Understanding the basics of Spiral Fluted Taps

- What is a spiral fluted tap ?
- Materials most suitable for spiral fluted taps and their chip configuration.
- Features of work materials being tapped.
- The sequence to follow when selecting a tap.
- Feed system and tooling required.
- The thread relief on different types of taps.
- Classification of spiral fluted taps based on thread relief and work materials being cut.
- The relationship between an internal thread, a tap and a gauge.
- Selecting spiral fluted taps based on work materials being cut.
- Yamawa's line up of Spiral Fluted Taps
- Troubleshooting spiral fluted tap—offering the solution

Think threads with YAMAWA

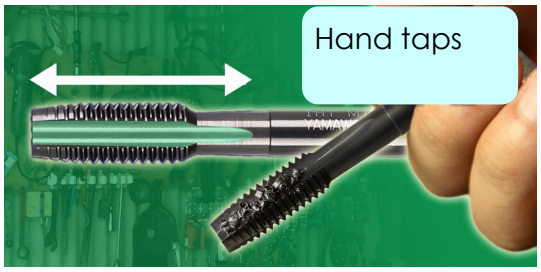
Understanding the basics of Spiral Fluted Taps

Spiral fluted taps are the most popular taps used in the manufacturing industry today. Spiral fluted taps are one of Yamawa's premier products.
Let us explain Spiral fluted taps from the basic concept, so everyone can easily understand the function of these taps.

What is a spiral fluted tap ?

Spiral fluted taps have flutes that wrap around the tap's axis in a spiral or a helical configuration. The tap is used mainly for tapping threads in blind holes. A spiral fluted tap pulls the chips out of the hole toward the tap shank and opposite of the tapping direction.

<Classification of a tap's cutting action is based on the tap geometry, the chip direction, and the hole shape>



Features of spiral fluted taps:

- Spiral fluted taps are most suitable for tapping blind holes.
- Spiral fluted taps start cutting easily in most materials and offer good cutting performance.
- Spiral fluted taps do not have as strong of a cutting edge as spiral pointed taps or hand taps so, these taps may not be recommended for taping materials over 45HRC.
- On occasion, spiral fluted taps can have performance issues that are caused by the chips in very soft materials or in short chipping materials.

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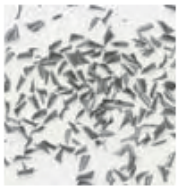
Materials suitable to Spiral fluted taps and their chip configuration.

The types of materials for spiral fluted taps are mainly classified into 2 types,
Ferrous and non-ferrous.
When tapping a material with chips that are curled and stringy a spiral fluted taps is suitable.
When tapping a material with chips that are minutely fragmented, such as cast irons and aluminum die-castings, special care should be taken during the tapping process. In materials with fragmented chips, spiral fluted taps may poorly eject chips and can cause tapping problems.
Refer to the chip shape based on the materials being cut below:

Classification of materials

Kind	Chip shape after boring (drilling)	No.	Examples of materials
Ferrous	 Chip or powder like	①	Cast iron, Ductile cast iron, Sintered material
		②	High hardness material
		③	Heat treated steel (45-55HRC)
		④	Heat treated steel (25-45HRC)
	 Continuous	⑤	High carbon steel, Tool steel, Alloy steel, Heat treated steel
		⑥	Medium carbon steel, Cast steel
		⑦	Stainless steel
		⑧	Low carbon steel
Non-ferrous	 Continuous	⑨	Titanium alloy
		⑩	Nickel base alloy
		⑪	Rolled aluminum, Copper, Copper alloy
	 Chip or powder like	⑫	Aluminum diecasting, Aluminum zinc diecasting, Magnesium alloy, Bronze
		⑬	Thermosetting plastic

Hardness of materials : Please refer to material composition table shown in technical data.

Chip shape and the work material and to be tapped by spiral fluted tap.

3.Features of various work materials being tapped.

Thermal refined steels (25～45HRC)

Steels that are heat-treated to a hardness over 40HRC may not thread well with a general purpose tap and you may have difficulties with too life or tap breakage. In the case of volume tapping of this type of material, special purpose taps for thermal refined steel should be selected.

High carbon steels • • • S45C、S50C、S55C

These materials can become harder as the carbon content increases This increased hardness results in rapid tap wear.
If you have heat-treated thermal refined materials, then select a tap designed for Thermal Refined Steels.

Alloy steels • • • SCM415、SCM420、SCM435

Alloy steels are rather hard and tough, thus tap wear can develop quickly and become a problem.

Tool steels

Tool steels are rather hard and tough, thus tap wear can develop quickly and become a problem.
If you have heat-treated thermal refined, then you should choose a tap for Thermal Refined Steels.

Middle Carbon steels • • • S25C、S35C、S45C

These steels are widely used in all industries and have a high machinability rating. This material is easily tapped with a general purpose tap.

Stainless steels • • • SUS303、SUS304

Austenitic stainless steels are sticky, hard, and have a tendency of work-harden. When tapping stainless steels, problems may occur like internal torn threads or material welding over the tap. Chips are rather hard and tended to be extended in length. This can cause chip ejection problems.

Low carbon steels and Structural carbon steels • • • SS400、S10C、S15C、S20C

These materials have a high machinability rating but can often cause material welding over the tool when tapping internal threads.

Titanium alloys • • • Ti-6Al-4V

This type of material has low thermal-conductivity. The heat from tapping this material tends to be concentrated at the cutting edge of the tap. This easily brings about chip welding and the tap's rapid wear. This material can also causes chipping of the cutting edge of the tap. Tap breakage issues often occur from the chipped cutting edges.

Nickel base alloys • • • Nickel base alloy, Inconel, Hastelloy, Waspaloy

These materials have a high degree of toughness. The machinability rating of these materials is very low. Chip welding problems or rapid wear on the tap can easily occur. These materials have a tendency for a large shrinkage problems in internal threads. Tap breakage caused by material tightening occurs easily.

Wrought aluminum, Aluminum die-casting • • • A5052、AC4B-T6、ADC12

These materials have a melting point that easily causes chip welding problems on taps. They are soft and sticky materials. Unless you use the tap with high cutting performance and high geometry , you may easily create torn threads in your internal threads. Material shrinkage problems occur easily in internal threads.

Copper, Copper alloys • • • C1100、C2801

Once a free-cutting component is added, the machinability rating of these materials is comparatively high. However, initially these materials are soft and sticky. Torn threads occur easily in internal threads. Welding problems occur in taps and shrinking problems in internal threads may also happen causing tap breakage.

The Sequence to follow when selecting a tap

In tapping, issues can occur when a variety of machining factors are mixed together. These issues can become difficult to solve. The Solution to these problems is in choosing the most suitable tap based on the tapping condition.

STEP 1. Confirm the kind of work material and it's characteristics

- Features/Hardness

STEP2. Confirm the shape of bored hole

- Blind hole => Spiral Flute SP/Hand Tap HT/ROLL tap (2P Thread chamfer)
- Through hole =>Spiral Point PO/Left Hand Spiral Flute SL/Hand Tap HT/ ROLL Tap(4P Thread chamfer)

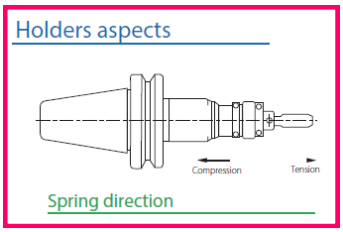
STEP 3. Confirm the feed mechanism of the machine

- Full synchronous feed：When tapping on a CNC machining centers or CNC tapping centers a fixed tapping holder should be used. The feed mechanism on these machines is precisely controlled by a linear encoder and the per revolution is matched to the pitch feed of the tap.
- These machines are applicable to such condition as tapping with high spindle speed and tapping in hard-to-machine materials.
- Asynchronous：When tapping on Non-CNC machines, tapping machines, special machines, lathes, and manual drive drilling machines a floating holder should be used. The feed mechanism of these machines is not as precisely controlled and normally the feed per revolution does not match the pitch of the tap. Pitch error is compensated by the adjusting spring of the floating holder. Feed control on these machines is limited on the tap side, and thread limit problems such as over-size cutting tend occur. So tapping at lower cutting speed is recommended.

※For more details, refer to page "Feed system and Tooling".

STEP 4. Confirming the function and performance of the tapping holder

- Full fixed type holder: The tap is fully attached and fixed in the holder.
- Holder with tension/compression on mechanism: This type of holder lets the tap float by utilizing tension and compression springs. The holder compensates for any lead error or pitch error between the machine's feed and the tap's lead with the floating mechanism.



※For more details, refer to page "Feed system and tooling required."

STEP 5. Confirming the tapping speed

- Normal tapping speed: General purpose taps and special purpose taps.
- High spindle speed tapping and Ultra high spindle speed tapping: Taps for high spindle speed tapping, such as F-SP),
- Taps for ultra high spindle speed tapping, (such as HF series)

※For more details, refer to page "Type of tap thread relief".

STEP 6. Confirming other tapping condition

- Lubricant：When tapping with insoluble oil, choose oxidized taps.
- Target of tapped holes: In volume tapping, choose coated taps.
- Thread limit of internal threads: When tapping materials that tend to shrink or

Feed system and Tooling

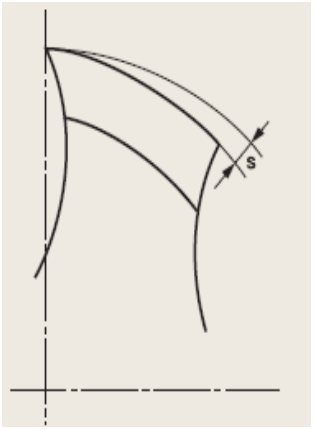
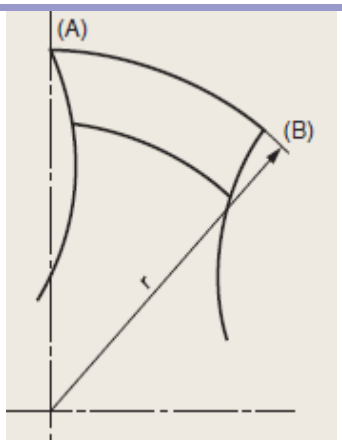
When tapping, it is helpful to fully understand the features of the tapping machine and the tooling before using them. For example, the most suitable machine for tapping is a CNC machining center that has a full synchronous feed mechanism. But if the tooling is not a full fixed type, the machining center can not operate as a high performance machine.
Problems such as oversize cutting of internal threads often occur when using tooling with tension/compression mechanism on these machines.

Kinds of Feed system	Features	Notes
Full synchronous feed system	The machine simultaneously checks the specified revolutions per minute and the feed per revolution and accurately synchronizes them together and a perfect pitch (lead) feed is created.	Choose a full synchronous type holder.
Feed by master lead screw	A better-feed condition can be obtained using a master lead screw because the tap is fed by the master lead screw shaft that has the same thread pitch (lead) as the tap.	If wear increases in the master lead screw shaft, uneven and lead error will come out on feed. Maintenance and inspection are periodically required.
Gear feed	By a combination of gears, the tap is fed at the same pitch (lead) as the tap. This result in a good match of machine feeding and the thread lead.	Due to wear and backlash of the gears, and uneven feeding may occur, resulting in a lead on reversing the taps.
Asynchronous feed system	When using an asynchronous feed system it is possible to freely set the rotation number and feed. A perfect pitch (lead) feed con not be produced with this system.	When the machine uses an asynchronous feed system it should be combined with a holder that has a tension/compression mechanism.
Free manual feed	The feed is controlled with a manual allowance, when can result in inconsistent pitch (lead) feed.	There can be a big difference in feed pitch (lead) depending on the skill of operator.

Types of tooling	Features	Notes
Full fixed type	The tap is attached to the machine and is fully fixed in place. There is no ratting in the tap collet portion or holder portion. These are holders for synchronous feed and holders of shrink fit holder.	Confirm in advance there is not slack between the tap collet and holder, or inside the holder itself.
Tooling with a tension/ compression mechanism	By installing tension and compression springs for compensation in the axial direction, the tool holder let's the tap float axially. This tooling has a mechanism to compensate and adjust for any error between the main spindle feed and tap feed or pitch (lead).	This holder compensates for the excessive error that occurs in the spindle feed compared to the tap feed and during the feed delay on the main spindle reversal.

The thread relief on different types of taps.

• Eccentric relief • • • Cutting performance is quite enough. A tap type should be used with a machine that has a full synchronous feed and a full fixed tap holder.
• Con-eccentric thread relief • • • Cutting performance is high. A tap of this type can be used with machines having full synchronous feed mechanism and other types of machines.
• Concentric-No relief • • • Cutting performance is low, but under the right condition when used on unstable drilling machines and manual tapping machines, a balance is achieved and consistent tapping is assured.

Type of thread relief	Eccentric thread relief	Con-eccentric thread relief	Concentric-No relief
Specification	Relief (S) begins from the edge of the flute at the cutting edge.	Relief (S) begins after the fully cylindrical portion of the tap diameter (t).	Round land, No relief.
Machines	Specially for full synchronous feed.	For asynchronous feed (can be used for full synchronous feed as well)	For drilling machine and manual tapping.
Conceptual diagram of tap's thread relief			

Understanding the basics of Spiral Fluted Taps

Classification of spiral fluted taps based on thread relief and work materials being cut.

Spiral fluted taps are one of Yamawa's main products. We classify these taps based on the type of thread relief and the work materials to be tapped. Refer to this table when selecting products.

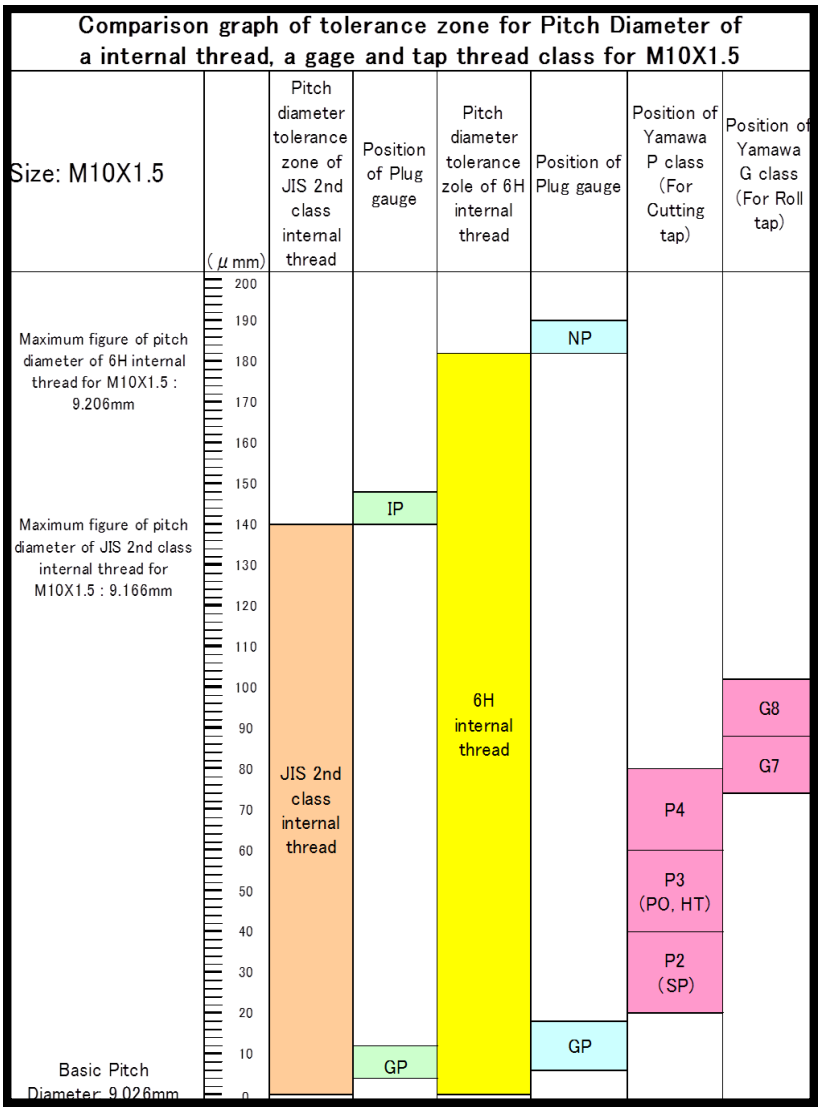
Type of thread relief	**Feed system**	**Type of tap based on work material being tapped**				
		Steels	**Stainless steels**	**Aluminum**	**Titanium**	**Nickel base alloy**
Eccentric thread relief	Specially for full synchronous feed	HFIHS	SUXSP	HFAHS	ZET-B	ZEN-B
		HFISP	SU2-SP	HFASP		
		HDISP	ZEN-B	HDASP		
		AUXSP				
		XSP				
		F-SP				
Con-eccentric thread relief	High spindle speed tapping: Full synchronous feed	AU+SP	SU+SP	AL+SP AL-SP		
	Low spindle speed tapping: Asynchronous feed	+SP				
	Both for Full synchronous feed and Asynchronous feed	SP	SU-SP	AL-SP		
		SP V				
		HC+SP HC-SP				
		E-SP				
Concentric-No relief	Both drilling machine and manual tapping	ISP				

The relationship between an internal thread, a tap and a gauge

Spiral Flute SP taps tend to cut oversize and are offered as a smaller thread class. Spiral Point PO taps have larger thread class because they tend to cut closer to tap size.
Roll taps deform or expand the material, so the thread class of roll taps are set close to the maximum value of 2nd class internal threads,

Yamawa recommends oversized taps for the following conditions:

- When material shrinking is expected due to material characteristics and geometries of the workpieces
- When coating is applied to internal threads after tapping, (a tap that is oversized by 4 times the coating thickness is recommended.)
- When material shrinking tendency is small and tool wear develops quickly due to the work material characteristics.
- When tapping is done with machines having rigid feed mechanism, there will be little thread enlargement in axial direction.
- Choose a tap that has as large of a thread class as possible.



Standard thread classes of each tap for M10X1.5 and the figure of pitch diameter. (Roll tap: Recommended tap thread class)

- SP P2 M10X1.5 P2=+20~+40μm
- PO P3 M10X1.5 P3=+40~+60μm
- HT P3 M10X1.5 P3=+40~+60μm
- ROLL G7 M10X1.5 G7=+76~+89μm

Selecting spiral fluted taps based on materials being cut.

※**Red colored tap**: Taps for fully synchronized feed

Material	Features of material	Recommendation by Yamawa	Tap feature	Surface treatment	Recommended speed (m/min)
Low carbon steels, Structural carbon steels Material signal: SS400 S10C S15C S20C	These materials have a high machinability rating but can often cause material welding over the tool when tapping internal threads.	ISP	For drilling/by hand	OX	~5
		SP OX	Oxided	OX	5~10
		E-SP	For soft structural steels	OX	5~10
		AU+SP	Coating	Coating	10~20
		F-SP	For high speed	Coating	15~25
		HFISP	For Ultra high speed tapping/ Horizontal tapping	Coating	20~50
		HFIHS	For Ultra high speed tapping/ Vertical tapping	Coating	20~50
Middle carbon steels Material signal: S25C S35C S45C	These steels are widely used in all industries and have a high machinability rating. This material is easily tapped with a general purpose tap.	SP	General purpose	-	5~10
		+SP	General purpose	-	10~15
		SP OX	Oxided	OX	5~10
		+SP OX	Oxided	OX	10~15
		AU+SP	Coating	Coating	10~20
		S-SP	For deep hole	OX	5~10
		LO-SP	For horizontal tapping	-	5~10
		MC-SP	Taps having coolant hole	-	5~10
		F-SP	For high speed	Coating	15~25
		HFISP	For Ultra high speed tapping/ Horizontal tapping	Coating	20~50
		HFIHS	For Ultra high speed tapping/ For dry tapping	Coating	20~50
High carbon steels Material signal: S45C S50C S55C	These materials can become harder as the carbon content increased. This increased hardness results in rapid tap wear. If you have heat-treated thermal refined materials, then select a tap designed for thermal refined steels.	HC+SP HC-SP	For high carbon steels/Bright	-	5~10
		HC+SP OX HC-SP OX	For high carbon steels/Oxide	OX	5~10
		AU+SP	Coating	Coating	5~10
		LO-SP	For horizontal tapping	-	5~10
		HFISP	For Ultra high speed tapping/ Horizontal tapping	Coating	20~30
		HFIHS	For Ultra high speed tapping/ Vertical tapping	Coating	20~30
		HDISP	For Ultra high speed tapping/ For dry tapping	Coating	10~20

Understanding the basics of Spiral Fluted Taps

Material	Features of material	Recommen-dation by Yamawa	Purpose/spec.	Surface treatment	Recommended speed (m/min)
Alloy steels Material signal: SCM415 SCM420 SCM435	Alloy steels are rather hard and tough, thus tap wear can develop quickly and become a problem.	SU+SP/SU-SP	For Stainless steels	OX	～10
		S-SP	For deep hole	OX	5～10
		AU+SP	Coating	Coating	10～20
		HFISP	For ultra high speed tapping	Coating	20～30
		HFIHS	For ultra high speed tapping	Coating	20～30
		HDISP	For ultra high speed tapping	Coating	10～20
		SU2-SP	For stainless steels	OX	5～20
Stainless steels Material signal: SUS303 SUS304	When tapping stainless steels, problems may occur like torn threads or material welding over the tap. Chips are rather hard and tended to be ex-tended in length. This can cause chip ejection problems.	SU+SP/SU-SP	Stainless steels	OX	～10
		SU-S-SP	For stainless steels with deep hole	OX	5～10
		SU2-SP	For stainless steels	OX	5～15
		ZEN-B	For Nickel base alloys	OX	5～15
Titanium alloys Material signal: Ti-6Al-4V	This type of material has low thermal-conductivity. The heat from tapping this material tends to be concentrated at the cutting edge of the tap. This easily brings about chip welding and the tap's rapid wear. This material can also causes chipping of the cutting edge of the tap. Tap break-age issues often occur from the chipped cutting edges.	**ZET-B**	For Titanium alloys	NI	5～10
Nickel base alloys, Inconel, Hastelloy, Waspaloy	These materials have a high de-gree of toughness. The machinabil-ity rating of these materials is very low. Chip welding problems or rapid wear on the tap occur easily occur. These materials have a tendency for a large shrinkage problems in internal threads. Tap breakage caused by material tightening is occurs easily.	**ZEN-B**	For Nickel base alloys	OX	5～10
Wrought aluminum, Aluminum die-castings, Material signal: A5052 AC4B-T6 ADC12	These materials have a melting point that easily causes chip welding problems on taps. They are soft and sticky materi-als. Unless you use the tap with high cutting performance and high geometry, you may easily create torn threads in your internal threads. Materials shrinkage problems occur easi-ly in internal threads.	AL+SP/AL-SP	For Aluminum	NI	10～25
		HFASP	For ultra high speed tapping	Coating	30～100
		HFAHS	For ultra high speed tapping	Coating	30～100
		HDASP	For ultra high speed tapping	Coating	20～50
Heat treat-ed steels (25～45HRC)	Steels that are heat-treated to a hardness over 40HRC may not thread well with a general purpose tap and you may have difficulties with tool life or tap breakage. In the case of volume tapping of this type of material, special purpose taps for thermal refined steels should be selected.	**ZET-B**	For Titanium alloys	NI	～5
		ZEN-B	For Nickel base alloys	NI	～5

Line up of Spiral Fluted Taps

Product symbol	Product name	Features	Size
ISP	 I series Spiral Fluted Taps for General Purpose applications.	The ISP taps are suitable for tapping materials like SPC and SS400 in small volume quantities. Recommended tapping speed should be lower than 5m/min.	M3~M10
SP	 Spiral Fluted Taps	The SP taps are general purpose taps widely used in many industries and can be applied in low tapping speed applications. Recommended tapping speed is 10m/min and lower.	M1.2~M48 Unified, Whitworth, Sawing Machines
+SP	 Plus series Spiral Fluted Taps	The +SP taps are general purpose taps widely used in all industries that can be applied in middle tapping speed applications. Recommended tapping speed is 13m/min and lower.	M2~M12
XSP	 X series Spiral Fluted Taps	The XSP taps demonstrate excellent performance in high efficiency CNC machining centers with high precision tooling. With Improved run-out tolerance and shank circularity throughout the entire tap dimensions, the XSP assures high precision tapping. Recommended tapping speed is 10 - 17m/min.	M6~M12
SP OX	 Spiral Fluted Taps, Oxided	The SP OX taps have an oxidized surface to protect against chip welding problems in ferrous materials. We recommend their use with insoluble oil.	M1.4~M36
AU+SP	 Spiral Fluted Taps, Coated.	The AU+SP taps are TIN coated and should be selected for tapping in the middle to high cutting speed ranges. Recommended tapping speed is 10-20m/min.	M2~M20
AUXSP	 X series Spiral Fluted Taps, Coated.	The AUXSP taps are demonstrate excellent performance in high efficiency CNC machining centers and high precision tooling. With Improved run-out tolerance and shank circularity throughout the entire tap dimensions, the XSP coated assures longer tool life. Recommended tapping speed is 10-25m/min.	M6~M12
SU+SP SU-SP	 Spiral Fluted Taps for Stainless Steels	The SU+SP/SU-SP taps are suitable for sticky work hardening stainless steels, chromium steels and molybdenum steels.	SU+SP: M1.4~M6 SU-SP: M8~M45 Unified Whitworth
SUXSP	 X series Spiral Fluted Taps for Stainless Steels	The SUXSP taps demonstrate superb performance on high efficiency CNC machining centers and high precision tooling. With improved run-out tolerance and shank circularity throughout the entire tap dimensions, these taps assure high precision tapping. They are suitable for sticky work hardening stainless steels, chromium steels and molybdenum steels.	M6~M12

Understanding the basics of Spiral Fluted Taps

Product symbol	Product name	Features	Size
SU2-SP	 Spiral Fluted Taps for Tough Stainless Steels	The SU2-SP taps have a spiral flute designed for tough stainless steels and are most suitable for blind hole tapping of stainless steels like SUS316 and SUS317.	M3~M24
S-SP	 Short spiral fluted taps for deep holes	The S-SP taps have a short thread portion to reduce friction and distribute lubrication better than a conventional tap. These spiral fluted taps are suitable in deep threaded holes where the depth length is more than 2.5 times longer than the nominal tap diameter.	M2~M45
E-SP	 Spiral Fluted Taps for Soft steels	The E-SP taps are suitable for soft steels like SS41, S25C and the like.	M3~M24
HC+SP HC-SP	 Spiral Fluted taps for High Carbon Steels	The HC+SP/HC-SP taps have a spiral flute designed for tapping high carbon steels like S55C similar materials.	HC+SP: M3~M16 HC-SP: M3~M30 Whitworth
AL+SP AL-SP	 Spiral Fluted taps for aluminum	The AL+SP/AL-SP taps are designed for tapping light aluminum cast alloys, aluminum castings and aluminum die casting. These taps assure stable tapping even in the area of high spindle speed cutting.	AL+SP: M2~M6 AL-SP: M6~M16 STI
LO-SP	 Low Spiral Fluted Taps	The low helix of these spiral flutes LO-SP taps break the chips down to a size that can be ejected smoothly. They are suitable for tapping high carbon thermal refined steels and alloy tool steels. They are very effective in horizontal tapping.	M3~M12
MC-SP	 Spiral Fluted taps with Internal Coolant Hole	The MC-SP taps have a through internal coolant hole (center through type), that supplies a satisfactory amount of oil to the exact cutting area. From the through coolant supply effect, these spiral fluted taps assure a long tool life and produce an internal threads with a good surface finish.	M6~M24
ZET-B	 Spiral Fluted taps for Titanium Alloys	The ZET-B taps have a spiral flute designed for tapping titanium alloys that have titanium as the main constituent. These materials are tough, light and heat resistant.	M3~M20
ZEN-B	 Spiral Fluted taps for Nickel Base Alloys	The ZEN-B taps have a spiral flute designed for tapping nickel base alloys that have nickel as the main constituent. Nickel base alloys are far superior to steels in corrosion resistance and in heat resistance.	M3~M20

Understanding the basics of Spiral Fluted Taps

Product symbol	Product name	Features	Size
F-SP	 Spiral Fluted Taps for High Speed Tapping	The F-SP taps have a spiral flute design applicable to high speed tapping in the range of 15 - 25m/min. When ran at low tapping speed the chips shape and chip ejection may become poor, which causes tapping problems.	M3~M12
HFIHS	 HFIHS spiral fluted taps for ultra fast tapping, for steels.	The HFIHS taps are applicable to ultra high speed tapping. These taps have center through hole for coolant delivery.	M6~M20
HFAHS	 HFAHS spiral fluted taps for ultra fast tapping, for aluminum	The HFAHS taps are applicable to ultra high speed tapping. These taps have a center through hole for coolant delivery. They are suitable for blind hole tapping of aluminum castings, and for vertical tapping.	M6~M20
HFASP	 HFASP low spiral fluted taps for ultra fast tapping, for aluminum	The HFASP taps are applicable to ultra high speed tapping. These taps have a center through hole for coolant delivery. They are suitable for blind hole tapping of aluminum castings, and work effectively in horizontal tapping.	M6~M20
HDISP	 HDISP spiral fluted taps for dry tapping, for steel	The HDISP taps are designed for mist or dry tapping. These taps have a center through hole for coolant delivery. They are suitable for blind hole tapping of carbon steels and alloy steels. These taps work well in both vertical tapping and horizontal tapping applications.	M6~M20
HDASP	 HDASP spiral fluted taps for tapping of aluminum under dry condition.	The HDASP taps are designed for mist or dry tapping. These taps have a center through hole for coolant delivery. They are suitable for blind hole tapping of aluminum castings. These taps work well in both for vertical tapping and for horizontal tapping applications.	M6~M20

Troubleshooting spiral fluted taps—offering the solution

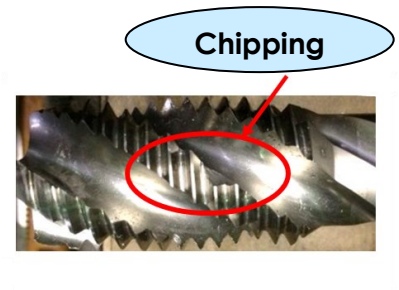
1. Problem: Chipping

Chipping on the full thread portion

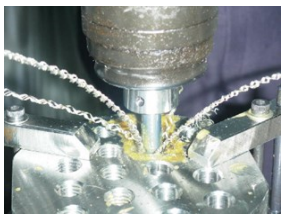
This problems is often seen in tapping with spiral fluted taps.

Cause

Chips get entangled in tap's threads, and these entangled chips get jammed in between the tap's threads and work materials. As the tap proceeds cutting forward, those chips push against the tap's threads and can cause chippings.



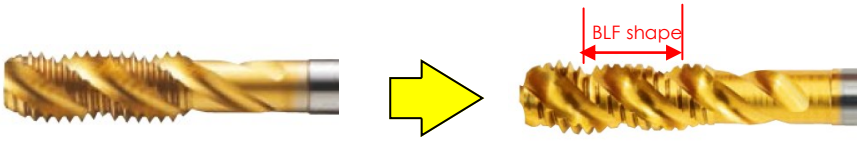
Good chip ejection



Poor chip ejection

Solution

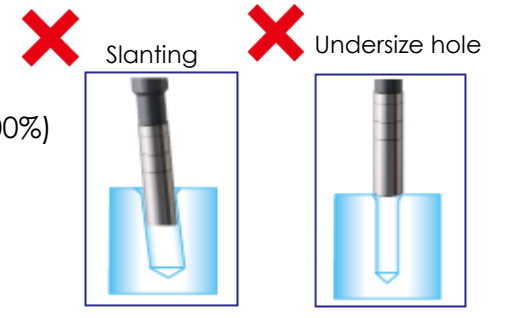
- Reduce the tapping speed to low end of recommended range.
- Choose the tap with higher helix spiral flutes.
- In horizontal tapping using CNC and M/C machines, if a spiral fluted taps is used, the problems can be caused by entangled chips that may expand up to the tapper's area, and result in chip clogging, chipping and tap breakage.
- To avoid these problems in horizontal machines an alternative would be to use Hand Taps or Low Spiral Fluted Taps (LO-SP). Low spiral fluted taps tend to prevent chips from expanding off during spindle rotation.



2. Breakage

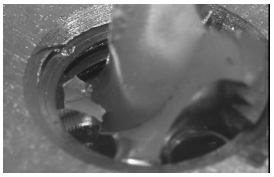
<Cause and solution>

- Confirm if bored hole is made to the proper size.
  (Check that the ratio of thread engagement is not beyond100%)
- Confirm that bored hole is not slanting.
- Confirm the workpiece is firmly fixed (Check clamping).
- In blind hole tapping, confirm that the tap does not hit the bottom of the hole.
  (Check that there is no trace of rubbing at tap's thread end.)
- Chip jamming
- Confirm if there is no welding over the tap.

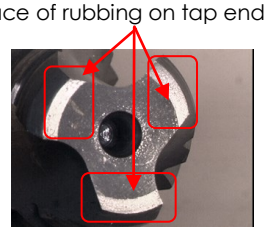


※Use Yamawa Check pin for checking the condition of bored hole.

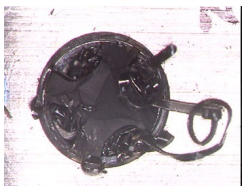
Breakage



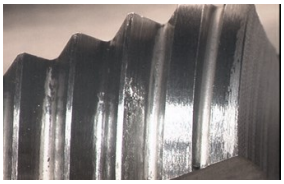
Trace of rubbing on tap end



Chip jamming



Welding



3. Class

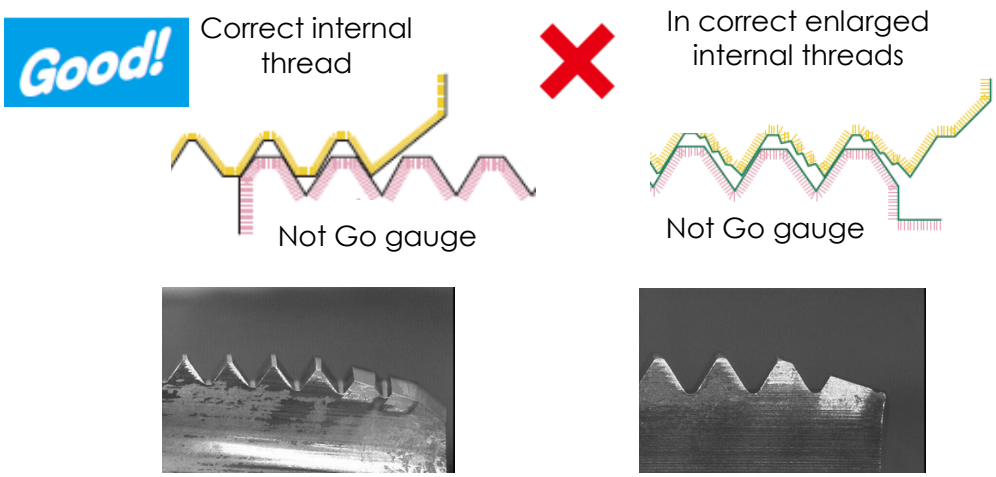
Problem: Enlarged thread class

Cause

If the thread class feels incorrect, feed the used tap manually into the threaded hole again. If you can feel rattling between the tap and the internal threads, it means tapping has not been done in the correct feed. In this case, poor feed would be the cause of trouble.

Solution

It will be necessary to properly adjust the feeding balance.
A combination of full rigid type machine and fixed holder is recommended.
When the machine does not have the above mechanism, adjust the feed-speed of main spindle.



Problem: Material shrinkage

Compared with thread enlargement problems, shrinkage problems occur less frequently. Shrinkage of internal threads can happen.
(1) When the material itself tends to shrink, such as non-ferrous materials like titanium, magnesium and aluminum plus plastic materials.
(2) When the wall of workpiece material is so thin that the diameter of an internal thread can become distorted.
Generally oversized taps that are designed to take material shrinkage volume into account and should be selected.
The following can also prevent the Go and NG gauge from entering the hole correctly:

1. Material welded to the threads.
2. Chips left inside the internal threads.
3. Damaged thread around the entrance of the hole.
4. Torn threads.

It is vital re-check the cutting performance of the tap and the condition of chip ejection prior to gaging.