No.002 Main causes of a bad surface finish on PT pipe threads *Pipe taps*

【Question】

Why does a Taper Pipe Tap Rc (PT) have so many Torn surface finish and Thread Chatter problems ?

【Answer】

Because the chip thickness produced by a Taper Pipe Tap Rc (PT) is different from that of a Parallel Pipe Tap Rp (PS).

When tapping a metric thread or when tapping a parallel pipe thread, as shown in Drawing-1, only the tap's cutting chamfer portion cuts the threads and the full thread portion of the tap just plays the role of guiding the tap in the threads.
When producing Rc(PT) threads, as shown in Drawing-2, an Rc(PT) tap will cut threads with a 1/16 taper. This means all threads of the tap, including the full threads, cut the Rc(PT) taper threads.
Accordingly, the chip thickness of each full thread becomes very thin. In soft materials as SS400 (A36) or low carbon steels, the cutting edge does not work well (it slips), and can cause Surface Tearing-Off and Thread Chatter problems.

Drawing-1 Cutting portion of a tap for parallel pipe threads

The thread cutting is done by only the chamfer portion of the tap.

Only the chamfer portion does the thread cutting operation.

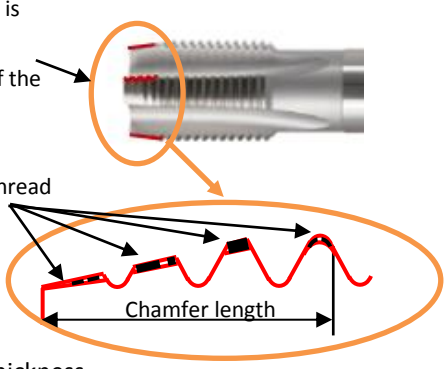
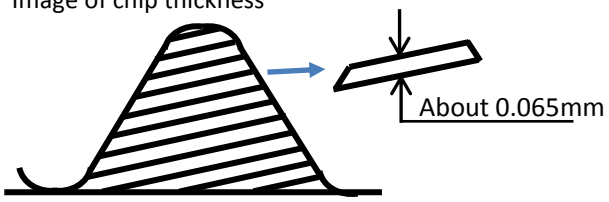


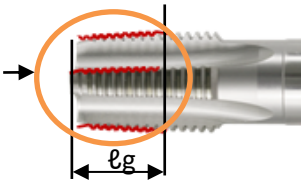
Image of chip thickness



Chip thickness on HT a 4flutes Rp(PS) 1/4-19 3.5 thread chamfer ----- about 65µm

Drawing-2 Cutting portion of a tap for taper pipe threads

The thread cutting of a taper pipe thread is done by the full thread portion of the tap.



All the threads do the cutting operation on a taper pipe thread.

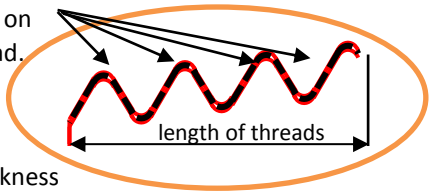
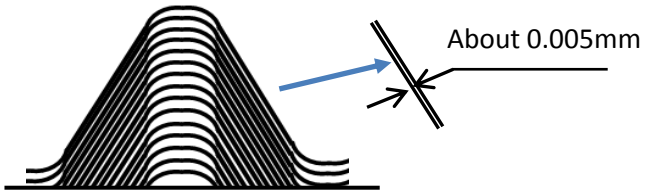


Image of chip thickness



Chip thickness on HT 4flutes Rc(PT) 1/4-19 ----- about 5µm

A Parallel Pipe Tap Rp(PS) cuts parallel threads, this means only the chamfer portion does the cutting operation.
Accordingly, the cutting length on the tap is determined by taps chamfer length.

A Taper Pipe Tap Rc(PT) has threads with a 1/16 taper. The tap's full thread length cuts thin and incrementally thread grooves to complete threads.

Interrupted Taps for Taper Pipe Threads

Long (ℓg) Type : INT-PT Short (ℓg) Type : INT-S-PT

INT-PT

INT-S-PT

I've noticed how thin the chips are with a Taper Pipe Tap!
The INT-PT taps and the INT-S-PT taps have interrupted threads. The chip thickness become 2 times larger. This is quite effective in reducing torn surface finish and Thread Chatter problems.