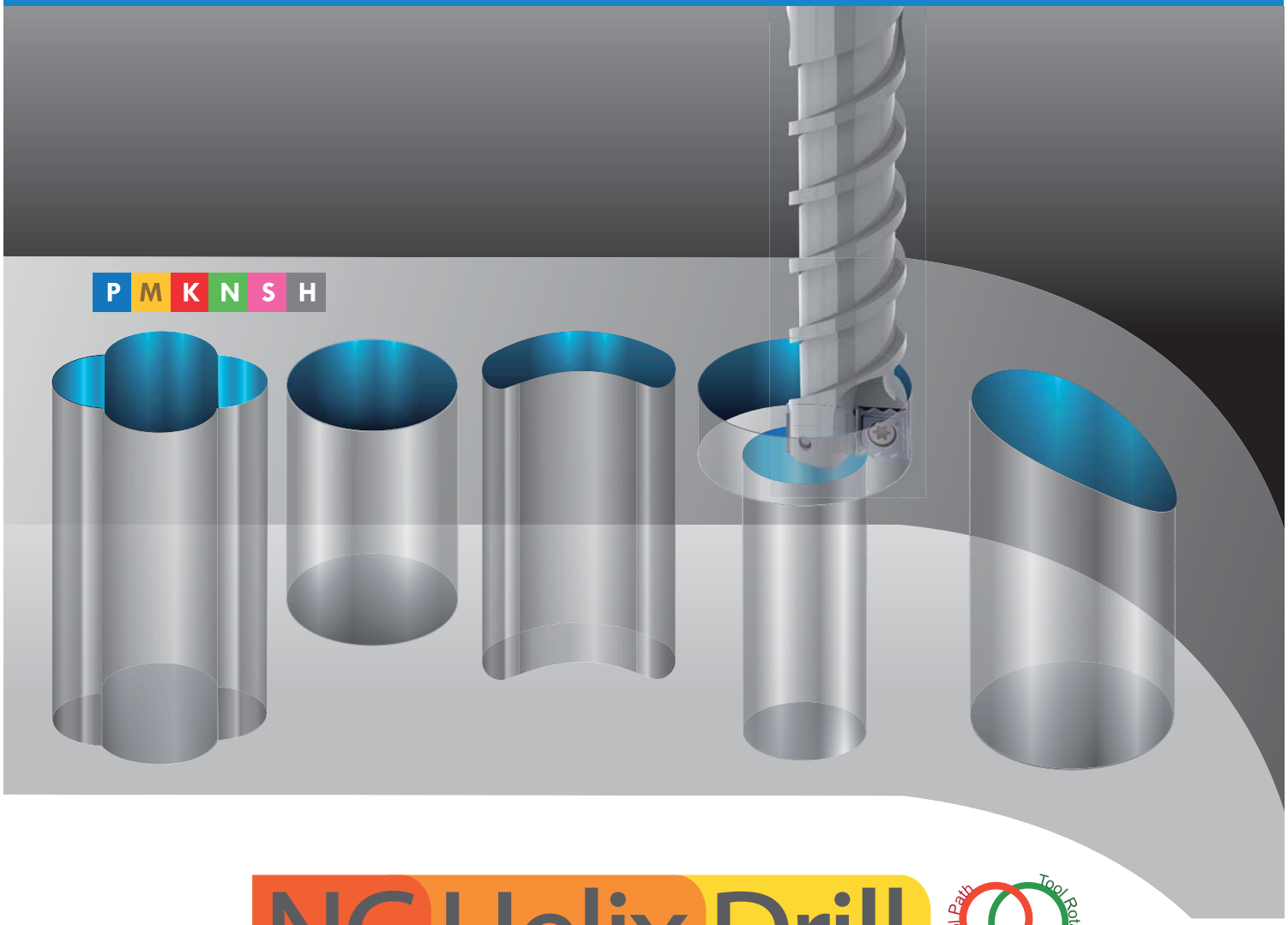
“One Tool” Performs Multiple Applications

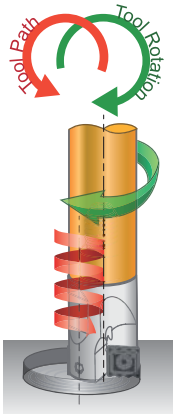
Nine9®

nine9.jic-tools.com.tw



NC Helix Drill

Helical Interpolation



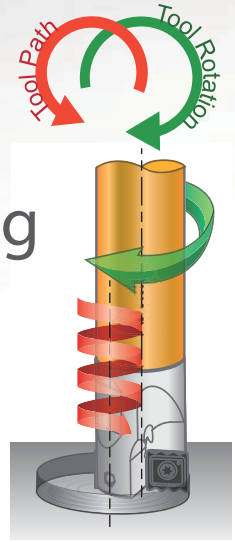
Cat. 05a

Principle

Nine9®

NC Helix Drill

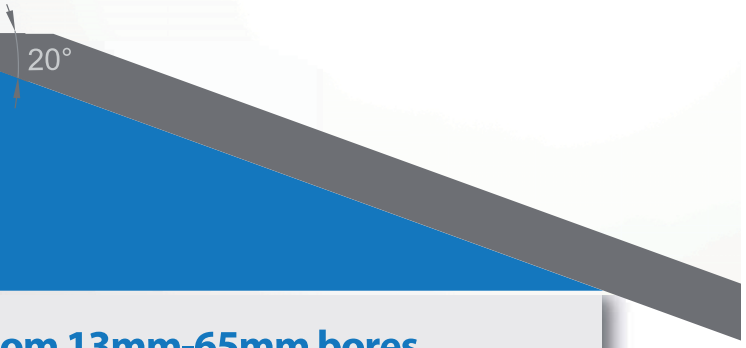
Rough Milling, Drilling & Slotting



Cuts material by helical interpolation;
serrated cutting edge minimizes chip length.
Low spindle power is not a problem, good for drilling material that generates long, soft chips.

20° Ramping Angle

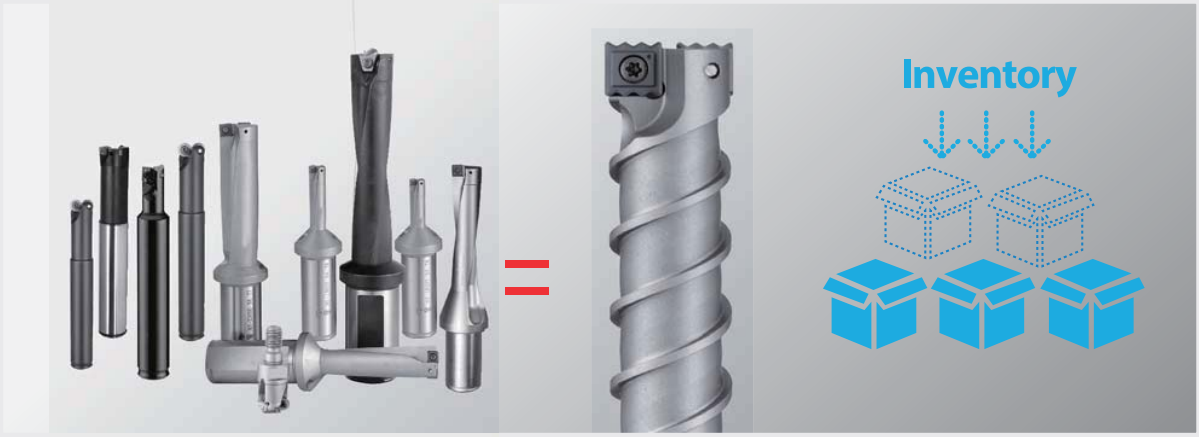
Either linear or circular ramping.



Reduce Your Tool Inventory

Just six tools can drill diameters from 13mm-65mm bores.

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.



Two types of shank

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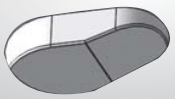
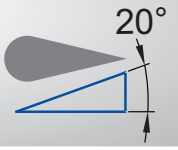
Lower spindle power consumption Easy to cut!

Circular milling	Ramping Angle
	

- 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.

02 Feature
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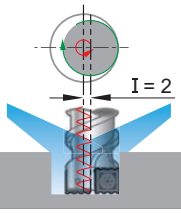
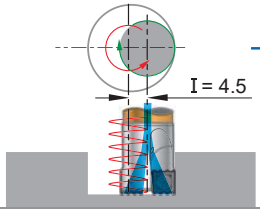
Just six tools for drilling Ø13~Ø65 mm or larger

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 internal coolant cutter, please refer to Page 5.

03 Feature
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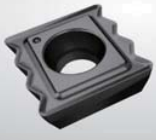
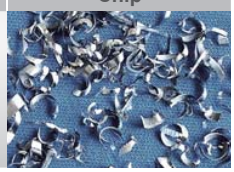
Special insert geometry - exceptional swarfs control.

Insert	Chip
	

- 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.

"One tool" performs multiple applications

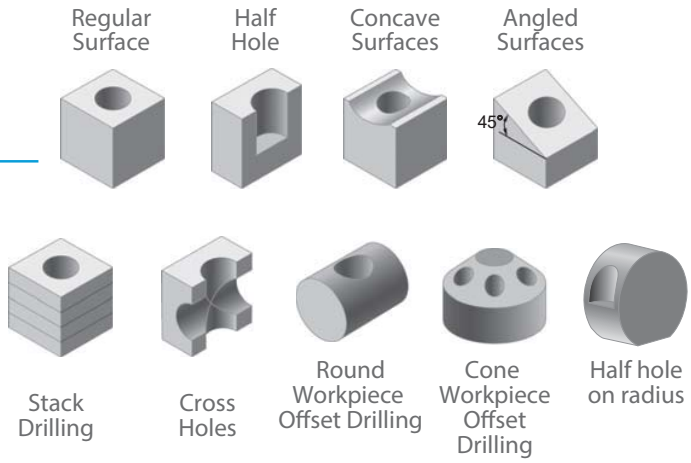
04 Feature <Page 12>

Shape

- 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>



Roughness Measuring

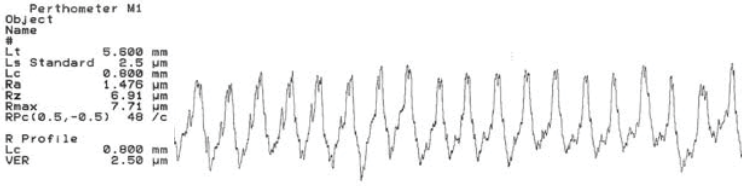
Feature 06 <Page 5>

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

Workpiece

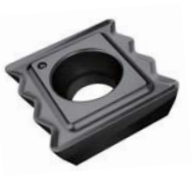
Make " One more turn" after reached the depth.
Ex :
:
G03 I-1.5 Z-30 P5
G03 I-1.5 <make one more turn >
G01 X0 Y0 < afterward, let tool back to center of hole >

Flatness



Specification

Insert

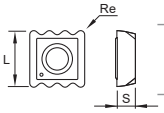


New NC5072 : P40, TiAlN coating.
General purpose, suitable for almost all kind of steel, stainless steel and Titanium.
Recommended while clamping devices is weak or apply on low power machines or deep hole drilling.

NC2032 : K20F, TiAlN coating.
Design for high performance cutting, special good for cast iron and hardened material <HRC50°.

● Best ◎ Suit ○ Possible

	P Steel	M SS	K Cast Iron	N Aluminum	S Titanium	H Hardened
NC5072	●	●	◎	◎	◎	○
NC2032	◎	○	●	◎	○	◎

Ordering code	Grade		Coating		Dimensions L	S	Re	Screw	Key
01-N9MX04T002	NC5072	P40	TiAlN		4.75	1.8	0.2	NS-18037 0.6Nm*	NK-T6
	NC2032	K20F							
01-N9MX05T103	NC5072	P40	TiAlN		5.75	2.0	0.3	NS-20045 0.6Nm*	NK-T6
	NC2032	K20F							
01-N9MX070204	NC5072	P40	TiAlN		7.5	2.4	0.4	NS-25045 0.9Nm*	NK-T7
	NC2032	K20F							
01-N9MX100306	NC5072	P40	TiAlN		10.0	3.18	0.6	NS-30072 2.0Nm	NK-T9
	NC2032	K20F							
01-N9MX12T308	NC5072	P40	TiAlN		12.5	3.97	0.8	NS-35080 2.5Nm	NK-T15
	NC2032	K20F							

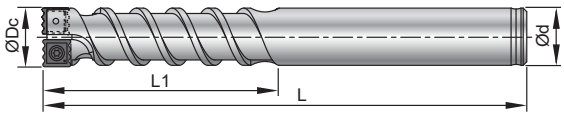
Note: * Torque screwdriver is recommended, please refer to page 5.

Holder

Cylindrical Shank (made from hardened high alloy steel)

▸ 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.

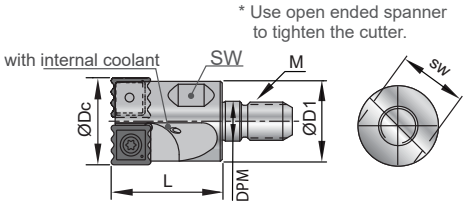


Ordering Code	Type	Capable of drill dia. mm Dmin.	Dmax.	Ød	ØDc	L	L1	Max. Depth	Insert type	Max. ramping angle
00-99321-010-1320	BC10-HD11-1320	13	20	10	11	80	40	30	N9MX04T002	20°
00-99321-012-1525	BC12-HD13-1525	15	25	12	13	100	50	36	N9MX05T103	20°
00-99321-016-2030	BC16-HD17-2030	20	30	16	17	110	60	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°

Screw Fit Cutter

With 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.

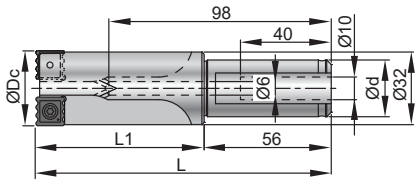


Ordering Code	Type	Capable of drill dia. mm		ØDc	ØD1	L	M	DPM	SW	Insert type	Max. ramping angle
		Dmin.	Dmax.								
00-99323-010-1320	M05-HD11-1320	13	20	11	10	20	M5	5.5	8	N9MX04T002	20°
00-99323-012-1525	M06-HD13-1525	15	25	13	12	25	M6	6.5	10	N9MX05T103	20°
00-99323-016-2030	M08-HD17-2030	20	30	17	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°

Side Lock Shank

With Internal Coolant

- Special size is available on request.

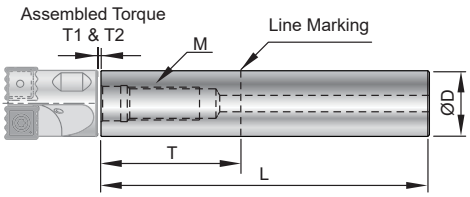


Ordering Code	Type	Capable of drill dia. mm		Ød	ØDc	L	L1	Max. Depth	Insert type	Max. ramping angle
		Dmin.	Dmax.							
00-99321-025-4265	SL25-HD33-4265	42	65	25	33	130	74	50	N9MX12T308	9°

Extension Bar

Steel Type

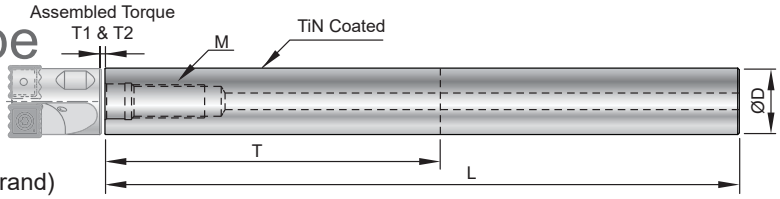
- T is the maximum overhang length.
- With internal coolant hole.



Ordering Code	Type	ØD	T	L	M	Assembled Torque	
						T1*	T2**
00-99801-10S	BC10-075M05S	10	25	75	M5	2.5 Nm	6.9 Nm
00-99801-12S	BC12-075M06S	12	25	75	M6	4 Nm	11.8 Nm
00-99801-16S	BC16-090M08S	16	35	90	M8	10 Nm	28.6 Nm
00-99801-20S	BC20-100M10S	20	40	100	M10	15 Nm	56.7 Nm
00-99801-25S	BC25-120M12S	25	50	120	M12	20 Nm	99 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)



Ordering Code	Type	ØD	T	L	M	Assembled Torque	
						T1*	T2**
00-99801-10W	BC10-100M05W	10	60	100	M5	2.5 Nm	6.9 Nm
00-99801-12W	BC12-100M06W	12	60	100	M6	4 Nm	11.8 Nm
00-99801-16W	BC16-150M08W	16	80	150	M8	10 Nm	28.6 Nm
00-99801-20W	BC20-200M10W	20	100	200	M10	15 Nm	56.7 Nm
00-99801-25W	BC25-200M12W	25	125	200	M12	20 Nm	99 Nm

* T1: Assembled torque until touch

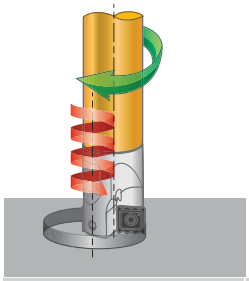
** T2: Assembled torque until secured lock

Technical Guide

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

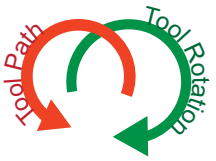
1 Programming

All NC Helix Drills must be programmed using helical interpolation



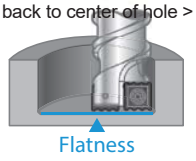
2 Recommend of Direction

Tool path of moving downward by CCW (G03) ,Tool Rotation by CW direction is recommended.



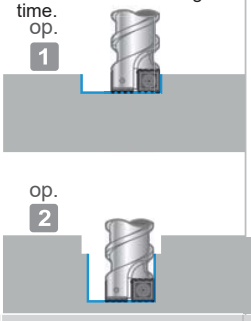
3 Flatness on blind hole bottom

Make one more turn 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 >



4 Step Hole

From solid is more safe and reduce the cutting time.



5 External coolant

Lower pressure higher volume is recommended.
Minimum 5 bar.
Aim nozzle toward the tool body, let the coolant effectively enter the hole.

6

For Start

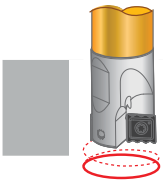
Vc	f	Pitch
Low Value	Middle Value	High Value

Result adjusting

Upgrade	Improve
Vc adj. 1	f adj. 1
f adj. 2	P adj. 2

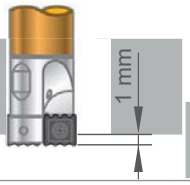
7 Through hole

Reduce Vc 50% at last cycle.



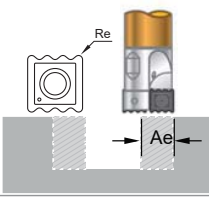
8 Through hole Add 1mm to the required depth (Z)

Failure to program beyond the through hole may result in insert breakage due to the force from circular interpolation.



9 Enlarge Hole

3xDc~6xDc Drilling.
Choosing a drill body with internal coolant (99323 is recommended).
Max. Ae=Dc- (Rex2) for enlarging hole.



10 Internal coolant

High pressure is recommended.
Minimum 10 bar.
Recommended for 3xDc ~6xDc Use.

※ 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.

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

※ Torque Screwdriver

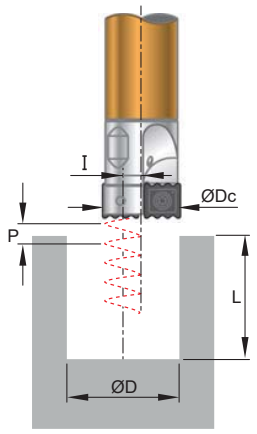
- 0.6Nm and 0.9Nm torque screwdriver with 25mm+50mm TORX® bit.

Part No.	Handle	Torque Adapter			High Precision Bit		Net Weight
		Nm	Kgfcm	In-lb	Size	25mm+50mm	
0-TPN01-TX06-0.6-HP	TPK-H04	0.6	6.1	5.3	TX6	1 pcs + 1 pcs	110g
0-TPN01-TX07-0.9-HP		0.9	9.2	8.0	TX7		

Note: other sizes are available, please contact us for detail.

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

NC Helix Drill



Cutting Parameters (S & F)

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

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

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

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

Cutting time (T)

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

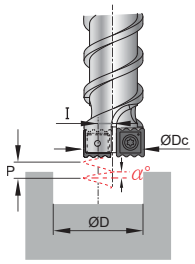
Chip removal Volume rate (Q)

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

Formula

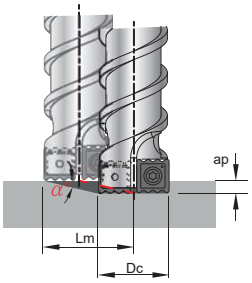
Dc	=	Dia. of Drill	mm
D	=	Dia. of Hole	mm
L	=	Depth of Drilling	mm
Vc	=	Cutting Speed	m/min.
S	=	Spindle Speed	r.p.m.
I	=	Circular radius	mm
f	=	Feed rate	mm/rev.
F	=	Table feed rate	mm/min.
d	=	Circular diameter (D-Dc)	mm
P	=	Pitch of helical interpolation	mm
T	=	Cutting time	sec.
Q	=	Chip removal volume rate	cm³ / min.

Ramping Angle



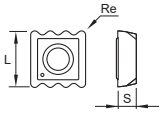
Circular ramping (α)

$$\alpha = \tan^{-1}\frac{P}{(D-Dc) \times \pi} \text{ degree}$$



Linear ramping (α)

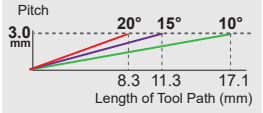
$$\alpha = \tan^{-1}\frac{ap}{Lm} \text{ degree}$$



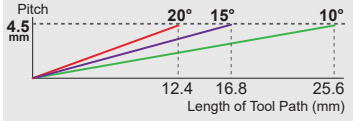
Max. ap < 3/4 of insert length

※ Length of tool path for linear ramping.
Length of tool path for Circular ramping= (D-Dc) x 3.14

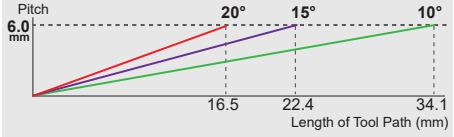
▪ N9MX04T002



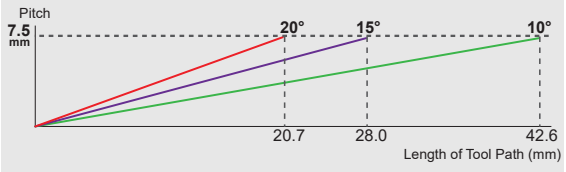
▪ N9MX05T103



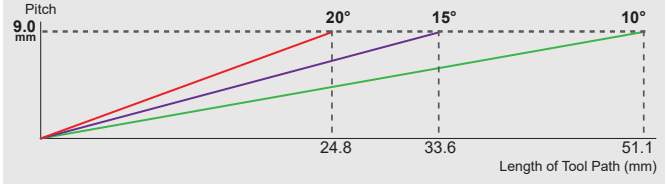
▪ N9MX070204



▪ N9MX100306

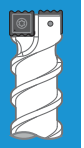


▪ N9MX12T308



Cutting Data

- Boldface number is recommended for start.
- Pitch is possible to increase 20% while cutting conditions are all fine.



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

Workpiece material		Vc m/min. 99321	Vc m/min. 99323	Ø13 f mm/rev.	Ø13 Pitch mm	Ø14 f mm/rev.	Ø14 Pitch mm	Ø16 f mm/rev.	Ø16 Pitch mm	Ø18 f mm/rev.	Ø18 Pitch mm	Ø20 f mm/rev.	Ø20 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**
P	Carbon steel 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**
P	Carbon steel 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**
P	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**
P	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**~130~250	**120**~210~500	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**
N	Cu	**60**~105~200	**100**~170~400	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**
S	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**
H	Hardened	**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**

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

Workpiece material		Vc m/min. 99321	Vc m/min. 99323	Ø15 f mm/rev.	Ø15 Pitch mm	Ø17 f mm/rev.	Ø17 Pitch mm	Ø20 f mm/rev.	Ø20 Pitch mm	Ø22 f mm/rev.	Ø22 Pitch mm	Ø25 f mm/rev.	Ø25 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**
P	Carbon steel 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**
P	Carbon steel 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**
P	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**
P	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**~130~250	**120**~210~500	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**
N	Cu	**60**~105~200	**100**~170~400	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**	0.03 **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**
S	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**	0.03 **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**
H	Hardened	**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**

Cutting Data

- Boldface number is recommended for start.
- Pitch is possible to increase 20% while cutting conditions are all fine.

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

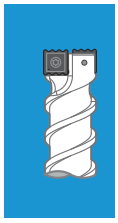
Workpiece material		Vc m/min. 99321	Vc m/min. 99323	Ø20 f mm/rev.	Ø20 Pitch mm	Ø22 f mm/rev.	Ø22 Pitch mm	Ø25 f mm/rev.	Ø25 Pitch mm	Ø27 f mm/rev.	Ø27 Pitch mm	Ø30 f mm/rev.	Ø30 Pitch mm
P	Carbon steel 0.25%C	**60**~90~130	**100**~160~220	0.06 **0.08** 0.10	1.80 2.40 **3.00**	0.09 **0.12** 0.15	1.90 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**
P	Carbon steel 0.45% C	**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**
P	Carbon steel 0.60%C	**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**
P	Low alloy steel	**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**
P	High alloy 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**
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**~130~250	**120**~210~500	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**
N	Cu	**60**~105~200	**100**~170~400	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**
S	Titanium	**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**
H	Hardened	**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**

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

Workpiece material		Vc m/min. 99321	Vc m/min. 99323	Ø25 f mm/rev.	Ø25 Pitch mm	Ø28 f mm/rev.	Ø28 Pitch mm	Ø32 f mm/rev.	Ø32 Pitch mm	Ø36 f mm/rev.	Ø36 Pitch mm	Ø40 f mm/rev.	Ø40 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**
P	Carbon steel 0.45% C	**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**
P	Carbon steel 0.60%C	**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**
P	Low alloy steel	**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**
P	High alloy 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**
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**~130~250	**120**~210~500	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**
N	Cu	**60**~105~200	**100**~170~400	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**
S	Titanium	**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**
H	Hardened	**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**

Cutting Data

- Boldface number is recommended for start.
- Pitch is possible to increase 20% while cutting conditions are all fine.



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

Workpiece material		Vc m/min. 99321	Vc m/min. 99323	Ø30 f mm/rev.	Ø30 Pitch mm	Ø35 f mm/rev.	Ø35 Pitch mm	Ø40 f mm/rev.	Ø40 Pitch mm	Ø45 f mm/rev.	Ø45 Pitch mm	Ø50 f mm/rev.	Ø50 Pitch mm
P	Carbon steel 0.25%C	**60**~90~130	**100**~160~220	0.08 **0.11** 0.13	2.40 3.20 **4.00**	0.12 **0.16** 0.20	2.70 3.60 **4.50**	0.17 **0.23** 0.28	3.00 4.00 **5.00**	0.19 **0.26** 0.32	3.30 4.40 **5.50**	0.20 **0.27** 0.34	3.60 4.80 **6.00**
P	Carbon steel 0.45% C	**60**~90~120	**100**~150~200	0.08 **0.11** 0.13	2.40 3.20 **4.00**	0.12 **0.16** 0.20	2.70 3.60 **4.50**	0.17 **0.23** 0.28	3.00 4.00 **5.00**	0.19 **0.26** 0.32	3.30 4.40 **5.50**	0.20 **0.27** 0.34	3.60 4.80 **6.00**
P	Carbon steel 0.60%C	**50**~70~110	**80**~130~180	0.07 **0.10** 0.12	2.20 2.90 **3.60**	0.10 **0.14** 0.18	2.40 3.20 **4.00**	0.15 **0.20** 0.25	2.70 3.60 **4.50**	0.17 **0.23** 0.28	3.00 4.00 **5.00**	0.18 **0.24** 0.30	3.20 4.30 **5.40**
P	Low alloy steel	**40**~70~100	**80**~120~160	0.06 **0.08** 0.10	1.90 2.55 **3.20**	0.09 **0.13** 0.16	2.20 2.90 **3.60**	0.13 **0.18** 0.22	2.40 3.20 **4.00**	0.15 **0.20** 0.25	2.60 3.50 **4.40**	0.16 **0.22** 0.27	2.90 3.85 **4.80**
P	High alloy steel	**40**~60~80	**60**~90~120	0.06 **0.08** 0.10	1.90 2.55 **3.20**	0.09 **0.13** 0.16	2.20 2.90 **3.60**	0.13 **0.18** 0.22	2.40 3.20 **4.00**	0.15 **0.20** 0.25	2.60 3.50 **4.40**	0.16 **0.22** 0.27	2.90 3.85 **4.80**
M	Stainless steel	**40**~60~80	**60**~90~120	0.06 **0.08** 0.10	1.90 2.55 **3.20**	0.09 **0.13** 0.16	2.20 2.90 **3.60**	0.13 **0.18** 0.22	2.40 3.20 **4.00**	0.15 **0.20** 0.25	2.60 3.50 **4.40**	0.16 **0.22** 0.27	2.90 3.85 **4.80**
K	Cast Iron	**40**~70~100	**80**~120~160	0.08 **0.11** 0.13	2.40 3.20 **4.00**	0.12 **0.16** 0.20	2.70 3.60 **4.50**	0.17 **0.23** 0.28	3.00 4.00 **5.00**	0.19 **0.26** 0.32	3.30 4.40 **5.50**	0.20 **0.27** 0.34	3.60 4.80 **6.00**
N	Al	**80**~130~250	**120**~210~500	0.08 **0.11** 0.13	3.60 4.80 **6.00**	0.12 **0.16** 0.20	4.00 5.35 **6.70**	0.17 **0.23** 0.28	4.50 6.00 **7.50**	0.19 **0.26** 0.32	4.90 6.55 **8.20**	0.20 **0.27** 0.34	5.40 7.20 **9.00**
N	Cu	**60**~105~200	**100**~170~400	0.08 **0.11** 0.13	2.90 3.85 **4.80**	0.12 **0.16** 0.20	3.20 4.30 **5.40**	0.17 **0.23** 0.28	3.60 4.80 **6.00**	0.19 **0.26** 0.32	4.00 5.30 **6.60**	0.20 **0.27** 0.34	4.30 5.75 **7.20**
S	Ni- Alloy	**10**~20~30	**15**~28~40	0.02 **0.04** 0.05	1.90 2.55 **3.20**	0.04 **0.06** 0.08	2.20 2.90 **3.60**	0.06 **0.09** 0.12	2.40 3.20 **4.00**	0.06 **0.09** 0.12	2.60 3.50 **4.40**	0.07 **0.11** 0.14	2.90 3.85 **4.80**
S	Titanium	**30**~40~50	**40**~60~80	0.02 **0.04** 0.05	1.90 2.55 **3.20**	0.04 **0.06** 0.08	2.20 2.90 **3.60**	0.06 **0.09** 0.12	2.40 3.20 **4.00**	0.06 **0.09** 0.12	2.60 3.50 **4.40**	0.07 **0.11** 0.14	2.90 3.85 **4.80**
H	Hardened	**40**~60~80	**60**~90~120	0.06 **0.08** 0.10	1.90 2.55 **3.20**	0.09 **0.13** 0.16	2.20 2.90 **3.60**	0.13 **0.18** 0.22	2.40 3.20 **4.00**	0.15 **0.20** 0.25	2.60 3.50 **4.40**	0.16 **0.22** 0.27	2.90 3.85 **4.80**

▸00-99321-025-4265 >>

Workpiece material		Vc m/min. 99321	Ø42 f mm/rev.	Ø42 Pitch mm	Ø50 f mm/rev.	Ø50 Pitch mm	Ø55 f mm/rev.	Ø55 Pitch mm	Ø60 f mm/rev.	Ø60 Pitch mm	Ø65 f mm/rev.	Ø65 Pitch mm
P	Carbon steel 0.25%C	**100** ~ 160 ~ 220	0.12 **0.16** 0.20	3.00 4.00 **5.00**	0.15 **0.20** 0.24	3.10 4.15 **5.20**	0.18 **0.24** 0.30	3.30 4.40 **5.50**	0.19 **0.26** 0.32	3.40 4.55 **5.70**	0.20 **0.27** 0.34	3.60 4.80 **6.00**
P	Carbon steel 0.45% C	**100** ~ 150 ~ 200	0.12 **0.16** 0.20	3.00 4.00 **5.00**	0.15 **0.20** 0.24	3.10 4.15 **5.20**	0.18 **0.24** 0.30	3.30 4.40 **5.50**	0.19 **0.26** 0.32	3.40 4.55 **5.70**	0.20 **0.27** 0.34	3.60 4.80 **6.00**
P	Carbon steel 0.60%C	**80** ~ 130 ~ 180	0.11 **0.15** 0.18	2.70 3.60 **4.50**	0.13 **0.18** 0.22	2.80 3.75 **4.70**	0.16 **0.22** 0.27	3.00 4.00 **5.00**	0.17 **0.23** 0.29	3.00 4.05 **5.10**	0.18 **0.24** 0.30	3.20 4.30 **5.40**
P	Low alloy steel	**80** ~ 120 ~ 160	0.10 **0.13** 0.16	2.40 3.20 **4.00**	0.11 **0.15** 0.19	2.50 3.35 **4.20**	0.14 **0.19** 0.24	2.60 3.50 **4.40**	0.15 **0.20** 0.25	2.80 3.70 **4.60**	0.16 **0.22** 0.27	2.90 3.85 **4.80**
P	High alloy steel	**60** ~ 90 ~ 120	0.10 **0.13** 0.16	2.40 3.20 **4.00**	0.11 **0.15** 0.19	2.50 3.35 **4.20**	0.14 **0.19** 0.24	2.60 3.50 **4.40**	0.15 **0.20** 0.25	2.80 3.70 **4.60**	0.16 **0.22** 0.27	2.90 3.85 **4.80**
M	Stainless steel	**60** ~ 90 ~ 120	0.10 **0.13** 0.16	2.40 3.20 **4.00**	0.11 **0.15** 0.19	2.50 3.35 **4.20**	0.14 **0.19** 0.24	2.60 3.50 **4.40**	0.15 **0.20** 0.25	2.80 3.70 **4.60**	0.16 **0.22** 0.27	2.90 3.85 **4.80**
K	Cast Iron	**80** ~ 120 ~ 160	0.12 **0.16** 0.20	3.00 4.00 **5.00**	0.15 **0.20** 0.24	3.10 4.15 **5.20**	0.18 **0.24** 0.30	3.30 4.40 **5.50**	0.19 **0.26** 0.32	3.40 4.55 **5.70**	0.20 **0.27** 0.34	3.60 4.80 **6.00**
N	Al	**120** ~ 210 ~ 500	0.12 **0.16** 0.20	4.50 6.00 **7.50**	0.15 **0.20** 0.24	4.70 6.25 **7.80**	0.18 **0.24** 0.30	4.90 6.55 **8.20**	0.19 **0.26** 0.32	5.20 6.90 **8.60**	0.20 **0.27** 0.34	5.40 7.20 **9.00**
N	Cu	**100** ~ 170 ~ 400	0.12 **0.16** 0.20	3.60 4.80 **6.00**	0.15 **0.20** 0.24	3.80 5.05 **6.30**	0.18 **0.24** 0.30	4.00 5.30 **6.60**	0.19 **0.26** 0.32	4.10 5.50 **6.90**	0.20 **0.27** 0.34	4.30 5.75 **7.20**
S	Ni- Alloy	**15** ~ 28 ~ 40	0.04 **0.06** 0.08	2.40 3.20 **4.00**	0.05 **0.08** 0.10	2.50 3.35 **4.20**	0.06 **0.09** 0.12	2.60 3.50 **4.40**	0.06 **0.10** 0.13	2.80 3.70 **4.60**	0.07 **0.11** 0.14	2.90 3.85 **4.80**
S	Titanium	**40** ~ 60 ~ 80	0.04 **0.06** 0.08	2.40 3.20 **4.00**	0.05 **0.08** 0.10	2.50 3.35 **4.20**	0.06 **0.09** 0.12	2.60 3.50 **4.40**	0.06 **0.10** 0.13	2.80 3.70 **4.60**	0.07 **0.11** 0.14	2.90 3.85 **4.80**
H	Hardened	**60** ~ 90 ~ 120	0.10 **0.13** 0.16	2.40 3.20 **4.00**	0.11 **0.15** 0.19	2.50 3.35 **4.20**	0.14 **0.19** 0.24	2.60 3.50 **4.40**	0.15 **0.20** 0.25	2.80 3.70 **4.60**	0.16 **0.22** 0.27	2.90 3.85 **4.80**

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.

Example 1

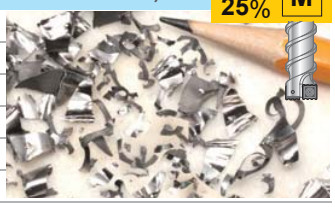
Hole size: Ø25 x 50L mm | Tool: 00-99321-016-2030

Material: SAE8620 — Load 28% P

Vc	=	80	m/min.
S	=	1500	r.p.m.
f	=	0.15	mm/rev.
F	=	225	mm/min
P	=	6.0	mm
T	=	63	sec.

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

Vc	=	80	m/min.
S	=	1500	r.p.m.
f	=	0.08	mm/rev.
F	=	120	mm/min
P	=	6.0	mm
T	=	118	sec.

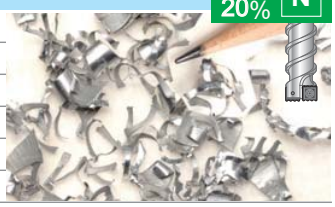


Material: C1100 — Load 25% N

Vc	=	120	m/min.
S	=	2250	r.p.m.
f	=	0.10	mm/rev.
F	=	225	mm/min
P	=	6.0	mm
T	=	63	sec.

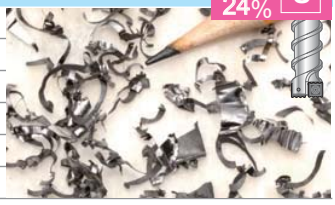
Material: AL6061T6 — Load 20% N

Vc	=	180	m/min.
S	=	3370	r.p.m.
f	=	0.20	mm/rev.
F	=	674	mm/min
P	=	6.0	mm
T	=	21	sec.



Material: TiAl6V4 — Load 24% S

Vc	=	80	m/min.
S	=	1500	r.p.m.
f	=	0.08	mm/rev.
F	=	120	mm/min
P	=	6.0	mm
T	=	118	sec.



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

Vc	=	40	m/min.
S	=	750	r.p.m.
f	=	0.3	mm/rev.
F	=	225	mm/min
P	=	2.0	mm
T	=	100	sec.

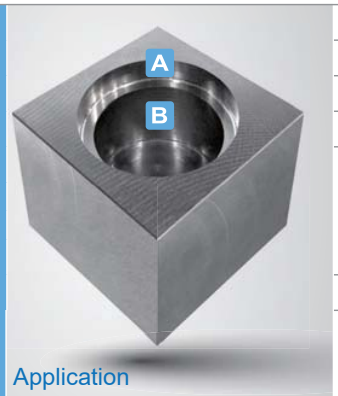
Suggested insert grades for best result >>

Example 2

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		N9MX070204-**NC5072**	N9MX070204-**NC5072**	N9MX070204-**NC2032**
No. of Edges		2	2	2
Vc = (m/min.)		120	40	80
S = r.p.m.		2250	750	1500
f = (mm/rev.)		0.2	0.13	0.1
F = (mm/min.)		450	97.5	150
Pitch = (mm)		6	3	3
Machine Load = % (BT40, VMC)		35%	20%	20%
Tool Life (hole)		150	108	18
Chip Removal Volume (cm³)		3682	2651	441.78

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

Example 3

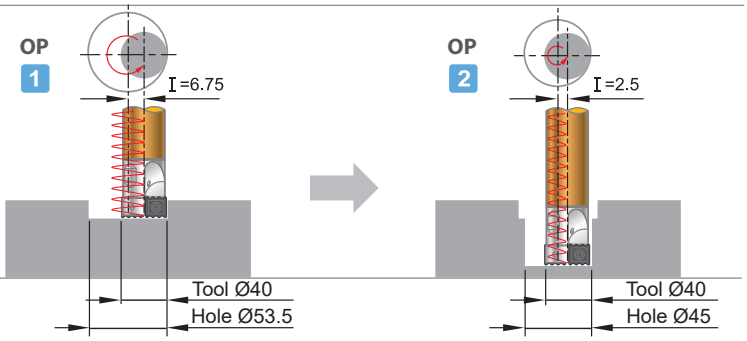


Application

- 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

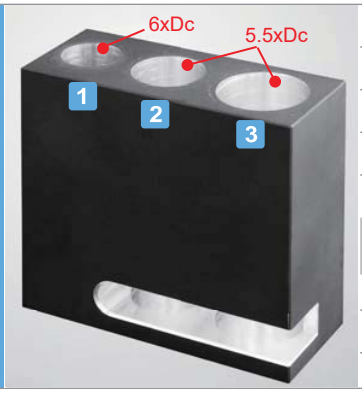
Hole	Dc mm	D mm	L mm	Vc m/min.	S r.p.m	f mm/rev.	F mm/min.	I mm	P mm	T sec.
A	Ø40	Ø53.5	10	300	2400	0.15	360	6.75	5.0	14
B		Ø45.0	32	300	2400	0.15	360	2.5	2.0	42



▶ 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 >>

Example 4



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	Vc m/min.	S r.p.m	f mm/rev.	F mm/min.	P mm
1	Ø17	20	100	120	2250	0.1	225	3
2		25	95	100	1900	0.18	342	4.5
3		30	95	60	1200	0.25	300	6

Low spindle power is not a problem! 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.

▶ Drilling diameter, increase flexibility and occupy few tools in CNC machine.

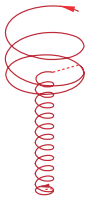
One tool performs multiple patterns >>

Example 6

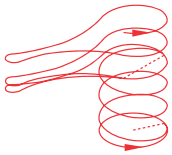
Material	AL6061T6
Tool	00-99323-016-2030 M08-HD17-2030
Insert	N9MX070204-NC5072
Machine	HAAS VM-3, BT40, 22.5KW
Coolant	Internal

Fig.	Dc mm	Vc m/min.	S r.p.m	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	95
3		200	3800	0.15	570	4	80

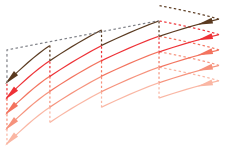
Tool Path 1



2



3



```
%
G40 G80 G69
G28 G91 Z0
G28 G91 X0 Y0
G00 G90
G126
G00 G90 X0. Y0.
G52 X18. Y-20.
G00 G90 X0. Y0.
T5
M06
#1= 6.5 (X1)
#11= -6.5 (X1=-I)
#6= 1.5 (X2)
#7= -1.5 (X2=-I)
#2= 0. (Y)
#3= 2.0 (Z1-1)
#13= -2.0 (Z1-2)
#16= -10.0 (Z1-1)
#17= -12.0 (Z1-2)
#4= 190.0 (F1-1)
#5= 570.0 (F1-2)
#14= 190.0 (F1-1)
#15= 380.0 (F1-2)
#8= 3 (L1=Deepth/P#9)
#9= 4.0 (P1=Z#3-DOWN Pitch)
#18= 7 (L2=Deepth/P#9)
#19= 2.0 (P2=Z#16-DOWN Pitch)
M88
G00 G90 X#1 Y#2
S3800 M03
G43 H05 Z30. (M08)
Z10.
Z5.
G01 Z#3 F#4
M97 P1000 L#8
G03 I#11 F#4
G01 X#6 Y#2 (Holes 2)
M97 P2000 L#18
G03 I#7 F#14
G01 X0. Y0.
G00 G90 Z10. M05
G00 G90 Z20. M89
G00 G90 Z30. M09
G28 G91 Z0. M05
M00
G28 G91 Y0.
M30
N1000
G03 I#11 Z#13 F#5
#13= #13 - #9
M99
N2000
G03 I#7 Z#17 F#15
#17= #17 - #19
M99

%
```

```
%
G40 G80 G69
G28 G91 Z0
G28 G91 X0 Y0
G00 G90
G126
G00 G90 X0. Y0.
G52 X0. Y0.
G00 G90 X0. Y0.
T5
M06
#12= 1.0 (Z-UP)
#13= 0.0 (Z1)
#14= -1.512 (Z2)
#15= -2.608 (Z3)
#16= -2.904 (Z4)
#17= -4.0 (Z5-1) (Z2-1)
#4= 190.0 (F1)
#5= 570.0 (F2)
#7= -6.5 (X2=-I)
#18= -12.0 (Z2-2)
#19= 4.0 (P2=Z#17-DOWN PITCH)
G00 G90 X25. Y-51.
M88
S3800 M03
G43 H05 Z30. (M08)
Z10.
G01 Z#12 F#4
M97 P1000 L2
G01 X35.757 Y-55.924 F#4
G03 X35.757 Y-46.076 R-6.5
G02 X15.537 Y-49.599 R20.
G03 X15.537 Y-52.401 R-1.5
G02 X35.757 Y-55.924 R20.
G01 X46.5 Y-51.
M97 P2000 L3
G03 I#7 F#4
G01 X40. Y-51.
G00 G90 Z10. M05
G00 G90 Z20. M89
G00 G90 Z30. M09
G28 G91 Z0. M05
M00
G28 G91 Y0.
M30

N1000
G01 X35.757 Y-55.924 Z#13 F#4
G03 X35.757 Y-46.076 R-6.5 Z#14
F#5
```

```
G02 X15.537 Y-49.599 R20. Z#15
G03 X15.537 Y-52.401 R-1.5
Z#16
G02 X35.757 Y-55.924 R20. Z#17

#13= #13 - 4.0
#14= #14 - 4.0
#15= #15 - 4.0
#16= #16 - 4.0
#17= #17 - 4.0
M99

N2000
G03 I#7 Z#18 F#5
#18= #18 - #19
M99

%
```

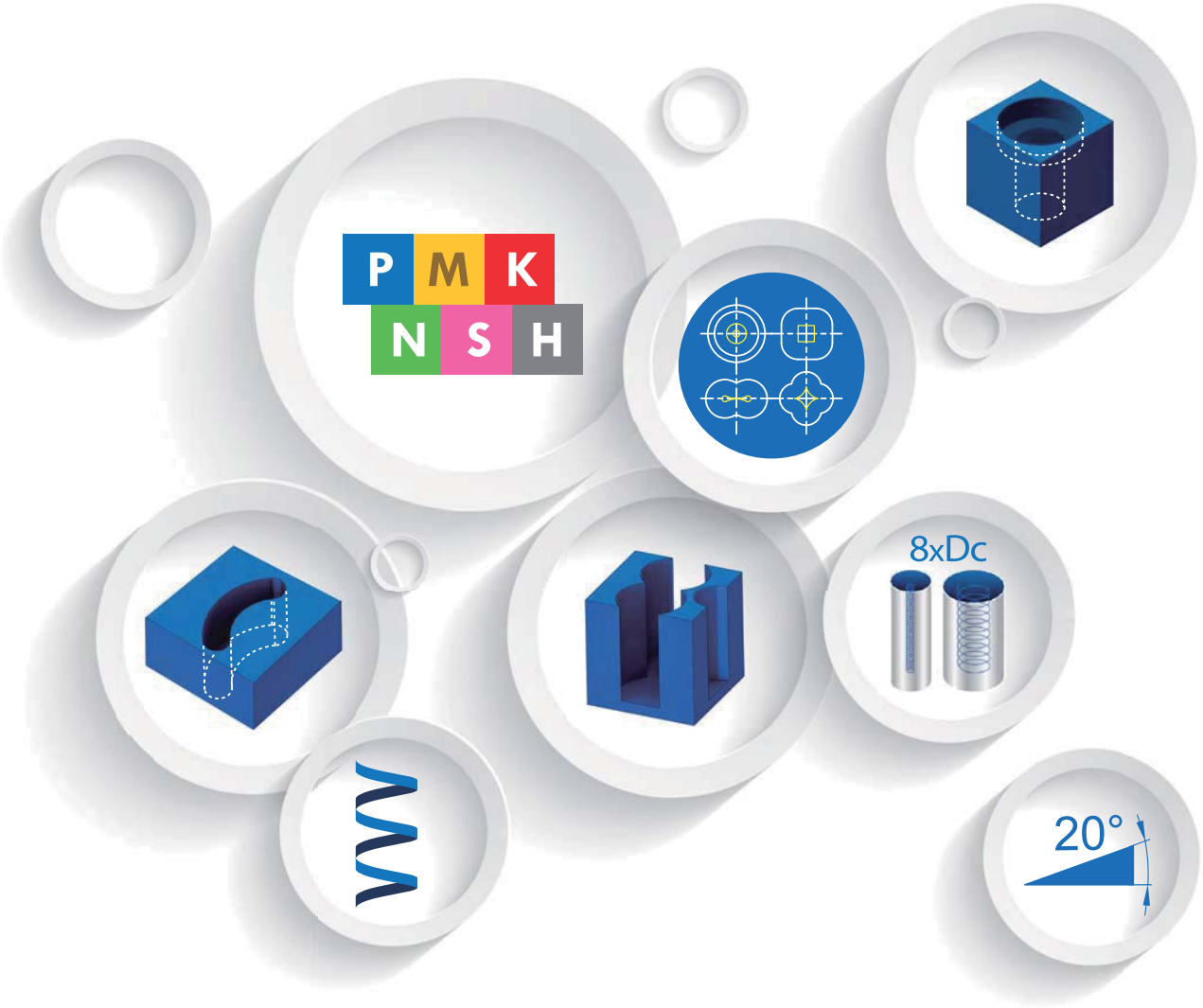
```
%
G40 G80 G69
G28 G91 Z0
G28 G91 X0 Y0
G00 G90
G126
G00 G90 X0. Y0.
G52 X0. Y0.
G00 G90 X0. Y0.
T5
M06
#1= 4.0 (Z up)
#2= 0.0 (Z1)
#3= -4.0 (Z2)
#4= 210.0 (F1)
#5= 420.0 (F2)
#6= 4.0 (Z#13-Pitch)
G00 G90 X92.56 Y-14.507
M88
S2800 M03
G43 H05 Z30. (M08)
Z10.
Z5.
M97 P1000 L5 (Z-Pitch)
G00 G90 Z30. M05
M09
M89
G28 G91 Z0. M05
M00
G28 G91 Y0.
M30

N1000

G00 G90 X92.56 Y-14.507
G01 Z#1 F#4
G02 X108.5 Y-20.416 Z#2 R72. F#5
G03 X92.56 Y-14.507 Z#3 R72. F#5
G01 Z#2
G03 X75.679 Y-12.5 Z#3 R72. F#5
G01 Z#2
G03 X58.798 Y-14.507 Z#3 R72. F#5
G01 Z#2
G03 X42.858 Y-20.416 Z#3 R72. F#5
G01 Z#2
G00 G90 Z5.
#1= #1 - #6 (Z up)
#2= #2 - #6 (Z1.)
#3= #3 - #6 (Z2.)
M99

%
```

No Need To Choose
Nine9 Does It All



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