May 2019
Newsletter

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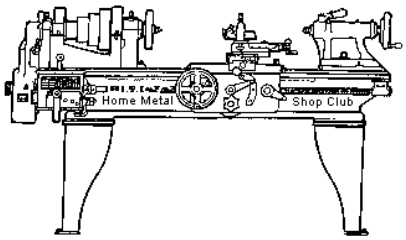


http://www.homemetalshopclub.org/

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*	*Emmett Carstens*	*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 08 June 2019 Meeting

The next general meeting will be held on 08 June at 1:00 P. M. at the Bayland Community Center, 6400 Bissonnet Street, Houston, Texas 77074. *John Hoff* will give a presentation on Punches and Dies. 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.

Recap of the 11 May 2019 General Meeting

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

15 members attended the 1:00 P.M. meeting at the Bayland Community Center, 6400 Bissonnet Street, Houston, Texas 77074. There were 3 guests in attendance, Davis Veir, Andy Anderson, and Denis Maras. There are thirty-one members in good standing with the club.

President Brian Alley led the meeting (right photo).

Presentation

Club member Richard Douglas gave a presentation on his visit to Tannehill Ironworks and to the Iron & Steel Museum of Alabama. Both are located in the Tannehill Ironworks Historical State Park near the town of McCalla in Tuscaloosa County, Alabama.

Founded by Daniel Hillman, Tannehill Ironworks operated from about 1829 to1865 when Union troops destroyed the furnaces during the Civil War. The Ironworks began with a bloomery forge. Later, two blast furnaces were added to the Ironworks. At the height of production the Ironworks made 22 tons of iron a day. Access to nearby large deposits of sandstone, limestone, coal, and iron ore ensured a successful iron making operation. The labor intensive operation relied on the efforts of an estimated 500 enslaved workers to quarry the stone. These workers also cut down the trees to be made into charcoal to feed the furnaces. The nearby swift running Roupes Creek and a large steam engine powered the blowing machines to add oxygen to the fires that melted iron ore. This melted ore formed into billets called 'pigs' of iron were later used to make ordnance and other items to support the Confederate war effort.

What stands today for the Ironworks is a replica of the original furnaces and support buildings. The Iron & Steel Museum is a testament to the ingenuity and success of the iron industry in Alabama.

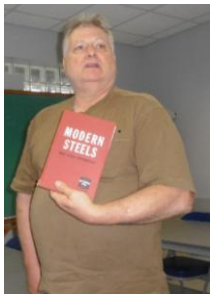
One may find more information on the state park at www.Tannehill.org.

Safety Moment

The safety video emphasized the importance of keeping one's extremities out of the way of the splitting ram when splitting logs and of wearing appropriate personal protective equipment (PPE). PPE includes hearing protection, safety glasses, work gloves, and sturdy safety footwear.

Show and Tell

John Cooper exhibited a few items purchased at an auction. The items included lab jacks, lab heater and demagnetizer, lab stands, and a hydraulic pump. See photos below.



Richard Douglas showed and discussed briefly the contents of a book, namely, Modern Steels and Their Properties published by Bethlehem Steel, 6th edition. See photo at right.

Martin Kennedy showed tools he made for use in his lathe. One tool, a relatively slender rod mounted in the tailstock, is used to support the opposite end of a small chucked work piece. This arrangement eliminates the risk of the carriage hitting the chuck and allows the tool bit to get close to the work piece. Another of the tools shown is used to hold a die and another to hold a tap. Both of these tools are used for threading. See photo at left.

Brian Alley showed a tractor whistle from the estate of his wife's grandfather. Unique about the whistle is that it is operated by the exhaust of the tractor engine. See photo at right.

Problems and Solutions

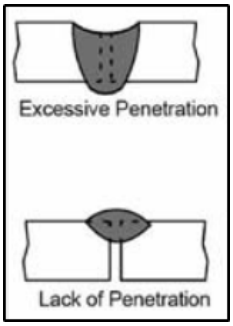
A member wanted to know if there is a way to determine without high costs the composition of a coil spring retrieved from the front suspension of a car. Another member commented that the coil is likely made from 1095 high carbon steel. See photo at right.

Articles

Forge Welding

By *Vance Burns*

Welding materials in a blacksmiths forge is technically complex in theory but straightforward in practice. Best practice is clean fire, clean materials, even heating, etc. I recall my first forge welding experience. Blacksmiths are inveterate scroungers and welding scraps together allows the smith to generate stock profiles according to need. It is quite satisfying to have the skill to add rather than just machine away valuable material. If you have performed or watched stick, tig or mig welding you have been observing a controlled melt. One of the early skills you hope to develop in electrical welding is proper penetration. Under or over welding is undesirable, under penetration (not melting enough) creates a poorly fused joint, over penetration produces deformation or at worst, unexpected holes melt into your project. Oops! Welding in this fashion is additive. However, it is usually restricted to the peripheral areas of mating surfaces. It is very costly to join large parts in stick, tig or mig as completely as forge welding does.



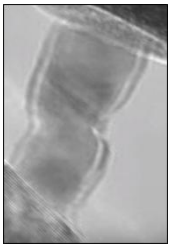
Misconceptions cleared

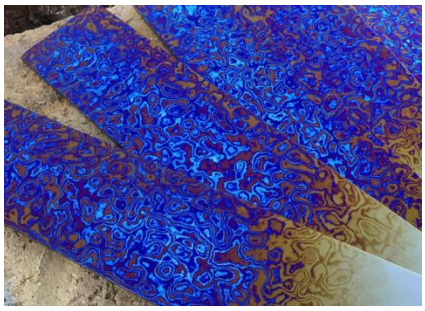
There is an illusion shared by many that forge welding is melting two metals together or melting them enough so they can be joined together. Consider this, if the metal, which heats uniformly in most cases, reached a state of liquidity, it would be like manipulating a wet noodle in the forge. The metal in the forge is not melted as much as it is prepared to deform uniformly. Let me explain. Fusion does not occur within the forge. Metals are prepped for fusion outside the forge by creating or forming the mating surfaces, cleaning them (this is a blacksmiths shop so “clean’ is relative) and bring them up to heat in the forge. Once the metals behave in a more plastic response to the heat, the joining surfaces are again manually cleaned of scale and coated with flux materials which serve to protect the surface. This coating blocks impurities and eliminates oxidation, Eliminating oxygen serves to deter formation of oxide scale. The pieces are then reinserted back into the flames to reach the plastic state desired. The use of flux is critical; there are many variations but the simplest flux is silica sand. The flux protects the surface from impurities and oxygen contamination, until it is forced out of the joint, creating the “flash” when the metal is hammered into uniform contact. The metal state or the degree of heating is judged by color. This heat-temp is not difficult to learn through moderate experience.

Heat?

Do we need heat to fuse materials? Metals in a natural state want to fuse but poor proximity (atomic level), contaminants and oxidation are barriers. Heating the materials helps overcome these limitations

by removing contaminants and conforming the surfaces to immediate proximity which promotes an environment where (according to modern theory) electrons are free to exchange boundaries, form bounds and become one piece. Although heat and pressure speed the process, there is a phenomenon called single phase welding which doesn't require heat or pressure, just proximity. In trying to solve a problem, Nasa Scientists learned that metals, in an ultrahigh vacuum can fuse. The 1991 failure to deploy the Galileo antenna is an example of unwelcome cold welding in space. Atoms in proximity with atoms of a similar part can exchange boundaries without heat or pressure. See this amazing video where a Rice University materials science professor discovered small wires will fuse themselves together without external forces (right photo).





There are a lot of information sources that will tell you dissimilar metals cannot be forge welded nor can anything but low carbon steels be joined in this manner. Unfortunately, blacksmiths and knife makers didn't know this and just did it anyway. Titanium is routinely forged into eye popping combinations; Copper, Brass and Silver are forged into Mokume. The breadth or materials used and the beauty of Damascus knives is legendary (right photo). Aluminum has been forge welded, and some hypoeutectic cast-irons can be forge welded. Magnesium has been forge welded, Nickel and Tungsten are capable of being forge welded.

The economy of single phase welding was a boon to our early preindustrial economy and is still part of the modern fabrication landscape. As we learn more about metal fusion, and how to exploit it, we will see better, cheaper products in our metal world.