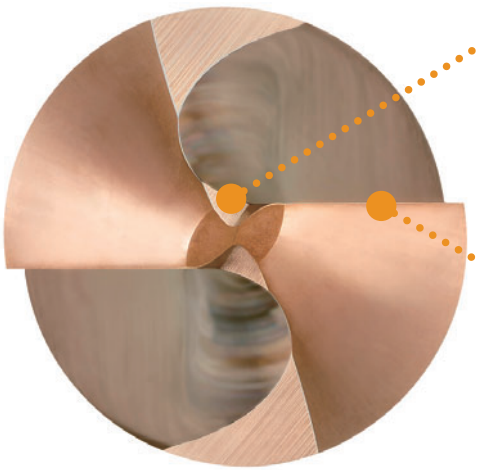
Completes strict standards for centering and chamfering.





Range of Use

Features

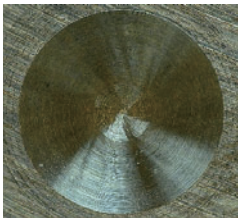


Thinning Geometry

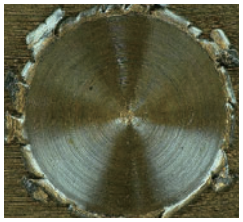
The thinning pocket promotes smooth chip evacuation and provides excellent hole position accuracy. Additionally, the negative cutting edge of the drill point offers high cutting edge strength.

Sharp Cutting Edge and High Fracture Resistance

Sharp cutting edge shape 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 prevents sudden fracturing.

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

DLE

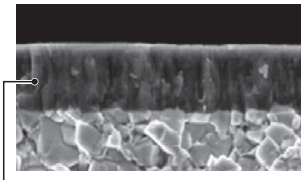
High Strength of Center

Conventional

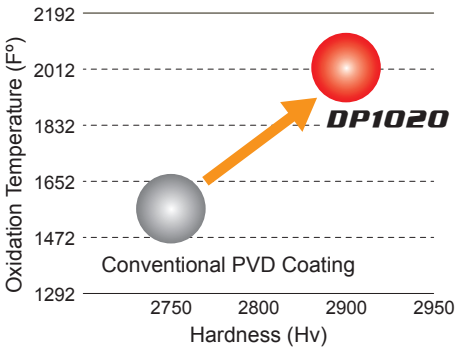
Fractures of Center

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.

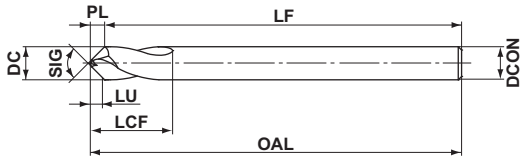
DCON(Connection Diameter) .197 inch=ER8

DCON .276 inch=ER11

Solid Carbide Drills for Centering and Chamfering

DLE
Leading Drill Series

P | M | K | N | S | H



(mm)

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

(inch)

	DCON=.1181	.1181 < DCON ≤ .2362	.2362 < DCON ≤ .3937	.3937 < DCON ≤ .6299
h7	0 −.0004	0 −.0005	0 −.0006	0 −.0007

External Coolant

DC		SIG	DP1020	Order Number	LU		LCF		OAL		LF		PL		DCON	
(mm)	(inch)				(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)
3.0	.1181	90°	●	**DLE0300S030P090**	1.2	.047	9	.354	45	1.772	43.7	1.720	1.3	.051	3	.118
4.0	.1575	90°	●	**DLE0400S040P090**	1.6	.063	12	.472	50	1.969	48.3	1.902	1.7	.067	4	.157
5.0	.1969	90°	●	**DLE0500S050P090**	2.0	.079	14	.551	60	2.362	57.9	2.280	2.1	.083	5	.197
6.0	.2362	90°	●	**DLE0600S060P090**	2.4	.094	15	.591	66	2.598	63.4	2.496	2.6	.102	6	.236
7.0	.2756	90°	●	**DLE0700S070P090**	2.8	.110	18	.709	74	2.913	71.0	2.795	3.0	.118	7	.276
8.0	.3150	90°	●	**DLE0800S080P090**	3.2	.126	20	.787	74	2.913	70.6	2.780	3.4	.134	8	.315
10.0	.3937	90°	●	**DLE1000S100P090**	4.1	.161	24	.945	84	3.307	79.7	3.138	4.3	.169	10	.394
12.0	.4724	90°	●	**DLE1200S120P090**	4.9	.193	28	1.102	95	3.740	89.9	3.539	5.1	.201	12	.472
16.0	.6299	90°	●	**DLE1600S160P090**	6.6	.260	35	1.378	113	4.449	106.2	4.181	6.8	.268	16	.630

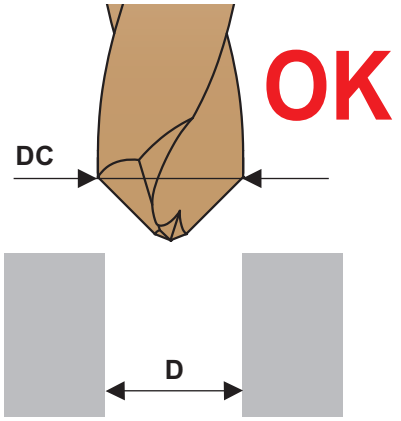
(Note 1) In the region of roughly **DC**/4, which is the region of the two-step point angles, the central area will not have a 90° bottom hole angle. Chamfering will also not be possible in this region.
(Note 2) The centering diameter should be less than the drill diameter (processing diameter) **DC** and the usable length **LU** should be referred to as a guideline.

● : Inventory maintained.

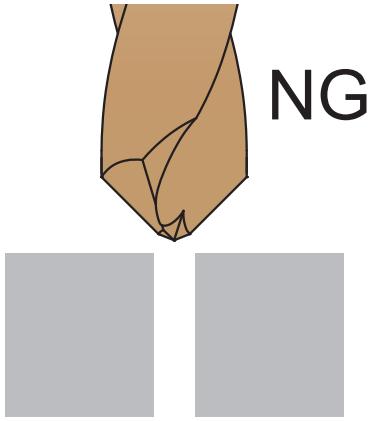
Drill Diameter Selection

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**.

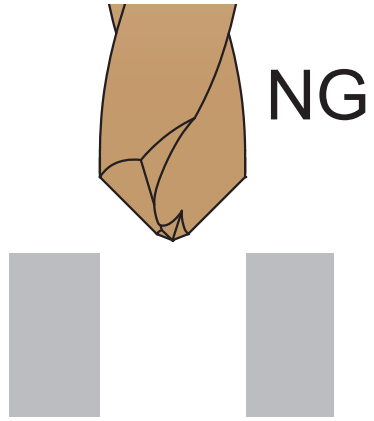


Example) If guide hole diameter **D** is .197": Drill diameter **DC** should be equal to or greater than .236" but less than .394". Select a **DC** of .236", .276", or .315".



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.

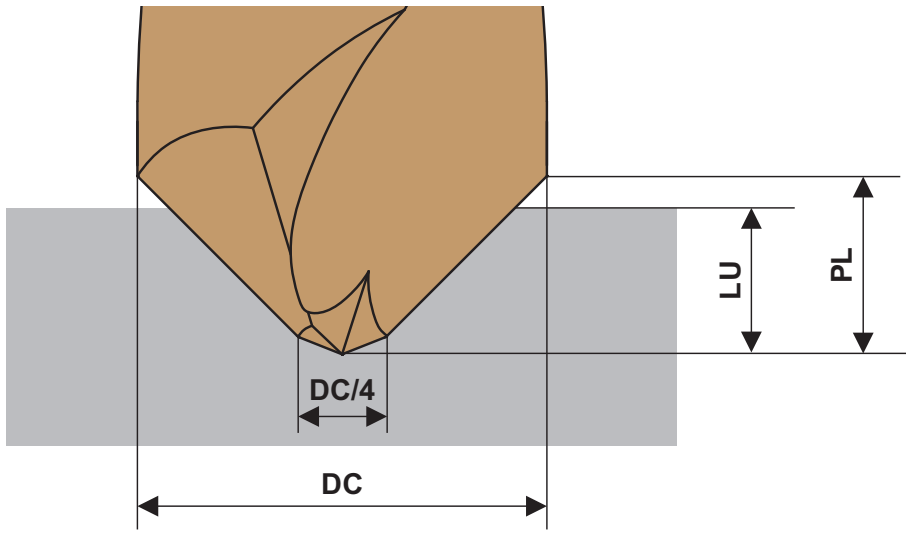


If DC is a drill diameter equal to D:

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° bottom hole angle.



Recommended Cutting Conditions

(inch)

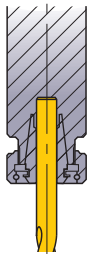
Work Material		Mild Steels (≤180HB) AISI 1010 etc.		Carbon Steels, Alloy Steels (180—280HB) AISI 1045, 4140 etc.		Carbon Steels, Alloy Steels (280—350HB) AISI 4340 etc.	
DC (mm)	DC (inch)	Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)	Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)	Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)
3	**.1181**	245	.0024 (.0016—.0031)	210	.0024 (.0016—.0031)	195	.0020 (.0012—.0028)
4	**.1575**	245	.0024 (.0016—.0031)	210	.0024 (.0016—.0031)	195	.0020 (.0012—.0028)
5	**.1969**	260	.0028 (.0020—.0035)	230	.0028 (.0020—.0035)	210	.0024 (.0016—.0031)
6	**.2362**	260	.0028 (.0020—.0035)	230	.0028 (.0020—.0035)	210	.0024 (.0016—.0031)
7	**.2756**	260	.0031 (.0020—.0039)	230	.0031 (.0020—.0039)	210	.0024 (.0016—.0031)
8	**.3150**	260	.0031 (.0020—.0039)	230	.0031 (.0020—.0039)	210	.0024 (.0016—.0031)
10	**.3937**	280	.0035 (.0020—.0043)	245	.0035 (.0020—.0043)	230	.0028 (.0016—.0035)
12	**.4724**	280	.0035 (.0020—.0043)	245	.0035 (.0020—.0043)	230	.0028 (.0016—.0035)
16	**.6299**	295	.0047 (.0039—.0055)	260	.0047 (.0039—.0055)	245	.0031 (.0024—.0039)

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 (mm)	DC (inch)	Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)	Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)	Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)
3	**.1181**	50	.0016 (.0008—.0024)	245	.0024 (.0016—.0031)	180	.0024 (.0016—.0031)
4	**.1575**	50	.0016 (.0008—.0024)	245	.0024 (.0016—.0031)	180	.0024 (.0016—.0031)
5	**.1969**	65	.0024 (.0016—.0031)	260	.0028 (.0020—.0035)	195	.0028 (.0020—.0035)
6	**.2362**	65	.0024 (.0016—.0031)	260	.0028 (.0020—.0035)	195	.0028 (.0020—.0035)
7	**.2756**	65	.0024 (.0016—.0031)	260	.0031 (.0020—.0039)	195	.0028 (.0020—.0035)
8	**.3150**	65	.0024 (.0016—.0031)	260	.0031 (.0020—.0039)	195	.0028 (.0020—.0035)
10	**.3937**	65	.0024 (.0016—.0031)	280	.0035 (.0020—.0043)	195	.0031 (.0020—.0039)
12	**.4724**	65	.0024 (.0016—.0031)	280	.0035 (.0020—.0043)	195	.0031 (.0020—.0039)
16	**.6299**	65	.0031 (.0024—.0039)	295	.0047 (.0039—.0055)	195	.0043 (.0035—.0051)

(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.

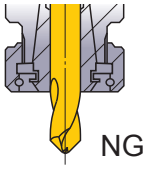
Operational Guidance

Drill Holding



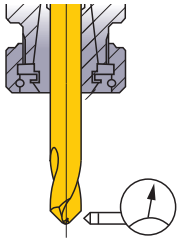
Collet chuck holds the drill securely.

Drill Installation



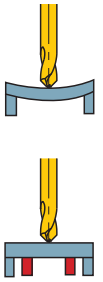
Do not clamp on the flutes.

Installation Tolerance

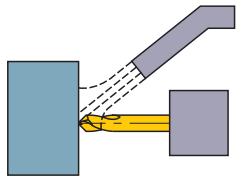


Run-out ≤ .001 inch

Thin Workpiece



Coolant Method

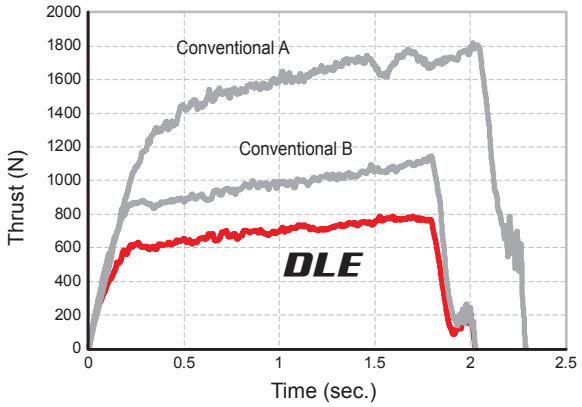


Coolant positions,at the end at the center are ideal.

Cutting Performance

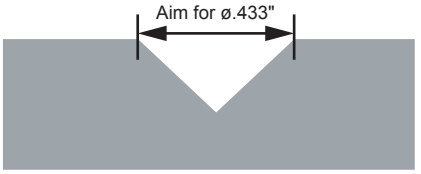
Comparison of Cutting Performance during Centering

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



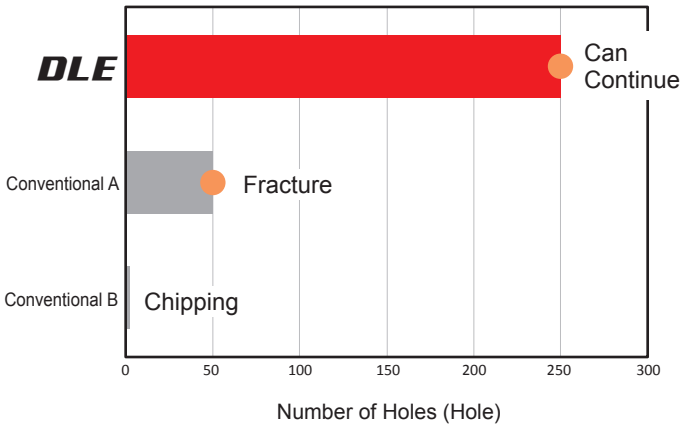
*Differences along the time axis are a result of differences in processing depth.

<Cutting Conditions>
Work Material : AISI 1045
Drill : DLE1200S120P090 ø.472"
Cutting Speed : vc = 195 SFM
Feed per Rev. : fr = .0024 IPR
Cutting Mode : Wet Cutting External Coolant (Chlorine Free Emulsion)
Machine : Vertical MC

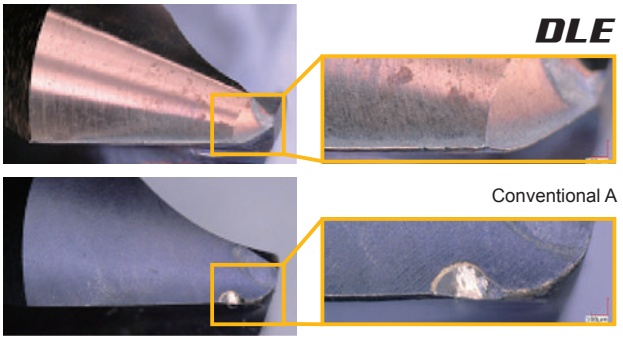


Comparison of Centering Life when Processing AISI 304

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

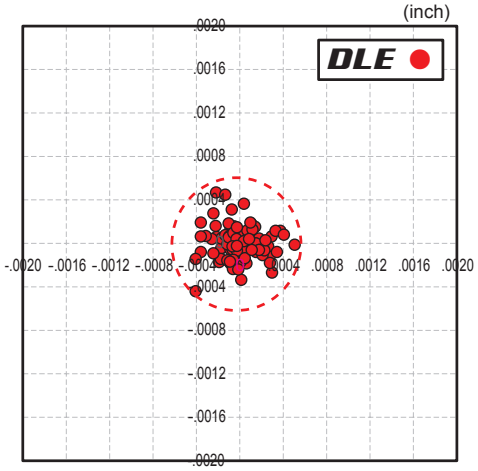


<Cutting Conditions>
Work Material : AISI 304
Drill : DLE0600S060P090
Cutting Speed : vc = 80 SFM
Feed per Rev. : fr = .0024 IPR
Hole Depth : Aim for hole dia. ø.197"
Cutting Mode : Wet Cutting External Coolant (Water-insoluble Coolants)
Machine : Small Automatic Lathes

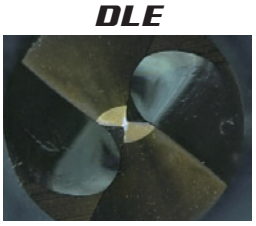


Centering Hole Position Precision for JIS SUS420J2

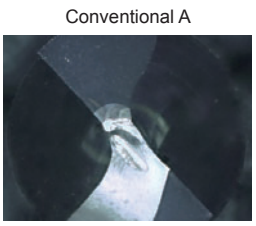
Stainless steels are likely to experience abnormal damage from build-up edge. Compared to conventional products which often suffered early fractures, the DLE has longer tool life.



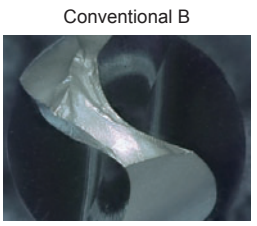
<Cutting Conditions>
Work Material : JIS SUS420J2
Drill : DLE0600S060P090
Cutting Speed: vc = 50 SFM
Feed per Rev. : fr = .0016 IPR
Hole Depth : Aim for hole dia. ø.217"
Cutting Mode : Wet Cutting External Coolant (Chlorine Free Emulsion)
Machine : Vertical MC



After 90 Holes

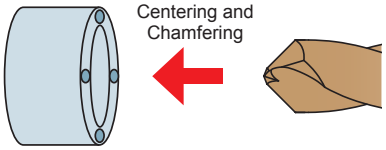
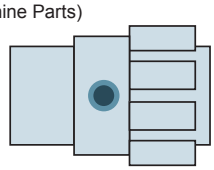
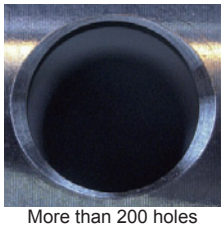


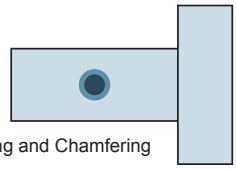
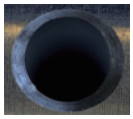
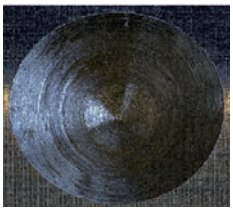
Measurement impossible due to early fracture



Measurement impossible due to early fracture

Application Example

Drill		DLE0400S040P090	DLE0600S060P090
Workpiece		AISI 1010 (Equipment Parts)  	AISI 304 (Machine Parts)  Centering and Chamfering
Cutting Conditions	Cutting Speed **vc** (SFM)	100	80
	Feed per Rev. **fr** (IPR)	.0018	.0020
	Guide Hole Dia. (inch)	ø.118	ø.197
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)  Centering and Chamfering 
Cutting Conditions	Cutting Speed **vc** (SFM)	80
	Feed per Rev. **fr** (IPR)	.0016
	Guide Hole Dia. (inch)	ø.079
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 after the first hole, the DLE achieved 60 holes without noticable damage and burrs, plus provided excellent surface finish.

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 using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc. ●Grinding or heating of cutting tools produces dust and mist. Inhaling large amount of dust or contacting with eyes and skins may harm your body.

MITSUBISHI MATERIALS U.S.A. CORPORATION

Customer Service : 800-523-0800
Technical Service : 800-486-2341

LOS ANGELES HEAD OFFICE
11250 Slater Avenue, Fountain Valley, CA 92708
TEL : 714-352-6100 FAX : 714-668-1320

CHICAGO OFFICE
1314B North Plum Grove Road, Schaumburg, IL 60173
TEL : 847-252-6300 FAX : 847-519-1732

TORONTO OFFICE
3535 Laird Road, Units 15 & 16, Mississauga, Ontario, L5L 5Y7, Canada
TEL : 905-814-0240 FAX : 905-814-0245

MMC METAL DE MEXICO, S.A. DE C.V.
Av. La Cañada No.16, Parque Industrial Bernardo Quintana,
El Marques, Queretaro, CP76246, Mexico
TEL : +52-442-221-6136 FAX : +52-442-221-6134

URL : http://www.mitsubishicarbide.com

(Tools specifications subject to change without notice.)

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