NC Helix Drill >>>

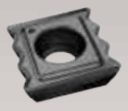
The Expert Of Swarfs Control

P M K N S H

Two Types Of Shank, Drilling Depth Up To 8xDc

- Cylindrical shank - Apply external coolant.
- Patented screw fit -With center coolant hole.

Features >>>



Serrated Cutting Edge.

- One insert is able to cut different materials.
- Special insert geometry is able to cut different materials and eliminate swarf and vibration problems while drilling difficult material or deeper holes. Excellent swarfs control for providing safe and smooth chip removal for modern automation.
- 2 cutting edges insert

Only Six Tools For Making Ø.512"~Ø2.559" (Ø13~Ø65mm) Holes From Solid.

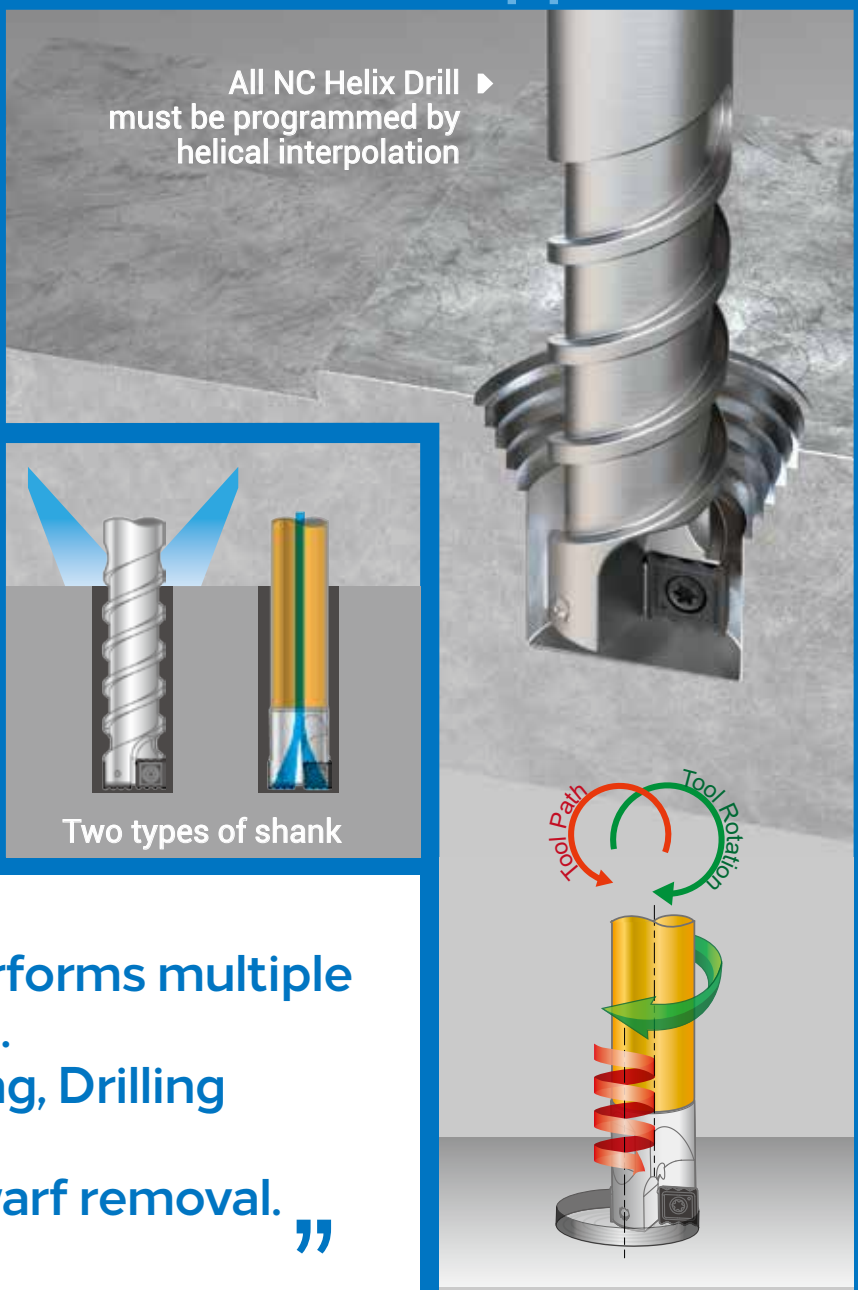
- Saving your tool inventory and cost!
- No need to peck drill or dwell in operation even machine without internal coolant.

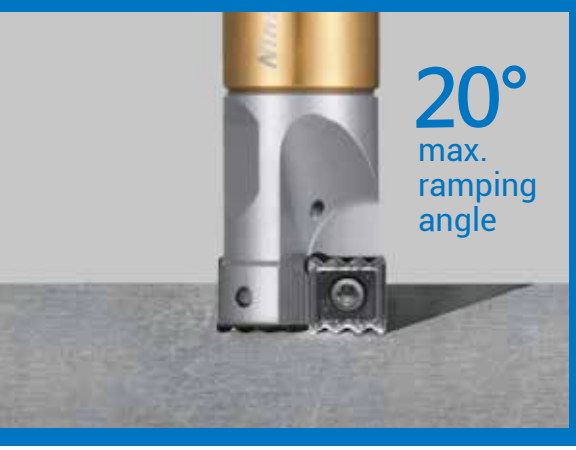
20° Ramping Angle, Either Linear Or Circular Ramping.

- Cuts material by helical interpolation, maximum ramping angle is 20°.

Low Spindle Power Is Required, Easy To Cut, Not Only A Drill, But An End Mill Too.

Applications





Two types of shank

- One tool performs multiple applications.
- Rough Milling, Drilling & Slotting.
- Excellent swarf removal.


Short & small chips

NC Helix Drill Features

Reduce your tool inventory >> Low Cost! Economy!

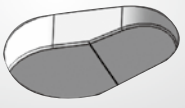
- Each holder can machine different diameters and hole depths, saving your tool inventory and cost!
- No need to peck drill or dwell in operation even machine without internal coolant.

Reduce Inventory	Large Inventory
	

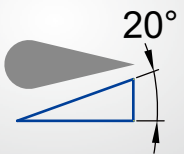
Lower spindle power consumption >> Easy to cut!

- Thanks to the small cutting load of the serrated cutting edge and helical interpolation lower power consumption. Work quicker, smarter and achieve better results.
- Circular ramping milling, maximum ramping angle is 20°.
- For example: tool HD27 machining Ø50 mm hole, 9 mm pitch for aluminum, 6 mm pitch for carbon steel.

Circular milling

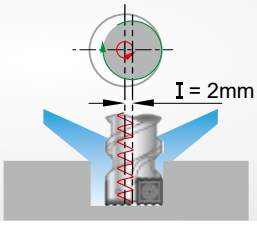
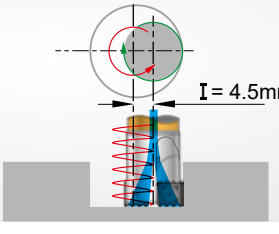


Ramping Angle



Just six tools for drilling Ø.512''~Ø2.559''(Ø13~Ø65mm) or larger >>

Example

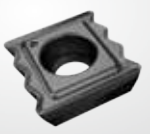
Hole Ø15mm (Ø.590") / Tool Ø11mm (Ø.433")	Hole Ø20mm (Ø .787") / Tool Ø11mm (Ø.433")
	

- Cuts by helical interpolation.
- Each holder can machine different diameters and hole depths.
- Enlarger hole is adaptable by using 99323 internal coolant cutter.

Special insert geometry >> exceptional swarfs control.

- Serrated cutting edge makes the chips short and small, and easier to evacuate.
- Eliminate swarf and vibration problems while drilling difficult material or deeper holes.
- Excellent swarfs control for providing safe and rational chip removal for modern automation.

Insert



Chip

Functions in variable conditions >>
It's so easy!

Circular milling	Half Hole	Concave Surfaces	Angled Surfaces	Stack Drilling
				

Cross Holes	Round Workpiece Offset Drilling	Cone Workpiece Offset Drilling	Half hole on radius
			

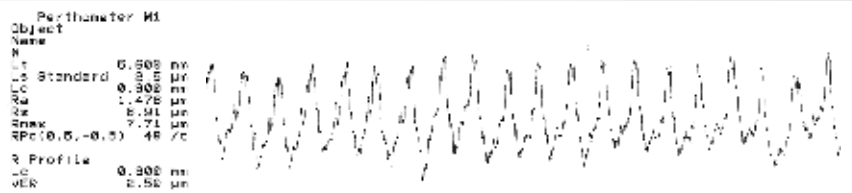
Roughness Measuring >>

• Making a flatness at bottom just by NC program, easy and smart!

Workpiece Application

Flatness

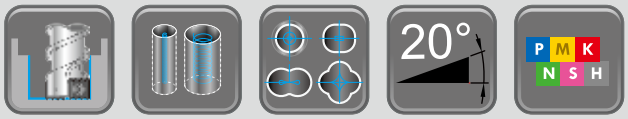
Make " One more turn" after reached the depth.
Ex :
:
G03 I-1.5 Z-30 P5
G03 I-1.5 <make one more turn >
G01 X0 Y0 < afterward, let tool back to center of hole >

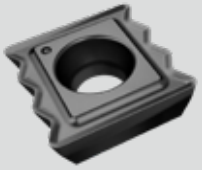


One tool performs multiple applications >>

Not only a drill, but an end mill tool. Small path radius to cut hole, step hole, various shape of cavity on different material.
Less inventory of different sizes of drills and indexable end mills.
Replace your end mill by NC Helix Drill. Make the impossible become possible!

NC Helix Drill



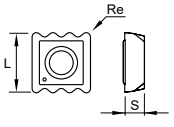


Inserts >>

NEW NC5075 : • Good for steel with heat treatment up to HRC50.
• Reduce heat and tool wear.
• Long tool life.

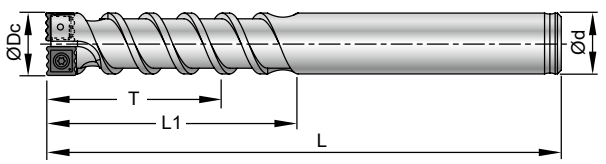
NC5072 : • General purpose,suitable for almost all kind of steel, stainless steel and Titanium.

NC2032 : • High performance cutting.
• Special good for cast iron and hardened material < HRC50.

Parts No.		Grade	Coating		Dimensions L	Dimensions S	Dimensions Re	Screw	Key
N9MX04T002	NC5075	P40	TiAlN+ALDURA		4.75 (0.187")	1.8 (0.071")	0.2 (0.008")	NS-18037 0.6Nm (5.31 in.-lb.)	NK-T6
	NC5072	P40	TiAlN						
	NC2032	K20F							
N9MX05T103	NC5075	P40	TiAlN+ALDURA		5.75 (0.226")	2.0 (0.079")	0.3 (0.012")	NS-20045 0.6Nm (5.31 in.-lb.)	NK-T6
	NC5072	P40	TiAlN						
	NC2032	K20F							
N9MX070204	NC5075	P40	TiAlN+ALDURA		7.5 (0.295")	2.4 (0.094")	0.4 (0.016")	NS-25045 0.9Nm (7.97 in.-lb.)	NK-T7
	NC5072	P40	TiAlN						
	NC2032	K20F							
N9MX100306	NC5075	P40	TiAlN+ALDURA		10.0 (0.394")	3.18 (0.125")	0.6 (0.024")	NS-30072 2.0Nm (17.7 in.-lb.)	NK-T9
	NC5072	P40	TiAlN						
	NC2032	K20F							
N9MX12T308	NC5075	P40	TiAlN+ALDURA		12.5 (0.492")	3.97 (0.156")	0.8 (0.031")	NS-35080 2.5Nm (22.13 in.-lb.)	NK-T15
	NC5072	P40	TiAlN						
	NC2032	K20F							

Cylindrical Shank >>

• Made from hardened high alloy steel 48 HRC.
• Unique helical groove design generates chip-removing coolant stream.
• Designed for CNC machine with external coolant.

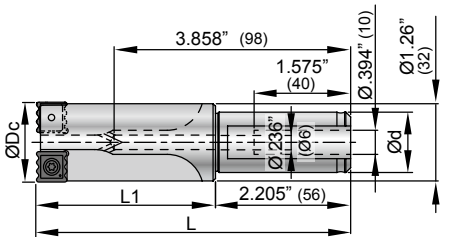


Parts No.	Type	Capable of drill dia. Dmin.	Capable of drill dia. Dmax.	ØDc	T	L1	L	Ød	Insert type	Max. ramping angle
99321-010-1320	BC10-HD11-1320	13 (0.512")	20 (0.787")	11 (0.433")	30 (1.181")	40 (1.575")	80 (3.150")	10 (0.394")	N9MX04T002	20°
99321-012-1525	BC12-HD13-1525	15 (0.591")	25 (0.984")	13 (0.512")	36 (1.417")	50 (1.969")	100 (3.937")	12 (0.472")	N9MX05T103	20°
99321-016-2030	BC16-HD17-2030	20 (0.787")	30 (1.181")	17 (0.669")	50 (1.969")	60 (2.362")	110 (4.331")	16 (0.630")	N9MX070204	20°
99321-020-2540	BC20-HD22-2540	25 (0.984")	40 (1.575")	22 (0.866")	60 (2.362")	70 (2.756")	125 (4.921")	20 (0.787")	N9MX100306	20°
99321-025-3050	BC25-HD27-3050	30 (1.181")	50 (1.969")	27 (1.063")	75 (2.953")	85 (3.346")	165 (6.496")	25 (0.984")	N9MX12T308	20°

Side Lock Shank

With Internal Coolant

• Special size is available on request.

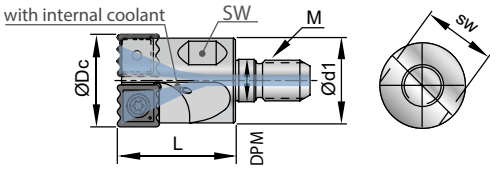


Parts No.	Type	Capable of drill dia.		ØDc	L	L1	Ød	Max. Depth	Insert type	Max. ramping angle
		Dmin.	Dmax.							
99321-025-4265	SL25-HD33-4265	42 (1.654")	65 (2.559")	33 (1.299")	130 (5.118")	74 (2.913")	25 (0.984")	50 (1.969")	N9MX12T308	9°

Screw Fit Cutter >>

* Use open ended spanner to tighten the cutter.

• Made from hardened high alloy steel 42 HRC.
• With internal coolant.
• Standard screw-fit body adapts to almost any kinds of the screw-fit tool holder or extension bar in the market.
• Possible to apply for enlarge hole.



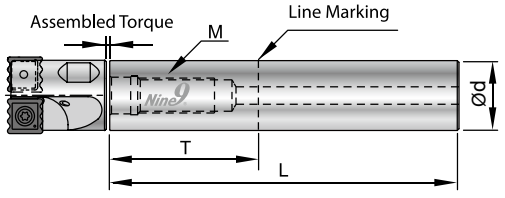
Parts No.	Type	Capable of drill dia.		ØDc	L	M	DPM	Ød1	SW	Insert type	Max. ramping angle
		Dmin.	Dmax.								
99323-010-1320	M05-HD11-1320	13 (0.512")	20 (0.787")	11 (0.433")	20 (0.787")	M5	5.5 (0.217")	10 (0.394")	8 (0.315")	N9MX04T002	20°
99323-012-1525	M06-HD13-1525	15 (0.591")	25 (0.984")	13 (0.512")	25 (0.984")	M6	6.5 (0.256")	12 (0.472")	10 (0.394")	N9MX05T103	20°
99323-016-2030	M08-HD17-2030	20 (0.787")	30 (1.181")	17 (0.669")	25 (0.984")	M8	8.5 (0.335")	16 (0.630")	14 (0.551")	N9MX070204	20°
99323-020-2540	M10-HD22-2540	25 (0.984")	40 (1.575")	22 (0.866")	30 (1.181")	M10	10.5 (0.413")	20 (0.787")	18 (0.709")	N9MX100306	20°
99323-025-3050	M12-HD27-3050	30 (1.181")	50 (1.969")	27 (1.063")	35 (1.378")	M12	12.5 (0.492")	25 (0.984")	23 (0.906")	N9MX12T308	20°

* Special size is available by request.

Extension Bar

Steel Type >>

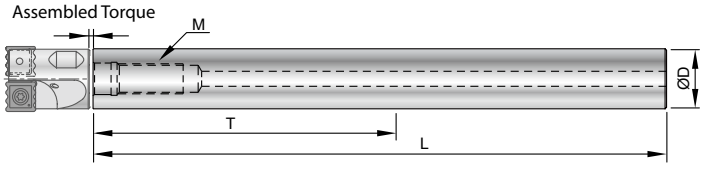
• T is the maximum overhang length.
• With internal coolant hole.



Parts No.	Type	ØD	T	L	M	Assembled Torque
99801-10S	BC10-075M05S	10 (0.394")	25 (0.984")	75 (2.953")	M5xP0.8	6.5 Nm
99801-12S	BC12-075M06S	12 (0.472")	25 (0.984")	75 (2.953")	M6xP1.0	11.0 Nm
99801-16S	BC16-090M08S	16 (0.630")	35 (1.378")	90 (3.543")	M8xP1.25	25.0 Nm
99801-20S	BC20-100M10S	20 (0.787")	40 (1.575")	100 (3.937")	M10xP1.5	50.0 Nm
99801-25S	BC25-120M12S	25 (0.984")	50 (1.969")	120 (4.724")	M12xP1.75	60.0 Nm

Solid Carbide Type >>

• T is the maximum overhang length.
• With internal coolant hole.
• Carbide extension bar with longer tool length is available on request. (REVA brand)

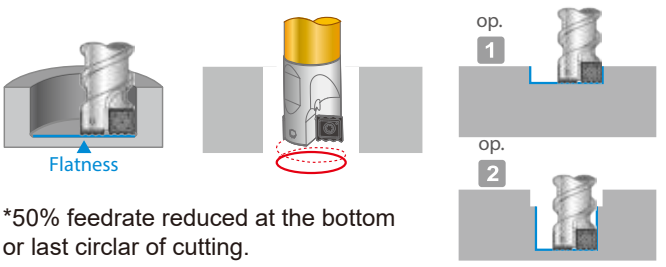


Parts No.	Type	ØD	T	L	M	Assembled Torque
99801-10W	BC10-100M05W	10 (0.394")	60 (2.362")	100 (3.937")	M5xP0.8	6.5 Nm
99801-12W	BC12-100M06W	12 (0.472")	60 (2.362")	100 (3.937")	M6xP1.0	11.0 Nm
99801-16W	BC16-150M08W	16 (0.630")	80 (3.150")	150 (5.906")	M8xP1.25	25.0 Nm
99801-20W	BC20-200M10W	20 (0.787")	100 (3.937")	200 (7.874")	M10xP1.5	50.0 Nm
99801-25W	BC25-200M12W	25 (0.984")	125 (4.921")	200 (7.874")	M12xP1.75	60.0 Nm

Technical Guide

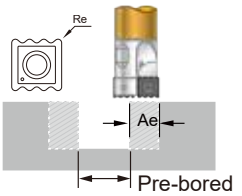
Programming conditions

Blind Hole* **Through Hole*** **Step Hole**



*50% feedrate reduced at the bottom or last circlar of cutting.

Pre-bored work piece

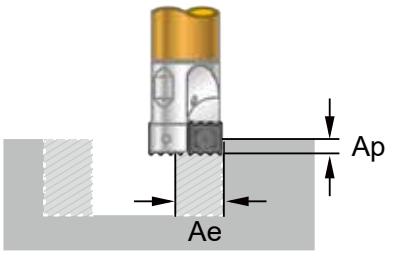


External coolant Min. 73 psi (5 bar)

Internal coolant Min.145 psi (10 bar)

For enlarge hole

Minimum and Maximum Ae for programming a pre-bored hole

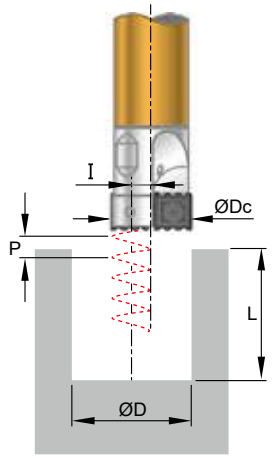


Max. Ae = Dc- (Rex2)
Min. Ae = 1/3 insert length (L)
Max. ap < 3/4 of insert length

Insert type	Re	Min. Ae	Max. Ae	Max. Ap
N9MX04T002	0.008”	0.062”	0.417”	0.138”
N9MX05T103	0.012”	0.076”	0.488”	0.169”
N9MX070204	0.016”	0.098”	0.638”	0.220”
N9MX100306	0.024”	0.130”	0.819”	0.295”
N9MX12T308	0.031”	0.164”	1.000”	0.354”
N9MX12T308*	0.031”	0.164”	1.236”*	0.354”

(* for 99321-025-4265)

NC Helix Drill



Cutting Parameters (S & F)

$$S = \frac{3.82 \times SFM}{Dc} \text{ r.p.m.}$$

$$F = S \times IPR \quad \text{IPM}$$

$$d = D - Dc \quad \text{Inch}$$

$$I = \frac{(D-Dc)}{2} \quad \text{Inch}$$

Cutting time (T)

$$T = \frac{\pi \times d \times L \times 60}{F \times P} \text{ sec.}$$

Chip removal Volume rate (Q)

$$Q = \frac{\pi \times D^2 \times L \times 60}{4 \times T} \quad \text{Inch}^3 \text{/min.}$$

Formula

Dc	=	Dia. of Drill	Inch
D	=	Dia. of Hole	Inch
L	=	Depth of Drilling	Inch
Vc	=	Cutting Speed	SFM
S	=	Spindle Speed	r.p.m.
I	=	Circular radius	Inch
fz	=	Feed rate	Inch / tooth
F	=	Table feed rate	IPM
d	=	Circular diameter (D-Dc)	Inch
P	=	Pitch of helical interpolation	Inch
T	=	Cutting time	sec.
Q	=	Chip removal volume rate	Inch³ / min.
Z	=	Insert tooth	

Spindle power

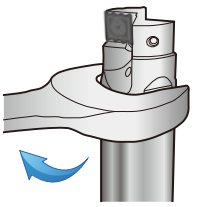
The Feed rate(Fc) may be adjusted by the power factor(PF) of below:

Fc= FxPF (mm/min.)

Spindle Type	BT-30 Small power			BT-40 Medium power			BT-50 Big power		
Spindle Power (KW)	< 5	7	10	12	16	20	22	25	> 30
Power Factor (PF)	0.8	0.85	0.9	0.95	1	1.05	1.1	1.15	1.2
Pitch (P)	Lower pitch			Medium pitch			Large pitch		

Remarks:
Fc: Adjusted Feed rate for real cutting
Pitch(P) can be selected according to spindle power.

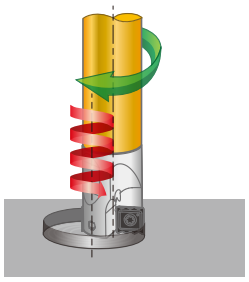
99323 screw fit cutter assembly

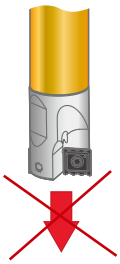


To ensure a secure fit, use a spanner to tighten the cutter until there is no gaps visible.

Part No.	Assembled Torque
99323-010-1320	6.5 Nm
99323-012-1525	11.0 Nm
99323-016-2030	25.0 Nm
99323-020-2540	50.0 Nm
99323-025-3050	60.0 Nm

Apply only helical interpolation or ramping down feed only!





Step 1: Choose Cutting speed(Vc), feed rate(f) and Pitch(P) on the cutting data tables (page 6-116~6-118).
The feed rate and Pitch can be adjusted depend on the spindle power, please see page 6-114.

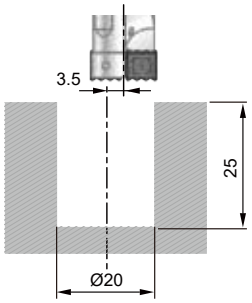
Step 2: Decide circular radius I (I= (D-Dc)/2)
For enlarge hole, decided Ae as page 6-114.

Step 3: Programming helical interpolation program according to CNC controller.

This sample program is written for general condition of the CNC controller. The NC program can be generated by most of the CAD/CAM system.

Example

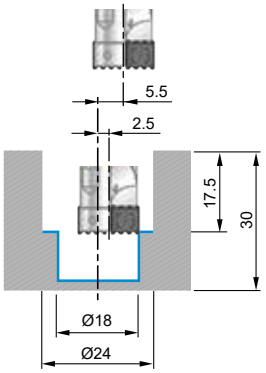
1 Programming a blind hole



Material	N AL6061T6
Holder	99321-012-1525
Insert	01-N9MX05T103-NC5072
Dc	ø13 mm
Vc	306 m/min.
f	0.065 mm/tooth
P	3 mm
I	(20-13)/2 = 3.5 mm

G00 G90 X3.5 Y0.
S7500 M03
G43 H01 Z30. M08
Z5.
G01 Z2. F500.
G03 I-3.5 Z-1. F975
G03 I-3.5 Z-4.
G03 I-3.5 Z-7.
G03 I-3.5 Z-10.
G03 I-3.5 Z-13.
G03 I-3.5 Z-16.
G03 I-3.5 Z-19.
G03 I-3.5 Z-22.
G03 I-3.5 Z-25.
G03 I-3.5 F500.
G01 X0. Y0.
G00 G90 Z5. M09
G00 G90 Z30. M05
G28 G91 Z0.

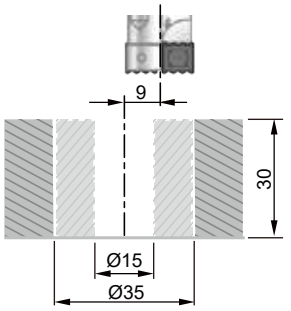
2 Programming a step hole



Material	P SCM440
Tool holder	99323-012-1525
Insert	01-N9MX05T103-NC5072
Dc	ø13 mm
Vc	100 m/min.
For D1	ø24 mm
f1	0.07 mm/tooth
I1	(24-13)/2 = 5.5 mm
P1	2.4 mm
For D2	ø18 mm
f2	0.05 mm/tooth
I2	(18-13)/2 = 2.5 mm
P2	1.5 mm

G00 G90 X5.5 Y0.
S2450 M03
G43 H02 Z10. M08
G01 Z1.7 F200.
Z5.
G03 I-5.5 Z-0.7 F343.
G03 I-5.5 Z-3.1
G03 I-5.5 Z-5.5
G03 I-5.5 Z-7.9
G03 I-5.5 Z-10.3
G03 I-5.5 Z-12.7
G03 I-5.5 Z-15.1
G03 I-5.5 Z-17.5
G03 I-5.5 F200.
G01 X2.5 Y0.
G03 I-2.5 Z-19. F245.
G03 I-2.5 Z-20.5
G03 I-2.5 Z-22.
G03 I-2.5 Z-23.5
G03 I-2.5 Z-25.
G03 I-2.5 Z-26.5
G03 I-2.5 Z-28.
G03 I-2.5 Z29.5
G03 I-2.5 Z31.
G03 I-2.5 F150.
G01 X0. Y0.
G00 G90 Z5. M09
G00 G90 Z30. M05
G28 G91 Z0.

3 Programming a pre-bore hole



Material	K FCD400
Tool holder	99321-016-2030
Insert	01-N9MX070204-NC5072
Prebore	15 mm
Dc	17 mm
Vc	90 m/min.
Pre-bored	ø15 mm
D	ø35 mm
f	0.1 mm/tooth
I	(35-17)/2 = 9.0 mm
P	4.0 mm

G00 G90 X9. Y0.
S1685 M03
G43 H03 Z30. M08
Z5.
G01 Z2. F200.
G03 I-9. Z-4. F337.
G03 I-9. Z-8.
G03 I-9. Z-12.
G03 I-9. Z-16.
G03 I-9. Z-20.
G03 I-9. Z-24.
G03 I-9. Z-28.
G03 I-9. Z-32.
G03 I-9. F200.
G01 X0. Y0.
G00 G90 Z5. M09
G00 G90 Z30. M05
G28 G91 Z0.

Cutting Data

Pitch Suggestion Table			
Spindle Power	< 12 KW	12-20 KW	> 20 KW
Pitch Pick Up	Lower Pitch	Medium Pitch	Higher Pitch

99321-010-1320 / 99323-010-1320 >>

Workpiece material		SFM		Ø .512"				Ø .630"				Ø .787"				Grade of Insert
		99321	99323	fz Inch/tooth	Pitch Inch			fz Inch/tooth	Pitch Inch			fz Inch/tooth	Pitch Inch			
P	Carbon steel C < 0.3%	394	656	.0010	.0236	.0315	.0394	.0022	.0354	.0472	.0591	.0031	.0472	.0630	.0787	NC2032
P	Carbon steel C > 0.3%	328	492	.0010	.0236	.0295	.0354	.0020	.0315	.0433	.0531	.0028	.0394	.0551	.0709	NC5075
P	Low alloy steel C < 0.3%	230	394	.0008	.0197	.0256	.0315	.0020	.0276	.0374	.0472	.0024	.0394	.0512	.0630	NC5072
P	High alloy steel	197	295	.0008	.0197	.0256	.0315	.0020	.0276	.0374	.0472	.0024	.0394	.0512	.0630	NC5072
M	Stainless steel	197	295	.0008	.0197	.0256	.0315	.0020	.0276	.0374	.0472	.0024	.0394	.0512	.0630	NC5072
K	Cast iron	230	394	.0010	.0236	.0315	.0394	.0022	.0354	.0472	.0591	.0031	.0472	.0630	.0787	NC2032
N	Al, Al-alloys	1150	1638	.0010	.0354	.0472	.0591	.0022	.0512	.0709	.0886	.0031	.0709	.0945	.1181	NC2032
N	Cu, Cu-alloy, casting Cu-alloy	656	1310	.0010	.0276	.0374	.0472	.0022	.0394	.0551	.0709	.0031	.0551	.0748	.0945	NC2032
S	Heat resistant alloy	66	92	.0004	.0197	.0256	.0315	.0006	.0276	.0374	.0472	.0012	.0354	.0512	.0630	NC5075
S	Ti, Ti-alloy	131	197	.0004	.0197	.0256	.0315	.0006	.0276	.0374	.0472	.0012	.0354	.0512	.0630	NC5072
H	Hardened steel < HRC50	197	295	.0008	.0197	.0256	.0315	.0020	.0276	.0374	.0472	.0024	.0394	.0512	.0630	NC5075

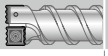
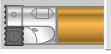
99321-012-1525 / 99323-012-1525 >>

Workpiece material		SFM		Ø .590"				Ø .787"				Ø .984"				Grade of Insert
		99321	99323	fz Inch/tooth	Pitch Inch			fz Inch/tooth	Pitch Inch			fz Inch/tooth	Pitch Inch			
P	Carbon steel C < 0.3%	394	656	.0014	.0472	.0630	.0787	.0026	.0591	.0787	.0984	.0035	.0709	.0945	.1181	NC2032
P	Carbon steel C > 0.3%	328	492	.0012	.0433	.0591	.0709	.0024	.0512	.0701	.0886	.0031	.0630	.0846	.1063	NC5075
P	Low alloy steel C < 0.3%	230	394	.0010	.0394	.0512	.0630	.0020	.0472	.0630	.0787	.0028	.0551	.0748	.0945	NC5072
P	High alloy steel	197	295	.0010	.0394	.0512	.0630	.0020	.0472	.0630	.0787	.0028	.0551	.0748	.0945	NC5072
M	Stainless steel	197	295	.0010	.0394	.0512	.0630	.0020	.0472	.0630	.0787	.0028	.0551	.0748	.0945	NC5072
K	Cast iron	230	394	.0014	.0472	.0630	.0787	.0026	.0512	.0748	.0984	.0035	.0709	.0945	.1181	NC2032
N	Al, Al-alloys	1150	1638	.0014	.0709	.0945	.1181	.0026	.0866	.1173	.1476	.0035	.1063	.1417	.1772	NC2032
N	Cu, Cu-alloy, casting Cu-alloy	656	1310	.0014	.0551	.0748	.0945	.0026	.0709	.0945	.1181	.0035	.0827	.1122	.1417	NC2032
S	Heat resistant alloy	66	92	.0005	.0394	.0512	.0630	.0009	.0472	.0630	.0787	.0012	.0551	.0748	.0945	NC5075
S	Ti, Ti-alloy	131	197	.0005	.0394	.0512	.0630	.0009	.0472	.0630	.0787	.0012	.0551	.0748	.0945	NC5072
H	Hardened steel < HRC50	197	295	.0010	.0197	.0256	.0315	.0020	.0276	.0374	.0472	.0028	.0394	.0512	.0630	NC5075

Cutting Data

Pitch Suggestion Table			
Spindle Power	< 12 KW	12-20 KW	> 20 KW
Pitch Pick Up	Lower Pitch	Medium Pitch	Higher Pitch

▸99321-016-2030 / 99323-016-2030 >>

	Workpiece material	SFM		Ø .787"				Ø .984"				Ø1.181"				Grade of Insert
		99321 	99323 	fz Inch/tooth	Pitch Inch			fz Inch/tooth	Pitch Inch			fz Inch/tooth	Pitch Inch			
P	Carbon steel C < 0.3%	394	656	.0016	.0709	.0945	.1181	.0031	.0827	.1102	.1378	.0041	.0945	.1260	.1575	NC2032
P	Carbon steel C > 0.3%	328	492	.0014	.0630	.0846	.1063	.0028	.0748	.1004	.1260	.0035	.0827	.1122	.1417	NC5075
P	Low alloy steel C < 0.3%	230	394	.0012	.0551	.0748	.0945	.0026	.0630	.0866	.1102	.0031	.0748	.1004	.1260	NC5072
P	High alloy steel	197	295	.0012	.0551	.0748	.0945	.0026	.0630	.0866	.1102	.0031	.0748	.1004	.1260	NC5072
M	Stainless steel	197	295	.0012	.0551	.0748	.0945	.0026	.0630	.0866	.1102	.0031	.0748	.1004	.1260	NC5072
K	Cast iron	230	394	.0016	.0709	.0945	.1181	.0031	.0827	.1102	.1378	.0041	.0945	.1260	.1575	NC2032
N	Al, Al-alloys	1150	1638	.0016	.1063	.1417	.1772	.0031	.1220	.1594	.1969	.0041	.1417	.1890	.2362	NC2032
N	Cu, Cu-alloy, casting Cu-alloy	656	1310	.0016	.0827	.1122	.1417	.0031	.0984	.1319	.1654	.0041	.1102	.1496	.1890	NC2032
S	Heat resistant alloy	66	92	.0006	.0551	.0748	.0945	.0012	.0630	.0866	.1102	.0016	.0748	.1004	.1260	NC5075
S	Ti, Ti-alloy	131	197	.0006	.0551	.0748	.0945	.0012	.0630	.0866	.1102	.0016	.0748	.1004	.1260	NC5072
H	Hardened steel < HRC50	197	295	.0012	.0551	.0748	.0945	.0026	.0630	.0866	.1102	.0031	.0748	.1004	.1260	NC5075

▸99321-020-2540 / 99323-020-2540 >>

	Workpiece material	SFM		Ø .984"				Ø1.260"				Ø1.575"				Grade of Insert
		99321 	99323 	fz Inch/tooth	Pitch Inch			fz Inch/tooth	Pitch Inch			fz Inch/tooth	Pitch Inch			
P	Carbon steel C < 0.3%	394	656	.0020	.0709	.0945	.1181	.0037	.0945	.1260	.1575	.0047	.1181	.1575	.1969	NC2032
P	Carbon steel C > 0.3%	328	492	.0016	.0630	.0846	.1063	.0031	.0866	.1142	.1417	.0043	.1063	.1417	.1772	NC5075
P	Low alloy steel C < 0.3%	230	394	.0014	.0551	.0748	.0945	.0028	.0748	.1004	.1260	.0037	.0945	.1260	.1575	NC5072
P	High alloy steel	197	295	.0014	.0551	.0748	.0945	.0028	.0748	.1004	.1260	.0037	.0945	.1260	.1575	NC5072
M	Stainless steel	262	295	.0014	.0551	.0748	.0945	.0028	.0748	.1004	.1260	.0037	.0945	.1260	.1575	NC5072
K	Cast iron	230	394	.0020	.0709	.0945	.1181	.0037	.0945	.1260	.1575	.0047	.1181	.1575	.1969	NC2032
N	Al, Al-alloys	1150	1638	.0020	.1063	.1417	.1772	.0037	.1417	.1890	.2362	.0047	.1772	.2362	.2953	NC2032
N	Cu, Cu-alloy, casting Cu-alloy	656	1310	.0020	.0827	.1122	.1417	.0037	.1142	.1516	.1890	.0047	.1417	.1890	.2362	NC2032
S	Heat resistant alloy	131	164	.0008	.0551	.0748	.0945	.0014	.0748	.1004	.1260	.0018	.0945	.1260	.1575	NC5075
S	Ti, Ti-alloy	262	295	.0008	.0551	.0748	.0945	.0014	.0748	.1004	.1260	.0018	.0945	.1260	.1575	NC5072
H	Hardened steel < HRC50	262	295	.0014	.0551	.0748	.0945	.0028	.0748	.1004	.1260	.0037	.0945	.1260	.1575	NC5075

Cutting Data

Pitch Suggestion Table			
Spindle Power	< 12 KW	12-20 KW	> 20 KW
Pitch Pick Up	Lower Pitch	Medium Pitch	Higher Pitch

▸99321-025-3050 / 99323-025-3050 >>

	Workpiece material	SFM		Ø1.181"				Ø1.575"				Ø1.969"				Grade of Insert
		99321	99323	fz Inch/tooth	Pitch Inch			fz Inch/tooth	Pitch Inch			fz Inch/tooth	Pitch Inch			
P	Carbon steel C < 0.3%	394	656	.0022	.0945	.1260	.1575	.0047	.1181	.1575	.1969	.0053	.1417	.1890	.2362	NC2032
P	Carbon steel C > 0.3%	328	492	.0020	.0866	.1142	.1417	.0039	.1063	.1417	.1772	.0047	.1260	.1693	.2126	NC5075
P	Low alloy steel C < 0.3%	230	394	.0016	.0748	.1004	.1260	.0035	.0945	.1260	.1575	.0043	.1142	.1516	.1890	NC5072
P	High alloy steel	197	295	.0016	.0748	.1004	.1260	.0035	.0945	.1260	.1575	.0043	.1142	.1516	.1890	NC5072
M	Stainless steel	197	295	.0016	.0748	.1004	.1260	.0035	.0945	.1260	.1575	.0043	.1142	.1516	.1890	NC5072
K	Cast iron	230	394	.0022	.0945	.1260	.1575	.0045	.1181	.1575	.1969	.0053	.1417	.1890	.2362	NC2032
N	Al, Al-alloys	1150	1638	.0022	.1417	.1890	.2362	.0045	.1772	.2362	.2953	.0053	.2126	.2835	.3543	NC2032
N	Cu, Cu-alloy, casting Cu-alloy	656	1310	.0022	.1142	.1516	.1890	.0045	.1417	.1890	.2362	.0053	.1693	.2264	.2835	NC2032
S	Heat resistant alloy	66	92	.0008	.0748	.1004	.1260	.0018	.0945	.1260	.1575	.0022	.1142	.1516	.1890	NC5075
S	Ti, Ti-alloy	131	197	.0008	.0748	.1004	.1260	.0018	.0945	.1260	.1575	.0022	.1142	.1516	.1890	NC5072
H	Hardened steel < HRC50	197	295	.0016	.0748	.1004	.1260	.0035	.0945	.1260	.1575	.0043	.1142	.1516	.1890	NC5075

▸99321-025-4265 >>

	Workpiece material	SFM	Ø1.654"				Ø2.165"				Ø2.559"				Grade of Insert
		99321	fz Inch/tooth	Pitch Inch			fz Inch/tooth	Pitch Inch			fz Inch/tooth	Pitch Inch			
P	Carbon steel C < 0.3%	656	.0031	.1181	.1575	.1969	.0047	.1299	.1732	.2165	.0053	.1417	.1890	.2362	NC2032
P	Carbon steel C > 0.3%	428	.0030	.1063	.1417	.1772	.0043	.1181	.1575	.1969	.0047	.1260	.1693	.2126	NC5075
P	Low alloy steel C < 0.3%	394	.0026	.0945	.1260	.1575	.0037	.1024	.1378	.1732	.0043	.1142	.1516	.1890	NC5072
P	High alloy steel	295	.0026	.0945	.1260	.1575	.0037	.1024	.1378	.1732	.0043	.1142	.1516	.1890	NC5072
M	Stainless steel	295	.0026	.0945	.1260	.1575	.0037	.1024	.1378	.1732	.0043	.1142	.1516	.1890	NC5072
K	Cast iron	394	.0031	.1181	.1575	.1969	.0047	.1299	.1732	.2165	.0053	.1417	.1890	.2362	NC2032
N	Al, Al-alloys	1638	.0031	.1772	.2362	.2953	.0047	.1929	.2579	.3228	.0053	.2126	.2835	.3543	NC2032
N	Cu, Cu-alloy, casting Cu-alloy	656	.0031	.1417	.1890	.2362	.0047	.1575	.2087	.2598	.0053	.1693	.2264	.2835	NC2032
S	Heat resistant alloy	92	.0012	.0945	.1260	.1575	.0018	.1024	.1378	.1732	.0022	.1142	.1516	.1890	NC5075
S	Ti, Ti-alloy	295	.0012	.0945	.1260	.1575	.0018	.1024	.1378	.1732	.0022	.1142	.1516	.1890	NC5072
H	Hardened steel < HRC50	295	.0026	.0945	.1260	.1575	.0037	.1024	.1378	.1732	.0043	.1142	1516	.1890	NC5075

Application Example

▸Special insert geometry is able to cut different materials>>

- Serrated cutting edge makes the chips short and small, and easier to evacuate.
- Recommended for almost all material types, good for drilling material that generates long, soft chips.

BT40, 22.5KW | Hole size: Ø25 x 50L mm | Tool: 00-99321-016-2030

Material: SAE8620

load 28% P

Vc	=	262.4	SFM
S	=	1500	r.p.m.
fz	=	.0059	IPR
F	=	8.850	IPM
P	=	.236	Inch
T	=	63	sec.

Material: SUS304 (Stainless steel 304)

load 25% M

Vc	=	262.4	SFM
S	=	1500	r.p.m.
fz	=	.0031	IPR
F	=	4.65	IPM
P	=	.236	Inch
T	=	118	sec.

Material: C1100

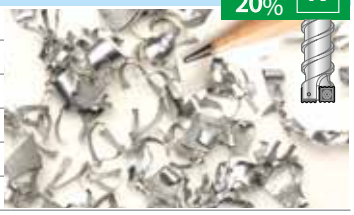
load 25% N

Vc	=	393.6	SFM
S	=	2250	r.p.m.
fz	=	.0039	IPR
F	=	8.775	IPM
P	=	.236	Inch
T	=	63	sec.

Material: AL6061T6

load 20% N

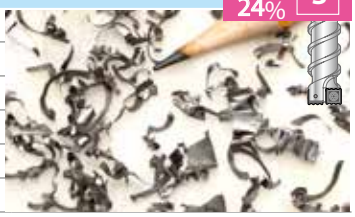
Vc	=	590.4	SFM
S	=	3370	r.p.m.
fz	=	.0079	IPR
F	=	26.623	IPM
P	=	.236	Inch
T	=	21	sec.



Material: TiAl6V4

load 24% S

Vc	=	262.4	SFM
S	=	1500	r.p.m.
fz	=	.0031	IPR
F	=	4.65	IPM
P	=	.236	Inch
T	=	118	sec.



Material: Inconel 718 (Drill with internal coolant)

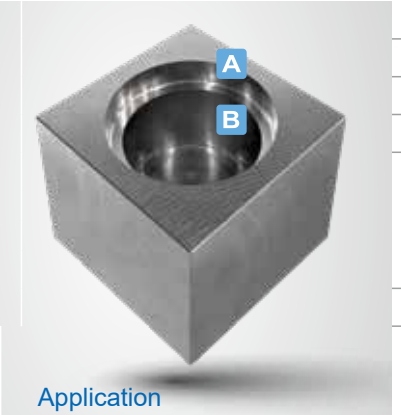
load 24% S

Vc	=	131.2	SFM
S	=	750	r.p.m.
fz	=	.0118	IPR
F	=	8.85	IPM
P	=	.079	Inch
T	=	100	sec.

▸Suggested insert grades for best result >>

Diameter (mm)		25 (0.984")		
Depth (mm)		50 (1.97")		
Tool (Dc=17mm)		00-99321-016-2030 (external coolant)		
Material		P Carbon Steel	M Stainless Steel	H Tool Steel
	DIN	C45E	X5CrNi18-10	X40CrMoV5 1
	SAE	1045	304	H13
	JIS	S45C	SUS304	SKD61 (HRC50°)
Insert Grade		**NC5072** (P40, TiAlN)	**NC5072** (P40, TiAlN)	**NC2032** (K20F, TiAlN)
No. of Edges		2	2	2
Vc = SFM		579.3	288.4	386.2
S = r.p.m.		2250	1120	1500
fz = IPR		0.0039	0.0025	0.0019
F = IPM		17.717	5.748	5.906
Pitch = (inch)		0.220	0.118	0.118
Machine Load = % (BT40, 22.5KW)		35%	20%	20%
Tool Life (hole)		150	108	18
Chip Removal Volume (cm^3/min.)		52.66	8.55	8.77

To produce step hole Ø2.106" & Ø1.772" by one tool >>

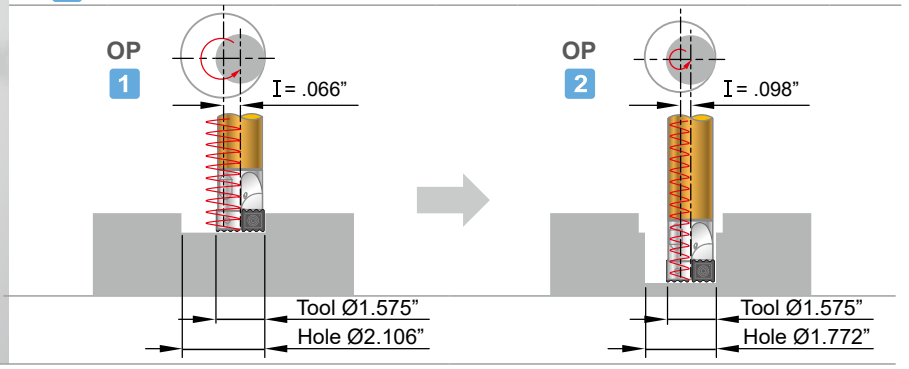


Application

- Hydraulic port for plug-in valve cylinders, counterbore for bolt, and more!

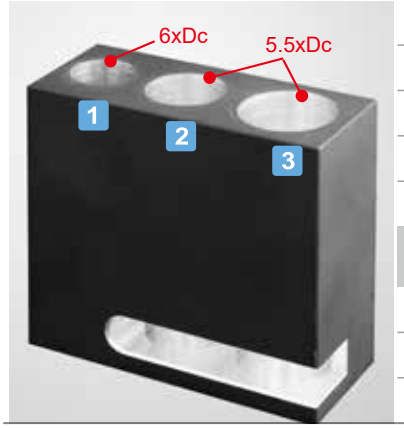
Material	S50C (JIS). High carbon steel
Tool	99323-LS32-HD40 (Non-standard size)
Insert	N9MX12T308-NC2032
Machine	BT40, 22.5 KW
Coolant	Internal

Hole	Dc Inch	D Inch	L Inch	Vc SFM	S r.p.m	fz IPR	F IPM	l Inch	P Inch	T sec.
A	Ø1.575	Ø2.106	.394	989	2400	.0059	14.96	.266	.197	13.3
B		Ø1.772	1.260	989	2400	.0059	14.96	.098	.079	39.48



Just one “NC Helix Drill” can machine different diameters and hole depths.

Just one tool to drill different diameters and hole depth, possible up to 6xDc >>



Material	AL6061T6
Tool	99323-016-2030
Insert	N9MX070204-NC5072
Machine	HAAS VM-3, BT40, 22.5KW
Coolant	Internal coolant

Fig.	Dc Inch	D Inch	l Inch	L Inch	Vc SFM	S r.p.m	fz IPR	fcut IPR	F IPM	P Inch	α deg
1	Ø .669	Ø .787	.059	3.937	394	2250	.0016	.0023	42.9	.118	17.67
2		Ø .984	.157	3.740	328	1900	.0031	.0041	76.0	.177	10.16
3		Ø 1.181	.256	3.740	197	1200	.0041	.0052	96.5	.236	7.81

One tool performs multiple patterns >>

Material	AL6061T6
Tool	99323-016-2030 M08-HD17-2030
Insert	N9MX070204-NC5072
Machine	HAAS VM-3, BT40, 22.5KW
Coolant	Internal

Fig.	Dc Inch	Vc SFM	S r.p.m	fz IPR	F IPM	P Inch	T sec.
1	Ø .669	656	3800	.0030	22.44	.157	67
2		656	3800	.0030	22.44	.157	95
3		656	3800	.0030	22.44	.157	80

Widening a deep hole (6xD) in stainless steel by NC Helix Drill. Predrilled 0.591" enlarge to 1.142". >>

0.591” hole 1.142” hole

Material	Stainless steel
Tool	00-99323-016-2030 with 0-398016-150M08 Extension Bar
Insert	N9MX070204-NC5072
Machine	VMC m/c.
Coolant	Internal coolant

Dc Inch	D Inch	L Inch	S r.p.m.	fz IPR	F IPM	P Inch
Ø .669	Ø1.142	4.134”	1685	.0020	6.61	.059

Low spindle power is not a problem! BT30 machine, Ø1.181" hole diameter, 3.3xDc drill depth >>

The main purpose of this example is to improve machining efficiency.

Maximum drilling capacity of the 5.5 kw spindle is Ø.630”

Material	S50C (JIS), High carbon steel
Tool	99321-020-2540 / BC20-HD22-2540
Insert	N9MX100306-NC2032
Machine	***BT30, 5.5 KW***
Coolant	External coolant

Dc Inch	D Inch	L Inch	Vc SFM	S r.p.m	fz IPR	fcut IPR	F IPM	I Inch	P Inch	T sec.
Ø .866	Ø1.181	2.756	656	* 2893	.0047	.0039	23.62	.157	.110	62

* 3000 r.p.m. is used.

NC Helix Drill reduces the spindle load and increases spindle life. >>

Maximum drilling capacity of the 18 kw spindle is Ø50 mm

Material	SS400 Low carbon steel
Tool	00-99323-025-3050
Insert	N9MX12T308-NC5072
Machine	Toshiba MPE-2140, CAT-50, 25HP / 18KW
Coolant	Internal coolant

Dc mm	D mm	L mm	Vc m/min.	S r.p.m.	fz mm/tooth	fcut mm/tooth	F IPM	I mm	P mm	T sec.
Ø27	Ø50	80	119	1400	0.15	0.165	16.55	11.5	3	275

15% Spindle load only!