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Newsletter

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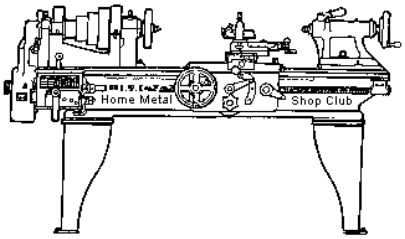


http://www.homemetalshopclub.org/

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
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 967 subscribers located all over the world.

About the Upcoming 12 March 2016 Meeting

The next general meeting will be held on12 March at 12:00 PM (Noon) at the home shop of member Tom Moore at 7903 Litchfield Ln, Spring, TX. Tom will give us a grand tour of his collection of machine tools. He will also demonstrate some of his techniques that have taught so many of us over the years.

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 13 February 2016 General Meeting

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

Twenty-three members attended the noon meeting at the Parker Williams County Library, 10851 Scarsdale Boulevard, Houston, TX 77089. Two visitors, Bill Berry and Jimmy Gilbert attended the meeting. There are 44 members in good standing with the club.

President *Vance Burns* led the meeting.

Presentation

Chris Marvel gave a presentation on heat treating aluminum alloys. He began by explaining both why and how heat treating is done and concluded by assuring home metal shop workers that heat treating can be done successfully in their shops.

One must appreciate that the properties and behavior of a material are closely related to the internal structure of that material. Appropriate changes must be made in the internal structure to modify properties. Likewise, if service conditions or mechanical processing of the material alter the structure, the behavior of the material will change.

A good reason to heat treat aluminum alloys is to improve the properties of the material by optimizing strength and ductility. The goal is to create a better distribution and shape for hardening particles. Cracks are known to propagate through continuous grain boundary precipitation. To minimize crack formation, a fine, even dispersion of hardening particles is desirable. As mentioned earlier, mechanical processing or cold working can adjust the behavior (hardness or structure) of the material. A highly elongated and aligned grain structure accompanied by an increase in residual stress due to cold working leads to an internal structure having different properties in different directions.

Annealing relieves the increased residual stress by heating the metal above its recrystallization temperature and maintaining it for a period of time. Doing so helps homogenize the chemistry and refines the grain size. Recall that grain size is a statistical grain diameter in a random cross section of the material. Grain size and grain boundary area are significant with respect to the behavior of the material.

An alloy strengthened by heat treatment is usually accompanied by a reduction in ductility. Heat treatment also mitigates the formation of dissimilar constituents in the internal composition (segregation) in ingots and castings. Welding is a casting operation, although it produces some segregation.

A brief comparison of the heat treatment of steel versus aluminum reveals steel usually hardens immediately after quenching. Further heat treatment sacrifices strength for ductility. On the other hand, aluminum and most other metals are soft after quenching. Subsequent heat treatment increases metal strength.

Certain alloys are non-heat treatable. Generally, they are restricted to annealing and recrystallization. Examples of these alloys are 5083 used in truck bodies and 1450 which includes foils and extruded shapes.

Of the heat treatable alloys 6061 and 7075 are used widely. There are some alloys that age-harden at room temperature, for example 2024. To check the aging of this alloy, 2024 wire or rod, typically used for rivets, is stored usually in a refrigerator to gain increased workability.

Solid-solution hardening, age or precipitation-hardening and annealing are included among several heat treatment methods. Generally speaking, heat treatment is the processing of metal through one or more cycles of increasing temperature for a set duration. In solid-solution hardening and annealing, alloys are made by heating the metal to near the melting point and then letting it come to an equilibrium temperature. Annealing renders the metal soft without melting. Solid-solution treatment softens the metal with the added task of dissolving the alloying elements. Age or precipitation hardening occurs when at elevated temperatures alloying elements precipitate out of solution after a period of time.

Can a home metal shop worker heat treat aluminum? Absolutely! Equipment options required to do the heating include a torch, home oven, and a farrier's forge. The torch will likely provide uneven heating. The home oven will likely cause friction with the spouse. The farrier's forge is efficient enough to get aluminum alloys into the solution temperature range.

A way to measure the temperature must be available. Laser temperature readers work up to a certain maximum temperature. Thermocouples are useful to determine the core temperature of the heated alloy.

For solution temperature attainment, heated metal temperature is critical. The time heated is not so critical. An extra ten to fifteen minutes is unlikely to do any harm. A temperature ten degrees Fahrenheit to fifteen degrees Fahrenheit too high can create incipient melting and cause undesirable consequences.

How does one know if the results of the home shop heat treating are successful? One could have the alloy tested at a metallurgy lab, but that may be costly. Another option is to destructively test a sample of one's work, but this may prove impractical. If one has access to the appropriate equipment, one could conduct a hardness test, but the results may not be all inclusive. Lastly, one could put the part into service and see if it breaks. This may be the only option available to many home metal shop workers.

Chris's presentation can be viewed at this web link.

Safety Moment

Vance Burns showed a video of a person being interviewed while undergoing treatment at a hospital for partly severed fingers resulting from failing to exercise caution when using a power tool. The patient revealed that he had used a circular saw to cut wood. In doing so, the saw blade became wedged between the cut pieces of wood. While trying to free the saw blade, the saw started and accidentally kicked-back, cutting several fingers on one hand of the patient. He had forgotten to unplug the saw before attempting to free the blade. This scenario is a reminder to always keep one's mind on the task.

Ray Thompson mentioned a news article about a worker who sustained a fatal injury while using a commercial mixer.

John Cooper spoke of an incident involving a neighbor who, while using a chain saw to cut wood from a downed tree, fell and suffered a fatal injury as the chain saw cut his neck during the fall.

Show and Tell

Dick Kostelnicek gave a demonstration on how to use the club website to find articles of interest. He then displayed a new infrared temperature gauge that he purchased on the web (Left photo). Dick also showed a deburring tool that works well in a hand held drill (Right photo).

Martin Kennedy showed a couple of tool holders that he purchased on-line from the AliExpress.com website (Left Photo). He then exhibited the results of a part with complex cuts made on his newly converted to CNC 1943 Monarch lathe (Right photo).

Tom Moore showed and explained the use of several line boring bars that he uses in his shop (Right photo).

Rich Pichler exhibited a non-sparking mallet that he bought at a garage sale (Left photo).

Fredy Martin displayed a three piece wooden form for an engine cylinder head that he would like to cast out of aluminum (Right photo). Attention to details was evident in the wooden forms. Fredy asked for suggestions on the best casting method to use for the cylinder head.

Problems and Solutions - *Ask the Blacksmith*

A member wanted to know the best way to dispose of a few gallons of gasoline discovered while doing a major clean-up of his garage. The gasoline was at least five years old and had begun to gel. The best option given was to take the gasoline to the hazardous waste facility at US 59 (I-69) and Fountainview in Houston, Texas.

Another member asked for suggestions on positioning the quill of his Smithy lathe/mill model CB 1220 XL. His Smithy has a 3 ½-inch quill stroke. When drilling holes in a part that must be flipped over to complete the hole, it seems as though the drill bit location for the second matching hole is usually off center because the mill head must be repositioned. As a result, the finished hole on one side is elliptical, not a true circle. Central to the suggestions offered was to establish a reference point to which the mill head could be aligned.

Articles

Material Color Codes

By *Dan Harper*

Many materials have a very similar appearance, but their physical properties can vary considerably. To differentiate between different materials, the manufacturers color code the ends of the bars they produce. Unfortunately, (at least in the US) there is little industry-wide standardization of these markings. Some materials are labeled along their length, but the labeling can be lost due to handling and cutting the bar shorter. Also, who wants to pull out each piece to see what it is?

Even though we can't reform the industry practices, we CAN establish standardization within our own shops.

First, develop organized storage methods that allow at least one end of your stock to be easily visible. Next, list the materials you currently use and those likely to be used in the future.

Select a color to identify each of these materials (white does not show up well on aluminum and other light-colored materials). Acrylic paint comes in a rainbow of colors, and is available in small bottles at craft stores, and even Wal-Mart. Paint markers in various colors are available from machinist supply companies.

The chart shown is an Excel spreadsheet that can be downloaded. It is just a chart; there is no math in it so it can be easily edited to meet your needs.

A	B	C	D
Material Color Codes			
	Steel	Aluminum	Plastic
none	unknown	unknown	unknown
none	A-36 etc.		
white	1018/1020		
red	1117		polypropylene
blue	1144 stress-proof	356	polycarbonate
pink	12L14	2011	acetal copolymer
green	1215	2024	Nylon
yellow	4130	6061	Delrin homopolymer
orange	4140/42, B7	6063	ABS
brown	O-1	7075	UHMW-PE
light blue	W-1		HDPE
other materials: write description on stock			
thread identification (in addition to the material spec)			
UNC threads	**none**		
UNF threads	**yellow**		
metric threads	**red**		

Now you are ready to mark all the material that comes into your shop before using it. Leftovers should be marked before they go into the small pieces container. And of course, pieces should be cut from the unmarked end.

Quality will be improved because it is easy to select the right material for each job. Time and money will be saved by not running out of material in the middle of a project, and eliminating the purchase of extra material by knowing what is already in inventory.

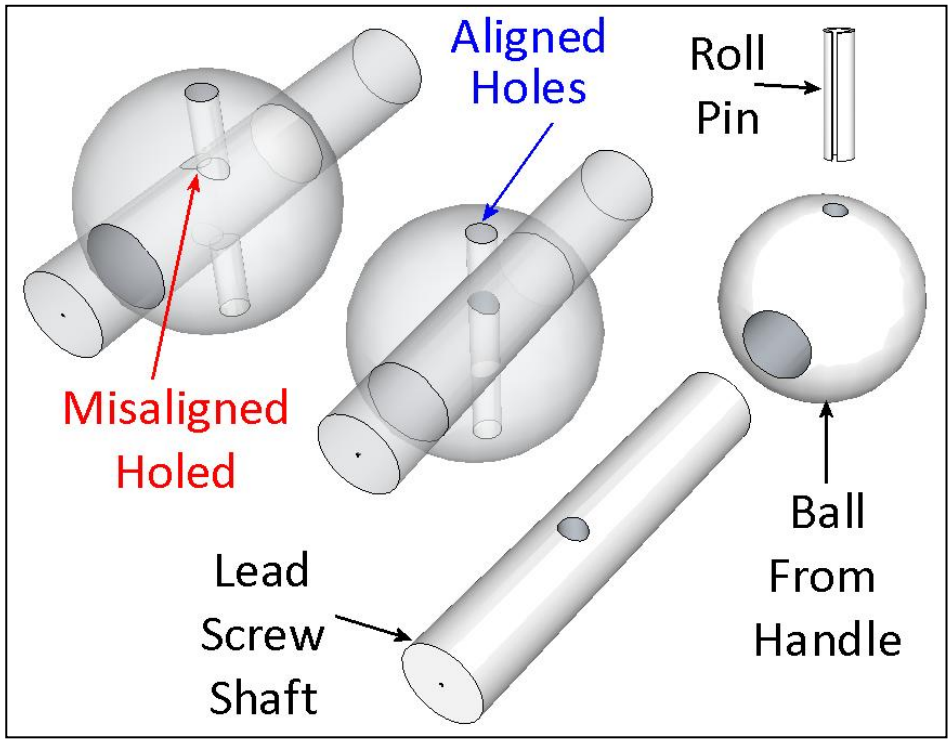
Misaligned Roll Pin

By *Dick Kostelnicek*

With ease I removed a ball handle from a lathe cross slide's lead-screw by pressing out the 1/8-inch roll pin with a pin punch (left photo).

In due course, I tried to replace the handle but the roll pin got stuck after entering about half way into the assembly. With great difficulty, I was able remove the stuck pin by pressing it out with a pin punch from the other side of the ball handle (right photo). The extracted pin was mangled and the holes in the lead-screw shaft and ball handle were both galled. So what went wrong?

During manufacture, the 1/8-inch hole was drilled simultaneously through both the handle ball and the shaft, but a bit off center. When I placed the ball handle over the shaft, I inadvertently turned it 180 degrees from its original orientation. Hence, the ball and shaft holes were no longer properly aligned (see drawings at right). Pressing the roll pin into the assembly bent the roll pin as it entered the offset shaft hole and then became stuck.



After removing the stuck, bent pin, I reamed both the shaft and ball handle holes. Then, I inserted a 1/8-inch pin punch to find the correct rotational orientation where the handle's ball and shaft holes were aligned. The roll pin was then pressed with ease into the assembly.