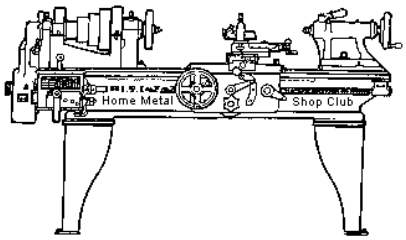
June 2014
Newsletter

Volume 19 - Number 6



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
Vance Burns	*Norm Berls*	*Joe Sybille*	*Emmett Carstens*	*Ray Thompson*
Webmaster/Editor	Photographer	CNC SIG	Casting SIG	Novice SIG
Dick Kostelnicek	*Jan Rowland*	*Dennis Cranston*	*Tom Moore*	----------

This newsletter is available as an electronic subscription from the front page of our website. We currently have over 642 subscribers located all over the world.

About the Upcoming 12 July Meeting

The next general meeting will be held on 12 July at noon at the South Houston Branch Library in southeast Houston TX. *Phill Lipoma* will give a presentation about a "Large Radius Tubing Roll".

Visit our website for up-to-the-minute details, date, location, 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. The library is maintained by the club librarian, Ray Thompson. These books can be quite expensive, and are not usually available at local public libraries. Access to the library is one of the many benefits of club membership.

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 'ugh ohs' along the way? If so, others would like to read about it. At the September, 2012 HMSC board meeting, the board elected to waive membership fees during the next membership renewal cycle for those providing newsletter articles.

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

The club has funds to purchase new books for the library. If you have suggestions, contact the librarian.

Recap of the 14 June General Meeting

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

Club president *Vance Burns* led the meeting held at the Fairbanks Branch Library in Houston, TX. Twenty members and one visitor, Lary Handcock, attended the meeting. Vance requested volunteers to serve on the novice SIG committee. The annual election of officers was held and all positions remain the same as present. Dan Harper, our librarian, will be succeeded by Ray Thompson. Thanks to Dan for a fine job over many years!

Presentation

J. R. Williams

Club members *J. R. Williams and Martin Kennedy* gave a joint presentation on “Ten+ Cheap and Useful Things for the Mill”. Their slides can be viewed at this web link. They concentrated on items that don’t cost a great deal such as:

- Speed handle for the milling vise
- Magnetic held Plexiglas chip shield
- Adjustable vise stop
- Long work outboard support

Martin Kennedy

- Jaw clamped lift handle to hoist mill vise
- Rack for spindle tool holders
- Check list observed prior to starting mill
- 123 blocks
- Machinist jacks

In a second presentation, *Martin Kennedy* talked about making an accurate taper on a lathe. He used a dial indicator attached to the compound slide to set the angle of an existing tapered tool holder held in the chuck. Then, the compound is used to guide a cutting tool to reproduce the taper on another homemade tool holder. Refer the article at the end of this newsletter for further details.

Show and Tell

John Hoff described his method for indexing the teeth on a gear being cut on a mill. Instead of using an expensive indexing head, he employed a more expensive CNC milling machine to make a circular indexing plate having, in this case, 57 holes. The plate was then attached to the gear's shaft to set the proper angle for cutting each tooth.

Gene Rowan Showed his technique of dropping a small but powerful neodymium magnet in an aluminum sausage link can containing cutting oil and brush in order to attach it to a convenient steel surface. He also brought a stainless steel part that he electro polished in his shop.

J. R. Williams showed the pvc pipe and caps in which he stores collets (left photo).

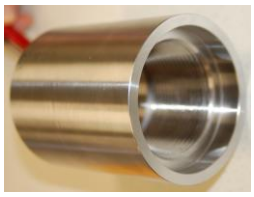
Jan Rowland showed a few organ stop knobs that he fashions on his CNC lathe.

Martin Kennedy showed some insert lathe tool holders that he made and finished by Parkerizing (right photo).

Norm Berls showed his supply and storage technique for the myriad of springs he has acquired over to years.

Dick Kostelnicek passed around his two ended foldable pliers (right photo).

Problems and Solutions - *Ask the Blacksmith*



John Elliot showed the internally threaded bushing that he mass produces for a client (left photo) and asked for suggestion on how to speed up the process.

Dave Ballinger asked for salient points he should be aware of when buying a lathe online.

Beunell Curtis asked for suggestions on how to repair a cracked, cast iron, thin shelled pulley used on a antique car he's restoring.

Articles

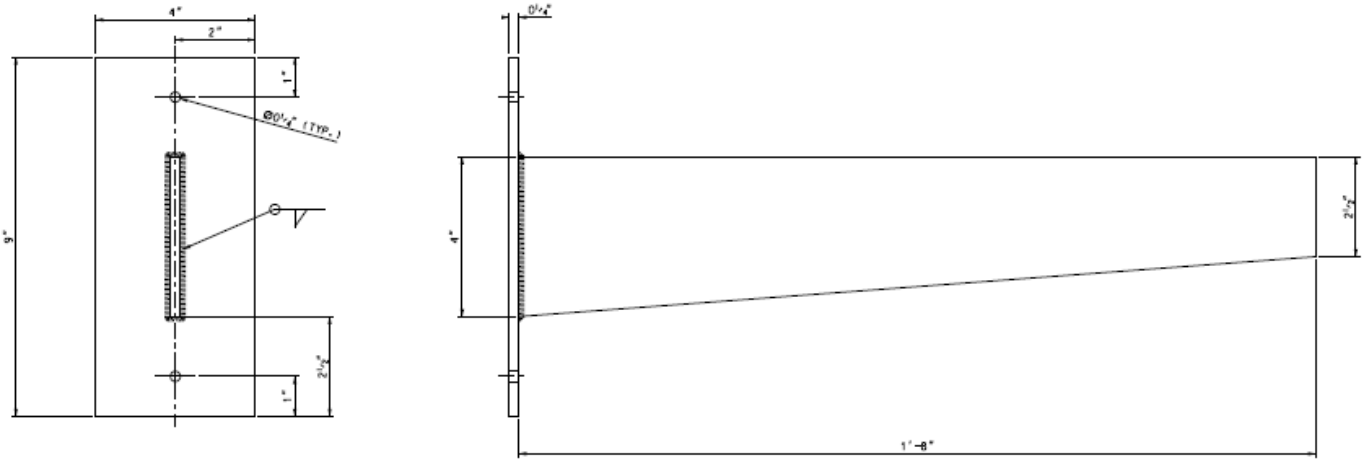
A Project to Please the Lady of the House

By *Joe Sybille*

Here is the design of a bracket to which a sliding wardrobe rod may be attached. The sliding wardrobe rod is a convenient addition to the closet, for some ladies prefer to set out for the next day's wearing the outfit of their choice.

The rod may be purchased at one's local home improvement center. I bought mine at Home Depot. The dimensions of the bracket can be adjusted to suit your particular arrangement. Those given are for a bracket attached to a single stud, which would be the case for most house closets. I had double wall studs put in my closet during construction of the house. Hence, the bracket shown in the photo has four (4) mounting screws rather than two.

My bracket is made from 1/4" thick aluminum that has been sandblasted and painted. Other 1/4" thick metal is suitable, just ensure the mounting holes are aligned with the center of the wall stud, and that the screw length to anchor the bracket is 2 1/2" to 3 1/2" long.
Mounting of the sliding rod is shown in the photo. Mounting holes were drilled and tapped to accommodate the sliding rod.



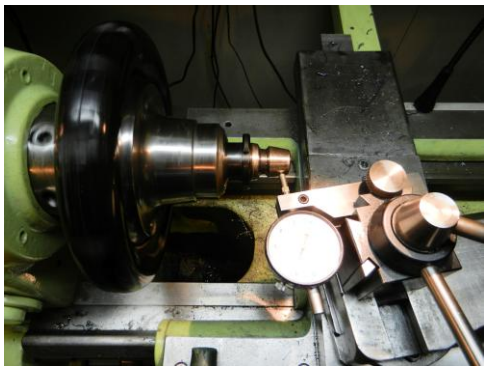
Making An Accurate Taper

By *Martin Kennedy*

My mill uses the Royal R8 Quick-Change Tool System. I love it, and I highly recommend a quick change for your mill. I've never, ever had to loosen the drawbar on the mill, and I can change out tools in literally five seconds.

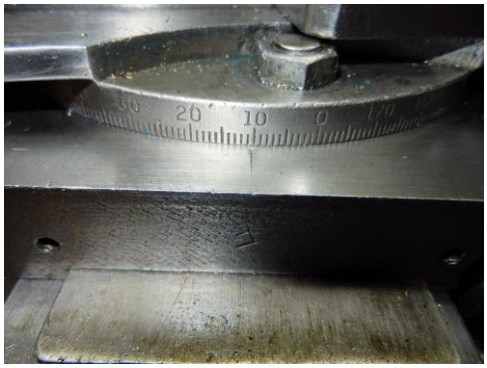
There are two downsides to having a quick change tool system. The first is that you may need some sort of tool holder that's not made. The second is the cost. Tool holders for this particular system can be well north of $200/each. To address both of these downsides, I have made several tool holders. This article is about how I make them accurately.

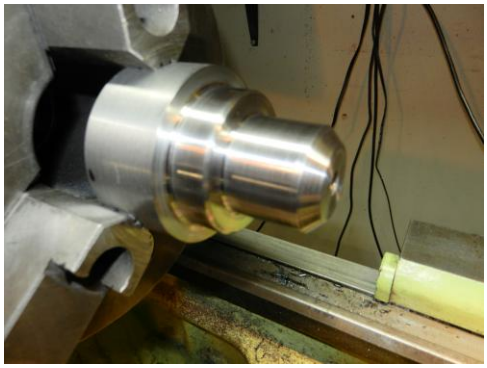
It is very important that the tool holders fit tightly into the holder body, and that they are exactly concentric. The way that the Royal tool holders are made makes it extremely difficult to measure angles and distances to the needed precision. So the best way to make one is to not need to measure much at all!



First, I chuck a factory tool holder into a collet chuck on the lathe, snugly but not tightly. I measure the runout on the piece with a 0.0001" dial gauge. It's usually a little off, so I take a small rubber mallet and tap (very lightly) and measure, tap and measure until I get it just right. Then I tighten the collet chuck and recheck. I can usually get the runout to be about 0.0001".

This taper is relatively short, so I can cut it with the compound. However, there's no reason that you couldn't use this same technique with a taper attachment. I set the compound to about the right angle. I run in back and forth while watching the reading on the dial indicator. It is helpful to use the rubber mallet to tap the compound slide lightly to make adjustments. I continue to adjust the angle until I no longer see any movement on the dial indicator. This means that the compound angle is exactly the same as the taper on the factory tool holder. The actual angle on this piece is 10°. On my compound, this is indicated to be about 10.5° on the front compound angle gauge.





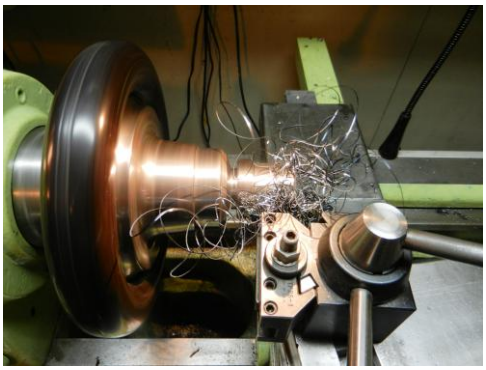
In this instance, I'm copying an existing angle. I think that you could also make an angle from scratch. I have not had the need to do this yet. If I were, I'd clamp a 90 degree angle plate to the ways. I'd then measure it with the dial gauge as above, and get it exactly parallel to the ways. Then, I'd get either a sine plate or an angle block adjusted to the desired angle, clamp it to to the angle plate, and indicate off of it.

Now, we're ready to start making the piece. For the stock, I used a piece of a 2.25" diameter B-7 (4140) stud. Although this

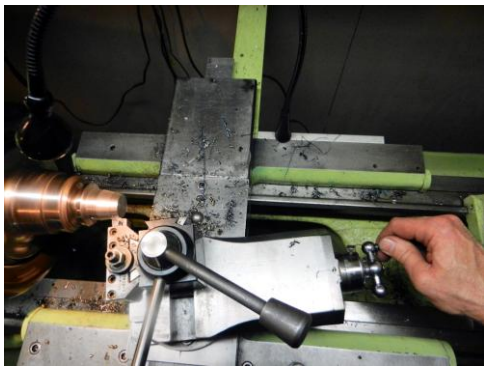
material is really tough, it is easy to cut with a carbide tool bit. I chucked up a piece in my three-jaw chuck. I made the nose end of the tool holder first, since it's not important that the OD is absolutely concentric.

Now I flipped the piece around and mounted it in my collet chuck. I checked and adjusted it again for runout, as above. At this point in the operations, I don't want to take the piece out until it's finished. That way, all the mating surfaces of the holder will be concentric with each other.

I cut it down to near size. I took cuts of about 0.030" – 0.040" (diameter). I could probably take bigger cuts, but I have to wear earplugs as it is! This material does not chip, at least not with the carbide cutter I'm using. It forms long strings, and I have to remove them after each cut (with pliers!). I have to watch the carbide, because it dulls during the operations. I find that I can re-sharpen the inserts on a diamond cutter a few times to get extra life.

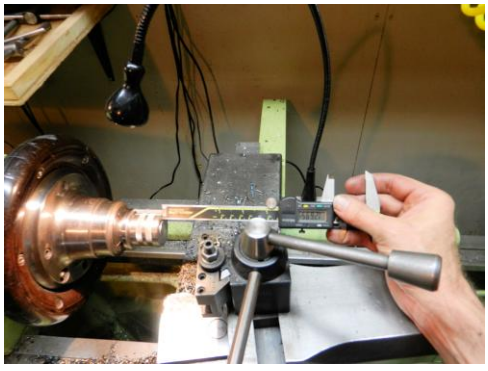


Once I get the piece cut straight, I'm ready to make the taper. For this operation, do not use the automatic feed on the lathe. Move the cutter back and forth with the crank on the compound. I took off about 0.020" per pass with the crank on the cross slide until I got close, then went down to 0.005" per pass. Since this is a shallow taper, it's very easy to take off too much.



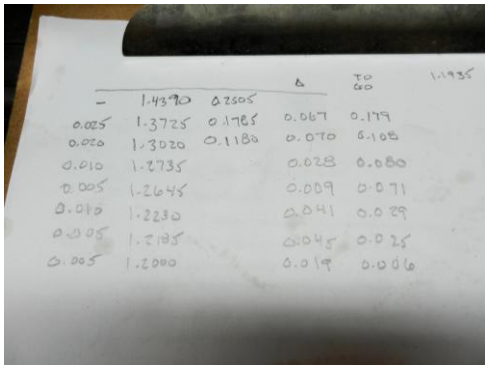
At the large end of the taper, there's a small cut so that there's no rounded section at the end to interfere with the fit. Unfortunately, this makes the taper diameter hard to measure. Additionally, the small end has a chamfer, and can't be accurately measured. I tried several ways to measure the diameter of the taper so that I knew when it was right. The best way I found was to make a gauge. The gauge fits over the taper, and was designed to have a small gap at the big end and the landing ring on the holder when the taper was the correct size.

The gauge was made after I got the exact taper angle set, but before I started making this piece. I had to cut it "backwards", or small end to large end, so that I didn't have to move the compound. I suppose that I could have cut it with the lathe running in reverse, but I didn't have a boring bar that cut that way. After I made the cut, I flipped it over and trimmed the edge until it fit with a small gap between it and the landing ring on the factory tool holder.



In use, the gauge is slid over the taper until it bottoms out. With calipers, I measure the distance from the end to the landing ring on the stock.

After each cut, I record the amount I cranked in on the cross slide, and the resulting change in the measurement. Mathematically, the distance changes at about a 5.7:1 ratio, that is, every 0.010" (diameter, or 0.005" radius) I crank in on the cross slide makes the gauge piece 0.025" closer to the landing ring. Writing it down and doing the calculations lets me pick the next amount to dial in on the

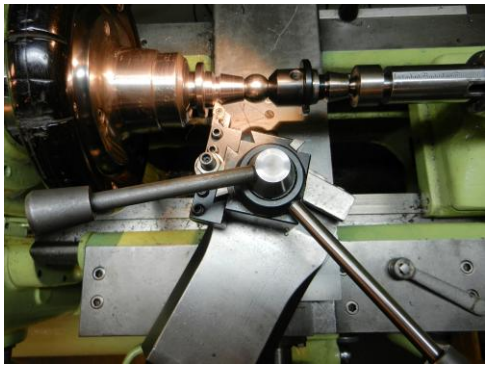


cross slide, and keeps me from overshooting my mark.

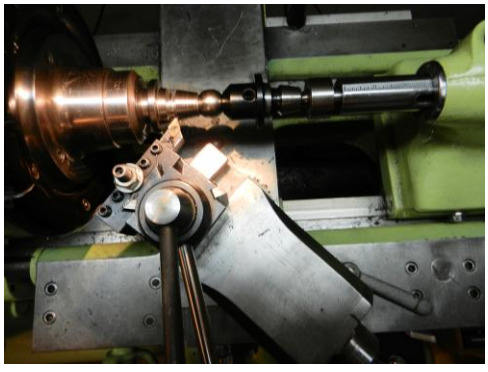
The next complicated thing to measure is a ring that's cut into the tool holder. To get this exactly right, I take a large ball bearing and the commercial tool holder, and clamp them all into the lathe as shown here.

Next, I measure the exact distance between the landing ring on the piece I am making and the landing ring on the commercial tool holder. In the picture above, you can see that I'm bumping the tool up against the landing ring. I used a DRO to make this measurement, but you could use a dial indicator mounted on the lathe ways or a Trav-A-Dial. For this case, the distance was 3.436". I'll use this dimension for all the upcoming cuts.

Next, I find the angle of the left side of the indention using the dial indicator, with the dial indicator as I did before. I set the compound at this angle. It turns out that this is about 30°. I put the cutting tool on the factory tool holder, so that it just touches. I zero the "Y", or saddle DRO. I move the tool away using only the crank on the compound. I then move the saddle to the left exactly 3.436", and crank the tool in using only the crank on the compound. Don't use the crank on the cross slide here! It'll mess up the dimension. I made the cut, focusing on the left half.



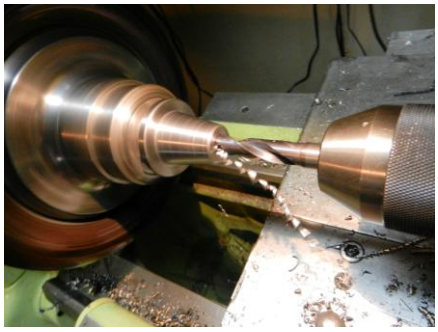
I then repeated this operation for the right half. It was a 45° angle, so I reset the compound.



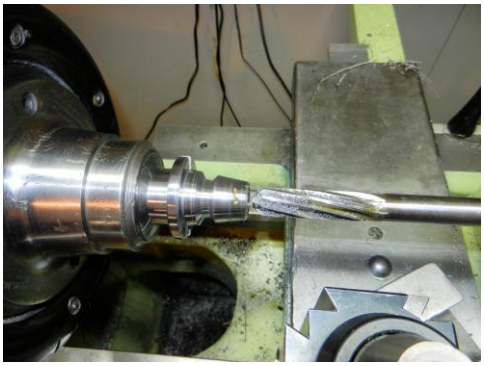
Now, without taking the part out of the collet chuck, I cut the hole

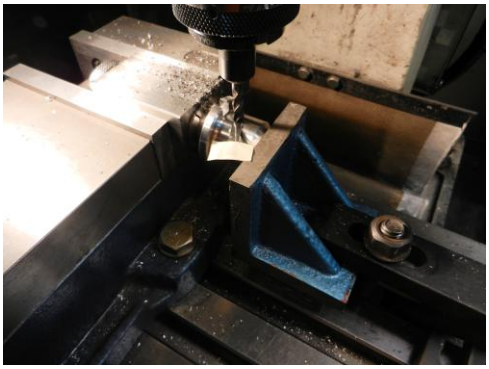
through the middle of the stock. I drilled it undersize. Again, this metal is hard, so I used a ½" carbide drill.

After I drilled the hole, I cut it to 0.005" undersize with a carbide boring bar. Using the boring bar removes the possibility that the drill didn't cut exactly concentrically. The last operation was to ream it to size using a 5/8" reamer. Using a reamer assures that I'll have a tight fit when this tool is used to hold a mill.



That was the hard part of the operation! A few operations remained. I needed to cut two slots on the landing ring, exactly 180° apart. I also needed to drill and thread for a set screw. This is most easily accomplished using a square collet block. The only place I could grab the tool holder was on the tapered section. I was a little concerned that it might move during cutting and drilling operations. I put an angle plate up against the piece for back-up, and I made the cuts towards the vice as shown.





It's all done, except for the Parkerizing! I did a fit test, and it snapped into the tool holder body perfectly the first time, without any slop. That was not the case when I first started making these holders! I used to have to do a bit of rework and marking with Dykem Hi Spot Blue to make them fit correctly.

Below is a photo of several tool holders that I've made. From left to right, there's a slitting saw, a fly cutter, a 5/8" mill holder, a mill camera, a digitizing probe, a short holder for a Blake Co-Ax Indicator and a drill chuck. I also made an ER32 collet chuck, not shown. Only three of the eight holders that I've made are available commercially.

Both the probe and the Blake holders were made of stainless. All the others are 4140 carbon steel.