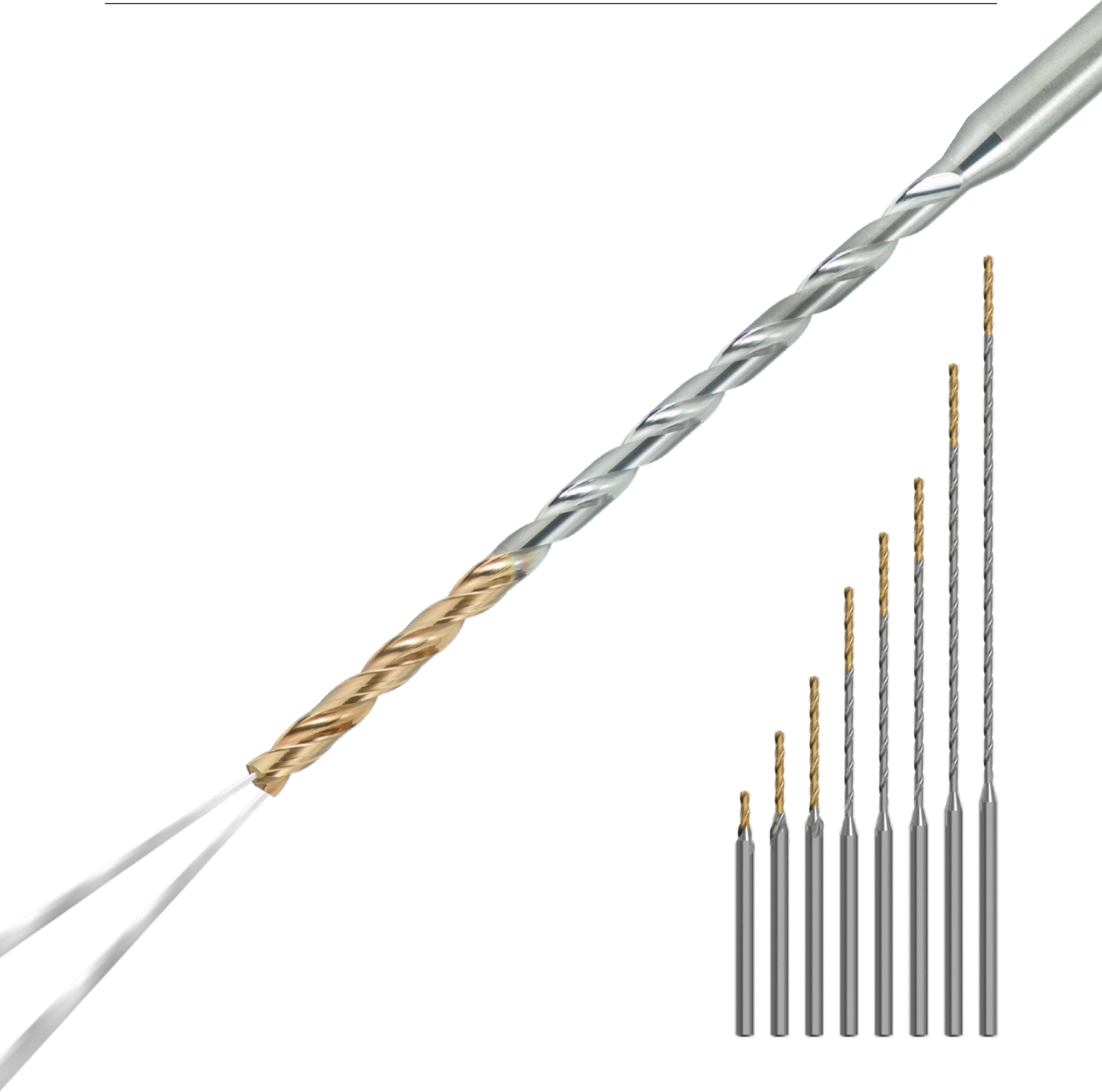


MINI DVAS

SOLID CARBIDE TRISTAR DRILL SERIES
FAST, RELIABLE AND ACCURATE



MINI DVAS

HIGH EFFICIENCY, LONG TOOL LIFE, HIGH PRECISION

TRISTAR, A NEW GENERATION DRILL SERIES PROVIDES 3 STRONG ADVANTAGES

TRISTAR: FAST

Conventional deep hole drilling is usually a slow process.

DVAS drills can perform at higher feeds and speeds meaning faster drilling cycles.

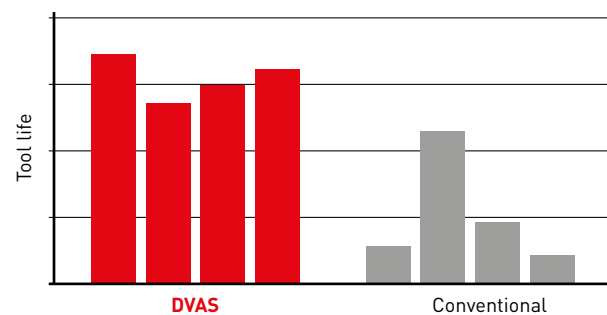


Cutting time 8 s/hole

TRISTAR: RELIABLE

Breakages, short tool life and lack of coolant can be common with standard tools.

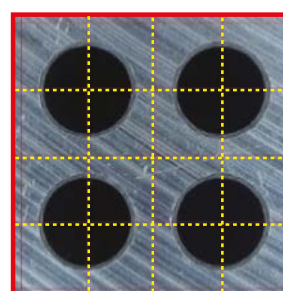
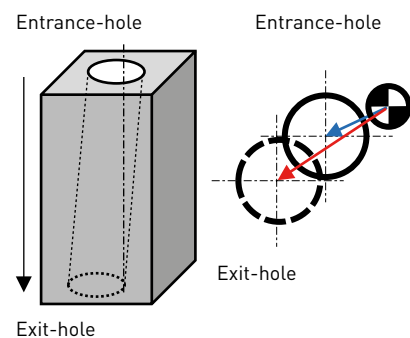
DVAS – Tool life exceeds all normal expectations.



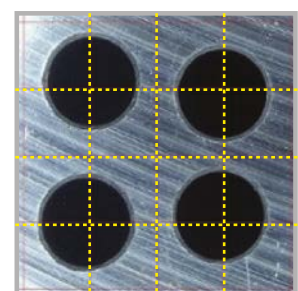
TRISTAR: ACCURATE

Conventionally drilled holes can wander considerably and have poor positioning.

Straighter holes and improved dimensional accuracy are enabled by using DVAS drills.



DVAS



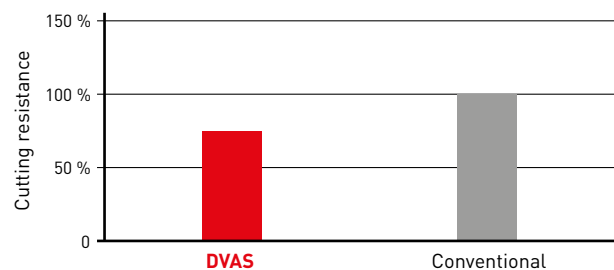
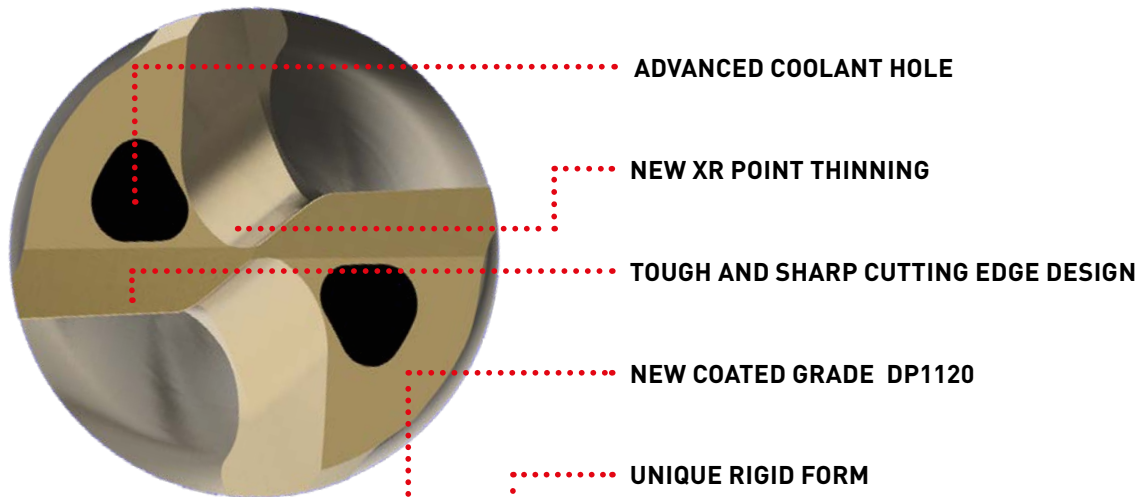
Conventional

MINI DVAS

FAST, RELIABLE AND ACCURATE NEW STANDARDS ENABLED BY FIVE TECHNOLOGIES

The first of the TRISTAR series is a small diameter drill with 5 technological features for fast, reliable and accurate drilling.

Ø 1.0 mm – Ø 2.9 mm L/D = 2 – 50



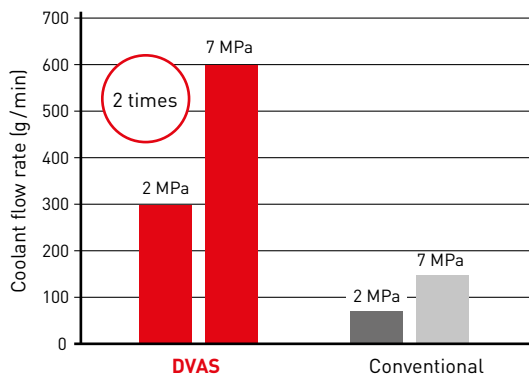
Material	42CrMo4
Tool	DC = Ø 1.0 mm, L/D = 20
Vc (m/min)	70
f (mm/rev)	0.04

MINI DVAS

COOLANT HOLES WITH TRI-COOLING TECHNOLOGY

TRI-Cooling is optimal for small-diameter drills and can achieve more than double the conventional coolant discharge volume. This can dramatically improve chip discharge and heat dissipation, contributing greatly to tool life stability.

Drill	DC = Ø2 mm, L/D = 20
Coolant	Water-soluble coolants



DVAS

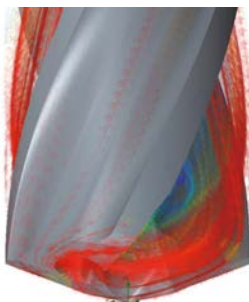


Conventional

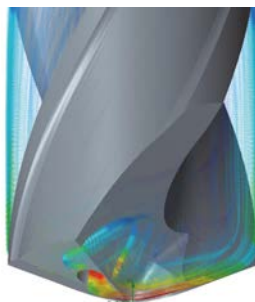
LARGE COOLANT HOLES IMPROVE COOLING EFFECT, REDUCE DAMAGE AND INCREASE TOOL LIFE

Increased coolant flow provides effective cooling even in difficult applications or when using an oil based cutting fluid.

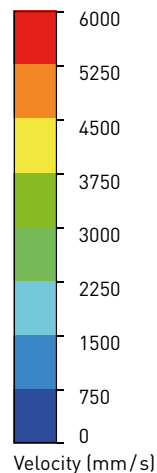
COOLANT FLOW SPEED SIMULATION



DVAS



Conventional



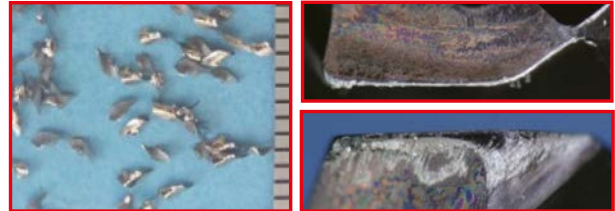
Velocity (mm/s)

MINI DVAS

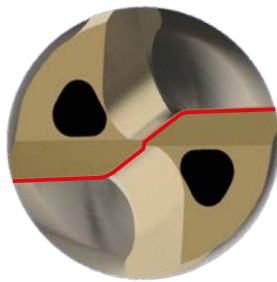
TOUGH, SHARP CUTTING EDGE DESIGN

The straight cutting edge and thinned point are connected by a smooth curved geometry that significantly improves fracture resistance. The geometry of the rake angle and land also improves tool wear and chip disposal.

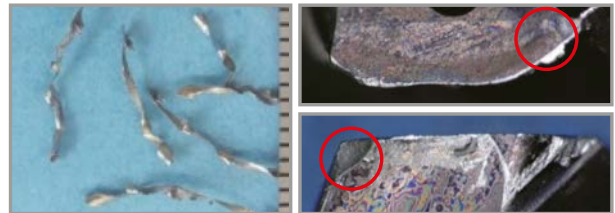
Material	42CrMo4
Tool	DC = Ø2 mm, L/D = 20
Vc (m/min)	50
f (mm/rev)	0.06
Cutting mode	Wet cutting Water-soluble coolants, 2 MPa



DVAS



LARGE CRATER WEAR AND FRACTURE OF THE OUTER EDGE.



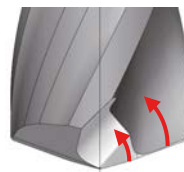
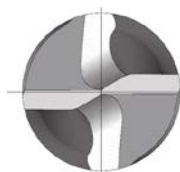
Conventional

NEW XR POINT THINNING, REDUCES CUTTING LOAD AND OPTIMISES CHIP FLOW

The new point thinning breaks chips into the optimum shape for a streamlined flow and achieves a much lower cutting resistance.

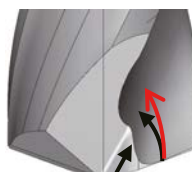
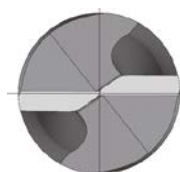
DVAS

The R shaped space created by the point thinning helps to form compact chips and aid flow.



CONVENTIONAL DRILLS

Creates larger chips with a lower rate of flow that can cause chip clogging.



MINI DVAS

UNIQUE FLUTE FORM FOR GREATER RIGIDITY

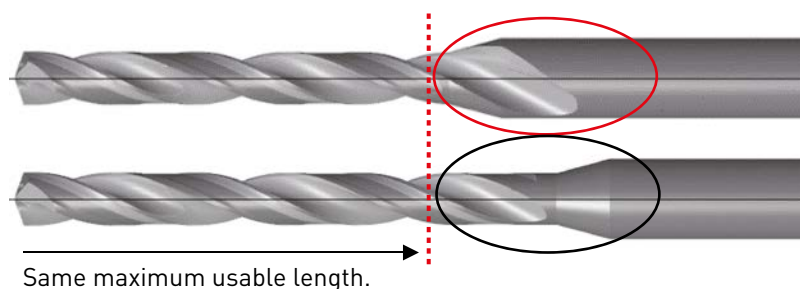
The short drill is designed for high rigidity and good chip evacuation by minimizing the neck length.

A chip discharge area is provided over the taper part, thus increasing tool rigidity by 20 % more than conventional models and in addition the extra strength improves hole position accuracy.

Applies to L/D = 2, 7, 12

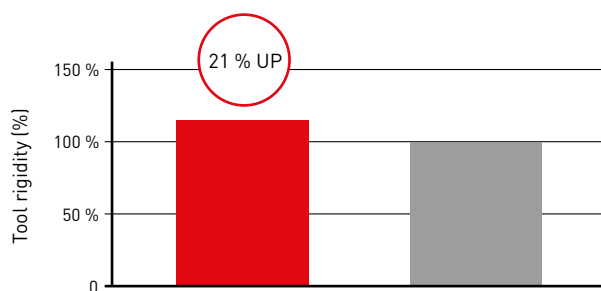
DVAS

Conventional



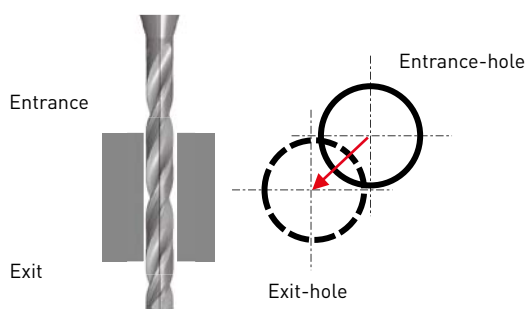
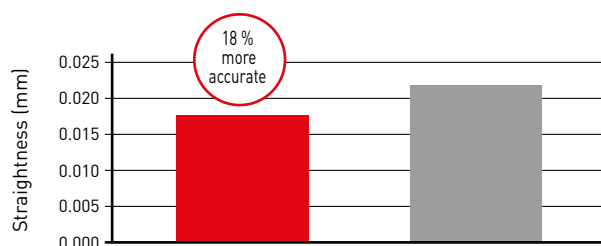
COMPARISON OF TOOL RIGIDITY

Tool	DC = Ø2 mm, L/D = 7
OAL (mm)	60
Constrained	Shank to tip range of 0-30 mm
Load	Distributed load of 140 N in Z axis direction



COMPARISON OF HOLE STRAIGHTNESS

Material	42CrMo4
Tool	DC = Ø2 mm, L/D = 7
Vc (m/min)	70
f (mm/rev)	0.008
ap (mm)	10
Cutting mode	Wet cutting, water-soluble coolant, 5 MPa Hydro chuck
Number of holes	100

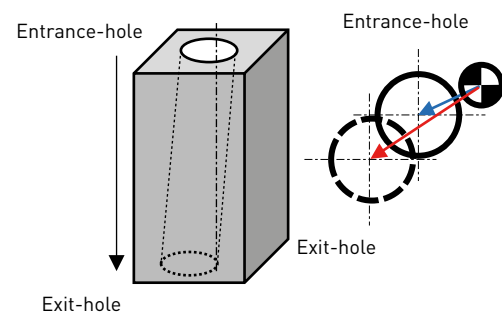
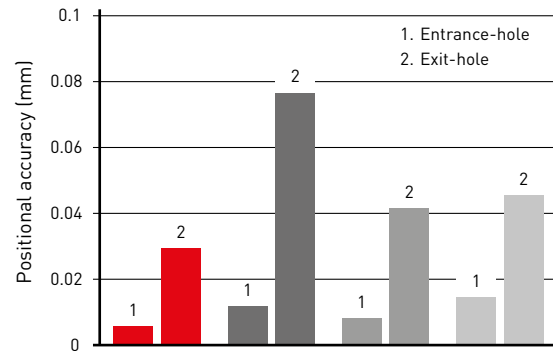


MINI DVAS

DEEP HOLE MACHINING EXAMPLE

For deep holes it is recommended to use a pilot drill to improve hole entry and reduce deviation at the exit point.

Material	42CrMo4
Tool	Pilot drill DC = Ø2 mm, L/D = 2
	Long drill DC = Ø2 mm, L/D = 20
Vc (m/min)	70
f (mm/rev)	0.07
Cutting mode	Wet cutting, water-soluble coolants, 5 MPa Hydro chuck
Number of holes	100



NEW COATED GRADE DP1120

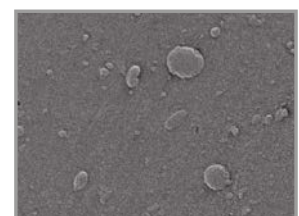
DP1120 has a special multi-layer PVD coating and a micro-grain, cemented carbide substrate. The outstanding surface smoothness prevents chip clogging and reduces breakage. Additionally the excellent crater wear resistance maintains cutting edge sharpness to enable long tool life.

Tool	DC = Ø2 mm, L/D = 20
Vc (m/min)	50
f (mm/rev)	0.06
Cutting mode	Wet cutting, Water-soluble coolants, 2 MPa
Number of holes	500

ENLARGED VIEW OF THE FLUTE SURFACE



DVAS



Conventional



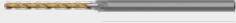
DVAS



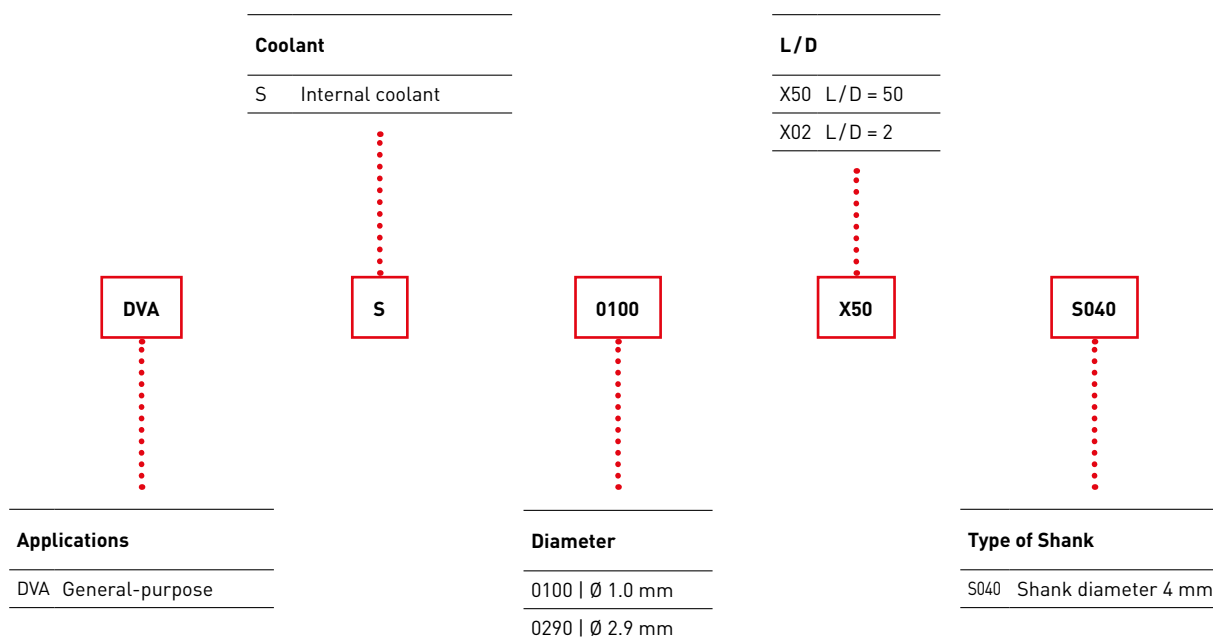
Conventional
Large crater wear

DRILLS SELECTION

DVAS – SOLID CARBIDE TRISTAR DRILL SERIES

	Product code	DC	Size	Item	Hole depth	Material					Shape
						P	M	K	N	S	
Pilot drill	DVAS0000X02	Ø1.0 – Ø2.9	0.1	20	2	⊙	⊙	○	○	⊙	
	DVAS0000X07	Ø1.0 – Ø2.9	0.1	20	7	⊙	⊙	○	○	⊙	
	DVAS0000X12	Ø1.0 – Ø2.9	0.1	20	12	⊙	⊙	○	○	⊙	
Long drill	DVAS0000X20	Ø1.0 – Ø2.9	0.1	20	20	⊙	⊙	○	○	⊙	
	DVAS0000X25	Ø1.0 – Ø2.9	0.1	20	25	⊙	⊙	○	○	⊙	
	DVAS0000X30	Ø1.0 – Ø2.9	0.1	20	30	⊙	⊙	○	○	⊙	
	DVAS0000X40	Ø1.0 – Ø2.9	0.1	20	40	⊙	⊙	○	○	⊙	
	DVAS0000X50	Ø1.0 – Ø2.5	0.5	20	50	⊙	⊙	○	○	⊙	

IDENTIFICATION

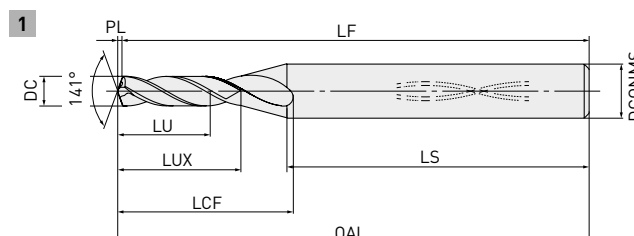


MINI DVAS



SOLID CARBIDE PILOT DRILLS - TRISTAR DRILLS

P M K N S



DC < 3
0.006
-0.004



DCONMS = 4
0
-0.008

Order number	DP1120	DC	DCONMS	L/D	LU	LUX	LCF	LS	OAL	LF	PL	Type
DVAS0100X02S040	●	1.0	4	2	2.2	3.2	8.6	41.2	50.0	49.8	0.2	1
DVAS0110X02S040	●	1.1	4	2	2.4	3.5	9.0	41.1	50.0	49.8	0.2	1
DVAS0120X02S040	●	1.2	4	2	2.6	3.9	9.4	41.0	50.0	49.8	0.2	1
DVAS0130X02S040	●	1.3	4	2	2.8	4.2	9.9	40.8	50.0	49.8	0.2	1
DVAS0140X02S040	●	1.4	4	2	3.0	4.5	10.3	40.7	50.0	49.8	0.2	1
DVAS0150X02S040	●	1.5	4	2	3.3	4.8	10.7	40.6	50.0	49.7	0.3	1
DVAS0160X02S040	●	1.6	4	2	3.5	5.1	11.1	40.4	50.0	49.7	0.3	1
DVAS0170X02S040	●	1.7	4	2	3.7	5.5	11.6	40.3	50.0	49.7	0.3	1
DVAS0180X02S040	●	1.8	4	2	3.9	5.8	12.0	40.2	50.0	49.7	0.3	1
DVAS0190X02S040	●	1.9	4	2	4.1	6.1	12.4	40.0	50.0	49.7	0.3	1
DVAS0200X02S040	●	2.0	4	2	4.4	6.4	12.9	39.9	50.0	49.6	0.4	1
DVAS0210X02S040	●	2.1	4	2	4.6	6.7	13.3	39.8	50.0	49.6	0.4	1
DVAS0220X02S040	●	2.2	4	2	4.8	7.0	13.7	39.7	50.0	49.6	0.4	1
DVAS0230X02S040	●	2.3	4	2	5.0	7.4	14.1	44.5	55.0	54.6	0.4	1
DVAS0240X02S040	●	2.4	4	2	5.2	7.7	14.6	44.4	55.0	54.6	0.4	1
DVAS0250X02S040	●	2.5	4	2	5.5	8.0	15.0	44.3	55.0	54.6	0.4	1
DVAS0260X02S040	●	2.6	4	2	5.7	8.3	15.4	44.1	55.0	54.5	0.5	1
DVAS0270X02S040	●	2.7	4	2	5.9	8.6	15.8	44.0	55.0	54.5	0.5	1
DVAS0280X02S040	●	2.8	4	2	6.1	8.9	16.3	43.9	55.0	54.5	0.5	1
DVAS0290X02S040	●	2.9	4	2	6.3	9.3	16.7	43.7	55.0	54.5	0.5	1

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MINI DVAS



SOLID CARBIDE TRISTAR DRILL

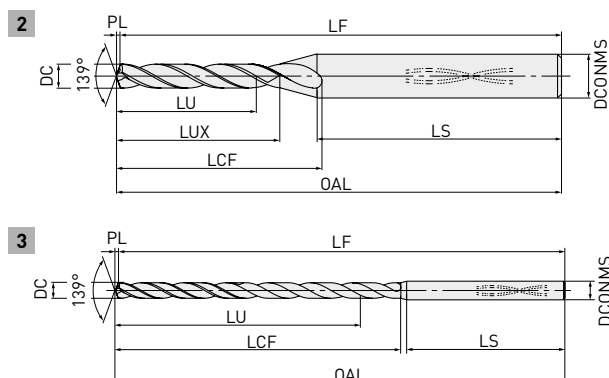
P M K S N



DC < 3
0
-0.010



DCONMS = 4
0
-0.008



Order number	DP1120	DC	DCONMS	L/D	LU	LUX	LCF	LS	OAL	LF	PL	Type
DVAS0100X07S040	●	1.0	4	7	7.2	8.2	13.6	41.2	55.0	54.8	0.2	2
DVAS0100X12S040	●	1.0	4	12	12.2	13.2	18.6	39.2	58.0	57.8	0.2	2
DVAS0100X20S040	●	1.0	4	20	20.2	—	23.2	38.2	67.0	66.8	0.2	3
DVAS0100X25S040	●	1.0	4	25	25.2	—	28.2	39.2	73.0	72.8	0.2	3
DVAS0100X30S040	●	1.0	4	30	30.2	—	33.2	40.2	79.0	78.8	0.2	3
DVAS0100X40S040	●	1.0	4	40	40.2	—	43.2	41.2	90.0	89.8	0.2	3
DVAS0100X50S040	●	1.0	4	50	50.2	—	53.2	43.2	102.0	101.8	0.2	3
DVAS0110X07S040	●	1.1	4	7	7.9	9.1	14.5	40.6	55.0	54.8	0.2	2
DVAS0110X12S040	●	1.1	4	12	13.4	14.6	20.0	38.1	58.0	57.8	0.2	2
DVAS0110X20S040	●	1.1	4	20	22.2	—	25.5	36.1	67.0	66.8	0.2	3
DVAS0110X25S040	●	1.1	4	25	27.7	—	31.0	36.6	73.0	72.8	0.2	3
DVAS0110X30S040	●	1.1	4	30	33.2	—	36.5	37.1	79.0	78.8	0.2	3
DVAS0110X40S040	●	1.1	4	40	44.2	—	47.5	37.1	90.0	89.8	0.2	3
NEW DVAS0110X50S040	●	1.1	4	50	55.2	—	58.5	38.1	102.0	101.8	0.2	3
DVAS0120X07S040	●	1.2	4	7	8.6	9.9	15.4	40.0	55.0	54.8	0.2	2
DVAS0120X12S040	●	1.2	4	12	14.6	15.9	21.4	39.0	60.0	59.8	0.2	2
DVAS0120X20S040	●	1.2	4	20	24.2	—	27.8	38.0	71.0	70.8	0.2	3
DVAS0120X25S040	●	1.2	4	25	30.2	—	33.8	38.0	77.0	76.8	0.2	3
DVAS0120X30S040	●	1.2	4	30	36.2	—	39.8	39.0	84.0	83.8	0.2	3
DVAS0120X40S040	●	1.2	4	40	48.2	—	51.8	40.0	97.0	96.8	0.2	3
NEW DVAS0120X50S040	●	1.2	4	50	60.2	—	63.8	41.0	110.0	109.8	0.2	3
DVAS0130X07S040	●	1.3	4	7	9.3	10.7	16.4	39.3	55.0	54.8	0.2	2
DVAS0130X12S040	●	1.3	4	12	15.8	17.2	22.9	37.8	60.0	59.8	0.2	2
DVAS0130X20S040	●	1.3	4	20	26.2	—	30.1	35.8	71.0	70.8	0.2	3
DVAS0130X25S040	●	1.3	4	25	32.7	—	36.6	35.3	77.0	76.8	0.2	3
DVAS0130X30S040	●	1.3	4	30	39.2	—	43.1	35.8	84.0	83.8	0.2	3
DVAS0130X40S040	●	1.3	4	40	52.2	—	56.1	35.8	97.0	96.8	0.2	3
NEW DVAS0130X50S040	●	1.3	4	50	65.2	—	69.1	35.8	110.0	109.8	0.2	3

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MINI DVAS – SOLID CARBIDE TRISTAR DRILL

	Order number	DP1120	DC	DCONMS	L/D	LU	LUX	LCF	LS	OAL	LF	PL	Type
	DVAS0140X07S040	●	1.4	4	7	10.1	11.5	17.3	38.7	55.0	54.7	0.3	2
	DVAS0140X12S040	●	1.4	4	12	17.1	18.5	24.3	39.7	63.0	62.7	0.3	2
	DVAS0140X20S040	●	1.4	4	20	28.3	—	32.5	37.7	75.0	74.7	0.3	3
	DVAS0140X25S040	●	1.4	4	25	35.3	—	39.5	37.7	82.0	81.7	0.3	3
	DVAS0140X30S040	●	1.4	4	30	42.3	—	46.5	38.7	90.0	89.7	0.3	3
	DVAS0140X40S040	●	1.4	4	40	56.3	—	60.5	39.7	105.0	104.7	0.3	3
NEW	DVAS0140X50S040	●	1.4	4	50	70.3	—	74.5	40.7	120.0	119.7	0.3	3
	DVAS0150X07S040	●	1.5	4	7	10.8	12.3	18.2	38.1	55.0	54.7	0.3	2
	DVAS0150X12S040	●	1.5	4	12	18.3	19.8	25.7	38.6	63.0	62.7	0.3	2
	DVAS0150X20S040	●	1.5	4	20	30.3	—	34.8	35.6	75.0	74.7	0.3	3
	DVAS0150X25S040	●	1.5	4	25	37.8	—	42.3	35.1	82.0	81.7	0.3	3
	DVAS0150X30S040	●	1.5	4	30	45.3	—	49.8	35.6	90.0	89.7	0.3	3
	DVAS0150X40S040	●	1.5	4	40	60.3	—	64.8	35.6	105.0	104.7	0.3	3
	DVAS0150X50S040	●	1.5	4	50	75.3	—	79.8	35.6	120.0	119.7	0.3	3
	DVAS0160X07S040	●	1.6	4	7	11.5	13.1	19.2	39.4	57.0	56.7	0.3	2
	DVAS0160X12S040	●	1.6	4	12	19.5	21.1	27.2	40.4	66.0	65.7	0.3	2
	DVAS0160X20S040	●	1.6	4	20	32.3	—	37.1	37.4	79.0	78.7	0.3	3
	DVAS0160X25S040	●	1.6	4	25	40.3	—	45.1	38.4	88.0	87.7	0.3	3
	DVAS0160X30S040	●	1.6	4	30	48.3	—	53.1	41.4	99.0	98.7	0.3	3
	DVAS0160X40S040	●	1.6	4	40	64.3	—	69.1	39.4	113.0	112.7	0.3	3
NEW	DVAS0160X50S040	●	1.6	4	50	80.3	—	85.1	40.4	130.0	129.7	0.3	3
	DVAS0170X07S040	●	1.7	4	7	12.2	14.0	20.1	38.8	57.0	56.7	0.3	2
	DVAS0170X12S040	●	1.7	4	12	20.7	22.5	28.6	39.3	66.0	65.7	0.3	2
	DVAS0170X20S040	●	1.7	4	20	34.3	—	39.4	35.3	79.0	78.7	0.3	3
	DVAS0170X25S040	●	1.7	4	25	42.8	—	47.9	35.8	88.0	87.7	0.3	3
	DVAS0170X30S040	●	1.7	4	30	51.3	—	56.4	38.3	99.0	98.7	0.3	3
	DVAS0170X40S040	●	1.7	4	40	68.3	—	73.4	35.3	113.0	112.7	0.3	3
NEW	DVAS0170X50S040	●	1.7	4	50	85.3	—	90.4	35.3	130.0	129.7	0.3	3
	DVAS0180X07S040	●	1.8	4	7	12.9	14.8	21.0	40.2	59.0	58.7	0.3	2
	DVAS0180X12S040	●	1.8	4	12	21.9	23.8	30.0	41.2	69.0	68.7	0.3	2
	DVAS0180X20S040	●	1.8	4	20	36.3	—	41.7	38.2	84.0	83.7	0.3	3
	DVAS0180X25S040	●	1.8	4	25	45.3	—	50.7	39.2	94.0	93.7	0.3	3
	DVAS0180X30S040	●	1.8	4	30	54.3	—	59.7	40.2	104.0	103.7	0.3	3
	DVAS0180X40S040	●	1.8	4	40	72.3	—	77.7	41.2	123.0	122.7	0.3	3
NEW	DVAS0180X50S040	●	1.8	4	50	90.3	—	95.7	43.2	143.0	142.7	0.3	3
	DVAS0190X07S040	●	1.9	4	7	13.7	15.6	21.9	39.5	59.0	58.6	0.4	2
	DVAS0190X12S040	●	1.9	4	12	23.2	25.1	31.4	40.0	69.0	68.6	0.4	2
	DVAS0190X20S040	●	1.9	4	20	38.4	—	44.1	36.0	84.0	83.6	0.4	3
	DVAS0190X25S040	●	1.9	4	25	47.9	—	53.6	36.5	94.0	93.6	0.4	3
	DVAS0190X30S040	●	1.9	4	30	57.4	—	63.1	37.0	104.0	103.6	0.4	3
	DVAS0190X40S040	●	1.9	4	40	76.4	—	82.1	37.0	123.0	122.6	0.4	3
NEW	DVAS0190X50S040	●	1.9	4	50	95.4	—	101.1	38.0	143.0	142.6	0.4	3
	DVAS0200X07S040	●	2.0	4	7	14.4	16.4	22.9	41.9	62.0	61.6	0.4	2
	DVAS0200X12S040	●	2.0	4	12	24.4	26.4	32.9	42.9	73.0	72.6	0.4	2
	DVAS0200X20S040	●	2.0	4	20	40.4	—	46.4	40.9	91.0	90.6	0.4	3
	DVAS0200X25S040	●	2.0	4	25	50.4	—	56.4	41.9	102.0	101.6	0.4	3
	DVAS0200X30S040	●	2.0	4	30	60.4	—	66.4	42.9	113.0	112.6	0.4	3
	DVAS0200X40S040	●	2.0	4	40	80.4	—	86.4	45.9	136.0	135.6	0.4	3
	DVAS0200X50S040	●	2.0	4	50	100.4	—	106.4	47.9	158.0	157.6	0.4	3

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MINI DVAS – SOLID CARBIDE TRISTAR DRILL

	Order number	DP1120	DC	DCONMS	L/D	LU	LUX	LCF	LS	OAL	LF	PL	Type
	DVAS0210X07S040	●	2.1	4	7	15.1	17.2	23.8	41.3	62.0	61.6	0.4	2
	DVAS0210X12S040	●	2.1	4	12	25.6	27.7	34.3	41.8	73.0	72.6	0.4	2
	DVAS0210X20S040	●	2.1	4	20	42.4	—	48.7	38.8	91.0	90.6	0.4	3
	DVAS0210X25S040	●	2.1	4	25	52.9	—	59.2	39.3	102.0	101.6	0.4	3
	DVAS0210X30S040	●	2.1	4	30	63.4	—	69.7	39.8	113.0	112.6	0.4	3
	DVAS0210X40S040	●	2.1	4	40	84.4	—	90.7	41.8	136.0	135.6	0.4	3
NEW	DVAS0210X50S040	●	2.1	4	50	105.4	—	111.7	42.8	158.0	157.6	0.4	3
	DVAS0220X07S040	●	2.2	4	7	15.8	18.1	24.7	40.6	62.0	61.6	0.4	2
	DVAS0220X12S040	●	2.2	4	12	26.8	29.1	35.7	40.6	73.0	72.6	0.4	2
	DVAS0220X20S040	●	2.2	4	20	44.4	—	51.0	36.6	91.0	90.6	0.4	3
	DVAS0220X25S040	●	2.2	4	25	55.4	—	62.0	36.6	102.0	101.6	0.4	3
	DVAS0220X30S040	●	2.2	4	30	66.4	—	73.0	36.6	113.0	112.6	0.4	3
	DVAS0220X40S040	●	2.2	4	40	88.4	—	95.0	37.6	136.0	135.6	0.4	3
NEW	DVAS0220X50S040	●	2.2	4	50	110.4	—	117.0	37.6	158.0	157.6	0.4	3
	DVAS0230X07S040	●	2.3	4	7	16.5	18.9	25.7	43.0	65.0	64.6	0.4	2
	DVAS0230X12S040	●	2.3	4	12	28.0	30.4	37.2	44.5	78.0	77.6	0.4	2
	DVAS0230X20S040	●	2.3	4	20	46.4	—	53.3	41.5	98.0	97.6	0.4	3
	DVAS0230X25S040	●	2.3	4	25	57.9	—	64.8	43.0	111.0	110.6	0.4	3
	DVAS0230X30S040	●	2.3	4	30	69.4	—	76.3	44.5	124.0	123.6	0.4	3
	DVAS0230X40S040	●	2.3	4	40	92.4	—	99.3	47.5	150.0	149.6	0.4	3
NEW	DVAS0230X50S040	●	2.3	4	50	115.4	—	122.3	50.5	176.0	175.6	0.4	3
	DVAS0240X07S040	●	2.4	4	7	17.2	19.7	26.6	42.4	65.0	64.6	0.4	2
	DVAS0240X12S040	●	2.4	4	12	29.2	31.7	38.6	43.4	78.0	77.6	0.4	2
	DVAS0240X20S040	●	2.4	4	20	48.4	—	55.6	39.4	98.0	97.6	0.4	3
	DVAS0240X25S040	●	2.4	4	25	60.4	—	67.6	40.4	111.0	110.6	0.4	3
	DVAS0240X30S040	●	2.4	4	30	72.4	—	79.6	41.4	124.0	123.6	0.4	3
	DVAS0240X40S040	●	2.4	4	40	96.4	—	103.6	43.4	150.0	149.6	0.4	3
NEW	DVAS0240X50S040	●	2.4	4	50	120.4	—	127.6	45.4	176.0	175.6	0.4	3
	DVAS0250X07S040	●	2.5	4	7	18.0	20.5	27.5	41.7	65.0	64.5	0.5	2
	DVAS0250X12S040	●	2.5	4	12	30.5	33.0	40.0	42.2	78.0	77.5	0.5	2
	DVAS0250X20S040	●	2.5	4	20	50.5	—	58.0	37.2	98.0	97.5	0.5	3
	DVAS0250X25S040	●	2.5	4	25	63.0	—	70.5	37.7	111.0	110.5	0.5	3
	DVAS0250X30S040	●	2.5	4	30	75.5	—	83.0	38.2	124.0	123.5	0.5	3
	DVAS0250X40S040	●	2.5	4	40	100.5	—	108.0	39.2	150.0	149.5	0.5	3
	DVAS0250X50S040	●	2.5	4	50	125.5	—	133.0	40.2	176.0	175.5	0.5	3
	DVAS0260X07S040	●	2.6	4	7	18.7	21.3	28.4	41.1	65.0	64.5	0.5	2
	DVAS0260X12S040	●	2.6	4	12	31.7	34.3	41.4	41.1	78.0	77.5	0.5	2
	DVAS0260X20S040	●	2.6	4	20	52.5	—	60.3	35.1	98.0	97.5	0.5	3
	DVAS0260X25S040	●	2.6	4	25	65.5	—	73.3	35.1	111.0	110.5	0.5	3
	DVAS0260X30S040	●	2.6	4	30	78.5	—	86.3	35.1	124.0	123.5	0.5	3
	DVAS0260X40S040	●	2.6	4	40	104.5	—	112.3	35.1	150.0	149.5	0.5	3
NEW	DVAS0260X50S040	●	2.6	4	50	130.5	—	138.3	35.1	176.0	175.5	0.5	3
	DVAS0270X07S040	●	2.7	4	7	19.4	22.2	29.4	43.5	68.0	67.5	0.5	2
	DVAS0270X12S040	●	2.7	4	12	32.9	35.7	42.9	45.0	83.0	82.5	0.5	2
	DVAS0270X20S040	●	2.7	4	20	54.5	—	62.6	42.0	107.0	106.5	0.5	3
	DVAS0270X25S040	●	2.7	4	25	68.0	—	76.1	43.5	122.0	121.5	0.5	3
	DVAS0270X30S040	●	2.7	4	30	81.5	—	89.6	45.0	137.0	136.5	0.5	3
	DVAS0270X40S040	●	2.7	4	40	108.5	—	116.6	48.0	167.0	166.5	0.5	3
NEW	DVAS0270X50S040	●	2.7	4	50	135.5	—	143.6	51.0	197.0	196.5	0.5	3

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MINI DVAS – SOLID CARBIDE TRISTAR DRILL

Order number	DP1120	DC	DCONMS	L/D	LU	LUX	LCF	LS	OAL	LF	PL	Type
DVAS0280X07S040	●	2.8	4	7	20.1	23.0	30.3	42.8	68.0	67.5	0.5	2
DVAS0280X12S040	●	2.8	4	12	34.1	37.0	44.3	43.8	83.0	82.5	0.5	2
DVAS0280X20S040	●	2.8	4	20	56.5	—	64.9	39.8	107.0	106.5	0.5	3
DVAS0280X25S040	●	2.8	4	25	70.5	—	78.9	40.8	122.0	121.5	0.5	3
DVAS0280X30S040	●	2.8	4	30	84.5	—	92.9	41.8	137.0	136.5	0.5	3
DVAS0280X40S040	●	2.8	4	40	112.5	—	120.9	43.8	167.0	166.5	0.5	3
NEW DVAS0280X50S040	●	2.8	4	50	140.5	—	148.9	45.8	197.0	196.5	0.5	3
DVAS0290X07S040	●	2.9	4	7	20.8	23.8	31.2	42.2	68.0	67.5	0.5	2
DVAS0290X12S040	●	2.9	4	12	35.3	38.3	45.7	42.7	83.0	82.5	0.5	2
DVAS0290X20S040	●	2.9	4	20	58.5	—	67.2	37.7	107.0	106.5	0.5	3
DVAS0290X25S040	●	2.9	4	25	73.0	—	81.7	38.2	122.0	121.5	0.5	3
DVAS0290X30S040	●	2.9	4	30	87.5	—	96.2	38.7	137.0	136.5	0.5	3
DVAS0290X40S040	●	2.9	4	40	116.5	—	125.2	39.7	167.0	166.5	0.5	3
NEW DVAS0290X50S040	●	2.9	4	50	145.5	—	154.2	40.7	197.0	196.5	0.5	3
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MINI DVAS

RECOMMENDED CUTTING CONDITIONS

Material	DC	L/D	Vc	n	fr
P Mild steel Carbon steel, Alloy steel	1.0	2 – 30	65 [30 – 100]	20700	0.035 (0.020 – 0.050)
	1.0	40, 50	65 [30 – 100]	20700	0.030 (0.020 – 0.040)
	1.5	2 – 30	65 [30 – 100]	13800	0.053 (0.030 – 0.075)
	1.5	40, 50	65 [30 – 100]	13800	0.045 (0.030 – 0.060)
	2.0	2 – 30	70 [40 – 100]	11100	0.070 (0.040 – 0.100)
	2.0	40, 50	70 [40 – 100]	11100	0.060 (0.040 – 0.080)
	2.5	2 – 30	70 [40 – 100]	8900	0.088 (0.050 – 0.125)
	2.5	40, 50	70 [40 – 100]	8900	0.075 (0.050 – 0.100)
	2.9	2 – 30	70 [40 – 100]	7700	0.102 (0.058 – 0.145)
	2.9	40, 50	70 [40 – 100]	7700	0.087 (0.058 – 0.116)
M Austenitic stainless steel, Ferritic stainless steel Ferritic and martensitic stainless steel Precipitation hardening stainless steel	1.0	2 – 30	60 [20 – 100]	19100	0.025 (0.010 – 0.040)
	1.0	40, 50	60 [20 – 100]	19100	0.020 (0.010 – 0.030)
	1.5	2 – 30	60 [20 – 100]	12700	0.038 (0.015 – 0.060)
	1.5	40, 50	60 [20 – 100]	12700	0.030 (0.015 – 0.045)
	2.0	2 – 30	60 [20 – 100]	9500	0.050 (0.020 – 0.080)
	2.0	40, 50	60 [20 – 100]	9500	0.040 (0.020 – 0.060)
	2.5	2 – 30	60 [20 – 100]	7600	0.063 (0.025 – 0.100)
	2.5	40, 50	60 [20 – 100]	7600	0.050 (0.025 – 0.075)
	2.9	2 – 30	60 [20 – 100]	6600	0.073 (0.029 – 0.116)
	2.9	40, 50	60 [20 – 100]	6600	0.058 (0.029 – 0.087)
K Cast iron Ductile cast iron	1.0	2 – 30	70 [40 – 100]	22300	0.035 (0.020 – 0.050)
	1.0	40, 50	70 [40 – 100]	22300	0.030 (0.020 – 0.040)
	1.5	2 – 30	70 [40 – 100]	14900	0.053 (0.030 – 0.075)
	1.5	40, 50	70 [40 – 100]	14900	0.045 (0.030 – 0.060)
	2.0	2 – 30	70 [40 – 100]	11100	0.070 (0.040 – 0.100)
	2.0	40, 50	70 [40 – 100]	11100	0.060 (0.040 – 0.080)
	2.5	2 – 30	70 [40 – 100]	8900	0.088 (0.050 – 0.125)
	2.5	40, 50	70 [40 – 100]	8900	0.075 (0.050 – 0.100)
	2.9	2 – 30	70 [40 – 100]	7700	0.102 (0.058 – 0.145)
	2.9	40, 50	70 [40 – 100]	7700	0.087 (0.058 – 0.116)
N Aluminium alloy	1.0	2 – 30	140 [100 – 180]	31800	0.040 (0.020 – 0.060)
	1.0	40, 50	140 [100 – 180]	31800	0.035 (0.020 – 0.050)
	1.5	2 – 30	140 [100 – 180]	21200	0.060 (0.030 – 0.090)
	1.5	40, 50	140 [100 – 180]	21200	0.053 (0.030 – 0.075)
	2.0	2 – 30	140 [100 – 180]	15900	0.080 (0.040 – 0.120)
	2.0	40, 50	140 [100 – 180]	15900	0.070 (0.040 – 0.100)
	2.5	2 – 30	140 [100 – 180]	12700	0.100 (0.050 – 0.150)
	2.5	40, 50	140 [100 – 180]	12700	0.088 (0.050 – 0.125)
	2.9	2 – 30	140 [100 – 180]	11000	0.116 (0.058 – 0.174)
	2.9	40, 50	140 [100 – 180]	11000	0.102 (0.058 – 0.145)

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1. This recommended condition is only when using internal coolant.
2. Check the condition of chips and perform step machining if necessary.
Reference of step length: 0.2 to 1.0 DC
3. Adjust the cutting conditions according to machine tool and workpiece clamp rigidity and machining geometry, etc.
4. Machining depths exceeding flute length (LU) are not recommend.
5. Clamp the drill so that the drill runout is within 0.003 mm.
6. Do not clamp the flute part of the drill.

MINI DVAS

Material	DC	L/D	Vc	n	fr
Heat resistant alloy	1.0	2 – 30	30 (10 – 50)	9500	0.015 (0.010 – 0.020)
	1.0	40, 50	30 (10 – 50)	9500	0.015 (0.010 – 0.020)
	1.5	2 – 30	30 (10 – 50)	6400	0.023 (0.015 – 0.030)
	1.5	40, 50	30 (10 – 50)	6400	0.023 (0.015 – 0.030)
	2.0	2 – 30	30 (10 – 50)	4800	0.030 (0.020 – 0.040)
	2.0	40, 50	30 (10 – 50)	4800	0.030 (0.020 – 0.040)
	2.5	2 – 30	30 (10 – 50)	3800	0.038 (0.025 – 0.050)
	2.5	40, 50	30 (10 – 50)	3800	0.038 (0.025 – 0.050)
	2.9	2 – 30	30 (10 – 50)	3300	0.044 (0.029 – 0.058)
	2.9	40, 50	30 (10 – 50)	3300	0.044 (0.029 – 0.058)
S Titanium alloy	1.0	2 – 30	30 (20 – 40)	9500	0.020 (0.010 – 0.030)
	1.0	40, 50	30 (20 – 40)	9500	0.020 (0.010 – 0.030)
	1.5	2 – 30	30 (20 – 40)	6400	0.030 (0.015 – 0.045)
	1.5	40, 50	30 (20 – 40)	6400	0.030 (0.015 – 0.045)
	2.0	2 – 30	30 (20 – 40)	4800	0.040 (0.020 – 0.060)
	2.0	40, 50	30 (20 – 40)	4800	0.040 (0.020 – 0.060)
	2.5	2 – 30	30 (20 – 40)	3800	0.050 (0.025 – 0.075)
	2.5	40, 50	30 (20 – 40)	3800	0.050 (0.025 – 0.075)
	2.9	2 – 30	30 (20 – 40)	3300	0.058 (0.029 – 0.087)
	2.9	40, 50	30 (20 – 40)	3300	0.058 (0.029 – 0.087)
Cobalt chrome alloy	1.0	2 – 30	60 (30 – 90)	19100	0.020 (0.010 – 0.030)
	1.0	40, 50	60 (30 – 90)	19100	0.020 (0.010 – 0.030)
	1.5	2 – 30	60 (30 – 90)	12700	0.030 (0.015 – 0.045)
	1.5	40, 50	60 (30 – 90)	12700	0.030 (0.015 – 0.045)
	2.0	2 – 30	60 (30 – 90)	9500	0.040 (0.020 – 0.060)
	2.0	40, 50	60 (30 – 90)	9500	0.040 (0.020 – 0.060)
	2.5	2 – 30	60 (30 – 90)	7600	0.050 (0.025 – 0.075)
	2.5	40, 50	60 (30 – 90)	7600	0.050 (0.025 – 0.075)
	2.9	2 – 30	60 (30 – 90)	6600	0.058 (0.029 – 0.087)
	2.9	40, 50	60 (30 – 90)	6600	0.058 (0.029 – 0.087)

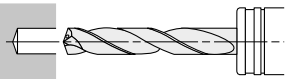
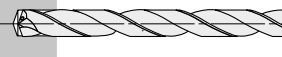
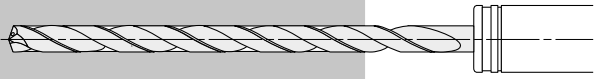
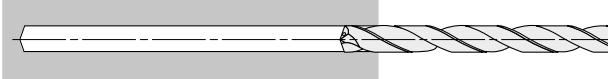
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1. This recommended condition is only when using internal coolant.
2. Check the condition of chips and perform step machining if necessary.
Reference of step length: 0.2 to 1.0 DC
3. Adjust the cutting conditions according to machine tool and workpiece clamp rigidity and machining geometry, etc.
4. Machining depths exceeding flute length (LU) are not recommend.
5. Clamp the drill so that the drill runout is within 0.003 mm.
6. Do not clamp the flute part of the drill.

OPERATIONAL GUIDANCE

OPERATIONAL GUIDANCE FOR THE DVAS $L/D = 2-40$

FLAT FACE DRILLING DRILLING A BLIND HOLE

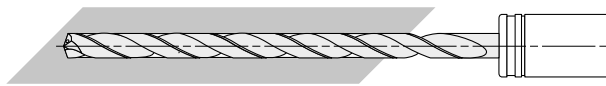
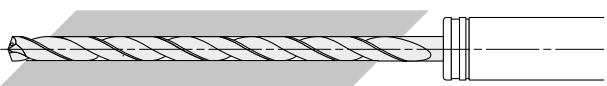
1. Drilling a pilot hole	2. Initial cutting with the long type drill
 1. Use a drill with a larger (flatter) point angle than the super long type. Use the shortest flute possible. A DVAS drill with $L/D = 2$ can be machined up to $L/D = 3$ when drilling pilot holes. 2. Ensure a high precision hole is drilled for the guide. 3. Drill depth: Approx $DC \times 3$. (Adjust the pilot hole depth according to the length of the long type drill.)	 1. Penetrate the guide hole at low revolution. (Revolution $500-1000 \text{ min}^{-1}$ feed rate $1000-2000 \text{ mm/min}$) 2. Stop the long type drill $1-3 \text{ mm}$ short of the guide hole bottom.
3. Drill the deep hole	4. Drill retraction
 1. Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.	 1. After drilling, lower the cutting revolution about $0.5-1 \text{ mm}$ short of the hole end. (Revolution of around $500-1000 \text{ min}^{-1}$) 2. Retract the drill to the pilot hole depth starting point at a feed rate of $1000-2000 \text{ mm/min}$. 3. Finally, clear the hole at a cutting speed of $20-30 \text{ m/min}$ and feed rate of $0.2-0.3 \text{ mm/rev}$.

OPERATIONAL GUIDANCE

OPERATIONAL GUIDANCE FOR THE DVAS $L/D = 2-40$

INTERRUPTED DRILLING

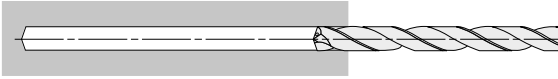
DRILLING AND BREAKING THROUGH ON IRREGULAR FACES OR ANGLES

1. Spot facing	2. Drilling a pilot hole
 1. Machine a flat or the irregular face by using an end mill or slot drill capable of spot facing. Make the spot face diameter the same size as the required deep hole diameter.	 1. Use a drill with a larger (flatter) point angle than the super long type. Use the shortest flute possible. 2. Ensure a high precision hole is drilled for the guide. 3. Drill depth : Approx $DC \times 2$. (Adjust the pilot hole depth according to the length of the long type drill.)
3. Initial cutting with the long type drill	4. Drill the deep hole
 1. Penetrate the guide hole at a low revolution. (Revolution $500-1000 \text{ min}^{-1}$, feed rate $1000-2000 \text{ mm/min}$) 2. Stop the long type drill $0.5-1 \text{ mm}$ short of the guide hole bottom.	 1. Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.
5. Breaking through	6. Drill retraction
 1. When breaking through, the cutting edge can be damaged. 2. Lower the feed rate when penetrating.	 1. Finally clear the hole at a feed rate of $0.2-0.3 \text{ mm/rev}$. (Revolution of around $500-1000 \text{ min}^{-1}$) 2. Retract the drill to the pilot hole depth starting point at a feed rate of $1000-2000 \text{ mm/min}$.

OPERATIONAL GUIDANCE

OPERATIONAL GUIDANCE FOR THE DVAS L/D = 50

FLAT FACE DRILLING DRILLING A BLIND HOLE

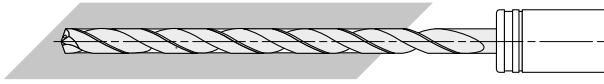
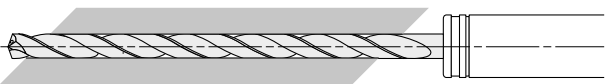
1. Drilling a pilot hole	2. Initial cutting with the long type drill
 1. Use a drill with a larger (flatter) point angle than the super long type. Use a DVAS drill with L/D = 7. 2. Ensure a high precision hole is drilled for the guide. 3. Drill depth : Approx DC×7. (Adjust the pilot hole depth according to the length of the long type drill.)	 1. Penetrate the guide hole at low revolution. (Revolution 500–1000min⁻¹ feed rate 1000–2000 mm/min) 2. Stop the long type drill 1–3 mm short of the guide hole bottom.
3. Drill the deep hole	4. Drill retraction
 1. Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.	 1. After drilling, lower the cutting revolution about 0.5–1 mm short of the hole end. (Revolution of around 500–1000min⁻¹) 2. Retract the drill to the pilot hole depth starting point at a feed rate of 1000–2000 mm/min. 3. Finally, clear the hole at a cutting speed of 20–30m/min and feed rate of 0.2–0.3 mm/rev.

OPERATIONAL GUIDANCE

OPERATIONAL GUIDANCE FOR THE DVAS L/D = 50

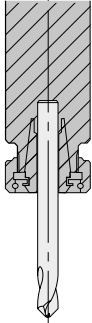
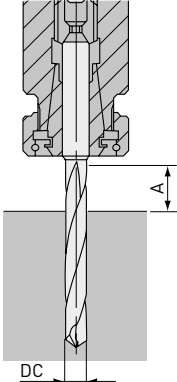
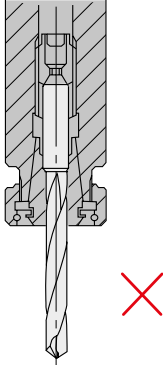
INTERRUPTED DRILLING

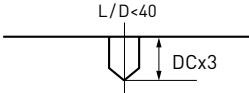
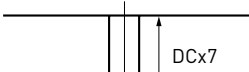
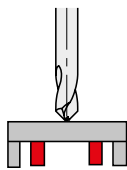
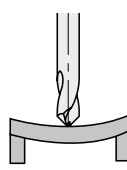
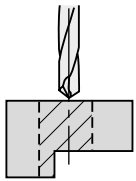
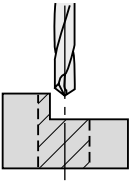
DRILLING AND BREAKING THROUGH ON IRREGULAR FACES OR ANGLES

1. Spot facing	2. Drilling a pilot hole
 1. Machine a flat or the irregular face by using an end mill or slot drill capable of spot facing. Make the spot face diameter the same size as the required deep hole diameter.	 1. Use a drill with a larger (flatter) point angle than the super long type. Use a DVAS drill with L/D = 7. 2. Ensure a high precision hole is drilled for the guide. 3. Drill depth: Approx DC×7. (Adjust the pilot hole depth according to the length of the long type drill.)
3. Initial cutting with the long type drill	4. Drill the deep hole
 1. Penetrate the guide hole at a low revolution. (Revolution 500–1000min⁻¹, feed rate 1000–2000 mm/min) 2. Stop the long type drill 0.5–1 mm short of the guide hole bottom.	 1. Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.
5. Breaking through	6. Drill retraction
 1. When breaking through, the cutting edge can be damaged. 2. Lower the feed rate when penetrating.	 1. Finally clear the hole at a feed rate of 0.2–0.3 mm/rev. (Revolution of around 500–1000min⁻¹) 2. Retract the drill to the pilot hole depth starting point at a feed rate of 1000–2000 mm/min.

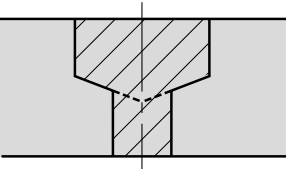
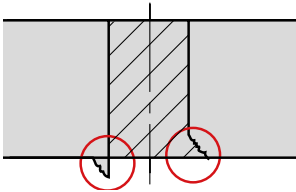
MINI DVAS

OPERATIONAL GUIDANCE

DRILL HOLDING	DRILL LENGTH	DRILL INSTALLATION	COOLANT PRESSURE									
 Adjusting Screw			Adjust the coolant pressure according to the type and concentration of coolant. <table><tr><th>Drill Dia. DC</th><th>Water- soluble</th><th>Water- insoluble</th></tr><tr><td>DC<2 mm</td><td>≥ 3 MPa</td><td>≥ 7 MPa</td></tr><tr><td>DC<3 mm</td><td>≥ 2 MPa</td><td>≥ 5 MPa</td></tr></table>	Drill Dia. DC	Water- soluble	Water- insoluble	DC<2 mm	≥ 3 MPa	≥ 7 MPa	DC<3 mm	≥ 2 MPa	≥ 5 MPa
Drill Dia. DC	Water- soluble	Water- insoluble										
DC<2 mm	≥ 3 MPa	≥ 7 MPa										
DC<3 mm	≥ 2 MPa	≥ 5 MPa										
Thrust bearing type collet chuck holds the drill securely.	$A \geq DC \times 2$	Do not clamp on the flutes.										

PILOT DRILL	COOLANT HANDLING	THIN WORKPIECE	INTERRUPTED CUTTING						
For deep hole drilling, refer to the figure below. $L/D < 40$  Use DVAS○○○○X02S040 *$L/D = 2$ can be machined up to $DC \times 3$ when drilling pilot holes. $L/D > 40$  Use DVAS○○○○X07S040	Small particles of swarf will jam in the oil hole of small diameter drills. Always use a fine mesh filter as a preventive measure. <table><tr><th>Drill Dia. DC</th><th>Fine Mesh Filter</th></tr><tr><td>$DC < 2 \text{ mm}$</td><td>$\leq 10 \mu\text{m}$</td></tr><tr><td>$DC < 3 \text{ mm}$</td><td>$\leq 20 \mu\text{m}$</td></tr></table>	Drill Dia. DC	Fine Mesh Filter	$DC < 2 \text{ mm}$	$\leq 10 \mu\text{m}$	$DC < 3 \text{ mm}$	$\leq 20 \mu\text{m}$	Support the workpiece OK  If bending occurs NG* 	One process OK  1. Lower the feed when drilling the interrupted part. Requires prior machining  1. Spot face with an end mill prior to drilling.
Drill Dia. DC	Fine Mesh Filter								
$DC < 2 \text{ mm}$	$\leq 10 \mu\text{m}$								
$DC < 3 \text{ mm}$	$\leq 20 \mu\text{m}$								

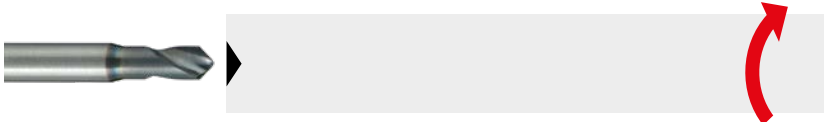
*NG – Displays chatter and vibration

STEPPED HOLES	BURRING AND WORKPIECE CHIPPING
 Divide the two processes. 1. Drill the larger hole first. 2. A tool for machining both chamfer and spot face can be produced to order.	 1. Lower the feed rate by 50 % at the end of through cutting. 2. Change the point angle.

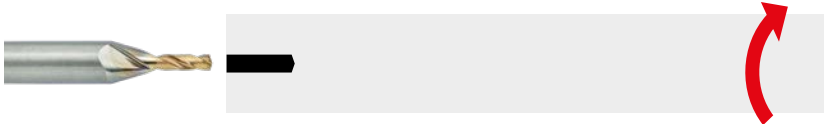
TIPS FOR DRILLING A DEEP HOLE EXCEEDING $L/D = 40$

WORKPIECE ROTATION METHOD: SMALL AND AUTOMATIC TYPE LATHES

(1) FACE COUNTERSINK (DLE DRILL IS RECOMMENDED)



(2) DRILL THE GUIDE HOLE TO A DEPTH OF APPROX. 3D (DVAS DRILL IS RECOMMENDED)

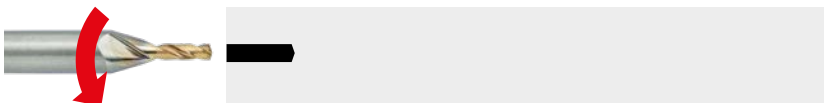


(3) DRILL THE DEEP HOLE USING DVAS0000X50S040



TOOL ROTATION METHOD: MACHINING CENTRES AND COMPOSITE TYPE MACHINES

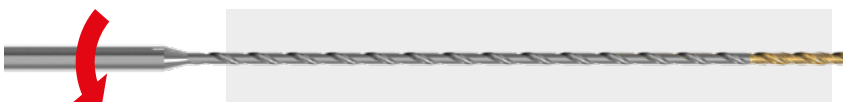
(1) DRILL THE GUIDE HOLE TO A DEPTH OF APPROX. 3D (DVAS DRILL IS RECOMMENDED)



(2) DRILL THE GUIDE HOLE DEEPER TO A APPROX. 7D
IF MORE STABILITY IS REQUIRED, DRILL A GUIDE HOLE DEEPER THAN 7D



(3) DRILL THE DEEP HOLE USING DVAS0000X50S040



MINI DVAS

CUTTING EXAMPLE

COMPARISON OF DRILLING EFFICIENCY ON AN AUTOMATIC LATHE

Drilling efficiency is 10 times higher compared to gun drills.

It provides highly efficient and stable machining even when drilling alloy and stainless steels.

DRILLING OF 34CrMo4

GENERAL CUTTING CONDITIONS FOR GUN DRILLS

Cutting time 107.8 sec./hole

Tool	DC = Ø2 mm, L/D = 50
Vc (m/min)	50
f (mm/rev)	0.007
ap (mm)	100
Cutting mode	Wet cutting, Oil, 15 MPa

DVAS

Cutting time 10.8 sec./hole

Tool	DC = Ø2 mm, L/D = 50
Vc (m/min)	50
f (mm/rev)	0.07
ap (mm)	100
Cutting mode	Wet cutting, Oil, 15 MPa

DVAS DRILL APPLICATION



DRILLING OF X5CrNi18-10

GENERAL CUTTING CONDITIONS FOR GUN DRILLS

Cutting time 188.4 sec./hole

Tool	DC = Ø2 mm, L/D = 50
Vc (m/min)	40
f (mm/rev)	0.005
ap (mm)	100
Cutting mode	Wet cutting, Oil, 15 MPa

DVAS

Cutting time 18.8 sec./hole

Tool	DC = Ø2 mm, L/D = 50
Vc (m/min)	40
f (mm/rev)	0.05
ap (mm)	100
Cutting mode	Wet cutting, Oil, 15 MPa

DVAS DRILLING APPLICATION



MINI DVAS

CUTTING EXAMPLE

EXAMPLE OF IMPROVED DRILLING EFFICIENCY ON AN AUTOMATIC LATHE

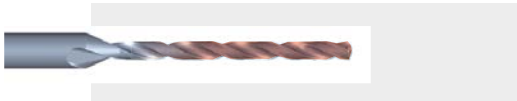
DVAS significantly reduces cycle times and ensures consistent drilling.

MINI DVAS

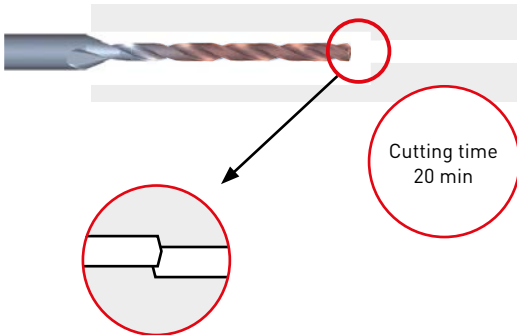
Material	C45E
Tool	DC = Ø2 mm, L/D = 50
Vc (m/min)	70
f (mm/rev)	0.09 – 0.12
ap (mm)	117
Cutting mode	Wet cutting, Oil, 7 MPa

DRILLING PROCESS OF BOTH ENDS MACHINING

1. One side drilled with blind hole.



2. Workpiece is inverted for a through hole.



Hole mismatch is likely to occur.

DRILLING PROCESS WITH DVAS DRILL

1. Drilling a through hole from one side at a time.



Cutting time
approx 1 min

MINI DVAS

CUTTING PERFORMANCE

COMPARISON OF FRACTURE RESISTANCE WHEN DRILLING 42CrMo4

DVAS has excellent fracture resistance and double tool life compared to conventional products.

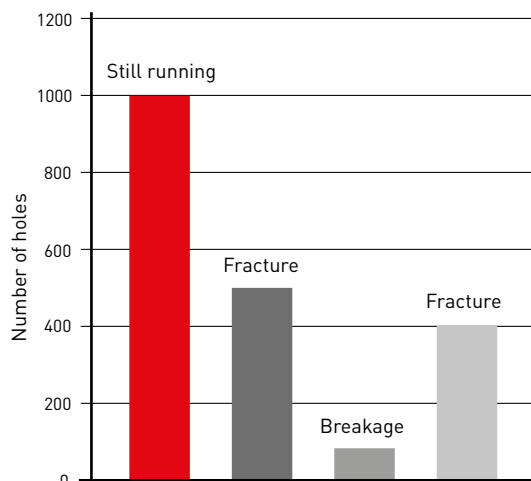
Material	42CrMo4
Tool	DC = Ø2 mm, L/D = 20
Vc (m/min)	50
f (mm/rev)	0.06
ap (mm)	40
Cutting mode	Wet cutting Water-soluble coolants, 2 MPa
Pilot drills	DC = Ø2 mm L/D = 2 Hole depth 4 mm



DVAS



Conventional C



COMPARISON OF FRACTURE RESISTANCE DURING HIGH-EFFICIENCY CUTTING OF 42CrMo4

DVAS drill is very stable even under high-efficiency cutting conditions.

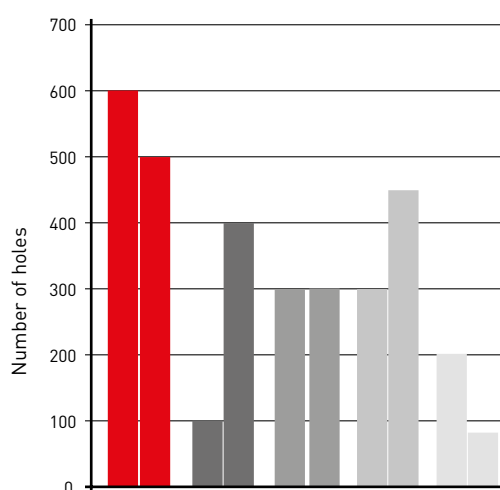
Material	42CrMo4
Tool	DC = Ø2 mm, L/D = 20
Vc (m/min)	70
f (mm/rev)	0.07
ap (mm)	40
Cutting mode	Wet cutting Water-soluble coolants, 2 MPa
Pilot drills	DC = Ø2 mm L/D = 2 Hole depth 4 mm/holes



DVAS



Conventional C



MINI DVAS

CUTTING PERFORMANCE

COMPARISON OF WELDING RESISTANCE AND CHIP DISPOSAL DURING HIGH-EFFICIENCY CUTTING OF X5CrNi189

Achieves excellent welding resistance and chip control when drilling stainless steels.

Material	X5CrNi18-10
Tool	Pilot drill DC = Ø2 mm, L/D = 2 Hole depth 4 mm
	Long drill DC = Ø2 mm, L/D = 20 Hole depth 40 mm
Vc (m/min)	50
f (mm/rev)	0.06
Cutting mode	Wet cutting Water-soluble coolants, 2 MPa

AFTER 1200 HOLES



DVAS



Conventional A



Some continuous chips



Conventional B

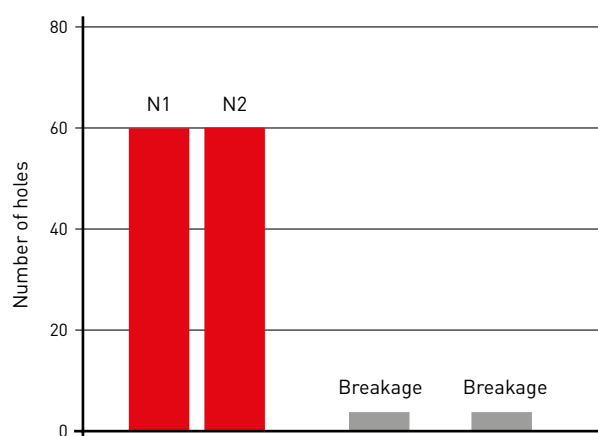


Continuous chips

COMPARISON OF BREAKAGE RESISTANCE WHEN DRILLING INCONEL® 718

Increased coolant discharge rate achieves stable machining of heat-resistant alloys when compared to conventional products.

Material	Inconel® 718
Tool	Pilot drill DC = Ø2 mm, L/D = 2 Hole depth 4 mm
	Long drill DC = Ø2 mm, L/D = 12 Hole depth 20 mm
Vc (m/min)	30
f (mm/rev)	0.03
ap (mm)	20
Cutting mode	Wet cutting Water-soluble Coolants, 2 MPa



AFTER 60 HOLES



DVAS

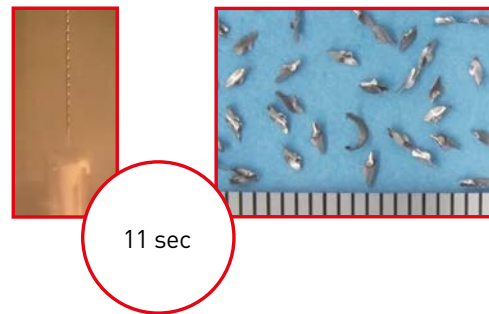
MINI DVAS

CUTTING PERFORMANCE

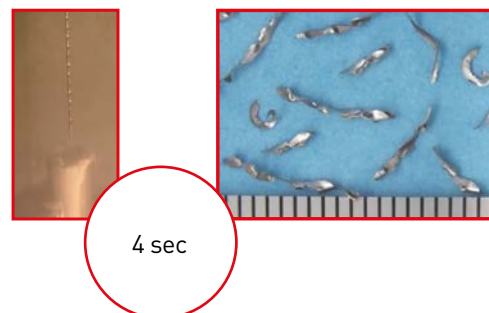
HIGH-EFFICIENCY EXAMPLE OF CUTTING X5CrNi189 L/D = 50

Achieves excellent chip disposal and high efficiency when deep hole drilling in stainless steels.

Material	X5CrNi18-10
Tool	Pilot drill DC = Ø2 mm, L/D = 2 Hole depth 4 mm
	Short drill DC = Ø2 mm, L/D = 7 Hole depth 14 mm
	Long drill DC = Ø2 mm, L/D = 50 Hole depth 100 mm
Vc (m/min)	60
f (mm/rev)	0.05
Cutting mode	Wet cutting Water-soluble coolants, 7 MPa



Material	X5CrNi18-10
Tool	Pilot drill DC = Ø2 mm, L/D = 2 Hole depth 4 mm
	Short drill DC = Ø2 mm, L/D = 7 Hole depth 14 mm
	Long drill DC = Ø2 mm, L/D = 50 Hole depth 100 mm
Vc (m/min)	100
f (mm/rev)	0.08
Cutting mode	Wet cutting Water-soluble coolants, 7 MPa

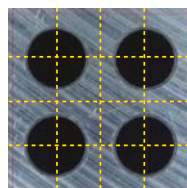
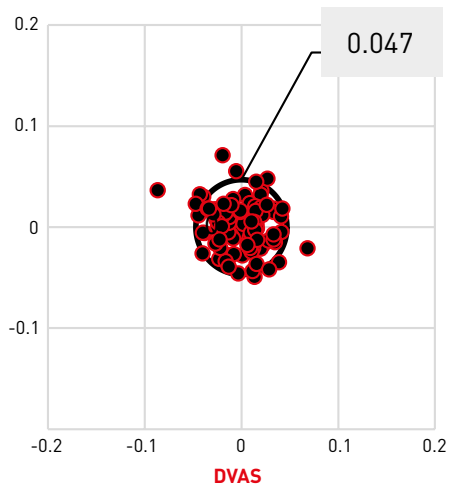


MINI DVAS

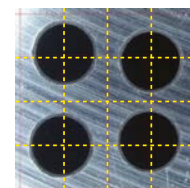
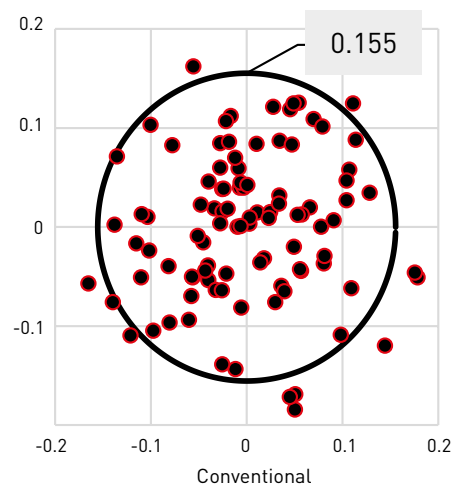
CUTTING PERFORMANCE

COMPARISON OF TRUE STRAIGHTNESS WHEN DRILLING 42CrMo4 L/D = 40

Hole wander is greatly reduced when compared to conventional products.

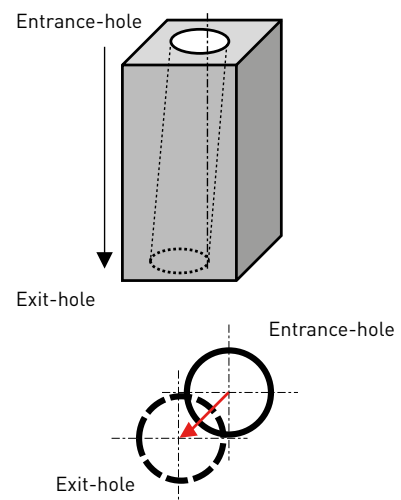


DVAS



Conventional

Material	42CrMo4
Tool	Pilot drill DC = Ø2 mm, L/D = 2 Hole depth 4 mm
	Long drill DC = Ø2 mm, L/D = 40 Hole depth 80 mm
f [mm/rev]	0.07
Cutting mode	Wet cutting Water-soluble coolants, 7 MPa



SYMBOLS

 Recommended cutting conditions	MACHINING TYPE
NEW Completely new products or expansions released in the current Spring or Autumn product launch and are not included in the latest version of the General Catalogue.	 Roughing
NEW Products or expansions that have already been introduced in one of the previous Spring or Autumn product launches but are not included in the latest General Catalogue.	 Medium cutting
APPLICATION	 Light cutting
 Face milling	 Pre-finishing
 Chamfer milling	 Finishing
 Shoulder milling with R	 Fine-finishing
 Face milling close to a wall	TOOL MATERIAL
 Shoulder milling	 Ultra micro grain carbide Ultra micro grain carbide substrate material.
 Side milling	 Cubic boron nitride Mitsubishi Materials' original CBN material.
 Slot milling	 Ceramic For high speed efficient machining of super alloys due to the excellent high temperature strength property.
 Ramping	 High hardness powder metallurgy HSS High hardness powder metallurgy HSS substrate material.
 Pocket milling	 High grade high alloy HSS High grade high alloy HSS substrate material.
 Slot milling with R	 Cobalt high speed steel Cobalt high speed steel substrate material.
 Copy milling	 High speed steel High speed steel substrate material.
 T-Slot milling	

SYMBOLS

COATING



SMART MIRACLE coating

New smooth and dense coating technology for high efficiency milling of difficult to cut materials.



CRN coating

Newly developed CrN coating for Copper Electrodes machining.



Violet coating

Increased tool life of 2-3 times more than TiN coated products.



DP coating

New generation coating suitable for a wide range of materials.



MIRACLE coating

The original Miracle (Al,Ti)N coating. Also suitable for dry cutting.



[Al, Ti]N coating

[Al,Ti]N highly versatile application range.



[Al,Ti,Cr]N multi-layer coating

For carbon, alloy and hardened steels.



IMPACT MIRACLE coating

Single phase nano crystal coating technology has higher film hardness and heat resistance.



MIRACLE coating

The original MIRACLE (Al,Ti)N coating. Also suitable for dry cutting.



VFR coating

The [AlCrSi]N/[AlTiSi]N PVD multilayer coating is ideal for machining of extremely hard materials up to 70 HRC.



DLC coating

Hardness similar to CVD diamond coating achieved with high adhesion strength.



Diamond coating

Suitable for CFRP and CFRP-aluminium materials.



Diamond coating

Suitable for graphite machining.



Diamond coating

The original CVD diamond coating.



CVD Diamond coating

Unique multi-layer micro-grain diamond crystal control technology drastically improves wear resistance and smoothness.

CUTTING EDGE PROPERTIES



Sharp corner edge

Indicates the end mill has a sharp corner edge.



Gash land

Indicates the end mill cutting edge has a protective chamfer.



Rake angle



Helix angle

Indicates the helix angle of the end mill.



Point angle

Indicates the drill point angle.



Roughing flute geometry



Variable helix



Rounded gash



Corner angle

WEB THINNING



X type point geometry

X web thinning used at the drill point.



XR type point geometry

XR web thinning used at the drill point.



S type point geometry

Easy cutting geometry.



N type point geometry

Effective when the point web is thick.



Chipbreaker

SYMBOLS

TOLERANCES



Tolerance of taper angle
Indicates the tolerance of the taper angle.



R tolerance
Indicates the radial tolerance of a ball nose end mill.



R tolerance
Indicates the radial tolerance of the corner radius.



R tolerance
Indicates the radial tolerance of a cutter with a corner radius.



Outside diameter tolerance
Indicates the diameter tolerance of the end mill.



Peak tolerance
Indicates the tolerance for the end diameter.



Shank diameter tolerance



Shank diameter tolerance



Drill tolerance / diameter

COOLANT HOLES



External coolant



Internal coolant



Internal coolant



Centered, internal coolant hole



Radial, internal coolant holes



Internal coolant holes



Internal coolant holes

MEMO

EUROPEAN SALES COMPANIES

GERMANY

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