# Square Peg, Triangular Hole: Holding a Small Tap in a Drill Chuck, Version 1.1

## By R. G. Sparber



The best time to run a tap is right after the tap hole has been drilled. All is in alignment, and the chuck can drive the tap. Well, almost true.

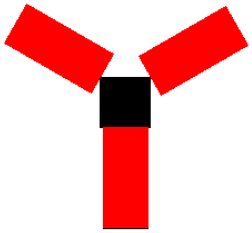
You may quickly run into problems. The tap, mounted in its handle, can't fit between the chuck and the part.

If you planned ahead, there would be room. Then you could mount a pointed rod into the chuck that engages the hole in the top of the tap handle. This would align the tap in the hole. Then all would be well?

You need a third hand to feed the spindle down if you use both hands to turn the tap. Alternately, you could loosen the chuck a little and let the guide rod drop down as the tap feeds in. The jaws must be snug enough for alignment, while the rod must be heavy enough to overcome the friction. When we remove the tap and its handle, the guide rod tends to drop out of the chuck and dive for some unknown corner of the shop.

What if we fitted the tap into the chuck? Sounds good but doesn't work because both the tap and the chuck jaws are hardened. There is no grip, so the tap slips as it tries to cut threads. If you tighten enough, the jaws will be damaged. But maybe we are on the right track.

What if we held the square part of the tap's shank in the chuck's jaws. Wouldn't that hold securely?



A square peg in a triangular hole is not going to be centered and won't hold. But maybe we are still on the right track.

I need to make an adapter triangular on the outside and square on the inside. Such an odd shape does not lend itself to cutting on a mill or lathe.

Can we relax the requirement a bit? Using some copper wire, I was able to form it close enough to transmit rotational force and be reasonably well centered.

I started with some 18-gage solid copper wire.

Then I wrapped it around my 6-32 tap[2] about ten times.

After trimming the ends, I slid the coil up to cover the square part of the shank.

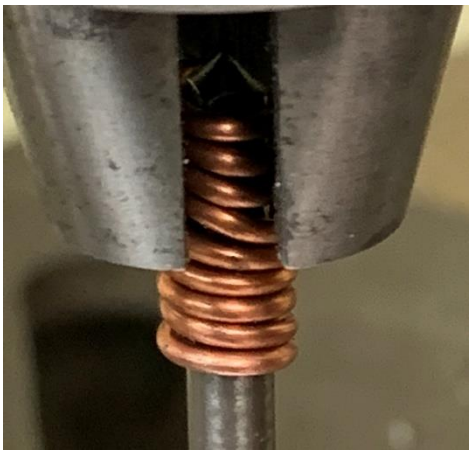
Next, I positioned my part and put the tap drill in my drill press chuck.

After drilling, I removed the drill and opened the jaws to accept the modified tap.

Next, I placed the tap's point in the hole and lowered the chuck until the square section of the tap's shank was inside. With the downfeed locked, I tightened the jaws.

It took a few turns of the chuck key as the copper wire deformed to fill the voids.

[2] Use small gauge wire for smaller taps. The goal is to pick a wire diamerter slightly larger than the gap between shank diameter and square section.



It looks like some of the round part of the tap's shank was caught in the chuck's jaws, but it still held.

After introducing some tapping fluid into the hole, I fed the quill down with one hand until it contacted the part. I then used the other hand to turn the chuck one revolution. The tap was then bedded enough to counteract the upward force of the quill retraction spring. It was then easy to turn the chuck and cut the threads with one hand.

This arrangement has a few advantages.

- the part is not disturbed, so any follow on drilling can be done with the best alignment
- the tap is well supported
- turning the tap with the chuck provides sufficient leverage
- only one hand is needed
- the upward force from the quill retraction spring is not noticeable while tapping
- when backing out, the spring lifts the tap away when it clears the last thread[3]

When finished, I can slide the copper sleeve off.

[3] For smaller taps, you may need to hold the chuck down while backing out the last few threads to prevent tearing.

The next time you need this tool, slide the copper sleeve back onto the tap.

Place the point of the tap in the hole, lower the jaws, and lock the vertical position. Slowly rotate the tap's shank with one hand while gently closing the jaws with the other hand. The jaws will find the flat spots. Then fully tighten the chuck.

I drilled a tap hole with my #4 drill as a further experiment. Then I used this same copper wire around the shank of a sharp ¼-20 spiral tap. This assembly was placed in my drill press chuck and tightened as hard as possible with the key. I then used a rod in one of the key holes to turn the chuck and had no problem tapping through the above block of aluminum.

This experiment demonstrates that a surprisingly large amount of friction is developed between two hardened surfaces if a layer of copper exists between them.

I plan to try this trick on all of my taps.

I welcome your comments and questions.

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