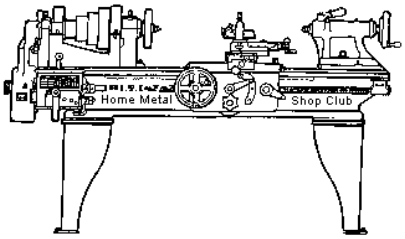
March 2016
Newsletter

Volume 21 - Number 3



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*	*Martin Kennedy*	*Tom Moore*	*Unfilled*

This newsletter is available as an electronic subscription from the front page of our website. We currently have 973 subscribers located all over the world.

About the Upcoming 9 April 2016 Meeting

The next general meeting will be held on 9 April at 12:45 PM in the meeting rooms of the Spring Branch Memorial Library, 930 Corbindale Rd. Houston, TX 77024. Dan Harper will continue his talk entitled Indexing – Part 2.

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 Norm Berls.

Recap of the 12 March 2016 General Meeting

By *Martin Kennedy*, with photos by *Dick Kostelnicek*

Fifteen members and two guests attended the noon meeting held in the home shop of member *Tom Moore*. There are 41 members in good standing with the club.

Presentation

No formal presentation was given at the meeting. Instead, members and guests toured the shop of member *Tom Moore*. Tom's shop is located inside his two-car garage.

Tom grew up in a family of mechanical people. His father did woodworking and had several pieces of woodworking equipment. Tom had always wanted a lathe, and he bought one in 1966. It was a used 6" Sears / Atlas lathe in disrepair. He restored the lathe to working condition and kept it in his apartment until he sold it in 1968. Tom found that he really enjoyed making parts and repairing the lathe to like new condition. He was hooked on machining.

He sold his Sears lathe and bought a new Unimat lathe, which he still has. After that, he moved into a house and started filling his garage with equipment. In 1972, he imported a Myford lathe from England. In 1986, he found a scrapped 1939 Royersford Excelsior 18" drill at a junkyard. He completely rebuilt the drill, including pouring babbitt bearings. The drill, which has a power feed, is huge and can turn up to a 1 1/2" bit without stalling.

In 1993 he bought a 7-inch Atlas Shaper and an Atlas Horizontal Benchtop Mill. In 1999 he obtained a Bridgeport mill. In 2002 he recieved a 12-inch Clausing lathe from a vocational school.

Other notable equipment in Tom's shop are an Excel Power Hacksaw, a Delta two speed bandsaw, several grinders and sanders, and several pieces of woodworking equipment.

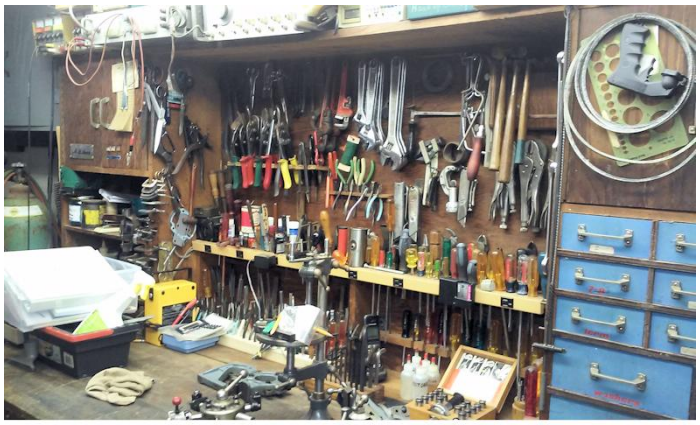
Today, Tom's garage is almost completely full of metalworking and woodworking equipment and tools. Several pieces of equipment are on wheels to allow rolling them out of way, or for using them under his carport. That came in handy for the meeting at his show, as he was able to make enough room so that more than one person could be in the shop!

Tom's current project is rebuilding a Delta surface grinder into a tooling / cutter grinder. He is also building a working model of a locomotive.

View into Tom's shop from carport

Members discuss Tom's horizontal mill

Club members discuss machining on Tom's carport



Tom's highly organized workbench

Club members discuss machining on Tom's carport

Safety Moment

No Safety Moment was given this month.

Show and Tell

No Show and Tell was given this month.

Problems and Solutions - *Ask the Blacksmith*

No Problems and Solutions were given this month.

Articles

Determining Screw Size and Pitch

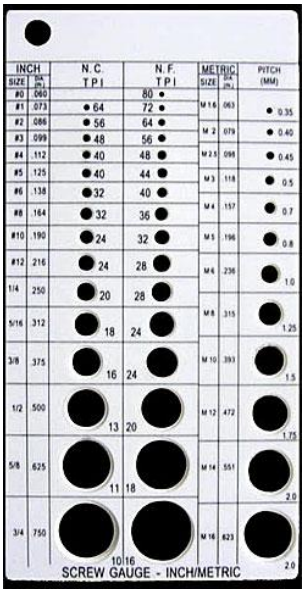
By *Martin Kennedy*

From time to time I have to determine the size of a screw, bolt, nut or threaded hole. With enough experience, sometimes it's easy to do by looking at it. Other times, more than just a look is required.

There are several ways of determining screw size:

Compare to another screw or bolt. If you have a selection of screws and nuts, you can try different sizes until you find one that fits.

Use a Screw Checker. This is an inexpensive gauge with different size holes and studs that you can use to determine size (right photo). It has been my experience that for smaller sizes, these are not very useful.



Use a Thread Detective or thread gauge. This is a collection of standard and metric threads that can be tried for fit (left photo). I like this gauge set. The downside is that they are a little expensive.

Measure the thread OD or ID with calipers, and compare to tables, such as the ones in the *Machinery's Handbook*. I used this method to sort through thousands of mixed screws to sort them out. Some things that I learned while doing this were:

- There is quite a bit of variance in measured sizes. In general, the measured size will be 0.005" to 0.010" less than the nominal size. This is because threads don't come to a point. Rather, there is usually a flat spot at the apex of the thread. There's a good article on threads on Wikipedia that explains this.
- There are some standard and metric sizes that are very close, and size with the tolerances overlap. Compounding the problem is that the standard pitch sizes can also be very close. An example of this is a 10-32 and a 5x0.8mm. The standard screw is 0.1900" OD with 32 TPI, while the metric screw is 0.1969" OD with 31.74 TPI.

The other parameter to measure on screw threads is pitch. For standard threads, pitch is given in threads per inch (TPI). For metric threads, pitch is given in mm per thread. Note that 1/TPI = pitch.

Again, there are several ways to measure pitch:

Compare to another screw or bolt. Hold a screw next to the unknown thread, and look for a perfect fit. Note that the screw does not have to be the same diameter. An 8-32 screw can be compared to a 10-32 screw.

Use a Thread Detective gauge.

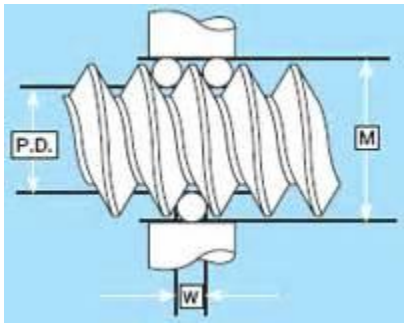
Use a Thread Gauge. These gauges are available in standard and metric sizes (right photo).

Measure with calipers. This is difficult to do accurately, but can be used in a pinch. Measure over a longer interval, such as 1", and count the threads.

When making a screw thread, the easiest way is to use a tap or die. Sometimes that is not possible, and you may want to cut the thread on a lathe. So how do you know when you are finished making the cuts?

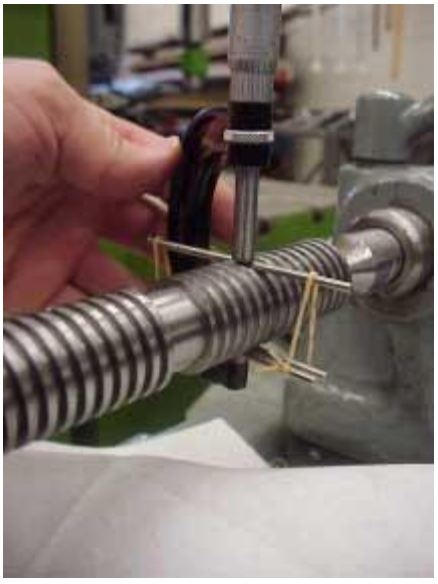
Check the thread with a nut or screw. Threads made on the lathe take multiple passes. Check for fit between passes.

Get the thread close, then finish with a tap or die. Screw sizes ½" and larger can require a lot of torque to make with a tap or die, and can be easier to make if you use your lathe to remove most of the material first before you use the tap or die.



Measure using the Three Wire Method. This is the most accurate method. However, it takes some manual dexterity or an assistant to hold everything while measuring. It also requires a Thread Pitch Diameter Measuring Wire Set. What you're measuring is the pitch diameter, which is halfway between the inner and outer apex of the threads. Note that because of the flat spots at the crest and root of the threads, the inner and outer apex are not the same as the major and minor diameters of threads given in tables.

To use this method, you'll need to determine the pitch diameter from tables for your thread. Select the appropriate wires from your set based on the included tables. With one hand, hold two wires on the top of the thread, and one on the bottom as shown in the picture. With the other hand, measure the distance with a micrometer. I said that this takes some manual dexterity! In the picture, the guy is using rubber bands to help (right photo). Subtract the number shown in the chart included with the wire set, and you'll have the pitch diameter. Compare this to the number shown in tables such as the one in Machinery's Handbook. If not correct, make additional passes on the lathe and recheck.



Use a Go / No-go tool. This is generally only used for production runs, because the tool set is expensive. The gauges have a threaded stud on each end. One thread is slightly larger than the other. When the cut thread passes one end, but not the other, it is within tolerance.

A real-world example…

Recently, I was asked to make a replacement jam nut for the adjustment screw on a ½" torque wrench. The wrench was older and Made-In-USA. I was not sure if it was a standard or metric thread, but my initial guess was standard.

I measured the OD of the threads with a caliper. I got 0.916" or 23.25mm. Neither of these is a standard size. The closest standard size was a 59/64", about halfway between 7/8" and 1". The closest metric size would be 24mm. Only about 5 threads were exposed, and when I measured the pitch, I got either 32 TPI or 0.8mm. I was not sure what the thread was!

The next thing I did was measure the pitch diameter. I got 0.895", or 22.75mm. Since this is a very fine thread for the screw size, it's not a standard size and I was unable to find any tables to check the size. However, using the formulas given in *Machinery's Handbook*, I confirmed the OD.

I now had the parameters for the cut:

- OD = 0.916"
- Pitch = 1/32 TPI = 0.313"
- Thread depth = pitch * cos(30) = 0.0313 * 0.866 = 0.271 (radius) = 0.054 (diameter)
- ID = 0.916" - 0.054" = 0.862"

I cut the ID to 0.862", and then cut a blind internal thread 0.271" deep on the lathe (right photo). Since it was an internal thread, I could not measure the pitch diameter to check it. Because of the way I made the part, I could not test it on the wrench until I cut it off of the stock, which would have made it very difficult to re-machine the thread if it was not correct. However, mostly because I had made careful measurements, it fit perfectly!