

TECHNICAL INFORMATION



THREAD WHIRLING

The solution for high performance medical screw production.



NGK | **NTK**
SPARK PLUGS | TECHNICAL CERAMICS
NGK SPARK PLUG CO., LTD.

THREAD WHIRLING <NTK Thread Whirling Advantage>

High Productivity

- Single-pass thread forming by using multiple full-profile inserts.
- Eliminates incremental threading.

Excellent Surface Finish

9-insert design provides better surface finish than conventional whirling cutters.

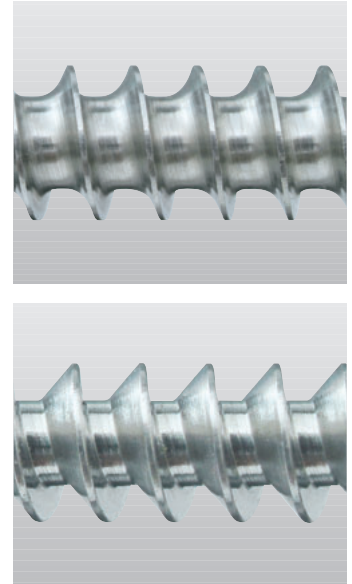
Superior Chip Evacuation

No chip control issues commonly seen with single-point threading.

Wide Selection

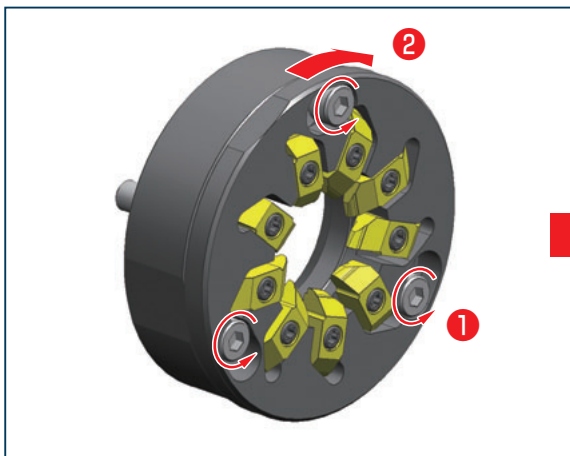
Available for a variety of CNC lathes, whirling spindles and attachments.

Please refer to Page 3 and 4 for more details.



NTK's Unique Attachment System

NTK's whirling insert holder can be attached and detached without removing mounting bolts.

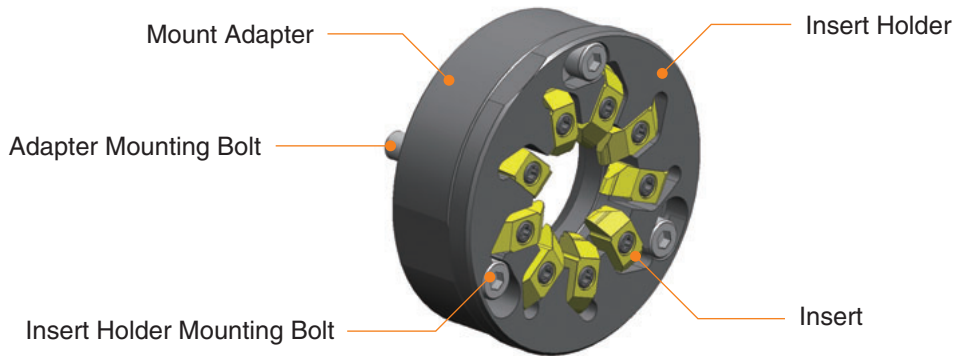


1. Loosen the mounting bolts and rotate the insert holder.

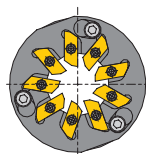


2. Pull the whirling insert holder out.

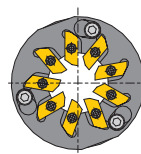
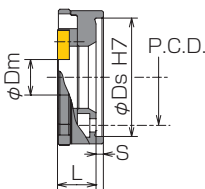
NTK Whirling System



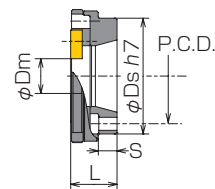
Standard Whirling Systems



[fig.1]



[fig.2]



Machine / Spindle Type	Spindle	Item	Part No.	Code	ϕD_m	L	ϕD_s	S	P.C.D.	Adapter Mounting Bolt	fig.
CITIZEN L20 Gang / M2032 Turret	PCM	Whirling System Kit	TWC9P1340P2	5699921	12	13	40	2.5	32.5	M4 (Use spindle bolts)	fig.1
CITIZEN L20 Gang / M2032 Turret	PCM	Mount Adapter-Only	TWC13P40MP2	5699939					32.5	M4 (Use spindle bolts)	
CITIZEN L20 Gang / M2032 Turret	Jarvis	Whirling System Kit	TWC9J1040P2	5699947	12	10	40	2.5	32.5	M4×12 5703392	
CITIZEN L20 Gang / M2032 Turret	Jarvis	Mount Adapter-Only	TWC10J40MP2	5699954					32.5	M4×12 5703392	
CITIZEN C1216 Gang / M1216 Turret	CITIZEN	Whirling System Kit	TWC9C1037P2	5703368	12	10	37	2.5	30.5	M3×12 5632260	
CITIZEN C1216 Gang / M1216 Turret	CITIZEN	Mount Adapter-Only	TWC10C37MP2	5703376					30.5	M3×12 5632260	
STAR※	STAR	Whirling System Kit	TWC9S1640P2	5699863	12	16	40	6.5	33	CS04148S 5702212	fig.2
STAR	STAR	Mount Adapter-Only	TWC16S40MP2	5699871					33	CS04148S 5702212	

■ Whirling system kit includes a complete assembly (mount adapter, insert holder, adapter mounting bolts, insert holder mounting bolts, insert screws, and screw wrench).

■ Mount adapter comes with adapter mounting bolts.

※The whirling system cannot be used with lead angle greater than 15 degrees.

Item	Part No.	Code	ϕD_m	
Insert Holder	TWC9HP2	5699962	12	Common item for all above systems

■ Insert holder comes only with screw wrench. Insert holder mounting bolts are not included.

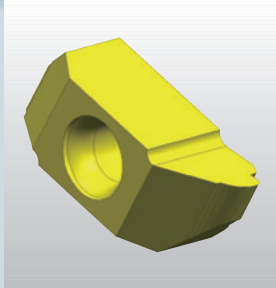
Parts

Item	Part No.	Code	
Insert Screw	FSI17-2.2 * 6.0	5683768	Common item for all above systems
Screw Wrench	T-07	5094917	Common item for all above systems
Insert Holder Mounting Bolt	CS0309	5702196	Common item for all above systems

Insert Grades

TM1

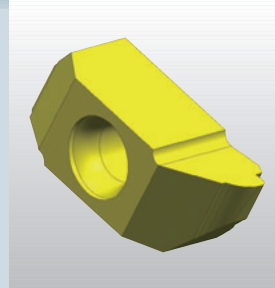
NEW



Multi-layer coated grade resists build-up-edge and wear while maintaining sharp cutting edge.

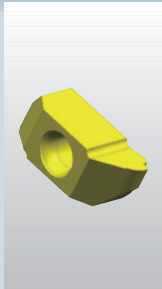
TM4

NEW



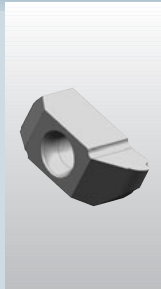
Multi-layer coated grade with increased toughness and resistance to build-up-edge and wear.

ZM3



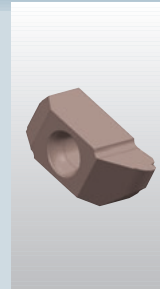
General purpose grade with excellent build-up-edge and breakage resistance.

VM1



Maintains sharp cutting edge without losing wear resistance and thermal shock resistance.

TAS



Excellent in thermal and oxidation resistance. Optimized for high-temp alloys and higher cutting speed.

■ The thickness of the whirling insert is 0.157 inch.

Recommended Cutting Conditions • Procedure

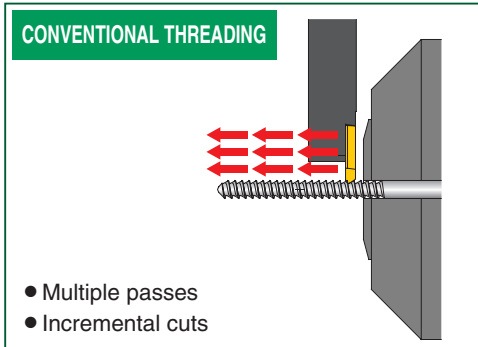
- (1) Identify the machine and the whirling spindle you currently use. Then select applicable NTK whirling system.
- (2) Send your part drawing to NTK. NTK designs and manufactures whirling inserts by calculating lead angle and insert form based on the part drawing.
- (3) Set up the whirling system with lead angle specified by NTK. Then run the system.

- Recommended cutting condition:
Whirling Cutter RPM: 600 – 2,500 RPM, Bar stock RPM: 8 – 16 RPM
- Feed Rate: Same as thread pitch (for single-start thread)
- Typical work diameter: 0.118 to 0.315 inch
- Typical work materials: Titanium, 316 Stainless

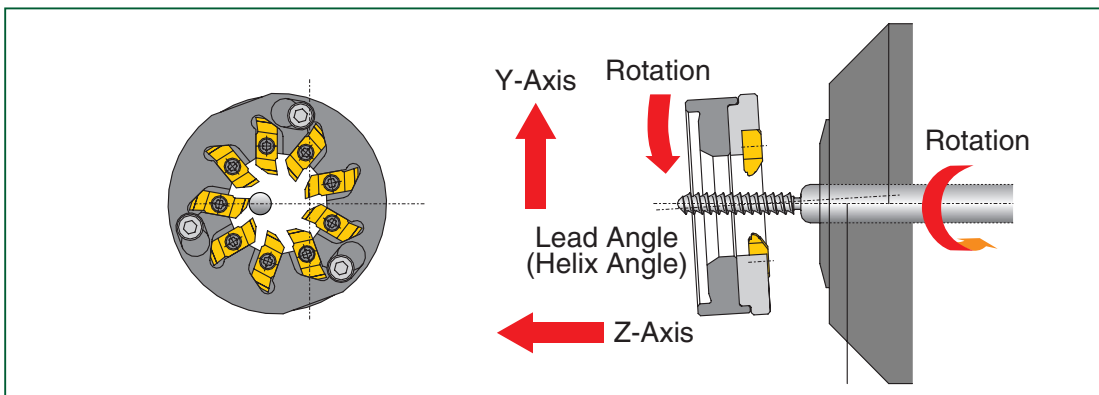
THREAD WHIRLING <What is Thread Whirling ?>



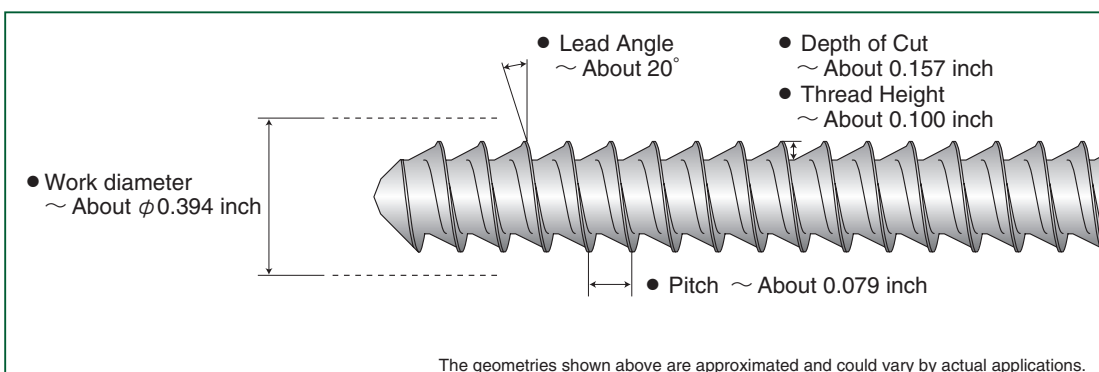
Conventional threading operations on Swiss lathes require multiple threading cuts by using a single-point tool. To make long screws, threading cuts must be performed section by section so that the part will stay in the guide bushing. On the other hand, thread whirling systems allow long screws such as bone screws to be manufactured by a single-pass operation. Using a whirling cutter dramatically improves quality and productivity.



In a whirling operation, the Lead Angle is determined by the tilt angle of the whirling system. The whirling cutter rotates at a high speed while bar stock (C-axis) rotates at a low speed. The thread pitch (Z-axis) is determined by the feed rate.



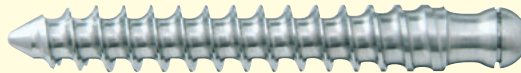
Applicable Thread Geometry (Approximated)



Application Example

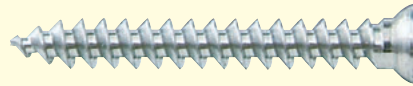
- Work Material : 316 Stainless
- Work Dimeter : ϕ 0.25 inch
- Cutter speed : 2,250r.p.m.
- Bar stock rotational speed : 15r.p.m.
- Feed=Pitch : 0.05 i.p.r
- Lead Angle : 8° 30'

Introduction of the NTK whirling system resulted in both high productivity and excellent surface finish.



- Work Material : Ti-6Al-4V
- Work Dimeter : ϕ 0.12 inch
- Cutter speed : 1,500r.p.m.
- Bar stock rotational speed : 15r.p.m.
- Feed=Pitch : 0.03 i.p.r
- Lead Angle : 9° 40'

The NTK whirling system improved productivity and surface finish even in this small diameter threading application.



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