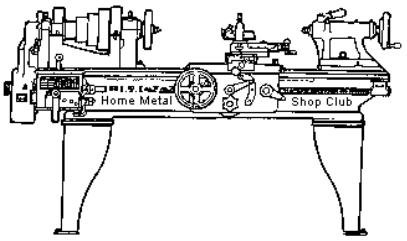
Home Metal Shop Club

October 2012
Newsletter

Volume 17 - Number 10



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	*John Hoff*	*Martin Kennedy*	*Emmett Carstens*	*Dan Harper*
Webmaster/Editor	**Photographer**	**CNC SIG**	**Casting SIG**	**Novice SIG**
Dick Kostelnicek	*Jan Rowland*	*Dennis Cranston*	*Tom Moore*	*Rich Pichler*

This newsletter is available as an electronic subscription from the any page of our website. We currently have over 262 subscribers located all over the world.

About the Upcoming November 10 Meeting

General meetings are usually held on the second Saturday of each month at 12:00 noon in the meeting rooms of the Parker Williams County Library, 10851 Scarsdale Boulevard, Houston, TX 77089. The next meeting is Nov. 10, 2012. Visit our website for up-to-the-minute details and for the main presentation topic.

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 and curated by the club 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 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 who can make a presentation, please contact the Vice President John Hoff.

Recap of the October 13 General Meeting

By Martin Kennedy, with photos by Jan Rowland

Twenty-one members and no guests attended the 12:00 noon meeting at the Parker Williams County Library. President *Vance Burns* led the meeting.

Rich Pilcher brought free items from the recent tailgate sale to the meeting.

Vance Burns and Martin Kennedy will be looking for a new, centralized location for meetings and will report back with a recommendation. If you know of a central location that could provide free facilities for our monthly meetings, please contact Vance Burns.

Safety Moment

C A Riser recounted an incident where he was having a broken coupler repaired on his trailer. The young employee of the shop that cut off the hitch with a grinder was not using a face shield. It was explained how grinder wheels can explode, and how it was important to wear a face shield.

A similar situation in our home shops is when a bench grinder is first turned on. You should stand to the side of the wheel when it starts so you're not in the path in case it shatters. Whenever tightening grinding wheels, make sure there is blotter paper on each side of the wheel and don't tighten them too much as you can introduce cracks that could later cause failure.

Presentation

The meeting began with an hour long video on the discovery and development of metal.

Martin Kennedy, HMSC Secretary, made a presentation on Simple Surveying. Slides are here.

Most of us are somewhat familiar with surveying. We've seen the equipment – a surveying device on a tripod, and a graduated stick - used in road building or in home construction. The practice of surveying is ancient – it was used by the Egyptians to build the pyramids. Today's surveying equipment involves expensive digital equipment employing lasers and GPS. This is beyond the scope of the presentation. Are there simple surveying tasks that we could use to do our projects around our shops and home?

Martin talked about several jobs where he used simple surveying:

- Determining how much higher the water could rise before flooding his house during Hurricane Allison
- Setting the slope to allow proper drainage of a patio in the back yard
- Setting the slope of drainage ditch
- Quantifying home subsidence with several surveys over the years
- Hanging pictures

Surveying for these purposes is very simple in concept. A horizontal base line is established, and readings are taken from that line to the points of interest. Subtracting one reading from the other yields the difference in elevations. For example, in the survey after Hurricane Allison, readings were taken at the trash line in the yard that represented the peak of the flooding and the door's sill plate.

Surveying also employs angles. It is used to lay out slabs for buildings and locations of property markers. Vertical angles can be used for determining large elevations.

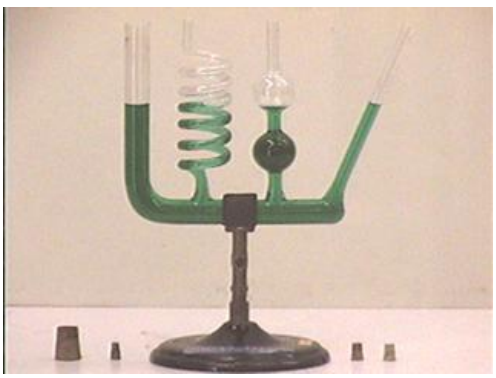
The surveying instrument used up until the late1990s was the theodolite. More modern instruments include EDM electronic distance measurement.

In use, the theodolite is set on a tripod. The tripod may be centered over a marker on the ground. Alignment to the marker is either through use of a plumb bob that hangs under the center of the theodolite, or optically. The theodolite has three thumbscrews and two levels. The thumbscrews are turned until the two levels show level. There is a knack to getting the theodolite level, and it can take a while at first.

The heart of the theodolite is a precision telescope with crosshairs. The precise orientation of the telescope can be quantified with a horizontal ring calibrated in degrees to measure angles, and a similar vertical ring.

Theodolites are complicated and expensive, and not necessary for most home uses. More useful is a device called a Transit Level. The transit level can be thought of as a theodolite that is fixed in the vertical orientation. Even more useful is a Self-leveling version. This version incorporates a mechanism that will precisely align the Level horizontally once a coarse adjustment has been made with a simple bubble level. Although fairly expensive when new, such instruments can be obtained for less than $100 on eBay.

The device that Martin used for his home subsidence survey is a spinning laser level. This device is put on a tripod (a photographic tripod will work) and aligned using bubble levels. It has a laser that spins horizontally. These levels are fairly inexpensive. More expensive self-leveling versions are available. Measurement was



made with a fiberglass pole with a scale taped on. Martin has used broom handles and PVC pipe in the past for the stick. Taping the scale to the stick allows movement of the scale when the level is moved from one location to another, and that way the measurements don't have to be adjusted to the base elevation every time the level is moved.

For the casual home user, a very inexpensive and very accurate technique can be employed. You may already have all the equipment you need to use it already! This is the water level. Water seeks its own level. This is independent of the path or size or geometry of the pipes used for connection.

A water level can be as simple as a length of plastic tubing or aquarium hose filled with water. The version that Martin used employed a 3 gallon bucket, a long garden hose, and some fittings that allowed connecting a 4' length of clear plastic tubing to the end of the hose. Inexpensive kits are available that contain two pieces of clear tubing and adapters for a garden hose.

In his version, Martin set the bucket, filled with water, on a chair. It's easiest if the water level in the bucket is the same as the level you want to mark. The level can be adjusted with books under the pail, or by adding/removing water. It is also good to set the bucket in a central location so that it does not have to be moved. One end of the garden hose was wired to the bucket so it would not fall out. The hose was completely filled with water. It's very important that there are not any air bubbles in the hose, or the gauge will not be accurate! The long hose allowed moving the clear tubing on the end to various locations. Once the water oscillations died off, the level was marked. The hose was then moved to the next location.

Martin used the water level to establish check marks that were compared to the laser level when surveying the floor elevations in his house. He had some residental foundation work done recently, and the readings will establish a baseline so that the floor can be rechecked in the future if more movement is suspected.

Show and Tell

Joe Williams brought in a work stop that he made for his mill vice. He was reminded about the stop when he heard the presentation last month on design. Similar to some of that discussion, Joe said that he has ideas for improvement if he makes another version.

He passed around a small piston that he built for a customer. It incorporated a grove on one end that had a complicated geometry. Since he was making multiple copies, he ground a small cutter with all of the geometry incorporated so that he could make it on the lathe with one cut instead of multiple cuts.

Scott Toney showed some pictures of a vintage South Bend lathe and tooling that a friend had for sale.

Tom Moore noted that Lindsay's Technical Books mailed their very last catalog. They will cease taking orders on February 28, 2013. Lindsay reprints old technical books, and has a great selection. If there are books that they publish that interest you, order now!

Mike Winkler acquired a new welder. In use, he found that the torch tended to slide off the work table. To prevent this, he built a magnetic holder. The base is a magnet from Harbor Freight. He made a shaft with a holder made of angle iron, dipped in a rubber coat (photo on previous page).

Problems and Solutions / Ask the Blacksmith

A member asked for a recommendation for a shop to sharpen end mills. The reply was that sharpening was expensive, and usually only the ends were sharpened. It was cheaper to buy new end mills from a retailer like Enco or Wholesale Tools. Another member who had a surface grinder said that he had made a tool holder to sharpen mills, but that he didn't use it that often.

A member asked about how to replace frozen bearings in a live center. The reply was that it was better to replace the center. The bearings are most of the cost of a center. It was noted that a rotating center is a place where you get what you pay for, and it pays off to get a good one. A good one will cost $150+

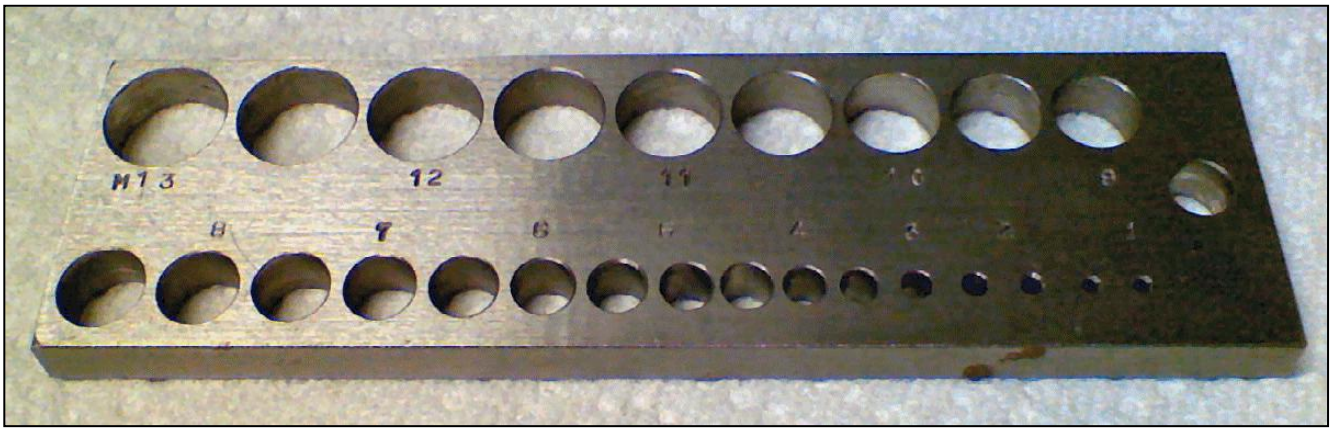
A member asked how he could grind his worn chuck jaws and was referred to an article in our August 2004 newsletter on that very topic.

Novice SIG Activities

Rich Pichler and the Novice group discussed and demonstrated knurling.

Metric Drill Gage

By *Dick Kostelnicek*

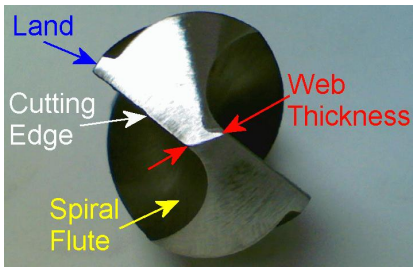


I acquired an indexed set of metric sized drill bits. They range from M1 through M13 and are separated by M0.5. The letter "M" indicates "Metric" followed by the diameter in millimeters. Compared to a standard Imperial sized drill set, which has 29 bits ranging from 1/16 through ½ inch by 1/64 (.0625 – 0.5) inches, my metric set has 25 bits covering diameters from 0.039 through 0.512 inches.

To compliment my new drill set, I could have bought a metric drill gauge for about $10, but then I wouldn't have known if all my new bits would drill precise metric sized holes. So, I made my own gauge (above photo) and checked the size of the holes with an inside micrometer and for the smaller ones, pin gages. "Spot on!"

Now, be aware that every drill bit makes a hole that is larger that its quoted diameter. Certainly it can't make a smaller one! Because a spiral drill bit's two cutting edges never have exactly the same angle, height, and sharpness, nor is the web connecting the flutes exactly centered and symmetrical, a bit often makes an over size hole and sometimes one that is out-of-round. To compound the problem, impurities in the work can push the bit off center, resulting in an imperfect hole.

Here's how to make precise round holes in your drill gage, without reaming them. If the gage's blank is mounted on an indexing platform such as a mill, spot each location with a short shank countersink or spotting bit (left photo). Alternatively use a prick punch if you scribe your layout. The spotted depression will prevent a bit from drifting around on the surface while starting a hole. Recall that the thickness of the blunt metal web connecting the two spiral drill flutes prevents it from cutting right at the drill's point (right photo). Here, metal is just upset or pushed out of the way while drilling and this accounts for much of the force required to advance the drill bit into the work. Some drill bits, called 135 degree split point, have the web thinned by grinding to a point. They are easier to start and are less prone to drifting on the surface.



Follow spotting by drilling a full depth pilot hole with a bit whose diameter is slightly larger than the web thickness of the finish size bit. This will provide clearance for the web of the next drill bit and allow it to freely cut rather than have to plough its way into the work. Next, enlarge the pilot hole using a bit that

is one or two sizes smaller than the finished hole. That's at least 1/64 inch or M0.5 smaller on diameter.

Finally, drill to depth with the finish size bit. This last operation will be very much like reaming. Both cutting edges, near the bit's lands (above right photo), should be sharp and undamaged. Use a very slow feed and rotational speed. For the smaller bits, when the depth is greater than twice the bit's diameter, peck the hole. This means that you exit and then re-enter frequently in order to ensure that cuttings don't clog the spiral flutes and that spiral cuttings are broken and kept short so they don't represent a danger to your person. Clogging can cause a small bit to be broken off in the work or produce an enlarged hole.

Make sure the bit does not pull itself into the hole. This often happens in a piloted hole, in soft metal like brass, or when the bit's cutting edges have excessive back rake or the flutes have a fast or large helix angle. Also, you may loose bit alignment if it is not properly chucked or the chuck itself has a tapered shank that is poorly seated.

As the bit breaks through the work and especially when drilling thin metal, there is no pilot hole remaining and possibly a scant amount of drilled wall above to act as a guide bushing. Under these conditions, the break out of the bit on the backside may result in an enlarged hole and one that is not perfectly round. To prevent this from happening, backup the drill blank with a thick piece of similar metal so that all holes are drilled as blind holes completely into the backup plate.

Finally, use metal stamps to imprint hole size information on your gage. Additionally, I like to stamp my initials and the date on my finished work. Sand off the raised metal that is upset around each stamped letter with a sheet of abrasive paper backed by a flat metal plate. Ease or deburr each hole both front and backside along with the sharp edges and corners of the gauge plate. If you used tool steel to make your gauge, heat treat, temper and polish it.