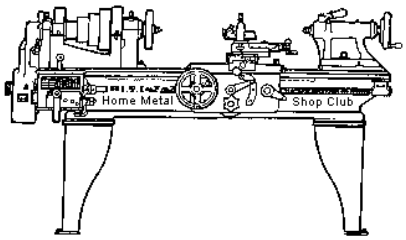
February 2020
Newsletter

Volume 25 - Number 02



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*	*Gary Toll*	*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 14 March 2020 Meeting

The next general meeting will be held on 14 March 2020 at 12:00 P. M. at the Bayland Community Center, 6400 Bissonnet Street, Houston, Texas 77074. John Legrand will deliver a presentation on Powder Coating.

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.

Please note. Commencing on 11 January 2020 the new meeting time will be noon to 4:00 P.M.

Members are requested to submit to the club secretary the name, address, telephone number, and website address, if any, of any metal or other material stock supplier with whom the member has had any favorable dealings. A listing of the suppliers will appear on the homepage of the club website. Suppliers will be added from time to time as appropriate.

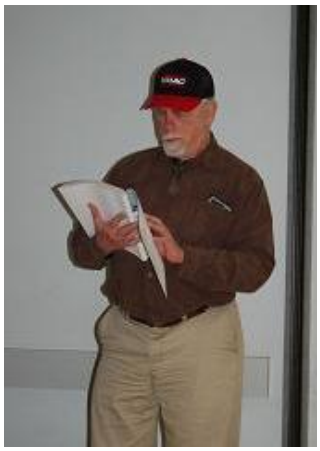
Recap of the 08 February 2020 General Meeting

By *Joe Sybille*, with photos by *Jan Rowland*

Eighteen members attended the 12:00 P.M. meeting at the Bayland Community Center, 6400 Bissonnet Street, Houston, Texas 77074. There was one visitor, John Legrand. There are twenty members in good standing with the club.

President *Brian Alley* led the meeting (right photo).

Presentation



Club member, *John Cooper*, gave a presentation on **Plasma Cutting – Theory and Operation.** Recently, Cooper purchased a Hypertherm Powermax model 30 XP Plasma Cutter (right photo). He has been learning about the use of the unit since receiving it. Plasma is considered the fourth state of matter behind solid, liquid, and gas. Why is it called plasma cutting? Cooper reduces the technically laden definition of plasma to one of an electrically heated gas stream. It is this gas stream that cuts the metal.

Major parts of a plasma cutting system include a power supply, torch, and a gas supply.

Power supplies may be a transformer, inverter, or a dual voltage sensing system for portable operations. Torches may be dedicated for hand held use or for use in a CNC setup. Some torches for machine applications may employ shield gas and cutting gas. Allowances for cutting gas feed apply to all torches whether for hand held or CNC operations. Torches have three major parts, namely, nozzle, electrode, and swirl ring. Gas supplies for both the cutting gas and the shield gas include air, nitrogen, oxygen, and an argon/helium mixture. If one uses air, the air supply must be free of moisture. Additional air filtering is usually required in the local humid climate.

Plasma torches work by creating an arc in one of two ways, either by high frequency or direct short. In both cases, a gas is forced through a constriction inside the torch creating a high pressure gas stream. An electric arc generated from the external power supply is introduced to this gas stream. This is the formation of a plasma jet. Quickly reaching extremely high temperatures, the plasma jet severs the metal being cut and blows aside the molten material leaving a cut edge. The smoothness of the cut edge is determined by several factors. Included among them are travel rate of the torch and velocity of the plasma jet. There is no physical contact between the electrode and the nozzle in the high frequency method. In the direct short method, the supply gas causes the electrode to move away from direct contact with the nozzle.

Personal protective equipment (PPE) includes cotton or other flame retardant clothing to protect the skin from hot sparks, eye protection with appropriate shading of grade 5 to 8, appropriate shoes to protect the feet from sparks and falling cut metal, and leather gloves.

Additional safety measures when using plasma cutting include recognizing that cutting stainless steel and chrome plated metal will emit fumes containing hexavalent chromium, a carcinogen known to cause lung cancer. Also, one should remove the oxide coating on old lead before cutting it. A respirator is helpful here.

Cooper's slide presentation may be found at this link.

Safety Moment

The safety video emphasized the importance of ensuring that a tool bit in a CNC router table spindle's collet is secure. Shown on the video was an unattended, though monitored by video camera, CNC router cutting a relief picture in wood. The bit worked itself loose in the collet and created enough friction between the bit and the wood to generate enough heat to cause a fire. Fortunately, the home owner saw the mishap and commenced fire suppression efforts.

Show and Tell

Joe Sybille exhibited a key made on a mill with a pneumatically operated drawbar. He found using the drawbar convenient, as there was no need for a wrench to loosen or tighten the drawbar to remove or install the spring collet holding the end mill. See photos at left and right.

John Legrand showed a benchtop press he designed and built. See photo at right.

Brian Alley displayed a set of welding helmet magnifier lens (aka cheater lens) he purchased recently. Unique about the lens is that they are made of glass. See photo at left.

Problems and Solutions

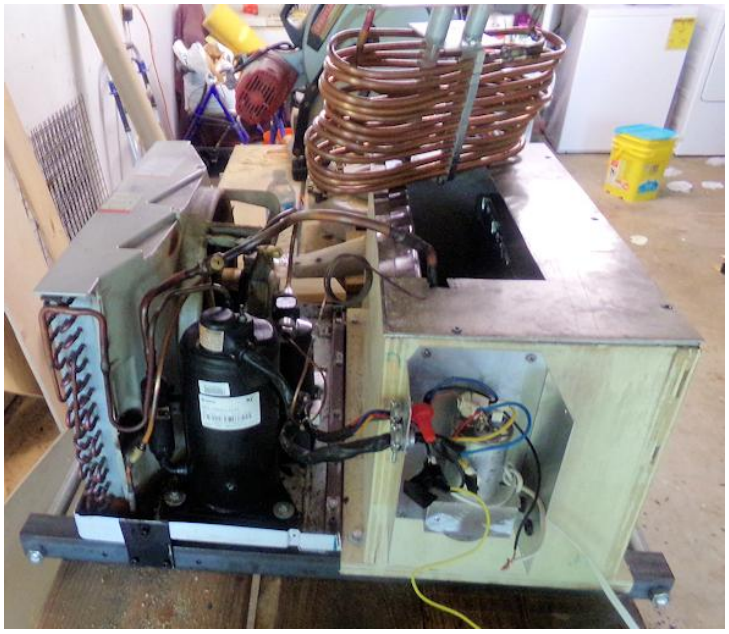
A member requested suggestions on resolving an issue with an erratic garage door opener. The opener works perfectly in cold weather, say, 40 °F to 60 °F, but in warmer weather, the opener works erratically (i.e., the door starts up, stops, then reverses direction). Several suggestions were offered.

Another member mentioned a favorable experience he had with a local company to apply a protective coating on the metal shafts of woodworking equipment in his shop.

Articles

Dehumidifying Shop Air

By *John Hoff*



When shop air is compressed, it gets hotter. Likewise, when air expands it cools. Also, warm air is able to retain more water vapor than cold air.

Compressed shop air is often laden with water vapor (high humidity). The compressor's pump heats and compresses the air, making for an elevated water content per unit of volume. This air then cools while stored in the air compressor's tank. Water vapor eventually condenses out, collects in the tank bottom and may be periodically drained by a purge valve. The compressed air above the collected tank water is still saturated with water vapor (100% humidity). When the pressure on that compressed air is suddenly released, such as by an air operated tool, the nozzle of a paint sprayer, or a blow gun, it cools down and droplets of water form in the air stream. This condensed water will shorten the life of air tools, put "fish eye" patterns in spray painted surfaces or cause a myriad of unwanted problems. To eliminate this, an after cooler between your air tool and the compressed air tank should be installed in the line to remove most of the entrained water vapor.

After coolers, as the name implies, cools the air down, thereby condensing out water in the process and greatly reducing the moisture content in the line. There are many types of commercial after coolers on the market. They all do the same thing, refrigerate the air below its dew point and wring the water out of the compressed air. With that in mind, I decided to make my own from a discarded AC window unit.

I found a GE brand 5K 110 volt nonworking unit on Craig's List. The owner said, "it was about four years old and one day it just stopped working". This unit came equipped with a remote control. He thought it would be cheaper to buy a new one than have this one fixed. I played a hunch that problem was just in the remote control. We settled on a price of forty dollars. After getting it home and onto the workbench, the compressor and fan were energized and it cooled nicely. Stripping all of the styrofoam support off the evaporator coil, the part that does the actual cooling, the bare finned coil measured 18" lengthwise x 8" high and 1 1/4" thick. The inlet and outlet tubes for the refrigerant were easily repositioned. Before modification, a water tight tank was constructed wide and deep enough to completely submerge the evaporator coil.

The tank was filled with an antifreeze solution. Sharing the tank was fifty feet of 3/8" dia. copper tubing to transport the compressed air. There are several sights on YouTube showing how to bend copper tubing without crimping it. I had no trouble fitting both the evaporator coil and the coiled compressed air tubing in the tank. When finished, the filled tank submerged both coils.

The tank is surrounded by a 3/4" thick styrofoam insulating board two layers thick on all sides and bottom. The insulated tank is encased by a plywood box. The sheet metal tank's top has wide flanges that cover and keep the styrofoam insulation dry. The AC unit's base plate is made from heavy gage steel plate with the edges bent up about 1" on all sides, thereby preventing overflow water damage. The plywood box was just the right width to fit inside the side lips of the base, but the back lip had to be cut off so the box could fit flat on the AC base plate. I deliberately broke the hermetic seal and had to recharge the system's refrigerant. In hindsight, the conversion could have been accomplished without the need to break the sealed system. I can now see by cutting off the fan motor's shaft with a hacksaw on the evaporator's side of the fan, the inlet and outlet tubes could have been repositioned so the evaporator could have placed in the cooling tank intact.

After recharging the system, I tested it out. To my surprise, it did not take long for the tank fluid to reach about 5 degrees F. This was much colder than I wanted it to be. I wanted to condense the water out but not freeze it, possibly plugging up the 3/8" air tubing. A temperature controller found on Ebay, now keeps the brine at 35 degrees F. Speaking of five degrees, if I were a beer drinker, a five degree bath to keep my brew in would be great. Maybe that will be a future article. The cold compressed air emerging from the copper tubing coil passes though a centrifugal water trap that separates out the condensed water, where it is periodically drained and discarded.

I'm well pleased with set up. Now when I use my blowgun or sandblaster etc. gone is the water dripping from the air tool.