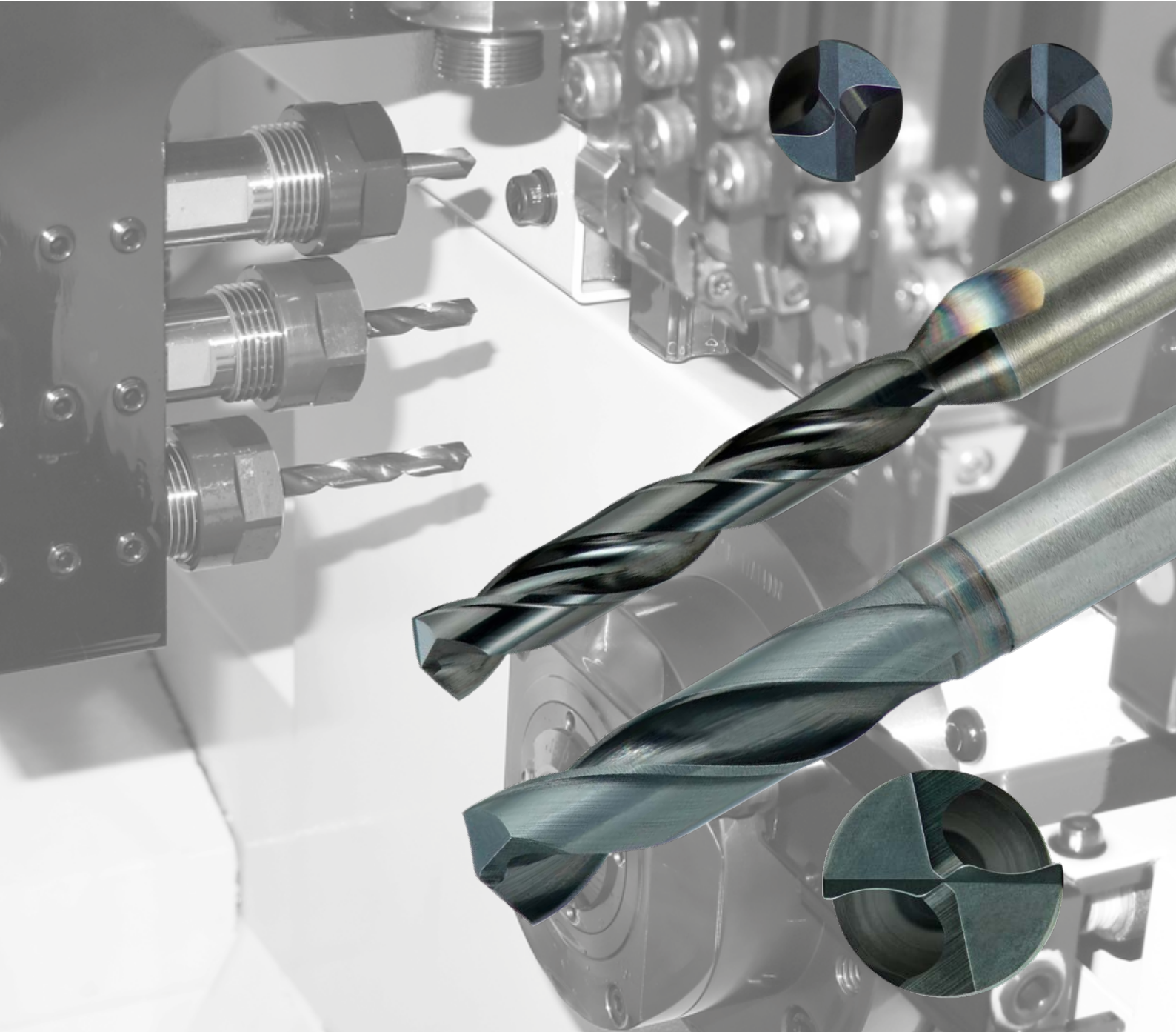


DWAE

SOLID CARBIDE DRILLS FOR SWISS-TYPE AUTOMATIC
& SMALL CNC LATHES



NEW

MINI DWAE

MINI SIZE Ø1.0 MM-Ø2.9 MM

- Solid carbide drills for swiss-type
- Automatic & small CNC lathes

FEATURING HIGH PRECISION AND LONG TOOL LIFE FOR SMALL DIAMETER DRILLING



NEW CUTTING EDGE TREATMENT THAT ACHIEVES BOTH SHARPNESS AND DURABILITY

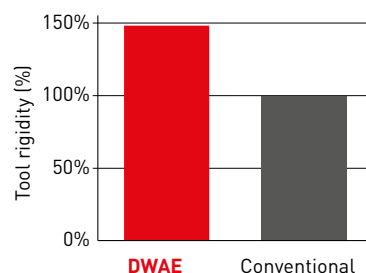
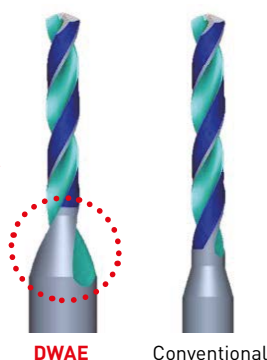
Mitsubishi's new original cutting edge treatment maintains the stability of the cutting edge while exhibiting excellent fracture and wear resistance.

COATED GRADE DP102A

DP102A coated grade provides excellent lubricity and long-term durability, achieving excellent wear resistance at low to medium cutting speeds.

UNIQUE FLUTE FORM FOR GREATER RIGIDITY

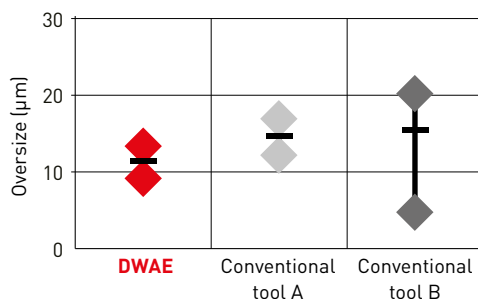
Mini Size is uniquely designed for rigidity and good chip evacuation by minimizing the neck length. A chip discharge area is provided through the taper neck. This increases tool rigidity by 50 % compared to conventional drills and also improves hole positional accuracy.



ANALYSIS CONDITIONS

DC=Ø2 mm, L/D=4, OAL= 50 mm
Distributed load of 130N in Z axis direction.

Material	DIN CK10
Tool	DC=Ø2 mm, L/D=4
Vc (m/min)	30
fr (mm/rev)	0.04
Hole depth	8
Cutting mode	Water-soluble coolants

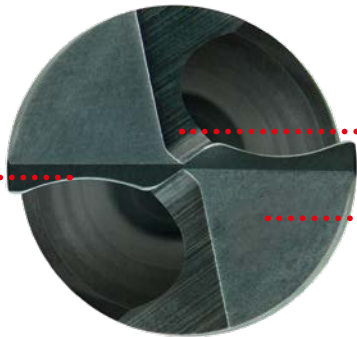


DWAE

OPTIMAL LENGTH, LOW CUTTING RESISTANCE DRILLS PROVIDES HIGH STABILITY AND EXCELLENT CHIP CONTROL (Ø3.0 MM-Ø14.0 MM)

WAVY CUTTING EDGE

The wavy cutting edge, in contrast to conventional cutting edges that are easily damaged, provides both sharpness and cutting edge strength by resisting wear to the outer cutting edge. It also breaks chips efficiently into smaller pieces.

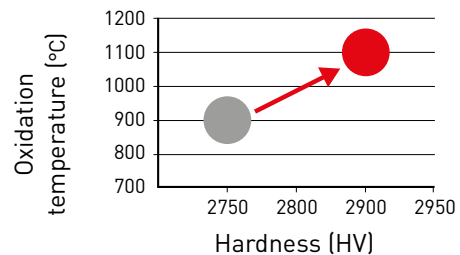


Z THINNING

The special web thinning geometry ensures sufficient space for chip evacuation and provides low cutting resistance.

COATED GRADE: DP102A

DP102A coated grade provides excellent lubricity and long-term durability, achieving excellent wear resistance at low to medium cutting speeds.



FLUTE SHAPE

Specially designed flute shape breaks chips into smaller pieces and prevents clogging during drilling.



ZERO-μ SURFACE

A smoothing surface treatment is applied to the drill, further reducing cutting resistance whilst also facilitating excellent chip evacuation.

OPTIMAL FLUTE LENGTH FOR SWISS-TYPE AUTOMATIC AND SMALL CNC LATHES

The flute length has been specifically engineered to meet the compact needs and limited machining space requirements of small CNC lathes. Shank diameters are compatible with standard ER collet sizes.

DCON (Shank diameter) : Ø5 = ER8
DCON : Ø7 = ER11

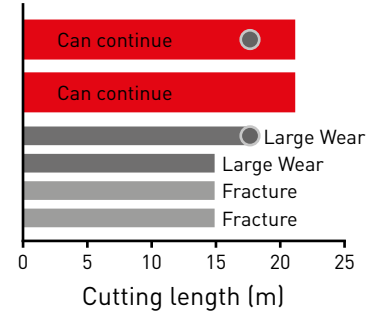
MINI DWAE

CUTTING PERFORMANCE

Material	DIN X30Cr13
Tool	DWAE0200X04S040
Vc (m/min)	30
fr (mm/rev)	0.045
ap (mm)	8
Cutting mode	Wet cutting, external coolant (Water-soluble coolants)

Results

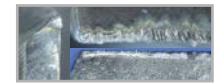
By combining DP102A and a new cutting edge treatment, durability and long tool life have been achieved when drilling with an external coolant supply.



After 18.0 m cutting length



DWAE

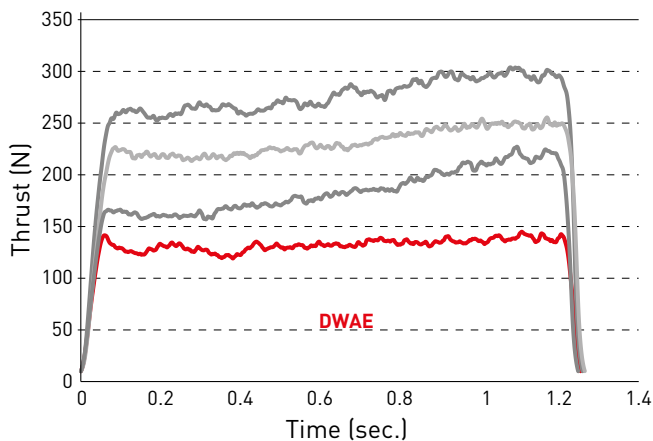


Conventional

Material	DIN X30Cr13
Tool	DWAE0200X04S040
Vc (m/min)	40
fr (mm/rev)	0.06
ap (mm)	8
Cutting mode	Wet cutting, external coolant (Water-soluble coolants)

Results

DWAE attains low thrust resistance compared to conventional products.



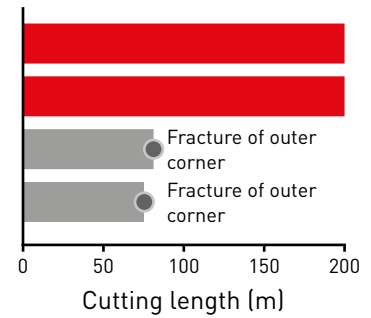
DWAE

CUTTING PERFORMANCE

Material	DIN Cf53
Tool	DWAE0600X04S060
Vc (m/min)	80
fr (mm/rev)	0.2
ap (mm)	24
Cutting mode	Wet cutting, external coolant (Water-insoluble)

Results

DP102A offers excellent lubricity and heat resistance, providing more fracture resistance and achieving longer tool life than conventional drills under medium cutting speeds. Stable machining achieved even with external coolant.



After 75.0 m cutting length



DWAE



Conventional

Material	DIN Ck10
Tool	DWAE0600X04S060
Vc (m/min)	60
fr (mm/rev)	0.3
ap (mm)	24
Cutting mode	Wet cutting, external coolant (Water-soluble coolants)

Results

DWAE, specially designed to break up chips into smaller pieces and prevent flutes from clogging during machining.



DWAE



Conventional A

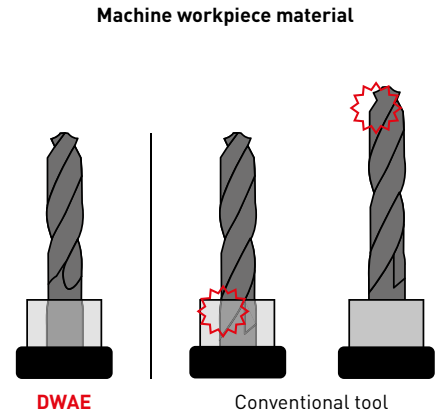
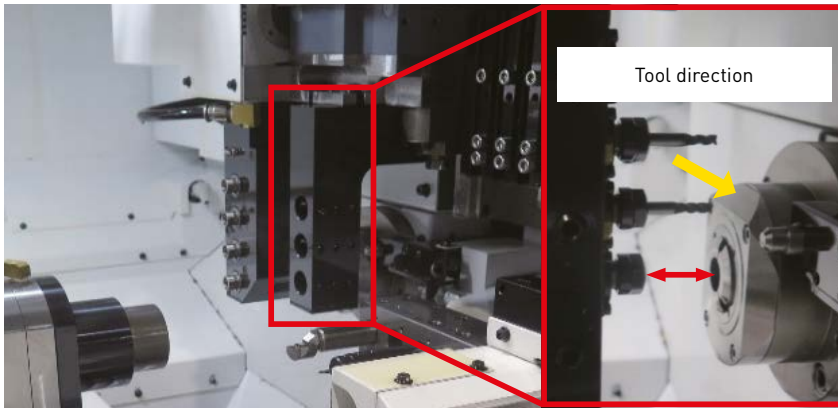


Conventional B

DWAE

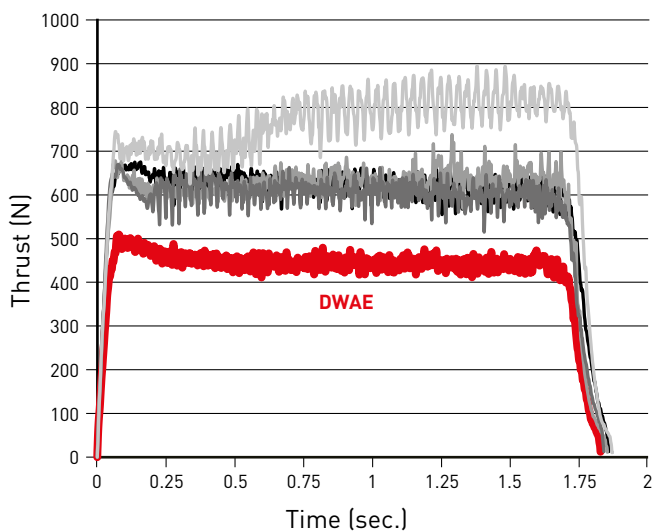
OPTIMAL CUTTING LENGTH

External coolant type carbide drills with ideal tool length for Swiss-type automatic and small CNC lathes.



LOW CUTTING RESISTANCE DESIGN

Material	Mild steel DIN C10
Tool	DWAE0600X04S060
Vc (m/min)	80
f (mm/rev)	0.2
ap (mm)	24
Cutting mode	Wet cutting, external coolant (Water-soluble coolants)
Results	Low cutting resistance design provides highly stable drilling even in situations where the rigidity of the workpiece material or clamping is difficult to secure.



NEW

MINI DWAE



DC<2.0

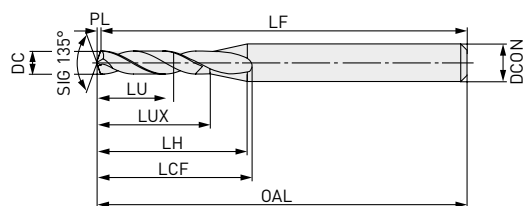
DC≥2.0

P M K

DC<2.0



DC≥2.0



DC≤3

0

-0.014



DCON=3

3<DCON≤4

0

0

-0.006

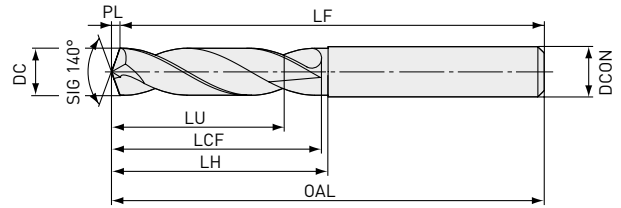
-0.008

Order number	DC	L/D	DP102A	LU	LUX	LCF	LH	OAL	LF	PL	DCON
DWAE0100X02S030	1.0	2	●	2.2	5.0	7.7	8.7	45.0	44.8	0.2	3
DWAE0100X04S030		4	●	4.2	7.0	9.9	10.7	45.0	44.8	0.2	3
DWAE0110X02S030	1.1	2	★	2.4	5.4	8.1	8.9	45.0	44.8	0.2	3
DWAE0110X04S030		4	★	4.6	7.6	10.5	11.1	45.0	44.8	0.2	3
DWAE0120X02S030	1.2	2	★	2.6	5.8	8.5	9.2	45.0	44.8	0.2	3
DWAE0120X04S030		4	★	5.0	8.2	11.1	11.6	45.0	44.8	0.2	3
DWAE0130X02S030	1.3	2	★	2.9	6.3	9.0	9.5	45.0	44.7	0.3	3
DWAE0130X04S030		4	★	5.5	8.9	11.9	12.1	45.0	44.7	0.3	3
DWAE0140X02S030	1.4	2	★	3.1	6.7	9.4	9.7	45.0	44.7	0.3	3
DWAE0140X04S030		4	★	5.9	9.5	12.5	12.5	45.0	44.7	0.3	3
DWAE0150X02S030	1.5	2	●	3.3	7.1	9.8	9.9	45.0	44.7	0.3	3
DWAE0150X04S030		4	●	6.3	10.1	13.1	12.9	45.0	44.7	0.3	3
DWAE0160X02S030	1.6	2	★	3.5	7.5	10.2	10.1	45.0	44.7	0.3	3
DWAE0160X04S030		4	★	6.7	10.7	13.7	13.3	45.0	44.7	0.3	3
DWAE0170X02S030	1.7	2	★	3.8	8.0	10.7	10.4	45.0	44.6	0.4	3
DWAE0170X04S030		4	★	7.2	11.4	14.4	13.8	45.0	44.6	0.4	3
DWAE0180X02S030	1.8	2	★	4.0	8.4	11.1	10.6	45.0	44.6	0.4	3
DWAE0180X04S030		4	★	7.6	12.0	15.1	14.2	45.0	44.6	0.4	3
DWAE0190X02S030	1.9	2	★	4.2	8.8	11.5	10.9	45.0	44.6	0.4	3
DWAE0190X04S030		4	★	8.0	12.6	15.7	14.7	45.0	44.6	0.4	3
DWAE0200X02S040	2.0	2	●	4.4	9.2	12.8	12.9	50.0	49.6	0.4	4
DWAE0200X04S040		4	●	8.4	13.2	17.2	16.9	50.0	49.6	0.4	4
DWAE0210X02S040	2.1	2	★	4.6	9.6	13.2	13.1	50.0	49.6	0.4	4
DWAE0210X04S040		4	★	8.8	13.8	17.8	17.3	50.0	49.6	0.4	4
DWAE0220X02S040	2.2	2	★	4.9	10.1	13.7	13.5	50.0	49.5	0.5	4
DWAE0220X04S040		4	★	9.3	14.5	18.5	17.9	50.0	49.5	0.5	4
DWAE0230X02S040	2.3	2	★	5.1	10.5	14.1	13.7	50.0	49.5	0.5	4
DWAE0230X04S040		4	★	9.7	15.1	19.2	18.3	50.0	49.5	0.5	4
DWAE0240X02S040	2.4	2	★	5.3	10.9	14.5	13.9	50.0	49.5	0.5	4
DWAE0240X04S040		4	★	10.1	15.7	19.8	18.7	50.0	49.5	0.5	4
DWAE0250X02S040	2.5	2	●	5.5	11.3	14.9	14.1	50.0	49.5	0.5	4
DWAE0250X04S040		4	●	10.5	16.3	20.4	19.1	50.0	49.5	0.5	4
DWAE0260X02S040	2.6	2	★	5.7	11.7	15.3	14.3	50.0	49.5	0.5	4
DWAE0260X04S040		4	★	10.9	16.9	21.0	19.5	50.0	49.5	0.5	4
DWAE0270X02S040	2.7	2	★	6.0	12.2	15.8	14.6	50.0	49.4	0.6	4
DWAE0270X04S040		4	★	11.4	17.6	21.7	20.0	50.0	49.4	0.6	4
DWAE0280X02S040	2.8	2	★	6.2	12.6	16.2	14.8	50.0	49.4	0.6	4
DWAE0280X04S040		4	★	11.8	18.2	22.4	20.4	50.0	49.4	0.6	4
DWAE0290X02S040	2.9	2	★	6.4	13.0	16.6	15.1	50.0	49.4	0.6	4
DWAE0290X04S040		4	★	12.2	18.8	23.0	20.9	50.0	49.4	0.6	4

DWAE



P M K



DC=3	3<DC≤6	6<DC≤10	10<DC≤14
0	0	0	0
-0.014	-0.018	-0.022	-0.027



DCON=3	3<DCON≤6	6<DCON≤10	10<DCON≤14
0	0	0	0
-0.006	-0.008	-0.009	-0.011

Order number	DC	L/D	DP102A	LU	LCF	LH	OAL	LF	PL	DCON
DWAE0300X02S030	3.0	2	●	6.5	12.5	14.5	45.5	45	0.5	3
DWAE0300X04S030		4	●	12.5	21.5	23.5	55.5	55	0.5	3
DWAE0310X02S040	3.1	2	●	6.8	12.6	14.6	55.6	55	0.6	4
DWAE0310X04S040		4	●	13.0	21.6	23.6	60.6	60	0.6	4
DWAE0320X02S040	3.2	2	●	7.0	13.6	15.6	55.6	55	0.6	4
DWAE0320X04S040		4	●	13.4	22.6	24.6	60.6	60	0.6	4
DWAE0330X02S040	3.3	2	●	7.2	13.6	15.6	55.6	55	0.6	4
DWAE0330X04S040		4	●	13.8	23.6	25.6	60.6	60	0.6	4
DWAE0340X02S040	3.4	2	●	7.4	13.6	15.6	55.6	55	0.6	4
DWAE0340X04S040		4	●	14.2	23.6	25.6	60.6	60	0.6	4
DWAE0350X02S040	3.5	2	●	7.6	14.6	16.6	55.6	55	0.6	4
DWAE0350X04S040		4	●	14.6	24.6	26.6	60.6	60	0.6	4
DWAE0360X02S040	3.6	2	●	7.9	14.7	16.7	55.7	55	0.7	4
DWAE0360X04S040		4	●	15.1	25.7	27.7	60.7	60	0.7	4
DWAE0370X02S040	3.7	2	●	8.1	14.7	16.7	55.7	55	0.7	4
DWAE0370X04S040		4	●	15.5	25.7	27.7	60.7	60	0.7	4
DWAE0380X02S040	3.8	2	●	8.3	15.7	17.7	55.7	55	0.7	4
DWAE0380X04S040		4	●	15.9	26.7	28.7	60.7	60	0.7	4
DWAE0390X02S040	3.9	2	●	8.5	15.7	17.7	55.7	55	0.7	4
DWAE0390X04S040		4	●	16.3	27.7	29.7	60.7	60	0.7	4
DWAE0400X02S040	4.0	2	●	8.7	15.7	17.7	55.7	55	0.7	4
DWAE0400X04S040		4	●	16.7	27.7	29.7	60.7	60	0.7	4
DWAE0410X02S050	4.1	2	●	8.9	16.7	18.7	62.7	62	0.7	5
DWAE0410X04S050		4	●	17.1	28.7	30.7	80.7	80	0.7	5
DWAE0420X02S050	4.2	2	●	9.2	16.8	18.8	62.8	62	0.8	5
DWAE0420X04S050		4	●	17.6	29.8	31.8	80.8	80	0.8	5
DWAE0430X02S050	4.3	2	●	9.4	17.8	19.8	62.8	62	0.8	5
DWAE0430X04S050		4	●	18.0	30.8	32.8	80.8	80	0.8	5
DWAE0440X02S050	4.4	2	●	9.6	17.8	19.8	62.8	62	0.8	5
DWAE0440X04S050		4	●	18.4	30.8	32.8	80.8	80	0.8	5
DWAE0450X02S050	4.5	2	●	9.8	17.8	19.8	62.8	62	0.8	5
DWAE0450X04S050		4	●	18.8	31.8	33.8	80.8	80	0.8	5
DWAE0460X02S050	4.6	2	●	10.0	18.8	20.8	62.8	62	0.8	5
DWAE0460X04S050		4	●	19.2	32.8	34.8	80.8	80	0.8	5

DWAE

Order number	DC	L/D	DP102A	LU	LCF	LH	OAL	LF	PL	DCON
DWAE0470X02S050	4.7	2	●	10.3	18.9	20.9	62.9	62	0.9	5
DWAE0470X04S050		4	●	19.7	32.9	34.9	80.9	80	0.9	5
DWAE0480X02S050	4.8	2	●	10.5	18.9	20.9	62.9	62	0.9	5
DWAE0480X04S050		4	●	20.1	33.9	35.9	80.9	80	0.9	5
DWAE0490X02S050	4.9	2	●	10.7	19.9	21.9	62.9	62	0.9	5
DWAE0490X04S050		4	●	20.5	34.9	36.9	80.9	80	0.9	5
DWAE0500X02S050	5.0	2	●	10.9	19.9	21.9	62.9	62	0.9	5
DWAE0500X04S050		4	●	20.9	34.9	36.9	80.9	80	0.9	5
DWAE0510X02S060	5.1	2	★	11.1	21.9	23.9	66.9	66	0.9	6
DWAE0510X04S060		4	★	21.3	35.9	37.9	80.9	80	0.9	6
DWAE0520X02S060	5.2	2	●	11.3	21.9	23.9	66.9	66	0.9	6
DWAE0520X04S060		4	●	21.7	36.9	38.9	80.9	80	0.9	6
DWAE0530X02S060	5.3	2	★	11.6	22.0	24.0	67.0	66	1.0	6
DWAE0530X04S060		4	★	22.2	37.0	39.0	81.0	80	1.0	6
DWAE0540X02S060	5.4	2	●	11.8	22.0	24.0	67.0	66	1.0	6
DWAE0540X04S060		4	●	22.6	38.0	40.0	81.0	80	1.0	6
DWAE0550X02S060	5.5	2	★	12.0	22.0	24.0	67.0	66	1.0	6
DWAE0550X04S060		4	★	23.0	39.0	41.0	81.0	80	1.0	6
DWAE0560X02S060	5.6	2	●	12.2	24.0	26.0	67.0	66	1.0	6
DWAE0560X04S060		4	●	23.4	39.0	41.0	81.0	80	1.0	6
DWAE0570X02S060	5.7	2	★	12.4	24.0	26.0	67.0	66	1.0	6
DWAE0570X04S060		4	★	23.8	39.0	41.0	81.0	80	1.0	6
DWAE0580X02S060	5.8	2	●	12.7	24.1	26.1	67.1	66	1.1	6
DWAE0580X04S060		4	●	24.3	41.1	43.1	81.1	80	1.1	6
DWAE0590X02S060	5.9	2	★	12.9	24.1	26.1	67.1	66	1.1	6
DWAE0590X04S060		4	★	24.7	41.1	43.1	81.1	80	1.1	6
DWAE0600X02S060	6.0	2	●	13.1	24.1	26.1	67.1	66	1.1	6
DWAE0600X04S060		4	●	25.1	42.1	44.1	81.1	80	1.1	6
DWAE0610X02S070	6.1	2	★	13.3	26.1	28.1	75.1	74	1.1	7
DWAE0610X04S070		4	★	25.5	44.1	46.1	84.1	83	1.1	7
DWAE0620X02S070	6.2	2	●	13.5	26.1	28.1	75.1	74	1.1	7
DWAE0620X04S070		4	●	25.9	44.1	46.1	84.1	83	1.1	7
DWAE0630X02S070	6.3	2	★	13.7	26.1	28.1	75.1	74	1.1	7
DWAE0630X04S070		4	★	26.3	44.1	46.1	84.1	83	1.1	7
DWAE0640X02S070	6.4	2	●	14.0	26.2	28.2	75.2	74	1.2	7
DWAE0640X04S070		4	●	26.8	44.2	46.2	84.2	83	1.2	7
DWAE0650X02S070	6.5	2	★	14.2	26.2	28.2	75.2	74	1.2	7
DWAE0650X04S070		4	★	27.2	44.2	46.2	84.2	83	1.2	7
DWAE0660X02S070	6.6	2	●	14.4	28.2	30.2	75.2	74	1.2	7
DWAE0660X04S070		4	●	27.6	46.2	48.2	84.2	83	1.2	7
DWAE0670X02S070	6.7	2	★	14.6	28.2	30.2	75.2	74	1.2	7
DWAE0670X04S070		4	★	28.0	46.2	48.2	84.2	83	1.2	7
DWAE0680X02S070	6.8	2	●	14.8	28.2	30.2	75.2	74	1.2	7
DWAE0680X04S070		4	●	28.4	46.2	48.2	84.2	83	1.2	7
DWAE0690X02S070	6.9	2	★	15.1	28.3	30.3	75.3	74	1.3	7
DWAE0690X04S070		4	★	28.9	46.3	48.3	84.3	83	1.3	7
DWAE0700X02S070	7.0	2	●	15.3	28.3	30.3	75.3	74	1.3	7
DWAE0700X04S070		4	●	29.3	46.3	48.3	84.3	83	1.3	7
DWAE0710X02S080	7.1	2	★	15.5	29.3	31.3	80.3	79	1.3	8
DWAE0710X04S080		4	★	29.7	51.3	53.3	91.3	90	1.3	8

DWAE

Order number	DC	L/D	DP102A	LU	LCF	LH	OAL	LF	PL	DCON
DWAE0720X02S080	7.2	2	●	15.7	29.3	31.3	80.3	79	1.3	8
DWAE0720X04S080		4	●	30.1	51.3	53.3	91.3	90	1.3	8
DWAE0730X02S080	7.3	2	★	15.9	29.3	31.3	80.3	79	1.3	8
DWAE0730X04S080		4	★	30.5	51.3	53.3	91.3	90	1.3	8
DWAE0740X02S080	7.4	2	●	16.1	29.3	31.3	80.3	79	1.3	8
DWAE0740X04S080		4	●	30.9	51.3	53.3	91.3	90	1.3	8
DWAE0750X02S080	7.5	2	★	16.4	29.4	31.4	80.4	79	1.4	8
DWAE0750X04S080		4	★	31.4	51.4	53.4	91.4	90	1.4	8
DWAE0760X02S080	7.6	2	●	16.6	31.4	33.4	80.4	79	1.4	8
DWAE0760X04S080		4	●	31.8	53.4	55.4	91.4	90	1.4	8
DWAE0770X02S080	7.7	2	★	16.8	31.4	33.4	80.4	79	1.4	8
DWAE0770X04S080		4	★	32.2	53.4	55.4	91.4	90	1.4	8
DWAE0780X02S080	7.8	2	●	17.0	31.4	33.4	80.4	79	1.4	8
DWAE0780X04S080		4	●	32.6	53.4	55.4	91.4	90	1.4	8
DWAE0790X02S080	7.9	2	★	17.2	31.4	33.4	80.4	79	1.4	8
DWAE0790X04S080		4	★	33.0	53.4	55.4	91.4	90	1.4	8
DWAE0800X02S080	8.0	2	●	17.5	31.5	33.5	80.5	79	1.5	8
DWAE0800X04S080		4	●	33.5	53.5	55.5	91.5	90	1.5	8
DWAE0810X02S090	8.1	2	★	17.7	33.5	35.5	85.5	84	1.5	9
DWAE0810X04S090		4	★	33.9	57.5	59.5	99.5	98	1.5	9
DWAE0820X02S090	8.2	2	●	17.9	33.5	35.5	85.5	84	1.5	9
DWAE0820X04S090		4	●	34.3	57.5	59.5	99.5	98	1.5	9
DWAE0830X02S090	8.3	2	★	18.1	33.5	35.5	85.5	84	1.5	9
DWAE0830X04S090		4	★	34.7	57.5	59.5	99.5	98	1.5	9
DWAE0840X02S090	8.4	2	●	18.3	33.5	35.5	85.5	84	1.5	9
DWAE0840X04S090		4	●	35.1	57.5	59.5	99.5	98	1.5	9
DWAE0850X02S090	8.5	2	★	18.5	33.5	35.5	85.5	84	1.5	9
DWAE0850X04S090		4	★	35.5	57.5	59.5	99.5	98	1.5	9
DWAE0860X02S090	8.6	2	●	18.8	34.6	36.6	85.6	84	1.6	9
DWAE0860X04S090		4	●	36.0	61.6	63.6	99.6	98	1.6	9
DWAE0870X02S090	8.7	2	★	19.0	34.6	36.6	85.6	84	1.6	9
DWAE0870X04S090		4	★	36.4	61.6	63.6	99.6	98	1.6	9
DWAE0880X02S090	8.8	2	●	19.2	34.6	36.6	85.6	84	1.6	9
DWAE0880X04S090		4	●	36.8	61.6	63.6	99.6	98	1.6	9
DWAE0890X02S090	8.9	2	★	19.4	34.6	36.6	85.6	84	1.6	9
DWAE0890X04S090		4	★	37.2	61.6	63.6	99.6	98	1.6	9
DWAE0900X02S090	9.0	2	●	19.6	34.6	36.6	85.6	84	1.6	9
DWAE0900X04S090		4	●	37.6	61.6	63.6	99.6	98	1.6	9
DWAE0910X02S100	9.1	2	★	19.9	36.7	38.7	90.7	89	1.7	10
DWAE0910X04S100		4	★	38.1	63.7	65.7	106.7	105	1.7	10
DWAE0920X02S100	9.2	2	●	20.1	36.7	38.7	90.7	89	1.7	10
DWAE0920X04S100		4	●	38.5	63.7	65.7	106.7	105	1.7	10
DWAE0930X02S100	9.3	2	★	20.3	36.7	38.7	90.7	89	1.7	10
DWAE0930X04S100		4	★	38.9	63.7	65.7	106.7	105	1.7	10
DWAE0940X02S100	9.4	2	●	20.5	36.7	38.7	90.7	89	1.7	10
DWAE0940X04S100		4	●	39.3	63.7	65.7	106.7	105	1.7	10
DWAE0950X02S100	9.5	2	★	20.7	36.7	38.7	90.7	89	1.7	10
DWAE0950X04S100		4	★	39.7	63.7	65.7	106.7	105	1.7	10
DWAE0960X02S100	9.6	2	●	20.9	37.7	39.7	90.7	89	1.7	10
DWAE0960X04S100		4	●	40.1	66.7	68.7	106.7	105	1.7	10



DWAE

Order number	DC	L/D	DP102A	LU	LCF	LH	OAL	LF	PL	DCON
DWAE0970X02S100	9.7	2	★	21.2	37.8	39.8	90.8	89	1.8	10
DWAE0970X04S100		4	★	40.6	66.8	68.8	106.8	105	1.8	10
DWAE0980X02S100	9.8	2	●	21.4	37.8	39.8	90.8	89	1.8	10
DWAE0980X04S100		4	●	41.0	66.8	68.8	106.8	105	1.8	10
DWAE0990X02S100	9.9	2	★	21.6	37.8	39.8	90.8	89	1.8	10
DWAE0990X04S100		4	★	41.4	66.8	68.8	106.8	105	1.8	10
DWAE1000X02S100	10.0	2	●	21.8	37.8	39.8	90.8	89	1.8	10
DWAE1000X04S100		4	●	41.8	66.8	68.8	106.8	105	1.8	10
DWAE1010X02S110	10.1	2	●	22.0	40.8	42.8	101.8	100	1.8	11
DWAE1010X04S110		4	●	42.2	71.8	73.8	115.8	114	1.8	11
DWAE1020X02S110	10.2	2	●	22.3	40.9	42.9	101.9	100	1.9	11
DWAE1020X04S110		4	●	42.7	71.9	73.9	115.9	114	1.9	11
DWAE1030X02S110	10.3	2	●	22.5	40.9	42.9	101.9	100	1.9	11
DWAE1030X04S110		4	●	43.1	71.9	73.9	115.9	114	1.9	11
DWAE1040X02S110	10.4	2	●	22.7	40.9	42.9	101.9	100	1.9	11
DWAE1040X04S110		4	●	43.5	71.9	73.9	115.9	114	1.9	11
DWAE1050X02S110	10.5	2	●	22.9	40.9	42.9	101.9	100	1.9	11
DWAE1050X04S110		4	●	43.9	71.9	73.9	115.9	114	1.9	11
DWAE1060X02S110	10.6	2	●	23.1	41.9	43.9	101.9	100	1.9	11
DWAE1060X04S110		4	●	44.3	72.9	74.9	115.9	114	1.9	11
DWAE1070X02S110	10.7	2	●	23.3	41.9	43.9	101.9	100	1.9	11
DWAE1070X04S110		4	●	44.7	72.9	74.9	115.9	114	1.9	11
DWAE1080X02S110	10.8	2	●	23.6	42.0	44.0	102.0	100	2.0	11
DWAE1080X04S110		4	●	45.2	73.0	75.0	116.0	114	2.0	11
DWAE1090X02S110	10.9	2	●	23.8	42.0	44.0	102.0	100	2.0	11
DWAE1090X04S110		4	●	45.6	73.0	75.0	116.0	114	2.0	11
DWAE1100X02S110	11.0	2	●	24.0	42.0	44.0	102.0	100	2.0	11
DWAE1100X04S110		4	●	46.0	73.0	75.0	116.0	114	2.0	11
DWAE1110X02S120	11.1	2	●	24.2	45.0	47.0	102.0	100	2.0	12
DWAE1110X04S120		4	●	46.4	77.0	79.0	123.0	121	2.0	12
DWAE1120X02S120	11.2	2	●	24.4	45.0	47.0	102.0	100	2.0	12
DWAE1120X04S120		4	●	46.8	77.0	79.0	123.0	121	2.0	12
DWAE1130X02S120	11.3	2	●	24.7	45.1	47.1	102.1	100	2.1	12
DWAE1130X04S120		4	●	47.3	77.1	79.1	123.1	121	2.1	12
DWAE1140X02S120	11.4	2	●	24.9	45.1	47.1	102.1	100	2.1	12
DWAE1140X04S120		4	●	47.7	77.1	79.1	123.1	121	2.1	12
DWAE1150X02S120	11.5	2	●	25.1	45.1	47.1	102.1	100	2.1	12
DWAE1150X04S120		4	●	48.1	77.1	79.1	123.1	121	2.1	12
DWAE1160X02S120	11.6	2	●	25.3	47.1	49.1	102.1	100	2.1	12
DWAE1160X04S120		4	●	48.5	79.1	81.1	123.1	121	2.1	12
DWAE1170X02S120	11.7	2	●	25.5	47.1	49.1	102.1	100	2.1	12
DWAE1170X04S120		4	●	48.9	79.1	81.1	123.1	121	2.1	12
DWAE1180X02S120	11.8	2	●	25.7	47.1	49.1	102.1	100	2.1	12
DWAE1180X04S120		4	●	49.3	79.1	81.1	123.1	121	2.1	12
DWAE1190X02S120	11.9	2	●	26.0	47.2	49.2	102.2	100	2.2	12
DWAE1190X04S120		4	●	49.8	79.2	81.2	123.2	121	2.2	12
DWAE1200X02S120	12.0	2	●	26.2	47.2	49.2	102.2	100	2.2	12
DWAE1200X04S120		4	●	50.2	79.2	81.2	123.2	121	2.2	12
DWAE1210X02S130	12.1	2	●	26.4	49.2	51.2	102.2	100	2.2	13
DWAE1210X04S130		4	●	50.6	82.2	84.2	139.2	137	2.2	13

DWAE

Order number	DC	L/D	DP102A	LU	LCF	LH	OAL	LF	PL	DCON
DWAE1220X02S130	12.2	2	●	26.6	49.2	51.2	102.2	100	2.2	13
DWAE1220X04S130		4	●	51.0	82.2	84.2	139.2	137	2.2	13
DWAE1230X02S130	12.3	2	●	26.8	49.2	51.2	102.2	100	2.2	13
DWAE1230X04S130		4	●	51.4	82.2	84.2	139.2	137	2.2	13
DWAE1240X02S130	12.4	2	●	27.1	49.3	51.3	102.3	100	2.3	13
DWAE1240X04S130		4	●	51.9	82.3	84.3	139.3	137	2.3	13
DWAE1250X02S130	12.5	2	●	27.3	49.3	51.3	102.3	100	2.3	13
DWAE1250X04S130		4	●	52.3	82.3	84.3	139.3	137	2.3	13
DWAE1260X02S130	12.6	2	●	27.5	52.3	54.3	102.3	100	2.3	13
DWAE1260X04S130		4	●	52.7	84.3	86.3	139.3	137	2.3	13
DWAE1270X02S130	12.7	2	●	27.7	52.3	54.3	102.3	100	2.3	13
DWAE1270X04S130		4	●	53.1	84.3	86.3	139.3	137	2.3	13
DWAE1280X02S130	12.8	2	●	27.9	52.3	54.3	102.3	100	2.3	13
DWAE1280X04S130		4	●	53.5	84.3	86.3	139.3	137	2.3	13
DWAE1290X02S130	12.9	2	●	28.1	52.3	54.3	102.3	100	2.3	13
DWAE1290X04S130		4	●	53.9	84.3	86.3	139.3	137	2.3	13
DWAE1300X02S130	13.0	2	●	28.4	52.4	54.4	102.4	100	2.4	13
DWAE1300X04S130		4	●	54.4	84.4	86.4	139.4	137	2.4	13
DWAE1310X02S140	13.1	2	●	28.6	55.4	57.4	102.4	100	2.4	14
DWAE1310X04S140		4	●	54.8	92.4	94.4	149.4	147	2.4	14
DWAE1320X02S140	13.2	2	●	28.8	55.4	57.4	102.4	100	2.4	14
DWAE1320X04S140		4	●	55.2	92.4	94.4	149.4	147	2.4	14
DWAE1330X02S140	13.3	2	●	29.0	55.4	57.4	102.4	100	2.4	14
DWAE1330X04S140		4	●	55.6	92.4	94.4	149.4	147	2.4	14
DWAE1340X02S140	13.4	2	●	29.2	55.4	57.4	102.4	100	2.4	14
DWAE1340X04S140		4	●	56.0	92.4	94.4	149.4	147	2.4	14
DWAE1350X02S140	13.5	2	●	29.5	55.5	57.5	102.5	100	2.5	14
DWAE1350X04S140		4	●	56.5	92.5	94.5	149.5	147	2.5	14
DWAE1360X02S140	13.6	2	●	29.7	57.5	59.5	102.5	100	2.5	14
DWAE1360X04S140		4	●	56.9	97.5	99.5	149.5	147	2.5	14
DWAE1370X02S140	13.7	2	●	29.9	57.5	59.5	102.5	100	2.5	14
DWAE1370X04S140		4	●	57.3	97.5	99.5	149.5	147	2.5	14
DWAE1380X02S140	13.8	2	●	30.1	57.5	59.5	102.5	100	2.5	14
DWAE1380X04S140		4	●	57.7	97.5	99.5	149.5	147	2.5	14
DWAE1390X02S140	13.9	2	●	30.3	57.5	59.5	102.5	100	2.5	14
DWAE1390X04S140		4	●	58.1	97.5	99.5	149.5	147	2.5	14
DWAE1400X02S140	14.0	2	●	30.5	57.5	59.5	102.5	100	2.5	14
DWAE1400X04S140		4	●	58.5	97.5	99.5	149.5	147	2.5	14

DWAE / MINI DWAE

RECOMMENDED CUTTING CONDITIONS

Material	DC	Vc	n	f	Vf
Mild steel (<180HB), DIN ST44-2, DIN C10 etc.	1.0	30	9500	0.030 (0.02-0.04)	285
	1.5	30	6300	0.050 (0.03-0.06)	315
	2.0	55	8700	0.060 (0.04-0.08)	520
	2.5	55	7000	0.080 (0.05-0.10)	560
	3.0	65	6800	0.090 (0.07-0.11)	610
	4.0	70	5500	0.115 (0.09-0.14)	630
	5.0	70	4400	0.145 (0.11-0.18)	635
	6.0	80	4200	0.175 (0.14-0.21)	735
	7.0	80	3600	0.205 (0.16-0.25)	735
	8.0	85	3300	0.230 (0.18-0.28)	755
	10.0	90	2800	0.265 (0.21-0.32)	740
	12.0	95	2500	0.280 (0.22-0.34)	700
	14.0	95	2100	0.290 (0.23-0.35)	605
	Carbon steel, Alloy steel (180-250HB) DIN Ck45, DIN 41CrMo4 etc.	1.0	30	9500	0.030 (0.02-0.04)
1.5		30	6300	0.050 (0.03-0.06)	315
2.0		55	8700	0.060 (0.04-0.08)	520
2.5		55	7000	0.080 (0.05-0.10)	560
3.0		60	6300	0.090 (0.07-0.11)	565
4.0		65	5100	0.115 (0.09-0.14)	585
5.0		65	4100	0.145 (0.11-0.18)	590
6.0		75	3900	0.175 (0.14-0.21)	680
7.0		75	3400	0.205 (0.16-0.25)	695
8.0		80	3100	0.230 (0.18-0.28)	710
10.0		85	2700	0.265 (0.21-0.32)	715
12.0		90	2300	0.280 (0.22-0.34)	640
14.0		90	2000	0.290 (0.23-0.35)	580
Carbon steel, Alloy steel (280-350HB) DIN 41NiCrMo7-3-2 etc.		1.0	25	7900	0.020 (0.01-0.03)
	1.5	25	5300	0.040 (0.02-0.05)	210
	2.0	50	7900	0.050 (0.03-0.07)	395
	2.5	50	6300	0.070 (0.04-0.09)	440
	3.0	55	5800	0.075 (0.06-0.09)	435
	4.0	60	4700	0.105 (0.08-0.13)	490
	5.0	60	3800	0.130 (0.10-0.16)	490
	6.0	70	3700	0.155 (0.12-0.19)	570
	7.0	70	3100	0.180 (0.14-0.22)	555
	8.0	75	2900	0.205 (0.16-0.25)	590
	10.0	80	2500	0.240 (0.20-0.28)	600
	12.0	85	2200	0.250 (0.20-0.30)	550
	14.0	85	1900	0.250 (0.20-0.30)	475
	Austenitic stainless steel (<200HB) Ferritic, Precipitation hardening stainless steel (>200HB) with water-insoluble coolant DIN X22CrNi17, DIN X45Cr13 etc.	1.0	30	9500	0.020 (0.01-0.03)
1.5		30	6300	0.040 (0.02-0.05)	250
2.0		35	5500	0.040 (0.02-0.06)	220
2.5		35	4400	0.060 (0.03-0.08)	265
3.0		40	4200	0.070 (0.04-0.10)	290
4.0		40	3100	0.075 (0.05-0.10)	230
5.0		40	2500	0.100 (0.05-0.15)	250
6.0		40	2100	0.105 (0.06-0.15)	220
7.0		40	1800	0.120 (0.06-0.18)	215
8.0		40	1500	0.130 (0.06-0.20)	195
10.0		40	1200	0.140 (0.08-0.20)	165
12.0		40	1000	0.175 (0.10-0.25)	175
14.0		40	900	0.175 (0.10-0.25)	155

DWAE / MINI DWAE

RECOMMENDED CUTTING CONDITIONS

Material	DC	Vc	n	f	Vf
Gray cast iron (<350MPa) DIN GG30 etc.	1.0	30	9500	0.030 (0.02-0.04)	285
	1.5	30	6300	0.050 (0.03-0.06)	315
	2.0	55	8700	0.060 (0.04-0.08)	520
	2.5	55	7000	0.080 (0.05-0.10)	560
	3.0	60	6300	0.105 (0.06-0.15)	660
	4.0	65	5100	0.130 (0.08-0.18)	660
	5.0	65	4100	0.150 (0.10-0.20)	615
	6.0	75	3900	0.175 (0.12-0.23)	680
	7.0	75	3400	0.175 (0.12-0.23)	595
	8.0	80	3100	0.210 (0.17-0.25)	650
	10.0	85	2700	0.230 (0.18-0.28)	620
	12.0	90	2300	0.250 (0.20-0.30)	575
	14.0	90	2000	0.250 (0.20-0.30)	500
	Ductile cast iron (<450MPa) DIN GGG40 etc.	1.0	25	7900	0.020 (0.01-0.03)
1.5		25	5300	0.040 (0.02-0.05)	210
2.0		50	7900	0.050 (0.03-0.07)	395
2.5		50	6300	0.070 (0.04-0.09)	440
3.0		55	5800	0.085 (0.05-0.12)	490
4.0		60	4700	0.120 (0.07-0.17)	560
5.0		60	3800	0.140 (0.08-0.20)	530
6.0		70	3700	0.150 (0.10-0.20)	555
7.0		70	3100	0.175 (0.12-0.23)	540
8.0		75	2900	0.200 (0.15-0.25)	580
10.0		80	2500	0.230 (0.18-0.28)	575
12.0		85	2200	0.250 (0.20-0.30)	550
14.0		85	1900	0.250 (0.20-0.30)	475

1. The above cutting conditions are when water soluble coolant is used. For stainless steel, water-insoluble coolant is recommended.
2. When using a water-insoluble coolant, reduce the cutting speed by 20 % to ensure adequate lubrication.
3. Adjust the cutting conditions according to machine tool and workpiece clamping rigidity and machining geometry etc.
4. Machining depths exceeding flute length (LU) are not recommended.
5. Clamp the drill so that the runout is within 0.03 mm.
6. Check the condition of chips and perform step machining if necessary. * Reference of step length: 0.2 to 1.0 DC
7. Do not clamp the flute part of the drill.

DWAE

APPLICATION EXAMPLES

Material	KM-62F Electromagnetic stainless steel
Tool	DWAE1080X02S110
Vc (m/min)	71.3
fr (mm/rev)	0.25
Guide hole dia. (mm)	10.8
ap (mm)	14
Cutting mode	Wet cutting, external coolant (Water-insoluble)
Machine	CNC Automatic Lathe
Results	When compared with a conventional drill, the cutting resistance of DWAE was lower thereby achieving double tool life with no chipping of the cutting edge.

**Number of holes:
8000**

DWAE



Rake face



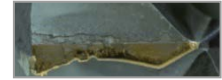
Flank



Margin

**Number of holes:
4000**

Conventional



Rake face



Flank



Margin

Material	Mild Steel DIN C10
Tool	DWAE0300X04S030
Vc (m/min)	51.8
fr (mm/rev)	0.08
Guide hole dia. (mm)	3.0
ap (mm)	7
Cutting mode	Wet cutting, external coolant (Water-insoluble)
Results	Compared to a conventional drill, cutting resistance was lower. Cutting conditions were improved by a factor of 1.5, while achieving 2.4 times longer tool life.

**Number of holes:
4800**

DWAE



Rake face



Flank



Margin

**Number of holes:
2000**

Conventional



Rake face



Flank



Margin

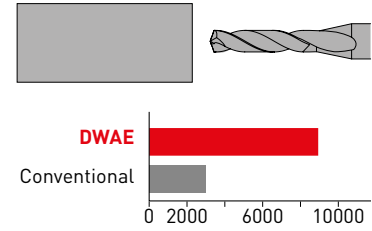
The above application examples are customer's applications, therefore can differ from the recommended conditions.

NEW

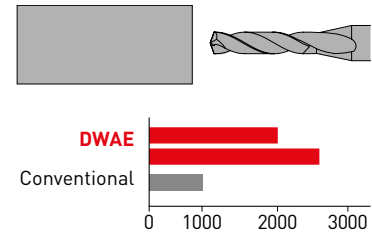
MINI DWAE

APPLICATION EXAMPLES

Material	DIN X30Cr13
Tool	DWAE0250X04S040
n (mm ⁻¹)	2546
Vc (m/min)	20
fr (mm/rev)	0.03
Guide hole dia. (mm)	2.5
ap (mm)	2.5
Cutting mode	Wet cutting (Water-insoluble)
Machine	Automatic Lathe
Results	Consistent hole dimensions and excellent chip disposal. Tool life tripled compared to conventional products.



Material	Martensitic Stainless Steel
Tool	DWAE0180X04S030
n (mm ⁻¹)	2000
Vc (m/min)	11
fr (mm/rev)	0.02
ap (mm)	1.8
Cutting mode	Step feed: 1 mm Wet cutting (Water-insoluble)
Machine	CNC-Lathe
Results	Damage to the cutting edge greatly reduced thereby allowing more than double tool life.



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