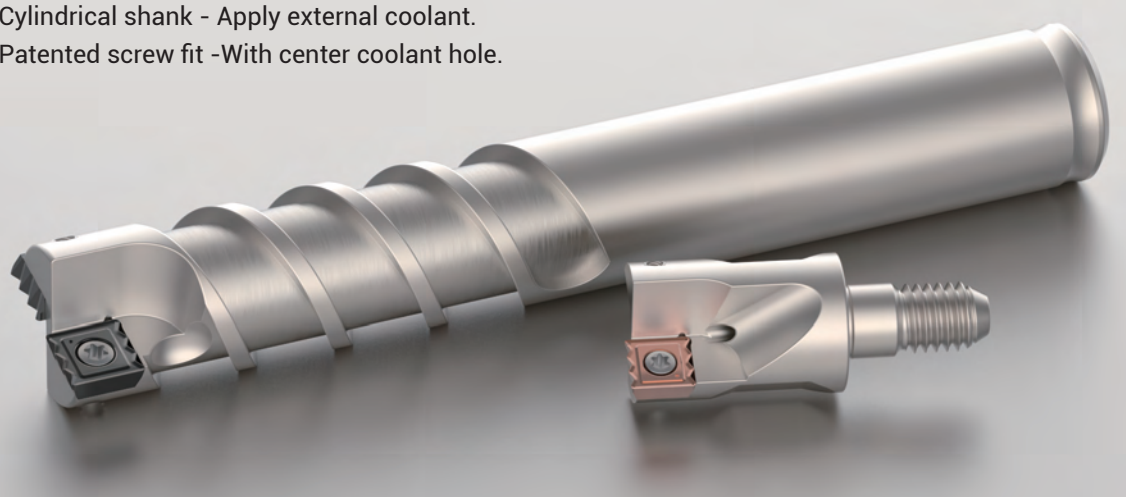
NC Helix Drill >>>

The Expert Of Swarfs Control

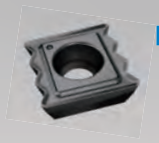
P M K N S H

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 Ø13~Ø65mm Holes From Solid.

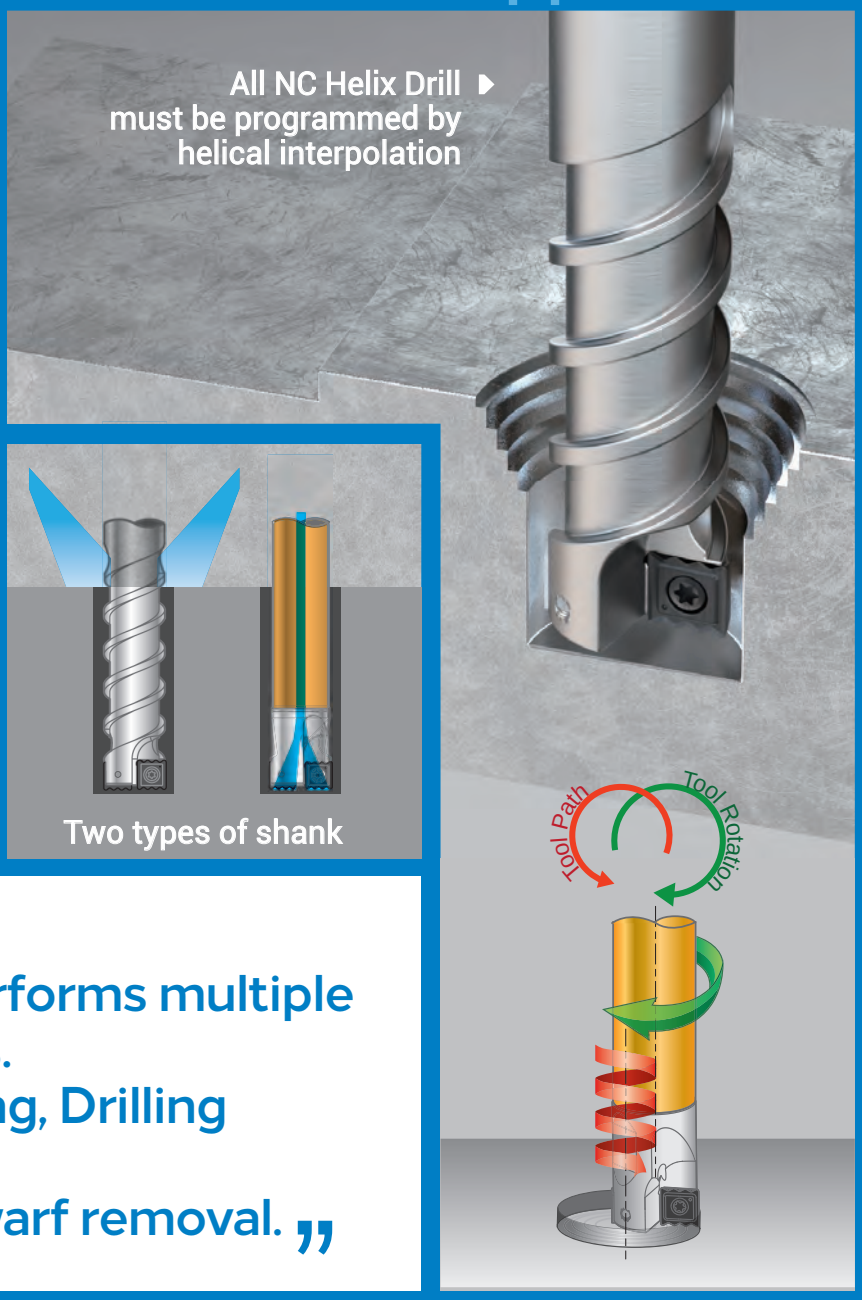
- Saving your tool inventory and cost!
- No need to peck drill or dwell in operation even machine without internal coolant.

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!

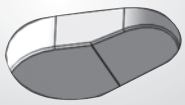
- Each holder can machine different diameters and hole depths, saving your tool inventory and cost!
- No need to peck drill or dwell in operation even machine without internal coolant.

Reduce Inventory	Large Inventory
	

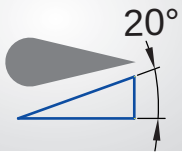
Lower spindle power consumption >> Easy to cut!

- 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

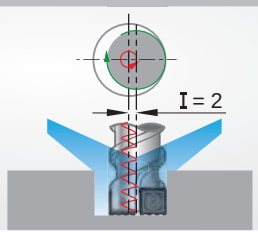
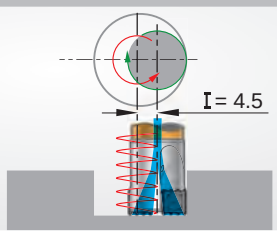


Ramping Angle



Just six tools for drilling Ø13~ Ø 65 mm or larger >>

Example

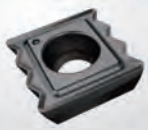
Hole Ø15 / Tool Ø11	Hole Ø20 / Tool Ø11
	

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

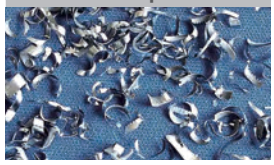
Special insert geometry >> exceptional swarfs control.

- 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.

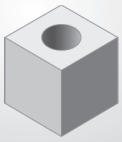
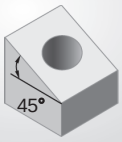
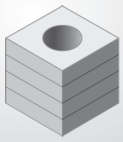
Insert



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 >>

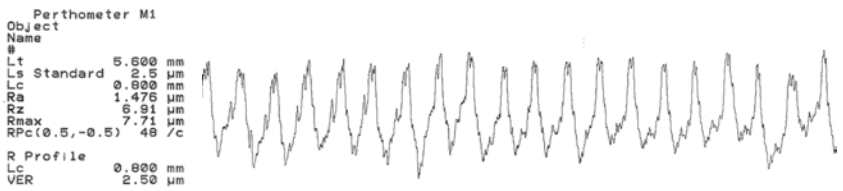
- Making a flatness at bottom just by NC program, easy and smart!

Workpiece Application

Flatness

Make " One more turn" after reached the depth.
Ex :

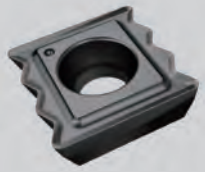
```
G03  I-1.5 Z-30 P5
G03  I-1.5    <make one more turn >
G01  X0 Y0  < afterward, let tool back to center of hole >
```



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



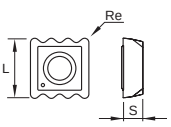
Inserts >>

NC5075 : • Good for steel with heat treatment up to HRC 50.
• Reduce heat and tool wear.
• Long tool life.

NC5072 : • P40, TiAlN coating. General purpose, suitable for almost all kind of steel, stainless steel and Titanium.
• Recommended while clamping devices is unstable or deep hole drilling or apply on low power machines.

NC2032 : • K20F, TiAlN coating.
• Design for high performance cutting, special good for cast iron and hardened material <HRC 50.

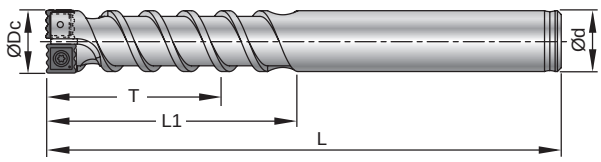
Code	Parts No.		Grade	Coating		Dimensions L	S	Re	Screw	Key
041041		NC5075	TiAlN+ALDURA	P40						
041021	01-N9MX04T002	NC5072	TiAlN	P40		4.75	1.8	0.2	*NS-18037 0.6Nm	NK-T6
041001		NC2032		K20F						
042041		NC5075	TiAlN+ALDURA	P40						
042021	01-N9MX05T103	NC5072	TiAlN	P40		5.75	2.0	0.3	*NS-20045 0.6Nm	NK-T6
042001		NC2032		K20F						
043041		NC5075	TiAlN+ALDURA	P40						
043021	01-N9MX070204	NC5072	TiAlN	P40		7.5	2.4	0.4	*NS-25045 0.9Nm	NK-T7
043001		NC2032		K20F						
044041		NC5075	TiAlN+ALDURA	P40						
044021	01-N9MX100306	NC5072	TiAlN	P40		10.0	3.18	0.6	NS-30072 2.0Nm	NK-T9
044001		NC2032		K20F						
045041		NC5075	TiAlN+ALDURA	P40						
045021	01-N9MX12T308	NC5072	TiAlN	P40		12.5	3.97	0.8	NS-35080 2.5Nm	NK-T15
045001		NC2032		K20F						



*Torque screwdriver is recommended.

Cylindrical Shank >>

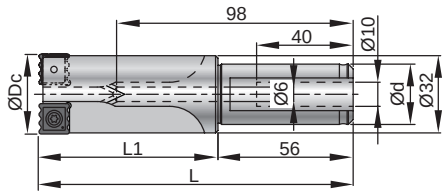
• Made from hardened high alloy steel HRC 48.
• Unique helical groove design generates chip-removing coolant stream.
• Designed for CNC machine with external coolant.



Code	Parts No.	Type	Capable of drill dia. mm Dmin.	Dmax.	ØDc	T	L1	L	Ød	Insert type	Max. ramping angle
401001	00-99321-010-1320	BC10-HD11-1320	**13**	**20**	11	30	40	80	10	N9MX04T002	20°
402001	00-99321-012-1525	BC12-HD13-1525	**15**	**25**	13	36	50	100	12	N9MX05T103	20°
403001	00-99321-016-2030	BC16-HD17-2030	**20**	**30**	17	50	60	110	16	N9MX070204	20°
404001	00-99321-020-2540	BC20-HD22-2540	**25**	**40**	22	60	70	125	20	N9MX100306	20°
405001	00-99321-025-3050	BC25-HD27-3050	**30**	**50**	27	75	85	165	25	N9MX12T308	20°

Side Lock Shank >>

- Made from hardened high alloy steel HRC 48.
- With internal coolant
- Special size is available on request.

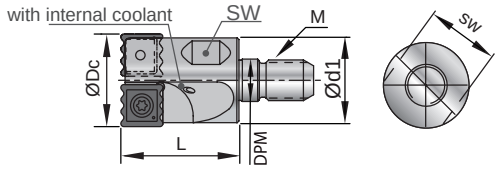


Code	Parts No.	Type	Capable of drill dia. mm		ØDc	L	L1	Ød	Max. Depth	Insert type	Max. ramping angle
			Dmin.	Dmax.							
405002	00-99321-025-4265	SL25-HD33-4265	**42**	**65**	33	130	74	25	50	N9MX12T308	9°

Screw Fit Cutter >>

- Made from hardened high alloy steel HRC 42.
- 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.

* Use open ended spanner to tighten the cutter.



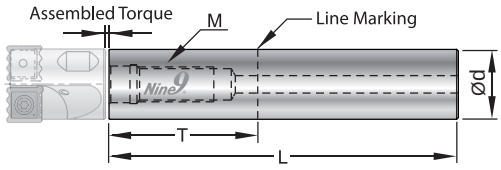
Code	Part No.	Type	Capable of drill dia. mm		ØDc	L	M	DPM	Ød1	SW	Insert type	Max. ramping angle
			Dmin.	Dmax.								
421001	00-99323-010-1320	M05-HD11-1320	**13**	**20**	11	20	M5	5.5	10	8	N9MX04T002	20°
422001	00-99323-012-1525	M06-HD13-1525	**15**	**25**	13	25	M6	6.5	12	10	N9MX05T103	20°
423001	00-99323-016-2030	M08-HD17-2030	**20**	**30**	17	25	M8	8.5	16	14	N9MX070204	20°
424001	00-99323-020-2540	M10-HD22-2540	**25**	**40**	22	30	M10	10.5	20	18	N9MX100306	20°
425001	00-99323-025-3050	M12-HD27-3050	**30**	**50**	27	35	M12	12.5	25	23	N9MX12T308	20°

* Special size is available by request.

Extension Bar

Steel Type >>

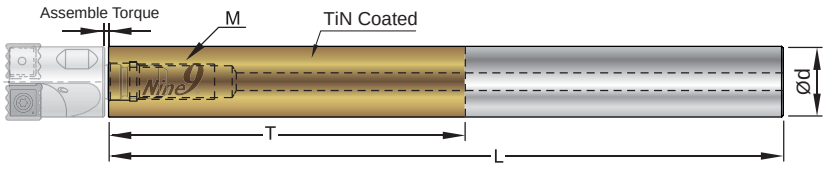
- T is the maximum overhang length.
- With internal coolant hole.



Code	Parts No.	Type	Ød	T	L	M	Assembled Torque
970100	00-99801-10S	BC10-075M05S	10	25	75	M5xP0.8	6.5 Nm
970122	00-99801-12S	BC12-075M06S	12	25	75	M6xP1.0	11.0 Nm
970161	00-99801-16S	BC16-090M08S	16	35	90	M8xP1.25	25.0 Nm
970202	00-99801-20S	BC20-100M10S	20	40	100	M10xP1.5	50.0 Nm
970253	00-99801-25S	BC25-120M12S	25	50	120	M12xP1.75	60.0 Nm

Solid Carbide Type >>

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

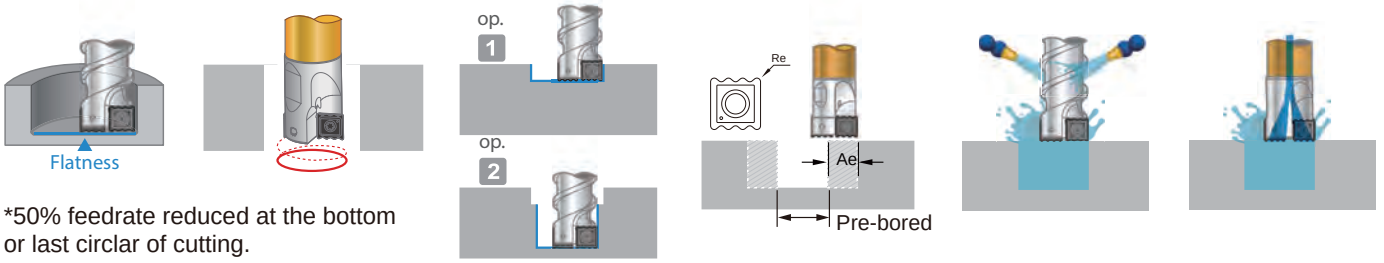


Code	Parts No.	Type	Ød	T	L	M	Assembled Torque
980102	00-99801-10W	BC10-100M05W	10	50	100	M5xP0.8	6.5Nm
980122	00-99801-12W	BC12-100M06W	12	60	100	M6xP1.0	11.0Nm
980143	00-99801-14W	BC14-120M08W	14	70	120	M8xP1.25	25.0Nm
980164	00-99801-16W	BC16-150M08W	16	80	150	M8xP1.25	25.0Nm
980184	00-99801-18W	BC18-150M10W	18	90	150	M10xP1.5	50.0Nm
980205	00-99801-20W	BC20-200M10W	20	100	200	M10xP1.5	50.0Nm
980255	00-99801-25W	BC25-200M12W	25	125	200	M12xP1.75	60.0Nm

Technical Guide

Programming conditions

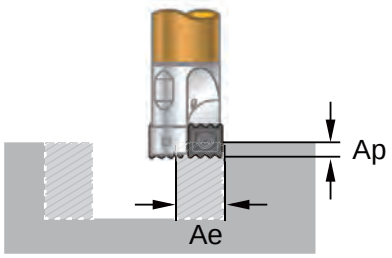
Blind Hole* **Through Hole*** **Step Hole** **Pre-bored work piece** **External coolant Min. 5 bar** **Internal coolant Min. 10 bar**



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

For enlarge hole

Minimum and Maximum Ae for programming a pre-bored hole

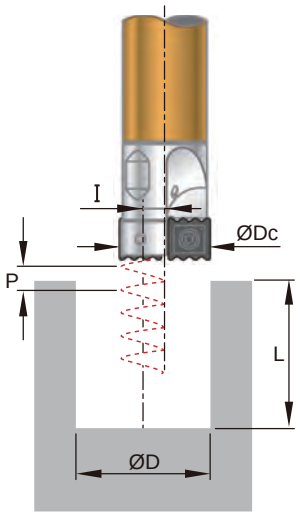


Max. Ae = Dc- (Rex2)
Min. Ae = 1/3 insert length (L)
Max. ap < 3/4 of insert length

Insert type	Re	Min. Ae	Max. Ae	Max. Ap
N9MX04T002	0.2	1.6	10.6	3.5
N9MX05T103	0.3	2.0	12.4	4.3
N9MX070204	0.4	2.5	16.2	5.6
N9MX100306	0.6	3.3	20.8	7.5
N9MX12T308	0.8	4.2	25.4	9
N9MX12T308*	0.8	4.2	31.4*	9

(* for 99321-025-4265)

NC Helix Drill



Cutting Parameters (S & F)

$$S = \frac{Vc \times 1000}{Dc \times \pi} \text{ r.p.m.}$$

$$F = S \times fz \times Z \quad \text{mm/min.}$$

$$d = D - Dc \text{ mm}$$

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

Cutting time (T)

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

Chip removal Volume rate (Q)

$$Q = \frac{\pi \times D^2 \times L \times 60}{4 \times 1000 \times T} \text{ cm}^3/\text{min.}$$

Formula

Dc	=	Dia. of drill	mm
D	=	Dia. of hole	mm
L	=	Depth of drilling	mm
Vc	=	Cutting speed	m/min.
S	=	Spindle speed	r.p.m.
I	=	Circular radius	mm
fz	=	Feed rate	mm/tooth
F	=	Table feed rate	mm/min.
d	=	Circular diameter (D-Dc)	mm
P	=	Pitch of helical interpolation	mm
T	=	Cutting time	sec.
Q	=	Chip removal volume rate	cm³ / min.
Z	=	Insert tooth	

Spindle power

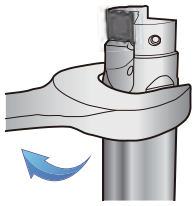
The Feed rate(Fc) may be adjusted by the power factor(PF) of below:

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.

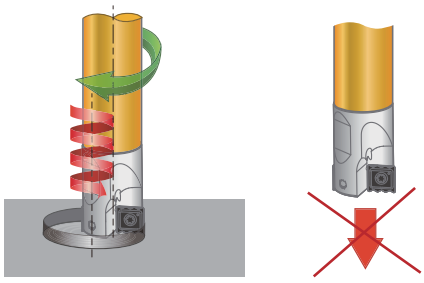
99323 screw fit cutter assembly



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!

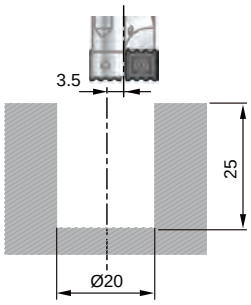


Step 1: Choose Cutting speed(Vc), feed rate(f) and Pitch(P) on the cutting data tables (page 122~124).
The feed rate and Pitch can be adjusted depend on the spindle power, please see page 120.
Step 2: Decide circular radius I (I= (D-Dc)/2)
For enlarge hole, decided Ae as page 120.
Step 3: Programming helical interpolation program according to CNC controller.
Step 4: Make the first hole and measure diameter as D', if D' is too small, please adjust "I" as I'=I+(D-D')/2 and try again, this value I' is possible to be adjusted to get correct D.

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

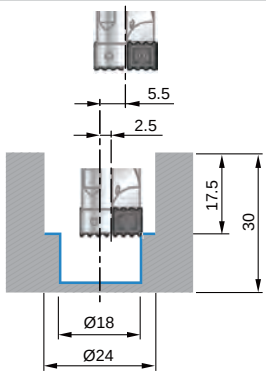
1 Programming a blind hole



Material	N AL6061T6
Holder	00-99321-012-1525
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.
```

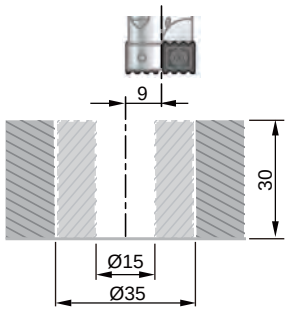
2 Programming a step hole



Material	P SCM440
Tool holder	00-99323-012-1525
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	00-99321-016-2030
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

00-99321-010-1320 / 00-99323-010-1320 >>

	Workpiece material	Vc m/min. 99321	Vc m/min. 99323	Ø13 fz mm/tooth	Ø13 Pitch mm			Ø16 fz mm/tooth	Ø16 Pitch mm			Ø20 fz mm/tooth	Ø20 Pitch mm			Grade of insert
P	Carbon steel C<0.3%	120	200	0.025	0.60	0.80	1.00	0.055	0.90	1.20	1.50	0.08	1.20	1.60	2.00	NC2032
P	Carbon steel C>0.3%	100	150	0.025	0.60	0.75	0.90	0.05	0.80	1.10	1.35	0.07	1.00	1.40	1.80	NC5075
P	Low alloy steel C<0.3%	70	120	0.02	0.50	0.65	0.80	0.05	0.70	0.95	1.20	0.06	1.00	1.30	1.60	NC5072
P	High alloy steel	60	90	0.02	0.50	0.65	0.80	0.05	0.70	0.95	1.20	0.06	1.00	1.30	1.60	NC5075
M	Stainless steel	60	90	0.02	0.50	0.65	0.80	0.05	0.70	0.95	1.20	0.06	1.00	1.30	1.60	NC5072
K	Cast Iron	70	120	0.025	0.60	0.80	1.00	0.055	0.90	1.20	1.50	0.08	1.20	1.60	2.00	NC2032
N	Al, Al-alloys	350	500	0.025	0.90	1.20	1.50	0.055	1.30	1.80	2.25	0.08	1.80	2.40	3.00	NC2032
N	Cu, Cu-alloy, casting Cu-alloy	200	400	0.025	0.70	0.95	1.20	0.055	1.00	1.40	1.80	0.08	1.40	1.90	2.40	NC2032
S	Heat resistant alloy	20	30	0.01	0.50	0.65	0.80	0.015	0.70	0.95	1.20	0.03	0.90	1.30	1.60	NC5075
S	Ti, Ti-alloy	40	60	0.01	0.50	0.65	0.80	0.015	0.70	0.95	1.20	0.03	0.90	1.30	1.60	NC5072
H	Hardened steel < HRC50	60	90	0.02	0.50	0.65	0.80	0.05	0.70	0.95	1.20	0.06	1.00	1.30	1.60	NC5075

00-99321-012-1525 / 00-99323-012-1525 >>

	Workpiece material	Vc m/min. 99321	Vc m/min. 99323	Ø15 fz mm/tooth	Ø15 Pitch mm			Ø20 fz mm/tooth	Ø20 Pitch mm			Ø25 fz mm/tooth	Ø25 Pitch mm			Grade of insert
P	Carbon steel C<0.3%	120	200	0.035	1.20	1.60	2.00	0.065	1.50	2.00	2.50	0.09	1.80	2.40	3.00	NC2032
P	Carbon steel C>0.3%	100	150	0.03	1.10	1.50	1.80	0.06	1.30	1.78	2.25	0.08	1.60	2.15	2.70	NC5075
P	Low alloy steel C<0.3%	70	120	0.025	1.00	1.30	1.60	0.05	1.20	1.60	2.00	0.07	1.40	1.90	2.40	NC5072
P	High alloy steel	60	90	0.025	1.00	1.30	1.60	0.05	1.20	1.60	2.00	0.07	1.40	1.90	2.40	NC5075
M	Stainless steel	60	90	0.025	1.00	1.30	1.60	0.05	1.20	1.60	2.00	0.07	1.40	1.90	2.40	NC5072
K	Cast Iron	70	120	0.035	1.20	1.60	2.00	0.065	1.30	1.90	2.50	0.09	1.80	2.40	3.00	NC2032
N	Al, Al-alloys	350	500	0.035	1.80	2.00	2.20	0.065	2.20	2.98	3.75	0.09	2.70	3.60	4.30	NC2032
N	Cu, Cu-alloy, casting Cu-alloy	200	400	0.035	1.40	1.90	2.20	0.065	1.80	2.40	3.00	0.09	2.10	2.85	3.60	NC2032
S	Heat resistant alloy	20	30	0.0125	1.00	1.30	1.60	0.0225	1.20	1.60	2.00	0.03	1.40	1.90	2.40	NC5075
S	Ti, Ti-alloy	40	60	0.0125	1.00	1.30	1.60	0.0225	1.20	1.60	2.00	0.03	1.40	1.90	2.40	NC5072
H	Hardened steel < HRC50	60	90	0.025	1.00	1.30	1.60	0.05	1.20	1.60	2.00	0.07	1.40	1.90	2.40	NC5075

Cutting Data

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

00-99321-016-2030 / 00-99323-016-2030 >>

	Workpiece material	Vc m/min. 99321	Vc m/min. 99323	Ø20 fz mm/tooth	Ø20 Pitch mm			Ø25 fz mm/tooth	Ø25 Pitch mm			Ø30 fz mm/tooth	Ø30 Pitch mm			Grade of insert
P	Carbon steel C<0.3%	120	200	0.04	1.80	2.40	3.00	0.08	2.10	2.80	3.50	0.105	2.40	3.20	4.00	NC2032
P	Carbon steel C>0.3%	100	150	0.035	1.60	2.15	2.70	0.07	1.90	2.55	3.20	0.09	2.10	2.85	3.60	NC5075
P	Low alloy steel C<0.3%	70	120	0.03	1.40	1.90	2.40	0.065	1.60	2.20	2.80	0.08	1.90	2.55	3.20	NC5072
P	High alloy steel	60	90	0.03	1.40	1.90	2.40	0.065	1.60	2.20	2.80	0.08	1.90	2.55	3.20	NC5075
M	Stainless steel	60	90	0.03	1.40	1.90	2.40	0.065	1.60	2.20	2.80	0.08	1.90	2.55	3.20	NC5072
K	Cast Iron	70	120	0.04	1.80	2.40	3.00	0.08	2.10	2.80	3.50	0.105	2.40	3.20	4.00	NC2032
N	Al, Al-alloys	350	500	0.04	2.70	3.00	3.40	0.08	3.10	4.05	5.00	0.105	3.60	4.80	5.60	NC2032
N	Cu, Cu-alloy, casting Cu-alloy	200	400	0.04	2.10	2.85	3.40	0.08	2.50	3.35	4.20	0.105	2.80	3.80	4.80	NC2032
S	Heat resistant alloy	20	30	0.015	1.40	1.90	2.40	0.03	1.60	2.20	2.80	0.04	1.90	2.55	3.20	NC5075
S	Ti, Ti-alloy	40	60	0.015	1.40	1.90	2.40	0.03	1.60	2.20	2.80	0.04	1.90	2.55	3.20	NC5072
H	Hardened steel < HRC50	60	90	0.03	1.40	1.90	2.40	0.065	1.60	2.20	2.80	0.08	1.90	2.55	3.20	NC5075

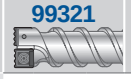
00-99321-020-2540 / 00-99323-020-2540 >>

	Workpiece material	Vc m/min. 99321	Vc m/min. 99323	Ø25 fz mm/tooth	Ø25 Pitch mm			Ø32 fz mm/tooth	Ø32 Pitch mm			Ø40 fz mm/tooth	Ø40 Pitch mm			Grade of insert
P	Carbon steel C<0.3%	120	200	0.05	1.80	2.40	3.00	0.095	2.40	3.20	4.00	0.12	3.00	4.00	5.00	NC2032
P	Carbon steel C>0.3%	100	150	0.04	1.60	2.15	2.70	0.08	2.20	2.90	3.60	0.11	2.70	3.60	4.50	NC5075
P	Low alloy steel C<0.3%	70	120	0.035	1.40	1.90	2.40	0.07	1.90	2.55	3.20	0.095	2.40	3.20	4.00	NC5072
P	High alloy steel	60	90	0.035	1.40	1.90	2.40	0.07	1.90	2.55	3.20	0.095	2.40	3.20	4.00	NC5075
M	Stainless steel	60	90	0.035	1.40	1.90	2.40	0.07	1.90	2.55	3.20	0.095	2.40	3.20	4.00	NC5072
K	Cast Iron	70	120	0.05	1.80	2.40	3.00	0.095	2.40	3.20	4.00	0.12	3.00	4.00	5.00	NC2032
N	Al, Al-alloys	350	500	0.05	2.70	3.00	3.40	0.095	3.60	4.80	6.00	0.12	4.50	6.00	7.50	NC2032
N	Cu, Cu-alloy, casting Cu-alloy	200	400	0.05	2.10	2.85	3.40	0.095	2.90	3.85	4.80	0.12	3.60	4.80	6.00	NC2032
S	Heat resistant alloy	20	30	0.02	1.40	1.90	2.40	0.035	1.90	2.55	3.20	0.045	2.40	3.20	4.00	NC5075
S	Ti, Ti-alloy	40	60	0.02	1.40	1.90	2.40	0.035	1.90	2.55	3.20	0.045	2.40	3.20	4.00	NC5072
H	Hardened steel < HRC50	60	90	0.035	1.40	1.90	2.40	0.07	1.90	2.55	3.20	0.095	2.40	3.20	4.00	NC5075

Cutting Data

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

00-99321-025-3050 / 00-99323-025-3050 >>

Workpiece material		Vc m/min.		Ø30				Ø40				Ø50				Grade of insert
		99321 	99323 	fz mm/tooth	Pitch mm			fz mm/tooth	Pitch mm			fz mm/tooth	Pitch mm			
P	Carbon steel C<0.3%	120	200	0.055	2.40	3.00	3.40	0.12	3.00	4.00	5.00	0.135	3.60	4.80	6.00	NC2032
P	Carbon steel C>0.3%	100	150	0.05	2.20	2.90	3.40	0.10	2.70	3.60	4.50	0.12	3.20	4.30	5.40	NC5075
P	Low alloy steel C<0.3%	70	120	0.04	1.90	2.55	3.20	0.09	2.40	3.20	4.00	0.11	2.90	3.85	4.80	NC5072
P	High alloy steel	60	90	0.04	1.90	2.55	3.20	0.09	2.40	3.20	4.00	0.11	2.90	3.85	4.80	NC5075
M	Stainless steel	60	90	0.04	1.90	2.55	3.20	0.09	2.40	3.20	4.00	0.11	2.90	3.85	4.80	NC5072
K	Cast Iron	70	120	0.055	2.40	3.00	3.40	0.115	3.00	4.00	5.00	0.135	3.60	4.80	6.00	NC2032
N	Al, Al-alloys	350	500	0.055	2.50	3.00	3.40	0.115	4.50	6.00	7.50	0.135	5.40	7.20	9.00	NC2032
N	Cu, Cu-alloy, casting Cu-alloy	200	400	0.055	2.50	3.00	3.40	0.115	3.60	4.80	6.00	0.135	4.30	5.75	7.20	NC2032
S	Heat resistant alloy	20	30	0.02	1.90	2.55	3.20	0.045	2.40	3.20	4.00	0.055	2.90	3.85	4.80	NC5075
S	Ti, Ti-alloy	40	60	0.02	1.90	2.55	3.20	0.045	2.40	3.20	4.00	0.055	2.90	3.85	4.80	NC5072
H	Hardened steel < HRC50	60	90	0.04	1.90	2.55	3.20	0.09	2.40	3.20	4.00	0.11	2.90	3.85	4.80	NC5075

00-99321-025-4265 >>

Workpiece material		Vc m/min.	Ø42				Ø55				Ø65				Grade of insert
		99321 	fz mm/tooth	Pitch mm			fz mm/tooth	Pitch mm			fz mm/tooth	Pitch mm			
P	Carbon steel C<0.3%	200	0.08	3.00	3.60	4.40	0.12	3.30	4.40	5.50	0.135	3.60	4.80	6.00	NC2032
P	Carbon steel C>0.3%	150	0.075	2.70	3.60	4.40	0.11	3.00	4.00	5.00	0.12	3.20	4.30	5.40	NC5075
P	Low alloy steel C<0.3%	120	0.065	2.40	3.20	4.00	0.095	2.60	3.50	4.40	0.11	2.90	3.85	4.80	NC5072
P	High alloy steel	90	0.065	2.40	3.20	4.00	0.095	2.60	3.50	4.40	0.11	2.90	3.85	4.80	NC5075
M	Stainless steel	90	0.065	2.40	3.20	4.00	0.095	2.60	3.50	4.40	0.11	2.90	3.85	4.80	NC5072
K	Cast Iron	120	0.08	3.00	3.60	4.40	0.12	3.30	4.40	5.50	0.135	3.60	4.80	6.00	NC2032
N	Al, Al-alloys	500	0.08	4.00	4.20	4.40	0.12	4.90	6.55	8.20	0.135	5.40	7.20	9.00	NC2032
N	Cu, Cu-alloy, casting Cu-alloy	400	0.08	3.60	4.00	4.40	0.12	4.00	5.30	6.60	0.135	4.30	5.75	7.20	NC2032
S	Heat resistant alloy	30	0.03	2.40	3.20	4.00	0.045	2.60	3.50	4.40	0.055	2.90	3.85	4.80	NC5075
S	Ti, Ti-alloy	60	0.03	2.40	3.20	4.00	0.045	2.60	3.50	4.40	0.055	2.90	3.85	4.80	NC5072
H	Hardened steel < HRC50	90	0.065	2.40	3.20	4.00	0.095	2.60	3.50	4.40	0.11	2.90	3.85	4.80	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.

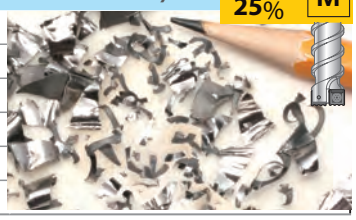
BT40, 22.5KW | Hole size: Ø25 x 50L mm | Tool: 00-99321-016-2030

Material: SAE8620 — Load 25% P

Vc	=	120	m/min.
S	=	2250	r.p.m.
fz	=	0.08	mm/tooth
F	=	360	mm/min
P	=	5.6	mm
T	=	40	sec.

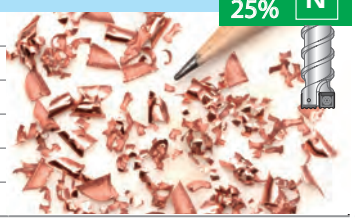
Material: SUS304 (Stainless steel 304) — Load 25% M

Vc	=	80	m/min.
S	=	1500	r.p.m.
fz	=	0.04	mm/tooth
F	=	120	mm/min
P	=	5.6	mm
T	=	118	sec.



Material: C1100 — Load 25% N

Vc	=	200	m/min.
S	=	3750	r.p.m.
fz	=	0.08	mm/tooth
F	=	600	mm/min
P	=	5.6	mm
T	=	23	sec.



Material: AL6061T6 — Load 20% N

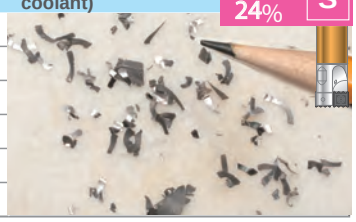
Vc	=	345	m/min.
S	=	6500	r.p.m.
fz	=	0.10	mm/tooth
F	=	1300	mm/min
P	=	5.6	mm
T	=	11	sec.

Material: TiAl6V4 — Load 24% S

Vc	=	80	m/min.
S	=	1500	r.p.m.
fz	=	0.04	mm/tooth
F	=	120	mm/min
P	=	5.6	mm
T	=	118	sec.

Material: Inconel 718 (Drill with internal coolant) — Load 24% S

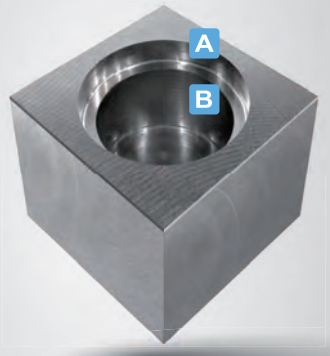
Vc	=	40	m/min.
S	=	750	r.p.m.
fz	=	0.15	mm/tooth
F	=	225	mm/min
P	=	2.0	mm
T	=	177	sec.



▸Suggested insert grades for best result >>

Diameter (mm)		25		
Depth (mm)		50		
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 = (m/min.)		120	60	80
S = r.p.m.		2250	1120	1500
fz = (mm/tooth)		0.1	0.065	0.05
F = (mm/min.)		450	146	150
Pitch = (mm)		5.6	3	3
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 Ø53.5 & Ø45 by one tool >>

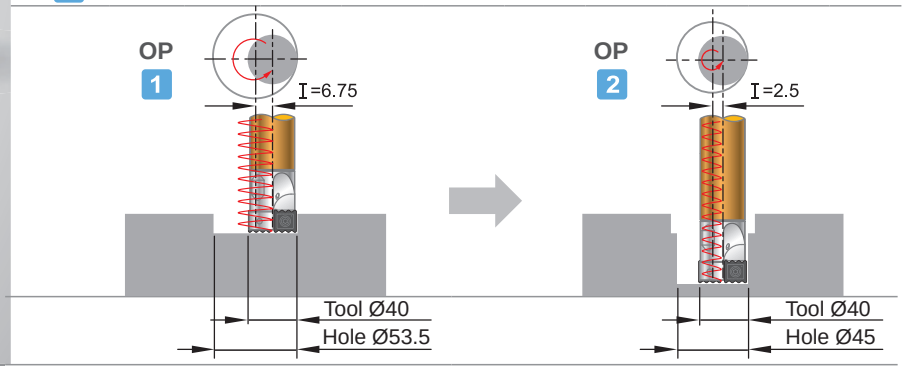


Application

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

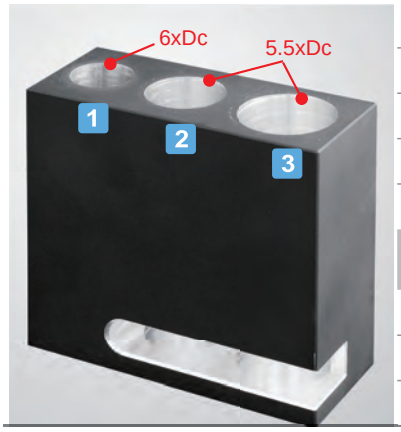
Material	S50C (JIS). High carbon steel
Tool	99323-LS32-HD40 (Non-standard size)
Insert	N9MX12T308-NC2032
Machine	BT40, 22.5 KW
Coolant	Internal

Hole	Dc mm	D mm	L mm	Vc m/min.	S r.p.m.	fz mm/tooth	F mm/min.	l mm	P mm	T sec.
A	Ø40	Ø53.5	10	300	2400	0.08	380	6.75	5.0	13.3
B		Ø45.0	32	300	2400	0.08	380	2.5	2.0	39.48



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

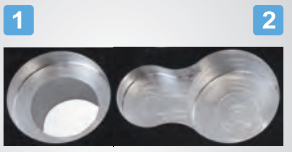
Just one tool to drill different diameters and hole depth, possible up to 6xDc >>



Material	AL6061T6
Tool	00-99323-016-2030
Insert	N9MX070204-NC5072
Machine	HAAS VM-3, BT40, 22.5KW
Coolant	Internal coolant

Fig.	Dc mm	D mm	l mm	L mm	Vc m/min.	S r.p.m.	fz mm/tooth	fcut mm/tooth	F mm/min.	P mm	α deg
1	Ø17	20	1.5	100	500	9360	0.04	0.058	1090	3	17.67
2		25	4	95	500	9360	0.08	0.103	1930	4.5	10.16
3		30	6.5	95	500	9360	0.105	0.131	2450	5.6	7.81

One tool performs multiple patterns >>



Material	AL6061T6
Tool	00-99323-016-2030 M08-HD17-2030
Insert	N9MX070204-NC5072
Machine	HAAS VM-3, BT40, 22.5KW
Coolant	Internal

Fig.	Dc mm	Vc m/min.	S r.p.m.	fz mm/tooth	F mm/min.	P mm	T sec.
1	Ø17	200	3800	0.075	570	4	67
2		200	3800	0.075	570	4	95
3		200	3800	0.075	570	4	80

Widening a deep hole (6xD) in stainless steel by NC Helix Drill. Predrilled 15mm enlarge to 29mm. >>

Ø15mm hole Ø29mm 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 mm	D mm	L mm	S r.p.m.	fz mm/tooth	F mm/min.	P mm
Ø17	Ø29	105	1685	0.05	168	1.5

Low spindle power is not a problem! BT30 machine, Ø30 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 Ø16 mm

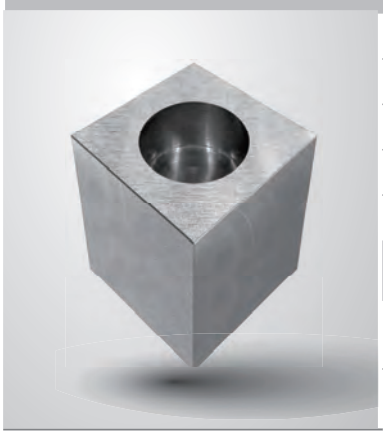
Material	S50C (JIS), High carbon steel
Tool	00-99321-020-2540 / BC20-HD22-2540
Insert	N9MX100306-NC2032
Machine	***BT30, 5.5 KW***
Coolant	External coolant

Dc mm	D mm	L mm	Vc m/min.	S r.p.m.	fz mm/tooth	fcut mm/tooth	F mm/min.	I mm	P mm	T sec.
Ø22	Ø30	60	200	* 2893	0.12	0.1	600	4	2.8	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 mm/min.	I mm	P mm	T sec.
Ø27	Ø50	80	119	1400	0.15	0.165	420	11.5	3	275

15% Spindle load only!