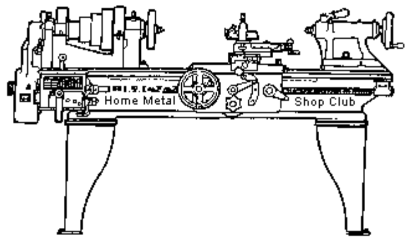
Home Metal Shop Club

November 2013
Newsletter

Volume 18 - Number 11



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 *Vance Burns*	Vice President *Norm Berls*	Secretary *Joe Sybille*	Treasurer *Emmett Carstens*	Librarian *Dan Harper*
Webmaster/Editor *Dick Kostelnicek*	Photographer *Jan Rowland*	CNC SIG *Dennis Cranston*	Casting SIG *Tom Moore*	Novice SIG *Rich Pichler*

This newsletter is available as an electronic subscription from the front page of our website. We currently have over 524 subscribers located all over the world.

About the Upcoming 14 December Meeting

HMSC member, Norm Berls, will give a presentation on adding a DRO (Digital Readout) to a Rong Fu mill/drill.

The next general meeting will be held on 14 December at noon at the Jungman Library, located at 5830 Westheimer Road in Houston, Texas. This location is near the intersection of Westheimer Road and Augusta Drive (west of the Galleria). 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 Librarian, Dan Harper. 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. In 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.

Recap of the 09 November General Meeting

By *Joe Sybille*, with photos by *Dick Kostelnicek*

Seventeen (17) members attended the noon meeting at the Collier Library. There were two guests present: Chuck Baker and Larry Seguine. President *Vance Burns* led the meeting.

Watch a video of the November meeting.

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

Presentation

John McCord of Mastercam gave a presentation on Dynamic Processes. This involves high speed machining and dynamic machining. The former entails conventional approaches to machining while running faster; while the latter focuses on tool engagement relative to the material being machined.

Three areas of concern are important in high speed applications, namely: software, CNC (computer numerical control) machining, and tool selection. New advanced mathematical algorithms have improved previous work practices, particularly with how the cutting tool enters the material and then exits it.

Tool paths play a pivotal role in high speed applications. For one, there is chip thinning. Here the production of smaller chips is desirable. Increased feed rates and increased spindle speeds both lead to increased material removal rates. Corner engagement is another. Radial engagement in corners allows lighter cuts to be taken. This, in turn, permits the use of lower horsepower machines.

High speed tooling features include improved tool geometry, new carbide coatings on the flutes, and variable helix tool shapes. The new coatings obviate the need for coolant during material removal. Steady air blasts serve to both cool the tool and remove chips from the work. The new geometry facilitates lighter faster cuts, permits smaller tools for roughing applications, and promotes longer tool life.

Safety Moment

Gary Toll cautioned those present to exercise extreme caution when changing electrodes in a welding clamp. Sometimes the rod is difficult to remove, and if the welding machine is left on while trying to remove the rod, one could inadvertently ground the rod while holding onto it. Doing so would likely subject the user to a shock.

Dan Harper remarked that a safety presentation by a representative of the local electrical utility revealed all rubber soled shoes do not serve as protective insulators against electrical shock.

Emmett Carstens described how one should remain alert while driving on a road where there is a convergence of three lanes into two. He said that some drivers are oblivious to the necessary caution that one must exercise to make the change.

Show and Tell

Dick Kostelnicek displayed several items from his selection of tools. Among the items were a homemade carbon arc torch (right photo), spin type ratchet with a swivel head, a template for nut sizes, and a tapered boring head for use on a milling machine.

Martin Kennedy described how he made a set of small hex headbolts for a project. Then he showed a video of his bolt making technique. He passed around his tailstock mounted holder for hex threading dies and a bolt holder for milling their hex heads (left photo).

Joe Williams exhibited his collection of odd taps in decimal sizes.

Dan Harper displayed a collection of tools acquired without cost by finding them on the side of the road. The collection included an aluminum pipe wrench, pipe cutters, a knife, a screw driver, an adjustable wrench, needle nose pliers, and swivel sockets.

Problems and Solutions - *Ask the Blacksmith*

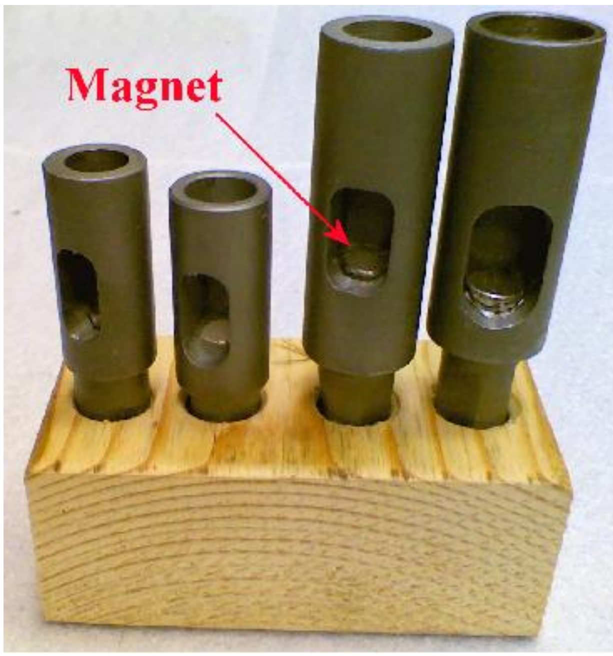
One member requested suggestions on the best way to measure a lathe's spindle pitch diameter. He wanted to make a face plate for the lathe. Several suggestions were offered, and among those was to place reference wires in the threads and using a micrometer to measure the distance between the two reference wires.

Another member requested suggestions on the use of split-end engraving blanks and the accuracy of consumer grade hardness testers. Several members remarked that the accuracy claims of consumer grade testers were exaggerated.

Articles

Tap Driver

By *John Hoff*



The internal thread cutting tools that we often use are called *American Standard Hand Taps*. However, we often don't operate them by hand. Who wants to tap a dozen 5/8 - 11 holes manually when you can power tap them quickly?

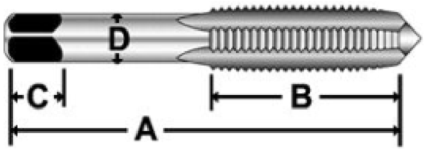
We are all guilty of inserting a tap directly into a Jacobs chuck on the mill or lathe and power tapping. Invariably the shank will slip in the chuck jaws. Then we will grab whatever is handy to use as a *cheater* on the chuck key to really tighten it down. This may not solve the problem and probably does no favor to the accuracy of your Jacobs chuck. Read on, for I have a solution to this nasty problem. Make a set of tap drivers!

Almost all taps, whether domestic or foreign, conform to American standard tap sizes. As a consequence, the shank sizes and drive squares are the same for all taps with the same major thread diameter, regardless of the thread pitch. How they arrived at these sizes is a mystery to me. For example: why does the 3/8-inch tap have 0.381-inch dia. shank, 6 thousandths larger than the 0.375-inch tapped hole; while a ½-inch tap's shank is 0.367-inch in dia. or 133 thousandths smaller than its threads diameter and smaller yet in diameter than that for the 3/8-inch tap. Be that as it may, these odd shank diameters mean that you'll have to make a tap driver for each size tap and finish the round shank hole by boring as the shanks are not of any standard drill size, whether metric or imperial.

I made tap drivers for my larger taps; viz., 1/2, 7/16, 5/8, and 3/4-inch diameter (see left drawing). The shanks of the drivers are all ½-inch diameter with three 120-degree spaced flats. This ensures that a 3-jaw Jacobs chuck will drive them without having being tightened excessively. Also, any of the drivers can be grabbed by a ½-inch round collet. Make sure that when you mill the side opening in the driver that the slot is the correct width and depth in order to engage three sides of the square drive tang on the tap. Have the appropriate tap handy to check the fit as you mill the slot.

To prevent a tap from dropping out from the driver, you can epoxy a cylindrical neodymium rare-earth magnet in the base of the driver (top photo). Alternatively, you can place an O-ring in a groove inside the round shank hole.

Diameter	A	B	C	D	Square Size
1/2	3.375	1.656	0.438	0.367	0.275
9/16	3.594	1.656	0.500	0.429	0.322
5/8	3.813	1.813	0.625	0.480	0.360
3/4	4.250	2.000	0.688	0.590	0.442



In the past I've employed this design to make a driver for a 1-1/2 inch tap but that was not for a home shop. Most Bridgeport size mills will handle a ¾-inch tap in mild steel but anything over that and you'll be pushing your luck. Under 3/8-inch, a Jacobs chuck can produce a good grip so that a tap driver is not necessary.

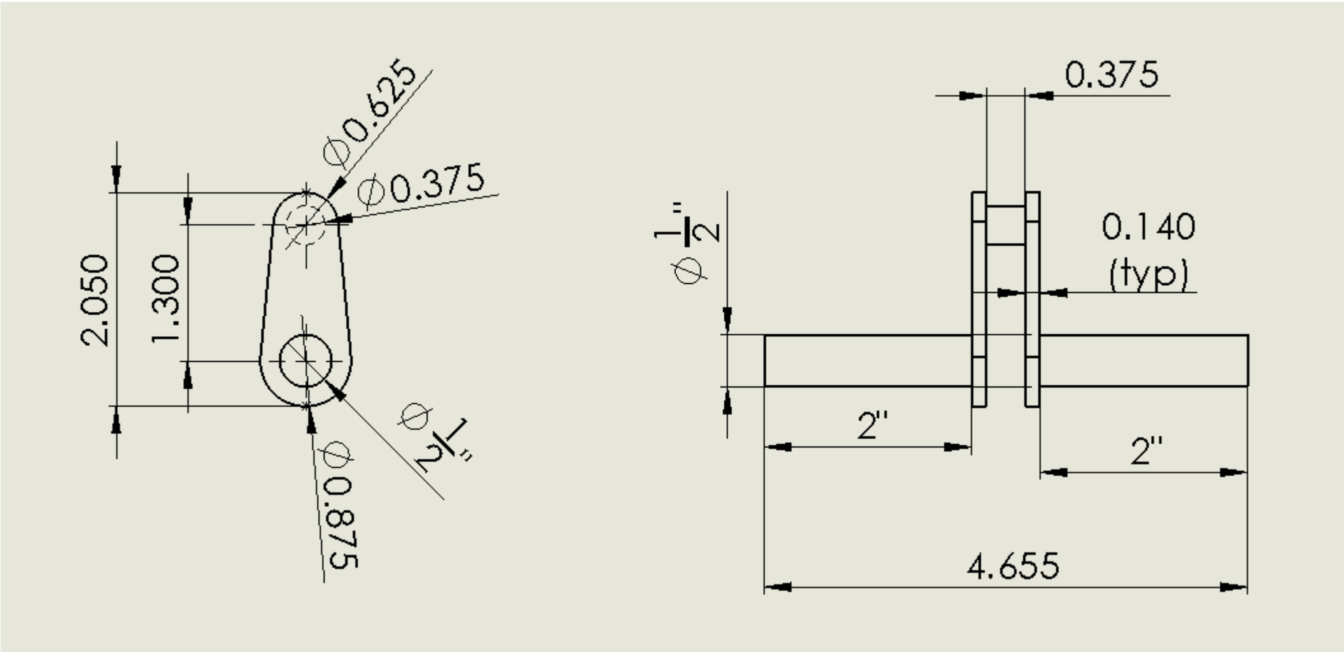
Good luck in your tapping endeavors. And be careful! Most broken taps happen because you hit bottom in a blind hole. Remember that the tap driver prevents slipping in the chuck. And, if the tap doesn't break the work may be dislodged from the hold down clamps.

Machining Between Centers – With a Mill!

By *Martin Kennedy*

I'm building a model of a Robertson Semi-Rotary Steam Engine. The first part I made was the crankshaft. I like to make one-piece crankshafts instead of building them up from pieces. It's more difficult, but I enjoy the challenge.

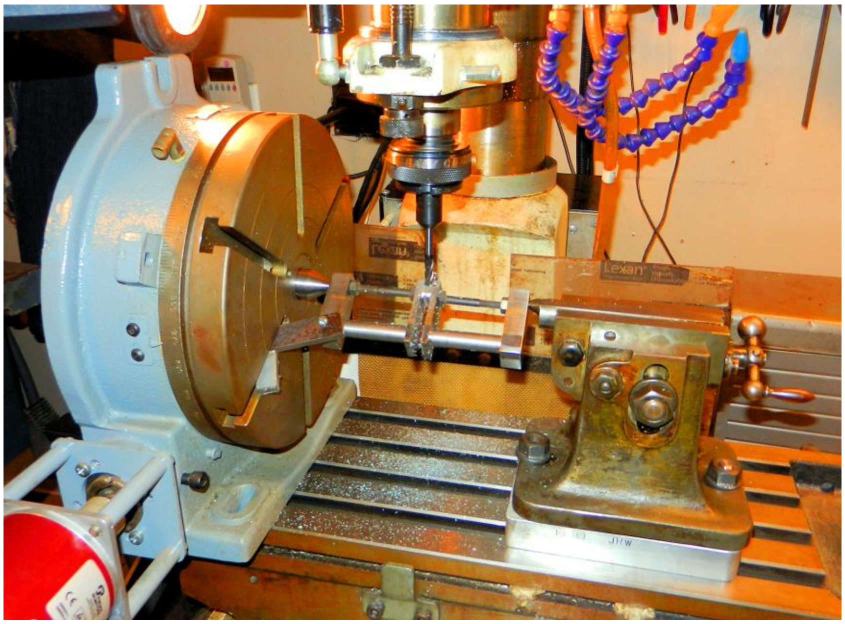
I wrote a lengthy article about making a one-piece crankshaft on the lathe by turning between centers. The article was called "Making A Model Crankshaft" and it can be found in the January 2010 HMSC Newsletter. I planned to use a similar technique to make this crankshaft.



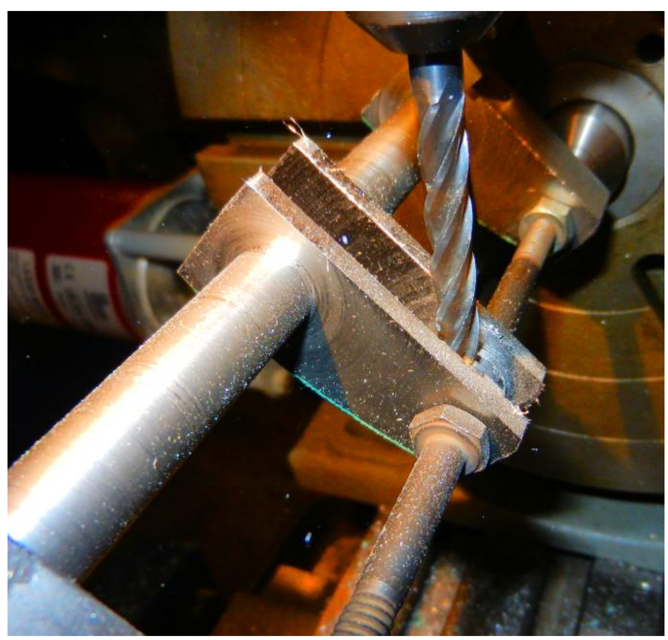
Above is a drawing of the crankshaft. I rough machined the crankshaft stock on the mill, and turned the main ½" shafts on the lathe. But then, I had a problem. The gap available for a tool to machine the smaller 3/8" shaft is only 3/8"; not much wider than the ¼" gap of the crankshaft for the engine in the earlier article. But this crankshaft has a 1.3" throw, almost twice the ¾" throw of the other crankshaft.

On the earlier crankshaft, I used a 5/32" cut off tool to machine the small shafts. Because of the small gap on this crankshaft, I needed a fairly skinny tool to reach up into the gap and machine the shaft. I first tried using a cut off tool similar to the one I used to machine the other crank, but it deflected too much because of the distance it had to be extended from the tool holder. I tried a much more substantial ¼" wide x ½" tall tool steel, but it, too, tended to deflect and ride up on the steel and not cut.

I started thinking about other ways that I could machine the small shaft. While thinking, I happened to glance at the rotary table that I use on my mill. The light bulb went off. I could machine between centers, but on the mill!



Here's a picture of the set up on the table of the mill. To the left is an 8" rotary table. In my case, it's driven by a CNC controlled stepper motor, but it would have worked equally well with a crank. The rotary table has a MT3 taper in the center. I inserted a dead center. On the right is a tailstock that was originally part of a dividing head set. It has a dead center that can be adjusted up or down. There's a spacer block underneath it to get it closer to the centerline of my rotary table. I aligned the two centers, and mounted the stock. I put two jacking bolts in the crank stock to prevent deflection of the crank. They were installed just barely finger tight. Tightening the tailstock prevents them from falling out. There's a simple dog connecting the crank stock to the face of the rotary table. It's a piece of scrap 1/8" steel wedged into a t-slot on the face of the rotary table and fastened to the stock with a screw into a threaded hole in the stock. Note that the pieces on the end of the crank will be removed after fabrication of the crank is complete. This is described in detail in my earlier article.



I used a long ¼-inch carbide end mill for the machining. I began by machining the sides of the crank's web, while slowly turning the rotary table. So far so good!

I then began machining the small shaft. It started out square from the rough cut. I carefully cut the shaft down to nearly the final dimension. I made the cut starting in the middle of the 3/8-inch gap, and worked out to each side. I experienced two problems while making this cut

First, an end mill is not flat on the bottom. It has a slight taper towards the center. When I made the cut around the shaft with the mill, it left a small ridge in the center. I was able to move the mill back and forth on the X axis slightly to machine away this ridge, so it was a minor problem. I could have also moved the bit on the Y axis away from the centerline to use another part of the bottom of the end mill, and rotated the stock.

The second problem was worse. However, it can be prevented if you know about it in advance. I didn't. If the mill is up against the wall on the left web, and a plunge is made towards the shaft, the mill is cutting conventionally (as opposed to climb) and tends to dig in, grab and deflect to the left. It will deflect towards the left web until it hits the web. It then quickly digs into the web along the length of the mill. This generates more torque than the mill can withstand, and the mill breaks near the holder. Ouch! To prevent this, make small plunges near the center of the shaft, and think about which way the mill will deflect. Make very small cuts as you move towards the left side.

Despite the problems, I did successfully finish machining the crankshaft. It has some gouges on the small shaft and on one side of the web, but they're not that bad. And the connecting rod will cover them up!