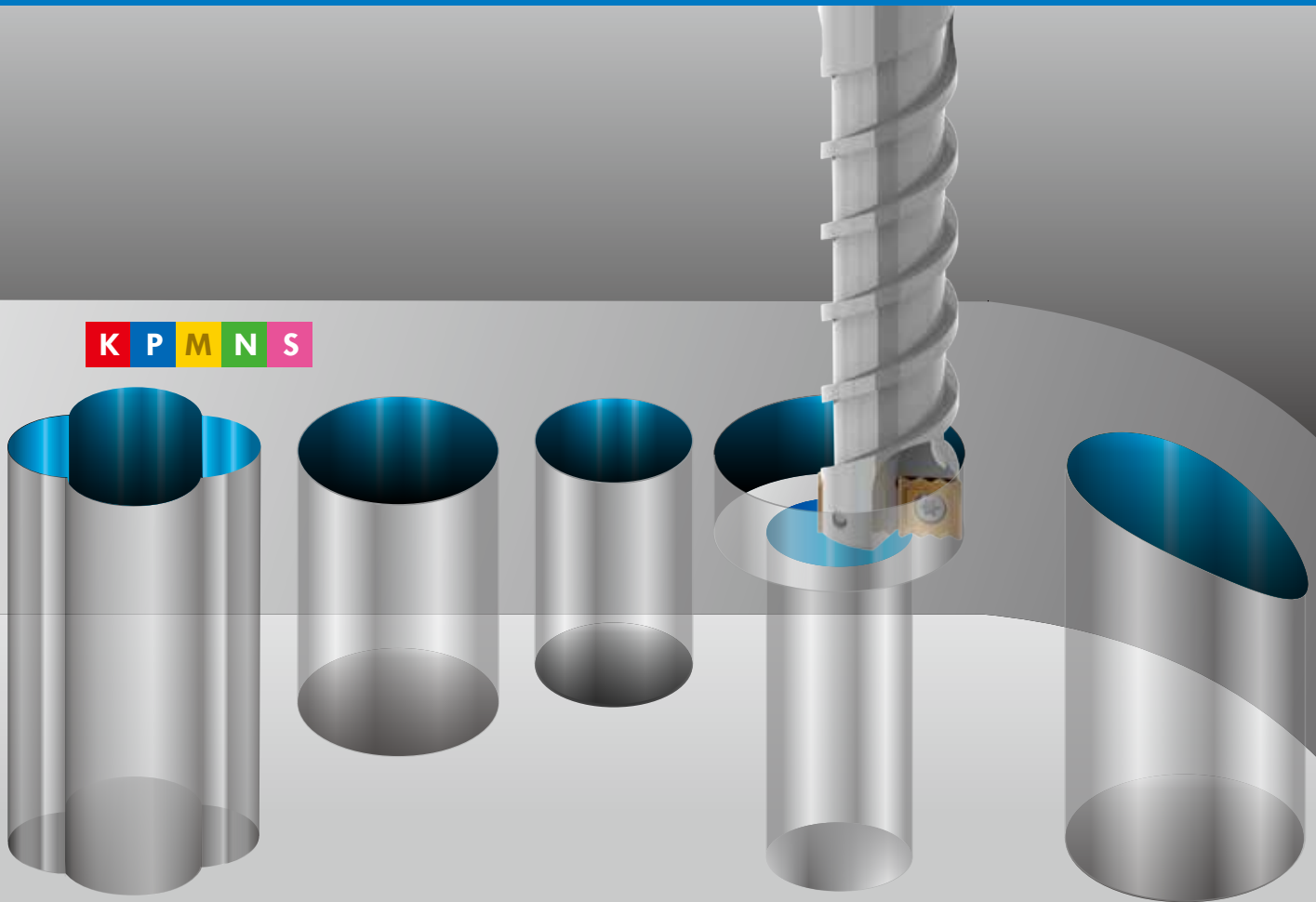


One Tool Performs
Multiple Applications



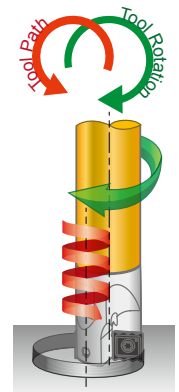
www.jic-tools.com.tw



NC Helix Drill

Helical Interpolation

Cat. 04



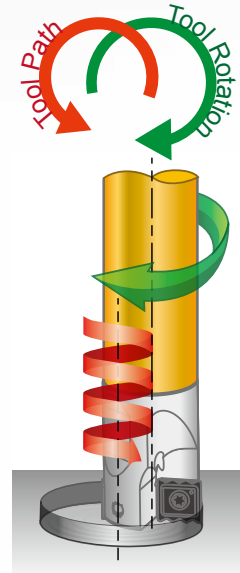
Principle



NC Helix Drill

Milling, Drilling & Slotting

Cuts material by helical interpolation;
serrated cutting edge minimizes chip length.
Low spindle power is required, good for drilling
material that generates long, soft chips.



20° Ramping Angle

Either linear or circular ramping.



Reduce Your Tool Inventory

Only six tools for making $\text{Ø}13\sim\text{Ø}65\text{mm}$ hole from solid.

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 without internal coolant.





◀ **Cylindrical shank**
Apply external coolant

Screw fit type ▶
With center coolant hole
Apply internal coolant

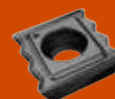


Two shank types

Made from hardened high alloy steel

Contents

Insert



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Holder



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Application



Page

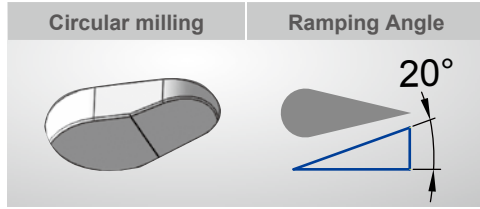
10



01

Feature
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Lower Spindle Power Consumption Easy to cut!

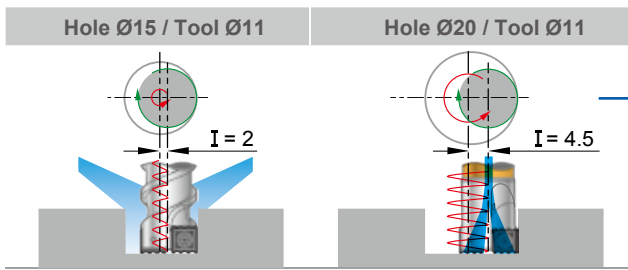


- Thanks to the small cutting load of the serrated cutting edge and helical interpolation, low power consumption of the spindle is required.
- Circular ramping milling, maximum ramping angle is 20°. For example: tool HD27 machining Ø50 mm hole, 9 mm pitch for aluminum, 6 mm pitch for carbon steel.

02

Feature
<Page 11>

Only six tools for drilling Ø13~Ø65 mm

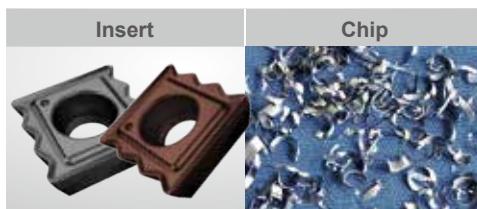


- Cuts by helical interpolation.
- Each holder can machine different diameters and hole depths.

03

Feature
<Page 10>

Special insert geometry for cutting different materials



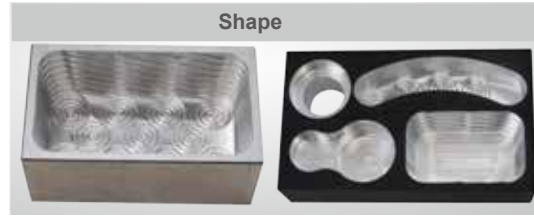
- Serrated cutting edge makes the chips short and small, and easier to evacuate.
- Eliminate swarf and vibration problems while drilling difficult or deep holes.



One tool performs multiple applications

04

Feature
<Page 12>



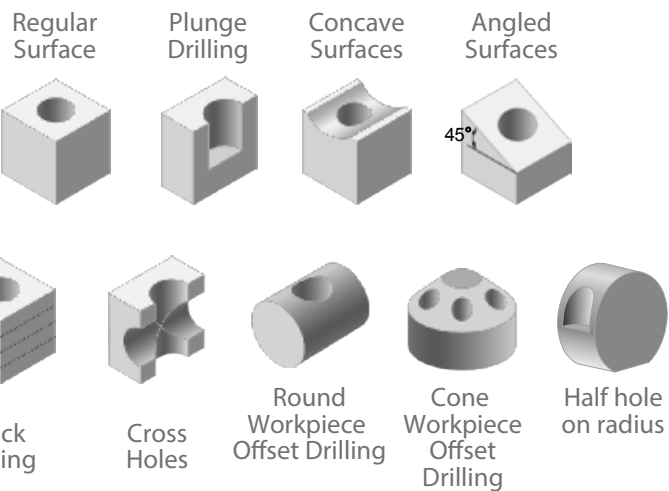
- Not only a drill, but an end mill too.
- Small radius path to cut a hole or step hole, various curved cavity shapes on different materials.



Functions in variable conditions

05

Feature
<Page 10>



Strength

Opportunities

ures


Extraordinary

Roughness Measuring

Feature
<Page 10>

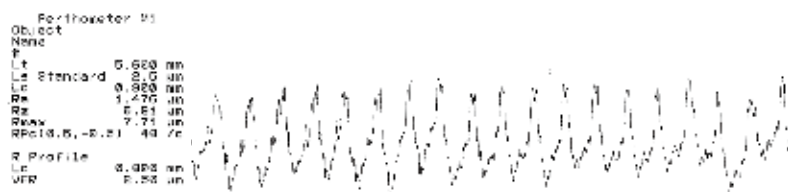
06

Workpiece



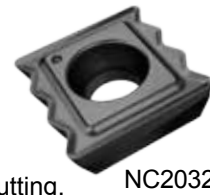
Make "One more turn" after reached the depth.
Ex:
...
G03 I-1.5 Z-30 P5
G03 I-1.5 <make one more turn >
G01 X0 Y0 < afterward, let tool back to center of hole >

Flatness

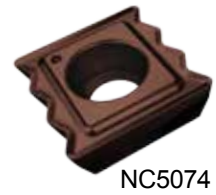


Specification

Insert



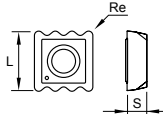
NC2032



NC5074

- NC2032** : For general purpose. Suitable for almost any material.
Top recommendation is 2xDc machining, high performance cutting.
- NC5074** : For smooth cutting. It resolves the chatter from weak clamping devices or low power machines.
Top recommendation is 3xDc or above. Also prevents chipping.

Ordering code	Grade	Coating	Dimensions	Screw	Key	* Max. Pitch			
							L	S	Re
01-N9MX04T002	NC2032	K20F	TiAlN	4.75	1.8	0.2	NS-18037 0.6Nm	NK-T6	3.0
	NC5074	P40	AlCrN						
01-N9MX05T103	NC2032	K20F	TiAlN	5.75	2.0	0.3	NS-20045 0.6Nm	NK-T6	4.5
	NC5074	P40	AlCrN						
01-N9MX070204	NC2032	K20F	TiAlN	7.5	2.4	0.4	NS-25045 0.9Nm	NK-T7	6.0
	NC5074	P40	AlCrN						
01-N9MX100306	NC2032	K20F	TiAlN	10.0	3.18	0.6	NS-30072 2.0Nm	NK-T9	7.5
	NC5074	P40	AlCrN						
01-N9MX12T308	NC2032	K20F	TiAlN	12.5	3.97	0.8	NS-35080 2.5Nm	NK-T15	9.0
	NC5074	P40	AlCrN						



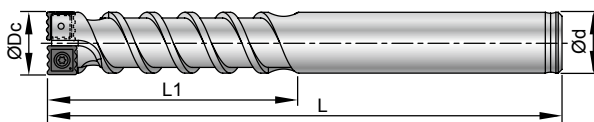
* Maximum pitch refers to maximum ramping angle. Please see page 6.

Holder

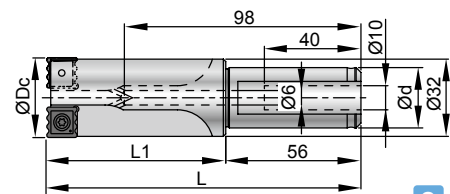
Cylindrical Shank

► Helical chip-removing groove >>

- Designed for CNC machines with external coolant
- Unique helical groove design generates chip-removing coolant stream.
- The helical groove is designed for the coolant to remove swarf from the cutting zone.
- For horizontal machining, it is necessary to increase coolant volume.



1



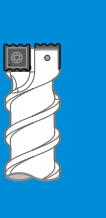
2

Fig.	Ordering Code	Type	Capable of drill dia. mm		Ød	ØDc	L	L1	Max. Depth	Insert type	* Max. ramping angle
			Dmin.	Dmax.							
	00-99321-010-1320	BC10-HD11-1320	13	20	10	11	80	40	30	N9MX04T002	20°
	00-99321-012-1525	BC12-HD13-1525	15	25	12	13	100	50	36	N9MX05T103	20°
1	00-99321-016-2030	BC16-HD17-2030	20	30	16	17	110	60	50	N9MX070204	20°
	00-99321-020-2540	BC20-HD22-2540	25	40	20	22	125	70	60	N9MX100306	20°
	00-99321-025-3050	BC25-HD27-3050	30	50	25	27	165	85	75	N9MX12T308	20°
2	* 00-99321-025-4265	SL25-HD33-4265	42	65	25	33	130	74	50		9°

* 00-99321-025-4265 is Ø25mm Side Lock Shank with internal coolant.

* Maximum ramping angle refers to maximum pitch. Please see page 6.



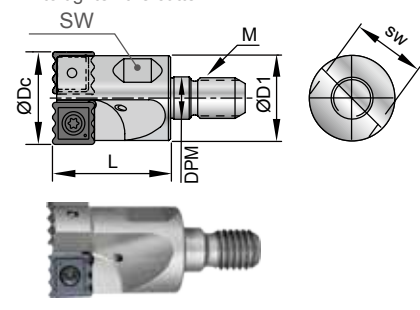


Screw Fit Cutter

Internal Coolant

- Designed for CNC machines with internal coolant.
- Standard screw-fit body adapts to almost any kind of the screw-fit tool holder or extension bar in the market.
- Use for enlarge hole.

* Use open ended spanner to tighten the cutter.



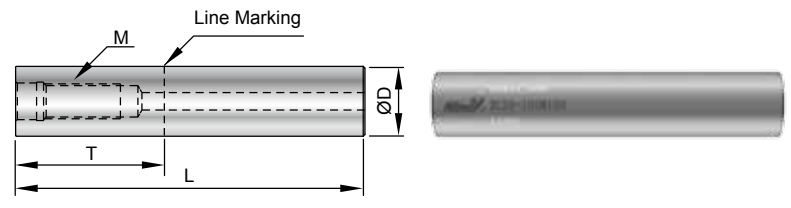
Ordering Code	Type	Capable of drill dia. mm		ØDc	ØD1	L	M	DPM	SW	Insert type	* Max. ramping angle
		Dmin.	Dmax.								
00-99323-010-1320	M05-HD11-1320	13	20	11	10	20	M5	5.5	8	N9MX04T002	20°
00-99323-012-1525	M06-HD13-1525	15	25	13	12	25	M6	6.5	10	N9MX05T103	20°
00-99323-016-2030	M08-HD17-2030	20	30	17	16	25	M8	8.5	14	N9MX070204	20°
00-99323-020-2540	M10-HD22-2540	25	40	22	20	30	M10	10.5	18	N9MX100306	20°
00-99323-025-3050	M12-HD27-3050	30	50	27	25	35	M12	12.5	23	N9MX12T308	20°

* Maximum ramping angle refers to maximum pitch. Please see page 6.

Extension Bar

Steel Type

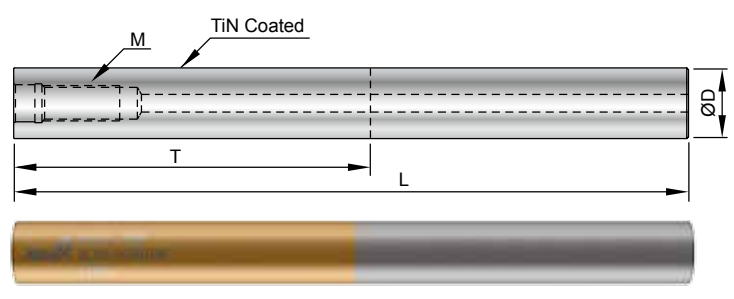
- T is the maximum overhang length.
- With internal coolant hole.



Ordering Code	Type	ØD	T	L	M
00-99801-10S	BC10-075M05S	10	25	75	M5
00-99801-12S	BC12-075M06S	12	25	75	M6
00-99801-16S	BC16-090M08S	16	35	90	M8
00-99801-20S	BC20-100M10S	20	40	100	M10
00-99801-25S	BC25-120M12S	25	50	120	M12

Solid Carbide Type

- Insert NC5074 is recommended for deep hole cutting.
- T is the maximum overhang length.
- With internal coolant hole.



Ordering Code	Type	ØD	T	L	M
00-99801-10W	BC10-100M05W	10	60	100	M5
00-99801-12W	BC12-100M06W	12	60	100	M6
00-99801-16W	BC16-150M08W	16	80	150	M8
00-99801-20W	BC20-200M10W	20	100	200	M10
00-99801-25W	BC25-200M12W	25	125	200	M12

* REVA brand extension bar is also available.

Technical Guide

Nine9



NC Helix Drill

※ Before you start, please pay attention the following conditions >>

⚠ 1	⚠ 2	⚠ 3	⚠ 4	⚠ 5						
Programming All NC Helix Drills must be programmed using helical interpolation	Recommend of Direction Tool path of moving downward by CCW (G03), Tool Rotation by CW direction is recommended.	For Start <table border="1"> <tr> <td>Vc Low Value</td> <td>f Middle Value</td> <td>Pitch High Value</td> </tr> </table>	Vc Low Value	f Middle Value	Pitch High Value	Through hole Reduce Vc 50% at last cycle.	Through hole Add 1mm to the required depth (Z) Failure to program beyond the through hole may result in insert breakage due to the force from circular interpolation.			
Vc Low Value	f Middle Value	Pitch High Value								
		Result adjusting <table border="1"> <tr> <td>Upgrade condition</td> <td>Improve condition</td> </tr> <tr> <td>Vc ↑ adj. 1</td> <td>f ↓ adj. 1</td> </tr> <tr> <td>f ↑ adj. 2</td> <td>P ↓ adj. 2</td> </tr> </table>	Upgrade condition	Improve condition	Vc ↑ adj. 1	f ↓ adj. 1	f ↑ adj. 2	P ↓ adj. 2		
Upgrade condition	Improve condition									
Vc ↑ adj. 1	f ↓ adj. 1									
f ↑ adj. 2	P ↓ adj. 2									

- The NC Helix Drill is programmed using "Helical interpolation" on CNC machine, the CNC controller must have 3-axis simultaneously motion function.

NC Helix Drill	Cutting Parameters (S & F)	Formula
	$S = \frac{Vc \times 1000}{Dc \times \pi} \text{ r.p.m.}$	Dc = Dia. of Drill mm
	$F = S \times f \text{ mm/min.}$	D = Dia. of Hole mm
	$d = D - Dc \text{ mm}$	L = Depth of Drilling mm
	$I = \frac{(D-Dc)}{2} \text{ mm}$	Vc = Cutting Speed m/min.
	Cutting time (T) $T = \frac{\pi \times d \times L \times 60}{F \times P} \text{ sec.}$	S = Spindle Speed r.p.m.
	Chip removal Volume rate (Q) $Q = \frac{\pi \times D^2 \times L \times 60}{4 \times 1000 \times T} \text{ cm}^3 / \text{min.}$	I = Circular radius mm
		f = Feed rate mm/rev.
		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 cm ³ / min.	

Example	
Material	S45C (JIS)
Tool	00-99321-016-BC16-HD17, Dc= Ø17
Insert	N9MX070204-NC2032
D= Ø30mm, L=20mm	
S =	$(120 \times 1000) / 17 / 3.14 = 2248 \text{ r.p.m.}$
F = S x f	$2248 \times 0.26 = 584 \text{ mm/min.}$
P = 4mm (refer to cutting data P for Carbon Steel 0.45%C)	
d = D - Dc	$30-17 = 13 \text{ mm}$

$T = \frac{3.14 \times 13 \times 20 \times 60}{584 \times 4} = 21 \text{ sec.}$
$Q = \frac{3.14 \times 30^2 \times 20 \times 60}{4 \times 1000 \times 21} = 40.3 \text{ cm}^3 / \text{min.}$

Technical Guide



⊗ Before you start, please pay attention the following conditions >>

⚠ 6	⚠ 7	⚠ 8	⚠ 9	⚠ 10
Flatness on blind hole bottom Make <u>one more turn</u> after reaching depth. Ex. : ∴ G03 I-1.5 Z-30 P5 G03 I-1.5 <make one more turn > G01 X0 Y0 < afterward return tool back to center of hole >	Step Hole op. 1 op. 2	Enlarge Hole Choosing a drill body with internal coolant. Max. Ae=Dc- (Rex2) for enlarging hole.	External coolant Lower pressure higher volume is recommended. Minimum 5 bar. Aim nozzle toward the tool body, let the coolant effectively enter the hole.	Internal coolant High pressure is recommended. Minimum 10 bar.
<p>Flatness</p>				

⚠ Choosing a suitable drill body.

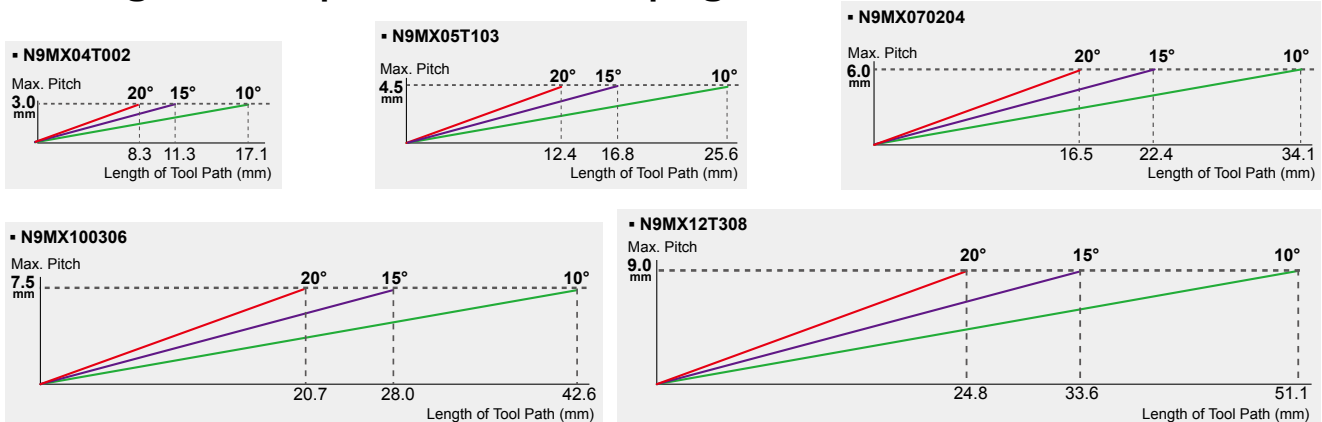
- Required hole diameter is within the recommended range (blue numbers).
- Required hole diameters (more than one size), choose the drill can cover more different hole diameters. Example 18,20,22 mm hole diameter, choose 00-99323-012-1525.
- Hole tolerance : 0/-0.5mm.

Drilling diameter	Coolant type	Max. drilling depth	Tool type	Dc	Insert type	Re	Max. pitch	Max. Ae
13-15-20	Internal	80 mm	00-99323-010-1320	11	N9MX04T002	0.2	3.0	10.6
	External	30 mm	00-99321-010-1320	11				
15-20-25	Internal	85 mm	00-99323-012-1525	13	N9MX05T103	0.3	4.5	12.4
	External	36 mm	00-99321-012-1525	13				
20-25-30	Internal	105 mm	00-99323-016-2030	17	N9MX070204	0.4	6.0	16.2
	External	50 mm	00-99321-016-2030	17				
25-30-40	Internal	130 mm	00-99323-020-2540	22	N9MX100306	0.6	7.5	20.8
	External	60 mm	00-99321-020-2540	22				
30-40-50	Internal	160 mm	00-99323-025-3050	27	N9MX12T308	0.8	9.0	25.4
	External	75 mm	00-99321-025-3050	27				
42-50-65	Internal	50 mm	00-99321-025-4265	33	N9MX12T308	0.8	9.0	31.4

⚠ Choosing a suitable insert grade for hole drilling.

- NC2032 for drill depth below 3xDc.
- NC5074 for drill depth 3xDc and above.

⚠ Length of tool path for linear ramping.



⚠ Length of tool path for Circular ramping= (D-Dc) x 3.14

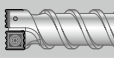
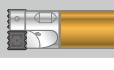
Cutting Data >> Boldface number is recommended for start.

► 00-99321-010-1320 / 00-99323-010-1320



Nine9



NC Helix Drill

Workpiece material	Vc m/min.		Ø13		Ø14		Ø16		Ø18		Ø20		
	 99321	 99323	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm	
P Carbon steel	0.25%C	60 ~ 90 ~ 130	100 ~ 160 ~ 220	0.04 0.05 0.07	0.60 0.80 1.00	0.06 0.08 0.10	0.70 0.95 1.25	0.08 0.11 0.14	0.90 1.20 1.50	0.10 0.14 0.18	1.00 1.40 1.75	0.12 0.16 0.20	1.20 1.60 2.00
	0.45% C	60 ~ 90 ~ 120	100 ~ 150 ~ 200	0.04 0.05 0.07	0.60 0.80 1.00	0.06 0.08 0.10	0.70 0.95 1.25	0.08 0.11 0.14	0.90 1.20 1.50	0.10 0.14 0.18	1.00 1.40 1.75	0.12 0.16 0.20	1.20 1.60 2.00
	0.60%C	50 ~ 70 ~ 110	80 ~ 130 ~ 180	0.04 0.05 0.06	0.60 0.75 0.90	0.06 0.07 0.09	0.70 0.90 1.12	0.07 0.10 0.12	0.80 1.10 1.35	0.09 0.12 0.16	0.90 1.20 1.57	0.10 0.14 0.18	1.00 1.40 1.80
	Low alloy steel	40 ~ 70 ~ 100	80 ~ 120 ~ 160	0.03 0.04 0.05	0.50 0.65 0.80	0.05 0.06 0.08	0.60 0.80 1.00	0.07 0.10 0.12	0.70 0.95 1.20	0.08 0.11 0.15	0.80 1.10 1.40	0.09 0.12 0.16	1.00 1.30 1.60
	High alloy steel	40 ~ 60 ~ 80	60 ~ 90 ~ 120	0.03 0.04 0.05	0.50 0.65 0.80	0.05 0.06 0.08	0.60 0.80 1.00	0.07 0.10 0.12	0.70 0.95 1.20	0.08 0.11 0.15	0.80 1.10 1.40	0.09 0.12 0.16	1.00 1.30 1.60
M Stainless steel	40 ~ 60 ~ 80	60 ~ 90 ~ 120	0.03 0.04 0.05	0.50 0.65 0.80	0.05 0.06 0.08	0.60 0.80 1.00	0.07 0.10 0.12	0.70 0.95 1.20	0.08 0.11 0.15	0.80 1.10 1.40	0.09 0.12 0.16	1.00 1.30 1.60	
K Cast Iron	40 ~ 70 ~ 100	80 ~ 120 ~ 160	0.04 0.05 0.07	0.60 0.80 1.00	0.06 0.08 0.10	0.70 0.95 1.25	0.08 0.11 0.14	0.90 1.20 1.50	0.10 0.14 0.18	1.00 1.40 1.75	0.12 0.16 0.20	1.20 1.60 2.00	
N Al	80 ~ 130 ~ 180	120 ~ 210 ~ 300	0.04 0.05 0.07	0.90 1.20 1.50	0.06 0.08 0.10	1.10 1.50 1.87	0.08 0.11 0.14	1.30 1.80 2.25	0.10 0.14 0.18	1.50 2.10 2.62	0.12 0.16 0.20	1.80 2.40 3.00	
	Cu	60 ~ 105 ~ 150	100 ~ 170 ~ 240	0.04 0.05 0.07	0.70 0.95 1.20	0.06 0.08 0.10	0.90 1.20 1.50	0.08 0.11 0.14	1.00 1.40 1.80	0.10 0.14 0.18	1.20 1.70 2.10	0.12 0.16 0.20	1.40 1.90 2.40
S Ni-Alloy	10 ~ 20 ~ 30	15 ~ 28 ~ 40	0.01 0.02 0.03	0.50 0.65 0.80	0.01 0.02 0.04	0.60 0.80 1.00	0.02 0.03 0.05	0.70 0.95 1.20	0.03 0.05 0.07	0.80 1.10 1.40	0.04 0.06 0.08	0.90 1.30 1.60	
	Titanium	30 ~ 40 ~ 50	40 ~ 60 ~ 80	0.01 0.02 0.03	0.50 0.65 0.80	0.01 0.02 0.04	0.60 0.80 1.00	0.02 0.03 0.05	0.70 0.95 1.20	0.03 0.05 0.07	0.80 1.10 1.40	0.04 0.06 0.08	0.90 1.30 1.60

► 00-99321-012-1525 / 00-99323-012-1525

Workpiece material	Vc m/min.		Ø15		Ø17		Ø20		Ø22		Ø25		
	 99321	 99323	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm	
P Carbon steel	0.25%C	60 ~ 90 ~ 130	100 ~ 160 ~ 220	0.05 0.07 0.09	1.20 1.60 2.00	0.07 0.10 0.13	1.30 1.78 2.25	0.09 0.13 0.16	1.50 2.00 2.50	0.12 0.16 0.20	1.60 2.18 2.75	0.13 0.18 0.22	1.80 2.40 3.00
	0.45% C	60 ~ 90 ~ 120	100 ~ 150 ~ 200	0.05 0.07 0.09	1.20 1.60 2.00	0.07 0.10 0.13	1.30 1.78 2.25	0.09 0.13 0.16	1.50 2.00 2.50	0.12 0.16 0.20	1.60 2.18 2.75	0.13 0.18 0.22	1.80 2.40 3.00
	0.60%C	50 ~ 70 ~ 110	80 ~ 130 ~ 180	0.05 0.06 0.08	1.10 1.50 1.80	0.07 0.09 0.11	1.20 1.61 2.02	0.08 0.12 0.15	1.30 1.78 2.25	0.10 0.14 0.18	1.40 1.94 2.47	0.12 0.16 0.20	1.60 2.15 2.70
	Low alloy steel	40 ~ 70 ~ 100	80 ~ 120 ~ 160	0.04 0.05 0.07	1.00 1.30 1.60	0.06 0.08 0.10	1.00 1.40 1.80	0.07 0.10 0.13	1.20 1.60 2.00	0.09 0.13 0.16	1.30 1.80 2.20	0.10 0.14 0.17	1.40 1.90 2.40
	High alloy steel	40 ~ 60 ~ 80	60 ~ 90 ~ 120	0.04 0.05 0.07	1.00 1.30 1.60	0.06 0.08 0.10	1.00 1.40 1.80	0.07 0.10 0.13	1.20 1.60 2.00	0.09 0.13 0.16	1.30 1.80 2.20	0.10 0.14 0.17	1.40 1.90 2.40
M Stainless steel	40 ~ 60 ~ 80	60 ~ 90 ~ 120	0.04 0.05 0.07	1.00 1.30 1.60	0.06 0.08 0.10	1.00 1.40 1.80	0.07 0.10 0.13	1.20 1.60 2.00	0.09 0.13 0.16	1.30 1.80 2.20	0.10 0.14 0.17	1.40 1.90 2.40	
K Cast Iron	40 ~ 70 ~ 100	80 ~ 120 ~ 160	0.05 0.07 0.09	1.20 1.60 2.00	0.07 0.10 0.13	1.30 1.78 2.25	0.09 0.13 0.16	1.30 1.90 2.50	0.12 0.16 0.20	1.60 2.18 2.75	0.13 0.18 0.22	1.80 2.40 3.00	
N Al	80 ~ 130 ~ 180	120 ~ 210 ~ 300	0.05 0.07 0.09	1.80 2.40 3.00	0.07 0.10 0.13	2.00 2.69 3.37	0.09 0.13 0.16	2.20 2.98 3.75	0.12 0.16 0.20	2.40 3.26 4.12	0.13 0.18 0.22	2.70 3.60 4.50	
	Cu	60 ~ 105 ~ 150	100 ~ 170 ~ 240	0.05 0.07 0.09	1.40 1.90 2.40	0.07 0.10 0.13	1.60 2.15 2.70	0.09 0.13 0.16	1.80 2.40 3.00	0.12 0.16 0.20	2.00 2.65 3.30	0.13 0.18 0.22	2.10 2.85 3.60
S Ni-Alloy	10 ~ 20 ~ 30	15 ~ 28 ~ 40	0.02 0.025 0.03	1.00 1.30 1.60	0.03 0.04 0.05	1.00 1.40 1.80	0.04 0.05 0.06	1.20 1.60 2.00	0.04 0.06 0.08	1.30 1.80 2.20	0.04 0.06 0.08	1.40 1.90 2.40	
	Titanium	30 ~ 40 ~ 50	40 ~ 60 ~ 80	0.02 0.025 0.03	1.00 1.30 1.60	0.03 0.04 0.05	1.00 1.40 1.80	0.04 0.045 0.06	1.20 1.60 2.00	0.04 0.06 0.08	1.30 1.80 2.20	0.04 0.06 0.08	1.40 1.90 2.40

Cutting Data >> Boldface number is recommended for start.

▶ 00-99321-016-2030 / 00-99323-016-2030

Workpiece material	Vc m/min.		Ø20		Ø22		Ø25		Ø27		Ø30	
	99321	99323	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm
P Carbon steel 0.25%C	60 ~ 90 ~ 130	100 ~ 160 ~ 220	0.06 0.08 0.10	1.80 2.40 3.00	0.09 0.12 0.15	1.90 2.56 3.25	0.12 0.16 0.20	2.10 2.80 3.50	0.14 0.19 0.24	2.20 2.96 3.75	0.15 0.21 0.26	2.40 3.20 4.00
	60 ~ 90 ~ 120	100 ~ 150 ~ 200	0.06 0.08 0.10	1.80 2.40 3.00	0.09 0.12 0.15	1.90 2.56 3.25	0.12 0.16 0.20	2.10 2.80 3.50	0.14 0.19 0.24	2.20 2.96 3.75	0.15 0.21 0.26	2.40 3.20 4.00
	50 ~ 70 ~ 110	80 ~ 130 ~ 180	0.05 0.07 0.09	1.60 2.15 2.70	0.08 0.11 0.13	1.70 2.30 2.90	0.10 0.14 0.18	1.90 2.55 3.20	0.13 0.18 0.22	2.00 2.70 3.40	0.13 0.18 0.23	2.10 2.85 3.60
	40 ~ 70 ~ 100	80 ~ 120 ~ 160	0.05 0.06 0.08	1.40 1.90 2.40	0.07 0.10 0.12	1.50 2.05 2.60	0.09 0.13 0.16	1.60 2.20 2.80	0.11 0.15 0.19	1.80 2.40 3.00	0.12 0.16 0.20	1.90 2.55 3.20
	40 ~ 60 ~ 80	60 ~ 90 ~ 120	0.05 0.06 0.08	1.40 1.90 2.40	0.07 0.10 0.12	1.50 2.05 2.60	0.09 0.13 0.16	1.60 2.20 2.80	0.11 0.15 0.19	1.80 2.40 3.00	0.12 0.16 0.20	1.90 2.55 3.20
M Stainless steel	40 ~ 60 ~ 80	60 ~ 90 ~ 120	0.05 0.06 0.08	1.40 1.90 2.40	0.07 0.10 0.12	1.50 2.05 2.60	0.09 0.13 0.16	1.60 2.20 2.80	0.11 0.15 0.19	1.80 2.40 3.00	0.12 0.16 0.20	1.90 2.55 3.20
K Cast Iron	40 ~ 70 ~ 100	80 ~ 120 ~ 160	0.06 0.08 0.10	1.80 2.40 3.00	0.09 0.12 0.15	1.90 2.58 3.25	0.12 0.16 0.20	2.10 2.80 3.50	0.14 0.19 0.24	2.20 2.98 3.75	0.15 0.21 0.26	2.40 3.20 4.00
N Al	80 ~ 130 ~ 180	120 ~ 210 ~ 300	0.06 0.08 0.10	2.70 3.60 4.50	0.09 0.12 0.15	2.80 3.84 4.87	0.12 0.16 0.20	3.10 4.05 5.00	0.14 0.19 0.24	3.30 4.45 5.60	0.15 0.21 0.26	3.60 4.80 6.00
	60 ~ 105 ~ 150	100 ~ 170 ~ 240	0.06 0.08 0.10	2.10 2.85 3.60	0.09 0.12 0.15	2.30 3.10 3.90	0.12 0.16 0.20	2.50 3.35 4.20	0.14 0.19 0.24	2.70 3.60 4.50	0.15 0.21 0.26	2.80 3.80 4.80
S Ni-Alloy	10 ~ 20 ~ 30	15 ~ 28 ~ 40	0.02 0.03 0.04	1.40 1.90 2.40	0.03 0.05 0.06	1.50 2.05 2.60	0.04 0.06 0.08	1.60 2.20 2.80	0.04 0.07 0.09	1.80 2.40 3.00	0.05 0.08 0.10	1.90 2.55 3.20
	30 ~ 40 ~ 50	40 ~ 60 ~ 80	0.02 0.03 0.04	1.40 1.90 2.40	0.03 0.05 0.06	1.50 2.05 2.60	0.04 0.06 0.08	1.60 2.20 2.80	0.04 0.07 0.09	1.80 2.40 3.00	0.05 0.08 0.10	1.90 2.55 3.20

▶ 00-99321-020-2540 / 00-99323-020-2540

Workpiece material	Vc m/min.		Ø25		Ø28		Ø32		Ø36		Ø40	
	99321	99323	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm
P Carbon steel 0.25%C	60 ~ 90 ~ 130	100 ~ 160 ~ 220	0.07 0.10 0.12	1.80 2.40 3.00	0.10 0.14 0.17	2.10 2.80 3.50	0.14 0.19 0.23	2.40 3.20 4.00	0.17 0.23 0.28	2.70 3.60 4.50	0.18 0.24 0.30	3.00 4.00 5.00
	60 ~ 90 ~ 120	100 ~ 150 ~ 200	0.07 0.10 0.12	1.80 2.40 3.00	0.10 0.14 0.17	2.10 2.80 3.50	0.14 0.19 0.23	2.40 3.20 4.00	0.17 0.23 0.28	2.70 3.60 4.50	0.18 0.24 0.30	3.00 4.00 5.00
	50 ~ 70 ~ 110	80 ~ 130 ~ 180	0.06 0.08 0.10	1.60 2.15 2.70	0.09 0.13 0.16	1.90 2.55 3.20	0.12 0.16 0.20	2.20 2.90 3.60	0.15 0.20 0.25	2.40 3.20 4.00	0.16 0.22 0.27	2.70 3.60 4.50
	40 ~ 70 ~ 100	80 ~ 120 ~ 160	0.05 0.07 0.09	1.40 1.90 2.40	0.08 0.11 0.14	1.70 2.25 2.80	0.10 0.14 0.18	1.90 2.55 3.20	0.13 0.18 0.22	2.20 2.90 3.60	0.14 0.19 0.24	2.40 3.20 4.00
	40 ~ 60 ~ 80	60 ~ 90 ~ 120	0.05 0.07 0.09	1.40 1.90 2.40	0.08 0.11 0.14	1.70 2.25 2.80	0.10 0.14 0.18	1.90 2.55 3.20	0.13 0.18 0.22	2.20 2.90 3.60	0.14 0.19 0.24	2.40 3.20 4.00
M Stainless steel	40 ~ 60 ~ 80	60 ~ 90 ~ 120	0.05 0.07 0.09	1.40 1.90 2.40	0.08 0.11 0.14	1.70 2.25 2.80	0.10 0.14 0.18	1.90 2.55 3.20	0.13 0.18 0.22	2.20 2.90 3.60	0.14 0.19 0.24	2.40 3.20 4.00
K Cast Iron	40 ~ 70 ~ 100	80 ~ 120 ~ 160	0.07 0.10 0.12	1.80 2.40 3.00	0.10 0.14 0.17	2.10 2.80 3.50	0.14 0.19 0.23	2.40 3.20 4.00	0.17 0.23 0.28	2.70 3.60 4.50	0.18 0.24 0.30	3.00 4.00 5.00
N Al	80 ~ 130 ~ 180	120 ~ 210 ~ 300	0.07 0.10 0.12	2.70 3.60 4.50	0.10 0.14 0.17	3.10 4.15 5.20	0.14 0.19 0.23	3.60 4.80 6.00	0.17 0.23 0.28	4.00 5.35 6.70	0.18 0.24 0.30	4.50 6.00 7.50
	60 ~ 105 ~ 150	100 ~ 170 ~ 240	0.07 0.10 0.12	2.10 2.85 3.60	0.10 0.14 0.17	2.50 3.35 4.20	0.14 0.19 0.23	2.90 3.85 4.80	0.17 0.23 0.28	3.20 4.30 5.40	0.18 0.24 0.30	3.60 4.80 6.00
S Ni-Alloy	10 ~ 20 ~ 30	15 ~ 28 ~ 40	0.02 0.04 0.05	1.40 1.90 2.40	0.03 0.05 0.07	1.70 2.25 2.80	0.04 0.07 0.09	1.90 2.55 3.20	0.05 0.08 0.10	2.20 2.90 3.60	0.06 0.09 0.12	2.40 3.20 4.00
	30 ~ 40 ~ 50	40 ~ 60 ~ 80	0.02 0.04 0.05	1.40 1.90 2.40	0.03 0.05 0.07	1.70 2.25 2.80	0.04 0.07 0.09	1.90 2.55 3.20	0.05 0.08 0.10	2.20 2.90 3.60	0.06 0.09 0.12	2.40 3.20 4.00





Cutting Data >> Boldface number is recommended for start.

▶ 00-99321-025-3050 / 00-99323-025-3050


Nine9



NC Helix Drill

Workpiece material	Vc m/min.		Ø30		Ø35		Ø40		Ø45		Ø50	
	 99321	 99323	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm
P Carbon steel 0.25%C	60 ~ 90 ~ 130	100 ~ 160 ~ 220	0.08	2.40	0.12	2.70	0.17	3.00	0.19	3.30	0.20	3.60
			0.11	3.20	0.16	3.60	0.23	4.00	0.26	4.40	0.27	4.80
			0.13	4.00	0.20	4.50	0.28	5.00	0.32	5.50	0.34	6.00
	60 ~ 90 ~ 120	100 ~ 150 ~ 200	0.08	2.40	0.12	2.70	0.17	3.00	0.19	3.30	0.20	3.60
			0.11	3.20	0.16	3.60	0.23	4.00	0.26	4.40	0.27	4.80
50 ~ 70 ~ 110	80 ~ 130 ~ 180	0.07	2.20	0.10	2.40	0.15	2.70	0.17	3.00	0.18	3.20	
		0.10	2.90	0.14	3.20	0.20	3.60	0.23	4.00	0.24	4.30	
Low alloy steel	40 ~ 70 ~ 100	80 ~ 120 ~ 160	0.06	1.90	0.09	2.20	0.13	2.40	0.15	2.60	0.16	2.90
			0.08	2.55	0.13	2.90	0.18	3.20	0.20	3.50	0.22	3.85
High alloy steel	40 ~ 60 ~ 80	60 ~ 90 ~ 120	0.06	1.90	0.09	2.20	0.13	2.40	0.15	2.60	0.16	2.90
			0.08	2.55	0.13	2.90	0.18	3.20	0.20	3.50	0.22	3.85
M Stainless steel	40 ~ 60 ~ 80	60 ~ 90 ~ 120	0.06	1.90	0.09	2.20	0.13	2.40	0.15	2.60	0.16	2.90
			0.08	2.55	0.13	2.90	0.18	3.20	0.20	3.50	0.22	3.85
K Cast Iron	40 ~ 70 ~ 100	80 ~ 120 ~ 160	0.08	2.40	0.12	2.70	0.17	3.00	0.19	3.30	0.20	3.60
			0.11	3.20	0.16	3.60	0.23	4.00	0.26	4.40	0.27	4.80
N Al	80 ~ 130 ~ 180	120 ~ 210 ~ 300	0.08	3.60	0.12	4.00	0.17	4.50	0.19	4.90	0.20	5.40
			0.11	4.80	0.16	5.35	0.23	6.00	0.26	6.55	0.27	7.20
S Cu	60 ~ 105 ~ 150	100 ~ 170 ~ 240	0.08	2.90	0.12	3.20	0.17	3.60	0.19	4.00	0.20	4.30
			0.11	3.85	0.16	4.30	0.23	4.80	0.26	5.30	0.27	5.75
S Ni-Alloy	10 ~ 20 ~ 30	15 ~ 28 ~ 40	0.02	1.90	0.04	2.20	0.06	2.40	0.06	2.60	0.07	2.90
			0.04	2.55	0.06	2.90	0.09	3.20	0.09	3.50	0.11	3.85
S Titanium	30 ~ 40 ~ 50	40 ~ 60 ~ 80	0.02	1.90	0.04	2.20	0.06	2.40	0.06	2.60	0.07	2.90
			0.04	2.55	0.06	2.90	0.09	3.20	0.09	3.50	0.11	3.85

▶ 00-99321-025-4265

Workpiece material	Vc m/min.	Ø42		Ø50		Ø55		Ø60		Ø65	
	 99321	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm	f mm/rev.	Pitch mm
P Carbon steel 0.25%C	100 ~ 160 ~ 220	0.12	3.00	0.15	3.10	0.18	3.30	0.19	3.40	0.20	3.60
		0.16	4.00	0.20	4.15	0.24	4.40	0.26	4.55	0.27	4.80
		0.20	5.00	0.24	5.20	0.30	5.50	0.32	5.70	0.34	6.00
P Carbon steel 0.45% C	100 ~ 150 ~ 200	0.12	3.00	0.15	3.10	0.18	3.30	0.19	3.40	0.20	3.60
		0.16	4.00	0.20	4.15	0.24	4.40	0.26	4.55	0.27	4.80
P Carbon steel 0.60% C	80 ~ 130 ~ 180	0.11	2.70	0.13	2.80	0.16	3.00	0.17	3.00	0.18	3.20
		0.15	3.60	0.18	3.75	0.22	4.00	0.23	4.05	0.24	4.30
Low alloy steel	80 ~ 120 ~ 160	0.10	2.40	0.11	2.50	0.14	2.60	0.15	2.80	0.16	2.90
		0.13	3.20	0.15	3.35	0.19	3.50	0.20	3.70	0.22	3.85
High alloy steel	60 ~ 90 ~ 120	0.10	2.40	0.11	2.50	0.14	2.60	0.15	2.80	0.16	2.90
		0.13	3.20	0.15	3.35	0.19	3.50	0.20	3.70	0.22	3.85
M Stainless steel	60 ~ 90 ~ 120	0.10	2.40	0.11	2.50	0.14	2.60	0.15	2.80	0.16	2.90
		0.13	3.20	0.15	3.35	0.19	3.50	0.20	3.70	0.22	3.85
K Cast Iron	80 ~ 120 ~ 160	0.12	3.00	0.15	3.10	0.18	3.30	0.19	3.40	0.20	3.60
		0.16	4.00	0.20	4.15	0.24	4.40	0.26	4.55	0.27	4.80
N Al	120 ~ 210 ~ 300	0.12	4.50	0.15	4.70	0.18	4.90	0.19	5.20	0.20	5.40
		0.16	6.00	0.20	6.25	0.24	6.55	0.26	6.90	0.27	7.20
S Cu	100 ~ 170 ~ 240	0.12	3.60	0.15	3.80	0.18	4.00	0.19	4.10	0.20	4.30
		0.16	4.80	0.20	5.05	0.24	5.30	0.26	5.50	0.27	5.75
S Ni-Alloy	15 ~ 28 ~ 40	0.04	2.40	0.05	2.50	0.06	2.60	0.06	2.80	0.07	2.90
		0.06	3.20	0.08	3.35	0.09	3.50	0.10	3.70	0.11	3.85
S Titanium	40 ~ 60 ~ 80	0.04	2.40	0.05	2.50	0.06	2.60	0.06	2.80	0.07	2.90
		0.06	3.20	0.08	3.35	0.09	3.50	0.10	3.70	0.11	3.85

Application Example







► Special insert geometry for cutting 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.





Material: SAE8620		P
Vc	= 80 m/min.	
S	= 1500 r.p.m.	
f	= 0.15 mm/rev.	
F	= 225 mm/min	
P	= 6.0 mm	
		

Material: SUS304 (Stainless steel 304)		M
Vc	= 80 m/min.	
S	= 1500 r.p.m.	
f	= 0.08 mm/rev.	
F	= 120 mm/min	
P	= 6.0 mm	
		


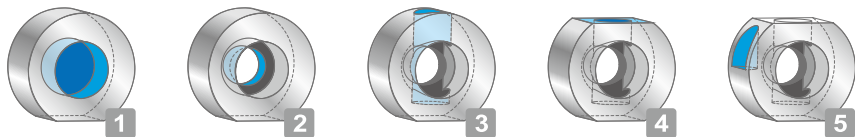
Material: C1100		N
Vc	= 120 m/min.	
S	= 2250 r.p.m.	
f	= 0.10 mm/rev.	
F	= 225 mm/min	
P	= 6.0 mm	
		

Material: AL6061T6		N
Vc	= 180 m/min.	
S	= 3370 r.p.m.	
f	= 0.20 mm/rev.	
F	= 674 mm/min	
P	= 6.0 mm	
		

Material: TiAl6V4		S
Vc	= 80 m/min.	
S	= 1500 r.p.m.	
f	= 0.08 mm/rev.	
F	= 120 mm/min	
P	= 6.0 mm	
		

Material: Inconel 718 (Drill with internal coolant)		S
Vc	= 40 m/min.	
S	= 750 r.p.m.	
f	= 0.3 mm/rev.	
F	= 225 mm/min	
P	= 2.0 mm	
		

► To cut Titanium in different conditions >>

Example 2										
	Material		Ti6Al4V, Titanium							
	Tool		00-99323-016-2030 M08-HD17-2030							
	Insert		N9MX070204-NC2032							
	Machine		HAAS VM-3, BT40, 22.5KW							
	Coolant		Internal							
Fig.	Dc mm	D mm	L mm	Vc m/min.	S r.p.m.	f mm/rev.	F mm/min.	P mm	T sec.	
1	Ø17	Ø30.5	20	60	1200	0.05	60	2	423	
2		Ø20.5	20	60	1200	0.03	36	1	366	
3		Ø20	50	60	1200	0.03	36	1	785	
5		Ø20	20	60	1200	0.05	60	2	94	
										
		Counter sink for M20 bolt	For M20 bolt hole	Cross hole	Surfacing	Half hole on radius				

► To produce step hole Ø53.5 & Ø45 with one tool >>

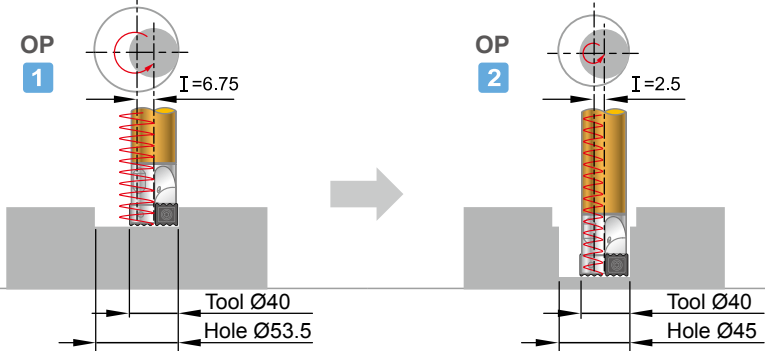
Example 3



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	f mm/rev.	F mm/min.	I mm	P mm	T sec.
A	Ø40	Ø53.5	10	300	2400	0.15	360	6.75	5.0	14
B		Ø45.0	32	300	2400	0.15	360	2.5	2.0	42



► Each holder “NC Helix Drill” can machine different diameters and hole depths.

► Producing a Ø60 x 27mm hole with just one tool.
Eliminates 2nd operation from the process. Machine load 8%. >>

Example 4



Material	Stainless Steel SUS304										
Tool	00-99321-025-4265 (Ø25mm Side Lock Shank)										
Insert	N9MX12T308-NC2032										
Machine	BT40										
Coolant	External coolant										
Dc mm	D mm	L mm	Vc m/min.	S r.p.m	f mm/rev.	F mm/min.	I mm	P mm	T sec.	Q cm ³ /mm	
Ø33	Ø60	27	100	1000	0.2	200	13.5	4	172	26.6	

► Requires low spindle power!
BT30 machine, Ø30 hole diameter, 3.3xDc drill depth >>

Example 5

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	f mm/rev.	F mm/min.	I mm	P mm	T sec.	
Ø22	Ø30	70	200	* 2893	0.2	600	4	2.8	62	

* 3000 r.p.m. is used.

► Drill bigger holes using lower power spindles. Increase flexibility and occupy fewer tool positions in CNC machines.



► Replace your end mill with an NC helix drill.
Make the impossible become possible >>

Example 6

Tool Path : 52mm		Rough Slotting							
	Slot Dimension	W:17mm x D:18mm x L:70mm							
	Material	S45C (JIS), Medium Carbon Steel							
	Tool	00-99323-016-2030 M08-HD17-2030							
	Insert	N9MX070204-NC2032							
	Machine	BT40							
	Coolant	Internal coolant, emulsion							
	Dc mm	L mm	Vc m/min.	S r.p.m	f mm/rev.	F mm/min.	P mm	T sec.	Q cm ³ /mm
	Ø17	70	200	3800	0.1	380	4*	91	34
* Ramping depth per cut = 2 mm									

Notch of Tool Path : 128mm		Rough Slotting							
	Slot Dimension	W:40mm x D:25mm x L:70mm							
	Material	C95400, Aluminium Bronze							
	Tool	00-99323-020-2540 M10-HD22-2540							
	Insert	N9MX100306-NC2032							
	Machine	HAAS BT40							
	Coolant	External / Internal coolant							
	Dc mm	L mm	Vc m/min.	S r.p.m	f mm/rev.	F mm/min.	P mm	T sec.	Q cm ³ /mm
	Ø22	25	350	5000	0.2	1000	5	23	212

► One tool performs multiple patterns. >>

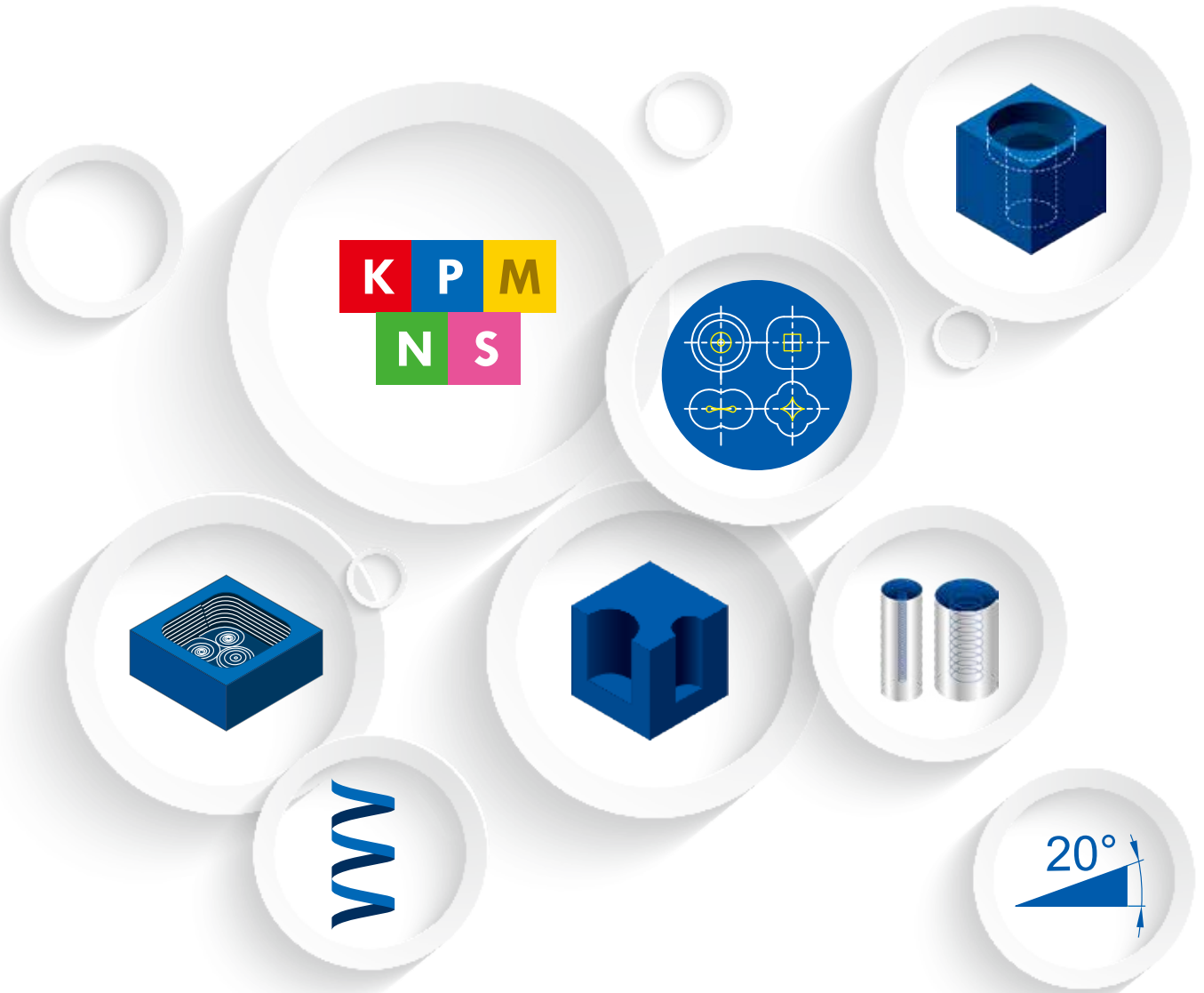
Example 7

	Material	AL6061T6						
	Tool	00-99323-016-2030 M08-HD17-2030						
	Insert	N9MX070204-NC5074						
	Machine	HAAS VM-3, BT40, 22.5KW						
	Coolant	Internal						
Fig.	Dc mm	Vc m/min.	S r.p.m	f mm/rev.	F mm/min.	P mm	T sec.	
1	Ø17	200	3800	0.15	570	4	67	
2		200	3800	0.15	570	4	80	
3		200	3800	0.15	570	4	95	
4		200	3800	0.15	570	5	101	

Not only a drill, but an end mill too. Maximum ramping angle is 20°. Small radius path to cut holes, countersink holes, and create various cavity shapes in different materials. Less inventory of different sizes of drills and indexable end mills, NC Helix Drill cuts it all !



No Need To Choose Nine9 Does It All



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