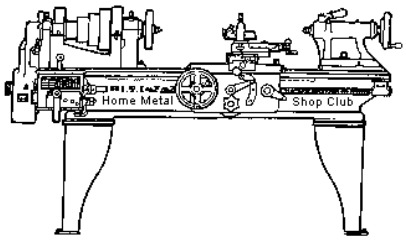
June 2019
Newsletter

Volume 24 - Number 06



http://www.homemetalshopclub.org/

The Home Metal Shop Club has brought together metal workers from all over the Southeast Texas area since its founding by John Korman in 1996.

Our members' interests include Model Engineering, Casting, Blacksmithing, Gunsmithing, Sheet Metal Fabrication, Robotics, CNC, Welding, Metal Art, and others. Members enjoy getting together and talking about their craft and shops. Shops range from full machine shops to those limited to a bench vise and hacksaw.

If you like to make things, run metal working machines, or just talk about tools, this is your place. Meetings generally consist of ***general announcements***, an ***extended presentation*** with Q&A, a ***safety moment***, ***show and tell*** where attendees share their work and experiences, and ***problems and solutions*** where attendees can get answers to their questions or describe how they approached a problem. The meeting ends with ***free discussion*** and a ***novice group*** activity, where metal working techniques are demonstrated on a small lathe, grinders, and other metal shop equipment.

President	Vice President	Secretary	Treasurer	Librarian
Brian Alley	*Ray Thompson*	*Joe Sybille*	*Emmett Carstens*	*Ray Thompson*
Webmaster/Editor	Photographer	CNC SIG	Casting SIG	Novice SIG
Dick Kostelnicek	*Jan Rowland*	*Martin Kennedy*	*Tom Moore*	*John Cooper*

This newsletter is available as an electronic subscription from the front page of our website. We currently have over 1027 subscribers located all over the world.

About the Upcoming 13 July 2019 Meeting

The next general meeting will be held on 13 July at 1:00 P. M. at the Bayland Community Center, 6400 Bissonnet Street, Houston, Texas 77074. *John Hoff* will give his presentation, originally slated for June, on Punches and Dies.

Visit our website for up-to-the-minute details, date, location maps, and presentation topic for the next meeting.

General Announcements

Videos of recent meetings can be viewed on the HMSC website.

The HMSC has a large library of metal shop related books and videos available for members to check out at each meeting. These books can be quite costly and are not usually available at local public libraries. Access to the library is one of the many benefits of club membership. The club has funds to purchase new books for the library. If you have suggestions, contact the Librarian *Ray Thompson*.

We need more articles for the monthly newsletter! If you would like to write an article, or would like to discuss writing an article, please contact the Webmaster Dick Kostelnicek. Think about your last project. Was it a success, with perhaps a few 'uh ohs' along the way? If so, others would like to read about it. And, as a reward for providing an article, you'll receive a free year's membership the next renewal cycle!

Ideas for programs at our monthly meeting are always welcomed. If you have an idea for a meeting topic, or if you know someone that could make a presentation, please contact Vice-President Ray Thompson.

Recap of the 8 June 2019 General Meeting

By *Dick Kostelnicek*, with photos by *Jan Rowland*

16 members attended the 1:00 P.M. meeting at the Bayland Community Center, 6400 Bissonnet Street, Houston, Texas 77074. There were 3 guests in attendance, Mrs. Alley, (Brian's Mom) , Tommy Taylor, and Robert Mate. Robert Mate donated a trove of Home Shop Machinists magazines to anyone willing to take them home. There are 33 members in good standing with the club.

The members discussed what should be placed on the back of the club's 3x5 inch business card. One suggestion was a diagram and table of common imperial screw dimensions.

Brian Alley showed a picture of a *lathe dog* --- a 4-leged animal with his paws on a lathe's carriage. It was mentioned that the lathe dog got its name from the bent tang that engages a lathe's drive plate slot. As in --- bent like a dog's leg (right illustration).

President Brian Alley led the meeting (above right photo)

Presentation

The planned presentation by John Hoff was put off until the coming July meeting due to his recent illness.

Brian Alley showed pictures illustrating the steps he took to repair a wheel pivot on a tractor (right photo). He bored out the upper and lower concentric pivot recesses and inserted new bushings, one of which was internally threaded. The new bushings were held in place by MIG welding. A commercially obtained swivel pin, inserted through the bushings, completed the repair. Brian was pleasantly surprised that the concentricity of the two bushings held to precise alignment after welding.

Safety Moment

A safety video reminding us not to present loose clothing to a powered machine tool having moving parts was shown. A member also commented on removing jewelry such as rings prior to using machine tools.

Show and Tell

John Cooper related that the lab jacks (right photo) that he described at the previous meeting were instrumental in assembling a 50 lb. table.

Richard Douglas showed a tool holder for a shaper that he machined (left photo).

One of our members showed a blow torch that was turned into a lamp (right photo)**.**

Problems and Solutions

Jan Rowland related how a tiny crack in a flexible plastic air line drove him nuts by the cycling of his shop compressed air system till the leak was discovered.

A member indicated that if the lathe chuck and lead screw are rotating in the same direction, then the lathe will cut right hand screw threads.

It was mentioned that twist drill bits are not hardened all over. The shanks are usually soft, hence, they can be turned down so that a large diameter bit can be held in a chuck that would have been too small to accommodate it.

When a drill's diameter is much larger than a metal plate that is being drilled, the resulting hole often is not round. Using a succession of larger and larger pilot holes was suggested as a solution. Another member suggested using a thick piece of cloth between the drill bit and plate to contain the drill bit to the hole that it was drilling. Many members objected to the safety of this procedure. For a discussion of this procedure, refer to this web link. Remember, all that is on the web is not all that is true!

Articles

Making a Taper on a Lathe

By *Martin Kennedy*

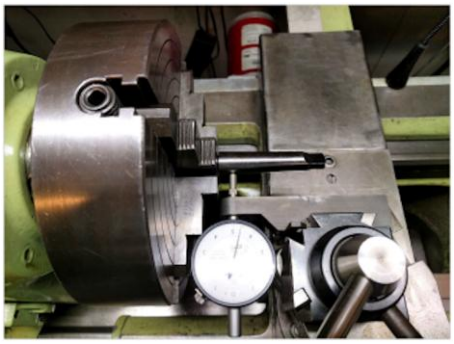
A question came up at the last HMSC meeting about how to make a taper on a lathe without having a taper attachment or a CNC lathe. There are many ways to do this. Here are four of them:

Making a taper using another taper as a pattern

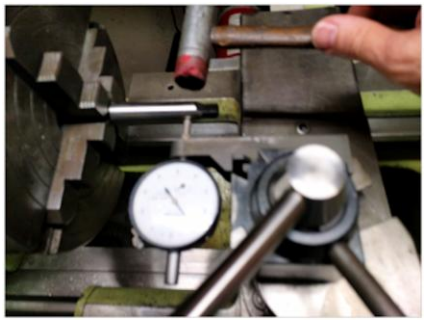
You can use this method if you already have a taper of the correct size, and want to make another one. For examples of these methods, I'll assume you want to make a Morse #2 taper, a very common size for home machinists.

Method #1

Take the taper that you will be using as a pattern and chuck it in your lathe. For the pictures, I used a 4 jaw chuck. You can also use a 3 jaw chuck or a collet chuck. Whatever chuck you use, it is important that the reference taper is dead true in the chuck.



Use a dial gauge at the root of the taper to measure concentricity. My dial gauge is marked in units of 0.0001", and I find this is allows me to get high accuracy. The taper copy you are going to make will only be as accurate as the original, so if you align to 0.001", the copy may not fit as well as you'd like.



Turn the taper by hand, and make sure it's as perfectly aligned as you can get it. I used the 4 jaw so that I could get it within +/- 0.0001". A collet chuck is also good here. If you use a 3 jaw chuck, you may have to shim the taper to get it accurate. I find that cut up aluminum cans, the metal strips inside a destructible anti-shoplifting label or even thin cardboard can be used for shims.
Once you have the root aligned, check the other end of the taper. It'll likely be slightly out of alignment. Even my collet chuck is regularly off by about 0.002" on this end. Use a small plastic hammer to gently tap it in to alignment.

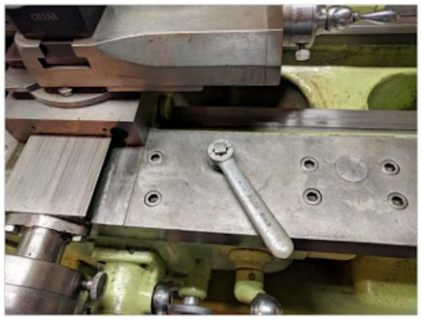
Go back and check the root end. It may have moved slightly, and you'll need to align it again. After it's in line, recheck the other end. Continue to go back and forth until both ends are aligned.

Now it's time to get the compound parallel to the taper. Crank the compound out so that you have enough stroke to machine all of the taper. If the taper is longer than the stroke, that's OK. It'll just take more than one setup to cut it all.

Look up the taper in Machinery's Handbook. For the Morse #2 taper, Table 1b, here are the dimensions. We don't necessarily need these numbers for this method, but we will need them for other methods. In fact, one of the advantages of using this method is that you can make copies of unknown or proprietary tapers without having to make measurements.

Taper / Inch: 0.04995
Diameter end of socket: 0.700
Small end of plug: 0.572
Depth of hole: 2 39/64 (2.6094)

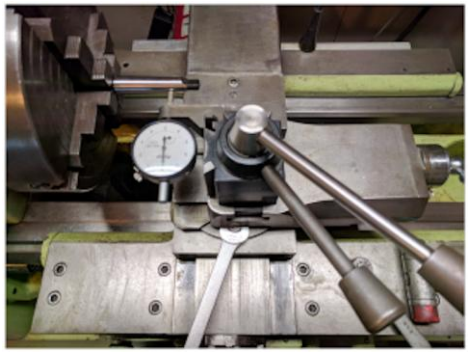
To calculate the taper angle, find the arctangent of ½ x taper / inch. (We need taper / inch based on the radius. The number given is based on the diameter, so we need to halve this number) ArcTangent of 0.04995/2 is 1.432 degrees, so set your compound to about 1.4 degrees to start with. If you don't want to do the math, just eyeball it!



First LOCK THE SADDLE! You will be making this taper by moving the cutting tool using only the compound, not the carriage. Accidentally moving the carriage will ruin your part.

Attach your dial gauge to the compound. I have a fancy one that I like (Plans here), but a magnetic one will work fine. Using the crank on the compound, run the gauge back and forth along the reference taper. If the gauge moves, the compound is not in alignment with the taper. Tap the compound lightly with a hammer, and measure again. Continue to do this until the gauge shows +/- 0.0001"

Now you're ready to cut the copy. Mount your stock in the chuck. It needs to be straight, but since we're cutting it to size, it's not critical. Crank the compound to move the cutting tool back and forth (this is tiring). You'll likely not be able to use the tailstock for support, so take lighter cuts.



If the stroke of the compound is not long enough, you'll need to release and reset the saddle lock and move the saddle further along the taper. Cut until it blends in to the original cuts.

Measure the large end of the taper, and cut until it matches specifications. Note that Machinery's Handbook gives a diameter that's not at the end, but a little back. I measure the diameter at the end of the reference taper, and cut until I hit that.

Method #2

For this method, we'll be moving the tailstock and cutting along a straight line using the saddle feed. This method is good for long tapers, and you won't have to move the saddle.

The very first thing to do is to make the stock that you'll use to make the copy. Cut centers into both ends. You want to do this before you move the tailstock! After you move the tailstock, you won't be able to drill holes on center. The stock piece must be exactly the same length as the original, including the countersinks, or the angle will be wrong. This is a disadvantage of this method, since you must have enough room to use a lathe dog, and the lathe dog may overlap some of the desired taper.

Mount the reference taper between centers. Centers are required, as we'll be moving the tailstock away from the centerline, and when making cuts, the stock will wobble in relation to the live or dead centers.

If you check the concentricity, you should not have to adjust anything. If the alignment is off, it means that the centers are not cut exactly in the center, and you'll need to address this somehow, such as using a different reference taper or redrilling the centers.

Loosen the alignment bolt on one side of the tailstock, and tighten the opposite one. Check the surface of the taper with your dial indicator while moving the carriage along the reference taper. Continue to adjust the tailstock until the indicator shows no movement along the length of the taper.

Now remove the reference piece and mount your stock on the lathe. You'll need a lathe dog to turn the stock while making the cut. Cut using the carriage until the large end is the correct diameter as in Method #1.

When you finish making the copy, you'll need to reset the tailstock using a tailstock alignment bar. If you don't have a bar, here's another method.

Making a taper from scratch, without having a pattern
Method #3

The next two methods are similar to the two above, but do not involve having a reference taper.

This method as analogous to Method #1. Start with your stock mounted in the lathe. Take a skim cut or two so that it is perfectly concentric.

Roughly set the compound to the correct angle. LOCK THE SADDLE. Put a dial indicator on the toolpost, and also another between the ways or carriage and the toolpost so you can measure how much the compound moves. Set the compound to the approximate angle needed (~1.4 degrees for

Morse #2). Figure out how much the reading should change over a designated distance. For the Morse #2, we know that it should change ½ x 0.04995", or 0.0250" over one inch. For more accuracy, you can look for 0.04995" over 2". Crank the compound back and forth, and keep adjusting the compound as you did in Method #1 until you get the calculated reading.

Note: the distance the tool post moves along the axis of lathe rotation is the one that you want to measure. If you measure the distance the compound moves when you crank it, you are measuring the length along the taper. These are slightly different. However, for small angles (like 1.4 degrees), the difference is negligible. If you want to calculate the actual length required along the compound, it is (½ x TPI) / cos(arctan(½ x TPI)) where TPI is the taper given in Machinery's Handbook.

Cut taper similar to Method #1, except use the carriage feed instead of the compound.

Method #4

This method is analogous to Method #2, and is good for long tapers. Put your stock between centers with a lathe dog. Take a skim pass to assure concentricity. Offset the tailstock similar to Method #2. Measure the offset as in Method #3. Cut using the carriage feed. Remember to reset the tailstock offset when you are through.