Making a Round Drift

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Lesson #24. Unit: Drawing Down

Definition: Reducing the cross-section of a bar.

Intent: The student will learn how to make and control two round tapers from a round parent bar by making a round drift.

Tools: Basic forging tools, 1/2" V-tongs, (or 1/2" bolt tongs), 3/8" V-tongs, (or 3/8" bolt tongs).

Material: 1/2" x 3 1/2" round stock

Drift definition: A drift is a tapered tool for enlarging, tapering, or dressing a hole, to a desired size. Its shape is dependent on the procedure. Some examples of drifts are:

1.) A round or square-bodied drift used to size an existing hole to a specific diameter/width throughout the length of the hole. In this case, the drift will have two tapered ends, so when the major diameter/width of the drift has sized the hole, the drift can easily exit the hole. The length of the driving taper (or trailing taper) should be longer than the thickness of the bar so that the drift does not get stuck. The driving taper also allows for the inevitable mushrooming that will occur from repeated hammer blows.

2.) A drift for a pick eye is tapered on one end only, and is not driven through the hole. This leaves an evenly tapered eye.

3.) A drift for a hammer-head eye is also tapered on one end only. However, in this case, the drift is driven from both sides to create an hourglass-shaped hole.

4.) Yet another drift is used as an anvil. Once inserted into the bar, it allows the sides of the bar to be forged without collapsing the hole, i.e., the hole in a latch handle that receives the thumbpiece.

In this lesson, we will make a drift as mentioned in example #1. The taper initially inserted into the hole to be drifted needs to set itself in a stable position when placed into the rough hole so as not to require peripheral tools to hold it vertical. Usually a long taper provides this stability. The drift should be made as short as possible, as this will shorten the time it takes to drive it through the piece, and will to some degree prevent the drift itself from buckling. (See drawing #1 of a 1/2" round drift.)

The drift we will be making in this lesson will be for sizing a 1/2" diameter hole in bars up to 1 3/8" thick. It will have a long taper (the leading end) of 2 1/2", a mid-section of 1", and a short taper (the driving end of the drift) of 1 1/2", for a total length of 5".

Step #1

In this step, you will be forging the leading, tapered end of the drift. Your goal is to initially forge a 2" square taper, with straight, flat facets. Using the 1/2" V-tongs, place the bar in the fire and heat 3" of the 1/2" round bar to yellow.

Caution: Do not leave the tongs in the fire, as they will get hot and will distort when forging.

Note: Sometimes it can be tricky to remove a short bar from a coal or charcoal fire. The tongs used to hold the bar can be clumsy, as bits of coal or charcoal block a clear path to grab the bar. If you have a pair of pick-up tongs, (tongs with narrow, flat bits) they may come in handy to pull the bar from the fire. Once you have the bar out of the fire, quickly change to the appropriate size tongs for the job.

With your 1/2" V-tongs, place the end of the bar on the face of the anvil at a 10-degree angle. With the hammer’s face angled at 20 degrees, strike the end of the bar two or three times. (See drawing #2a, and 2b.)

#2A. left. Hammer angle to the bar is equal to the bar angle to the anvil for an even taper.

#2B. right. Damage may occur to the anvil face if hammer blows land beyond the end of the bar.

Next, tumble the bar in place 90 degrees and strike two or three times. Repeat this action several times, working on the bar, until the end reaches about 5/16" square. Once the square end has been established, lay the taper flat on the anvil and work the taper back a bit, so the taper ends up at 2" long. The intent is to keep the cross-section as square as possible during this process. Continue working until the facets are straight, and the corners sharp.

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3. Drawing down one dimension too much before rolling the bar may result in the material folding upon itself.

Caution: Drawing the bar down too thin in cross-section will cause the bar to fold rather than extrude. (See drawing #3 of a bar drawn down too thin.) At this stage, the end of the taper should be 1/4" square.

Step #2
Your goal is to now forge an octagonal taper, with eight equally tapered facets.

Heat 3" of the end of the bar to bright yellow. Be careful not to burn the now-narrower tip. Place the taper of the bar flat on the face of the anvil, but this time place the bar on the diamond (see drawing #4). Begin forging the sharp corners, starting from the end, and coming back towards the main body of the bar. Your blows should be light towards the end of the taper, and gradually increase in force towards the middle of the drift. Tumble the bar 90 degrees as you did in step one, until the taper has eight equally tapered facets. You should be able to do this in one heat. (See drawing #5 as to how the bar should look at this point.) The end of the taper should be 1/4" across the facets.

Step #3
Your goal in this step is to forge the octagonal taper into a round taper. Heat 3" of the end of the bar to bright orange. Place the bar so one of the eight corners of the taper lies flat on the face of the anvil. Begin to lightly forge each corner its entire length, then indexing to the next (right or left...it is up to you which direction.) At some point, the facets will be too numerous and small to define.

When this happens, simply roll the bar left to right, right to left, repeatedly while striking light but rapid blows of the hammer on the very end of the taper first (so you utilize the heat in the bar where it cooks rapidly.) Watch for high spots. Lightly tap them with the hammer, not too hard as you will create new facets and high spots. Work your way up into the larger diameter of the bar until you have a smooth and round finish, free from facets and high spots. Because in this heat your intent is not to make major changes to the bar but rather refine the surface, it is acceptable to work well into a black heat. Your taper should be 2 1/2" long. The end of the taper will be slightly less than 1/4" in diameter.

Step #4
In this step, you want to forge the short taper on the driving end of the drift, which will be 1 1/2" long. You will utilize what you learned in step one, but alter the angle of the bar to the face of the anvil more severely than in step #1 to 20 degrees. The steeper angle will help to produce a shorter taper. The hammer blows should begin at 40 degrees.

Heat 3" of the opposite end of the bar to bright yellow. In this heat, place the end of the bar at the far, rounded edge of the anvil. Note: Because you are working at a more severe angle, you may risk accidentally hitting the face with the hammer. Holding the bar at the far edge of the anvil reduces the chances of marring the anvil face with an errant blow. (See drawing #6A and 6B) As you did in step one, tumble the bar 90 degrees (right or left) after three or four blows of the hammer, thereby forming the initial square taper. Once the taper's end reaches about 5/16" square, with a taper length of 1 1/4" long, place the bar on the diamond, and proceed to forge the square taper into an octagon as you did in step #3, with eight equally tapered facets. The end of the taper should be 5/16" in diameter.

#6A, left. Forging a taper at the far edge of the anvil with the bar held at the median angle between the hammer and anvil.

#6B, right. Hammer face and anvil edge may be damaged if the end of the bar is not kept at the edge of the anvil.

In the same heat, forge this short octagonal taper into a round taper, similarly as you did in Step #4. This step should complete shaping the drift.

Step #5
This step is only necessary if the drift is shaped incorrectly along its axis.

Inspect your drift to see whether the tapers are concentric around the axis of the main (middle) body of the bar. (See drawing #7 of a drift with misaligned tapers.) Roll the drift on the
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#7. Misaligned tapers— not concentric along the long axis.

Anvil face. If the tapers wobble, you need to align them to the center of the drift. You might also be able to see the error by sighting down the drift as you would a rifle barrel.

Next, determine where the taper(s) need to be adjusted. Lay the errant taper across the hardy hole, with the straighter edge facing down. Tap the taper with your hammer head over the hardy hole once or twice. This should bend the drift slightly to correct the problem. Re-inspect and repeat until the error has been corrected. This can be accomplished cold, as long as you haven’t quenched the bar at a high heat.

(Refer to drawing #1 to see how the finished drift should be shaped, with the points of the taper aligned with the axis of the middle.)

Note: When a bar cools, it shrinks. There will also be some shrinking in the hole that was drifted. For instance, if your hole needs to be 1/2” in diameter, and no less, you will need to slightly increase the diameter of the middle of this drift by upsetting it. Do this before you make the tapers; otherwise, you will distort them.

**Step #6**

Do not leave the end of the driving taper rugged, as the hammer will not transfer the energy efficiently to the drift. Dress the driving taper end of the drift to a flat or to a crown. Crowning can insure that the drift drives in more reliably, with less deflection from an errant blow. A crown also resists mushrooming.

**Targets:**

1. The drift is to be free from facets.
2. The drift is to be 5” long.
3. The short taper is to be 1 1/2” long, and 5/16” in diameter at the end.
4. The long taper is to be 2 1/2” long, and 1/4” in diameter at the end.
5. The drift is to have 1” of the middle at 1/2” in diameter.
6. The drift’s tapers are to be concentric around the axis.
7. The end of the driving taper is to be dressed.

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# Easy T-Nuts

**by Brian Gilbert**

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I recently had to make a number of T-nuts for my milling machine, and I came up with a simple setup for drilling a number of parts accurately and quickly. This is very basic to those of you with machine shop experience, but it might help those of us who are more in the beginner’s category... myself included.

I made a drill press fence that is nothing more than a small strip of wood screwed to a piece of plywood. It’s easily clamped to the drill table with welding clamps, and also easily renewed when it gets full of holes. I added a small piece of metal on one side to act as a stop. Using this fence and the stop, I aligned the setup using an existing T-nut. A tiny drill bit chucked in the press served as a locator, and I moved the base around until the drill bit appeared centered in the existing hole. I then marked the fence with the length of the finished piece.

I chucked in the correctly sized drill bit. A short length of 1/2” x 3/16” stock was finished on one end and placed on the fence, and then drilled. A sharp drill bit helps keep the tip from wandering, and it was drilled without a centerpunch.

After drilling, the piece was marked with a square. Since these T-nuts are very small, they were cut using a bolt cutter. This also helped chamfer the edges, reducing cleanup time.

Once cut, the sharp edge was sanded off with the belt grinder, the bar dressed, and the whole process repeated. I had eight T-nut blanks in no time.

But they had to be tapped, and I’d heard of a high-speed way for this as well. A bar of 1/2” square stock was drilled just undersize of the tap. This became my tapping guide. I used the same setup in the drill press, just changed the bit. Next, I drilled a clearance hole in a 1/2”-thick piece of wood and clamped this in my vise. The guide was clamped over the T-nut blank, with a spacer on the back of the guide to keep it square. Then I ran the tap into the whole pile... these small holes would usually tap within ten seconds. Occasionally I’d have to reverse the drill to clear the chips, but the chuck slipped at just the right moment to prevent breaking the tap... just like an expensive tapping head. It worked like a charm!