SCHSM

Southern California Home Shop Machinists June 6, 2020

OFFICERS

President	Doug Walker
Vice President	John Miller
Secretary	Ron Gerlach
Treasurer	Jim Endsley

COMING EVENTS

July Virtual Meeting
Sat, 4 July 2020, 2:00p.m.
via Zoom

Club Picnic (Canceled)
Sat, 20 June 2020
Alondra Park

PREFACE -
The virtual June meeting of the Southern California Home Shop Machinists was called to order a little past 2:00 p.m. on Saturday, June 6, 2020. We met in the cloud from our individual homes via Zoom. There were 27 members in attendance.

CLUB BUSINESS –
Doug called the meeting to order.

Jim Endsley provided a brief budget report, noting that the club account currently has a balance of $1569.25.

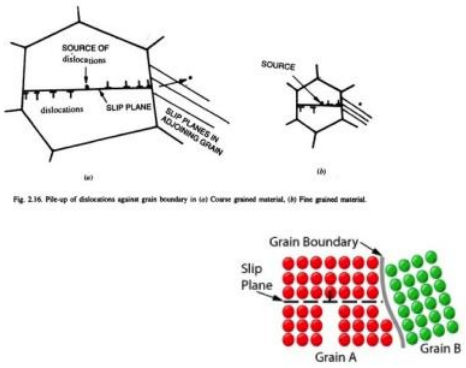
Doug brought up the issue about the next club meeting falling on the 4th of July. He proposed moving it a week to July 11th. There was some discussion back and forth and then a vote taken. The majority voted to keep the meeting date of the 4th.
The issues of scheduling a taco truck for the picnic (if it is held) were discussed. It became obvious the number of attendees at the picnic might be quite low. It was suggested that for this year, due to the unique conditions, the plan of providing food for the picnic be scrapped and just rely on attendees to BYOF (bring your own food). That would eliminate any further issues related to food and would provide maximum flexibility for those planning the event. This then led to a discussion of what if any should be charged for attendees to the picnic. It was suggested that a fee of $5 be charged to help offset the cost of reserving the park. This may all still be a moot point if the Parks and Recreation people decide the group event cannot be held on the 20th as planned. Jim Endsley is monitoring the situation and will keep the members apprised of any changes.

Ed mentioned that the official position is still for an October 17th resumption of any on-site class activities. This would be in the middle of the semester so classes would start on-line and revert to on-site on the 17th. This means the first potential on-site meeting would be Saturday, November 5th.

PRESENTATIONS
Michael Vulpillat presented a very detailed description and explanation of the heat-treating properties and processes for carbon steel. He started out by discussing grain structure within steel. The grains are formed into

clusters that are surrounded by boundaries and within these boundaries are a homogeneous crystal structure. There can also be slip planes within a grain. Carbon steel goes through phase changes as temperature is raised and lowered through critical temperatures. The grain structures are formed as a steel cools down from temperatures above the A3 level. These structures then become frozen and stay

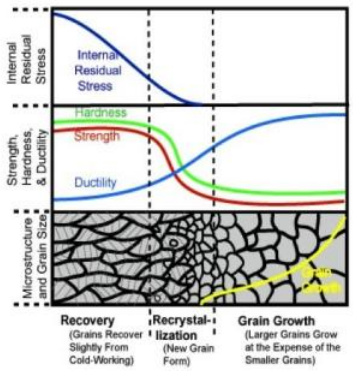
Slip Planes and Boundaries



unchanged unless they are influenced by additional heat treating or cold working. The bottom line for carbon steel is that size matters. Large grains in a steel are not good. They lead to poor properties of toughness and machinability. Small grains are good. They lead to optimum performance of the steel. The goal of heat treating is to transform large grains into small grains. He showed grain size charts to aid in determining grain size. These are compared to the steel samples with 500X to 1000X magnification. The surface of the steel is cut, polished and etched to bring out the grain structure.

Grain Restoration

- Normalizing

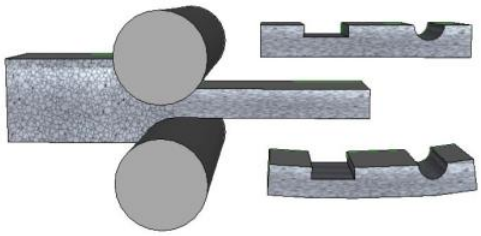


Next up was a discussion of the Grain Growth vs Temperature chart. This chart is for steel with varying amounts of carbon and no other alloying elements or compounds added. During cooling, Austenite grains grow like mercury blobs that gather together to form bigger blobs.

Cold forming of steel can change steel qualities by effectively pushing the grains in one direction. This improves hardness but only in the direction of the grain displacement. Thus, hardness becomes directional with cold formed steel. This whole process leaves internal stresses within the steel which can cause dimensional distortion when significant amounts of the material are cut away during the machining process.

Machining

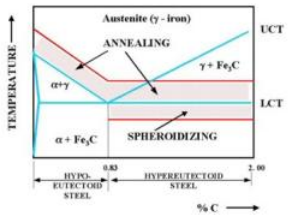
- Cutting the grain
  - Residual stress induces deformation

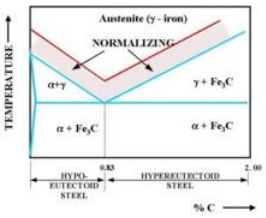


The basic and most common forms of heat treating are Annealing and Normalizing. These processes are similar but are uniquely different. Annealing leads to low internal stresses and improves machinability. Normalizing improves strength with a fine grain structure. His recommended sequence for optimum results would be to Anneal > Machine > Normalize > Finish > Heat Treat > Final Finish (grinding).

The Confusing Two

- Annealing
- Normalizing





Annealing is achieved by heating the steel up past A3 and soaking (The soak time would be a function of thickness); then cooling slowly by leaving the steel in the oven and allowing the oven to cool by itself. Normalizing involves multiple cycles of raising the steels temperature to just above A3 (by approx.. 50 degrees C) and then

cooling below A3 and then back up again over and over. This process refines the grain structure into fine grains. Slow cooling is not required. Normalizing in the shop Is fairly easy to achieve. The steel needs to be repeatedly heated to a visible dull red and then cooled.

The carbon content of the steel determines how hard it can become with heat treating. The magic limit is around .4% carbon. Steel with carbon levels above this number can be heat treated to obtain a very hard condition. Levels significantly less than .4% will just not respond to heat treating.

As a side note, Michael pointed out that the Forging process itself does not make steel better, it is the inherent process of repeatedly heating and cooling that effectively normalizes the steel.

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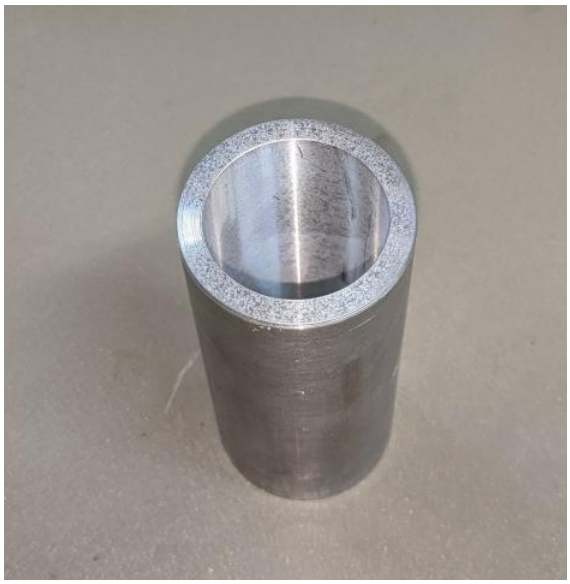
Ron Gerlach showed a series of photos of the antique engine he has been working on for the last couple of months. He had discussed bits and pieces of this engine at previous meetings, including the unfinished Babbitt shell mold he showed last time. First up was the pile of rusted parts that he started with in the February time frame.

Photos of the Babbitt shells made from the previously shown mold were shared. The first one shows the mold pieces opened up and covered with acetylene soot to prevent sticking of the Babbitt. The next shot shows the assembled mold with Babbitt after the pour. The bottom image shows the opened mold and the cast Babbitt shell in the foreground.

After the Babbitt cooled down it was placed in the lathe, on a special mandrel, and turned to the correct OD. This operation required the center form to remain in place in the raw slug.

The finished shell is shown below. After this point it was pressed into one side of the engine crankcase casting and then the grease flow tracks were cut by hand. These tracks allow grease to flow from the grease entry point along the length of the bearing.



Then he showed the new piston he made from a cast iron blank. The 3.5" diameter piston that came with the engine had a damaged crown which had been crudely welded back in place. This damage, plus the fact that the cylinder had to be bored out 0.065" to remove wear and rust pitting, necessitated a new piston. An internet search lead to a guy back East who had a blank that was intended for a bigger piston but had just enough "meat" to allow it to be used for this application. The image below shows the original piston and the cast iron blank used to make the new piston.

The next image down shows the original piston again alongside the newly turned replacement made from the blank.

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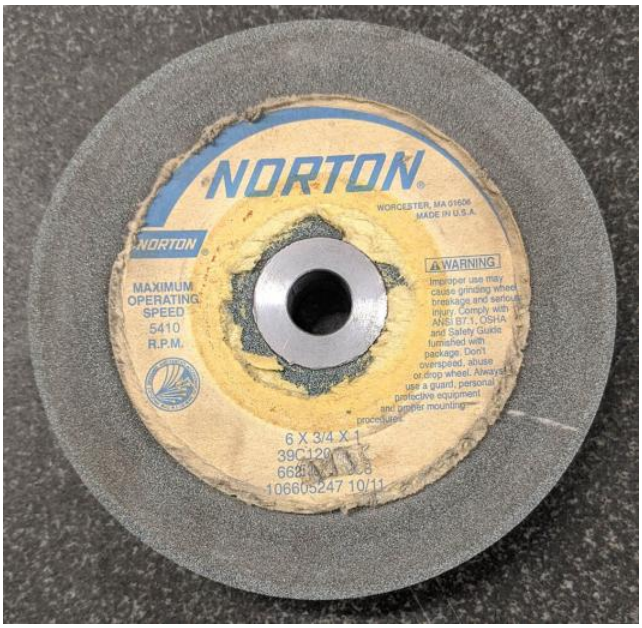
Don Huseman asked about black iron which no one seemed to know anything about. He also asked about a new white oxide grinding wheel he needed to mount to his old bench grinder. He was questioning the effectiveness of the supplied plastic spacer that sizes the center wheel opening to match his motor shaft. Several members spoke up and agreed these plastic spacers worked fine for most applications. Matt Rulla suggested using a technique that he uses where he pours molten lead into the center hole. He then gently peens

the lead to help it fit into and grip the existing hole. He then carefully mounts the wheel on his lathe and machines the lead to get the exact size hole precisely centered in the wheel. He admitted this was a bit overkill, but he had very good luck with it. Matt followed up this discussion after the meeting by sending a picture of one of his wheels mounted with this custom poured and turned lead center. That looks like a real solid and great way to mount a wheel.



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SCHSM welcomes presentations by members or guest speakers on any subject related to metal working activities. If you have some knowledge or experience you feel may be of interest to our members, or if you know someone that may have something interesting to relate, please consider making a presentation at a meeting. Presentations may be a little longer and more detailed than a show and tell, and may be accompanied by slides, video, or physical displays. Probably every member has some experience they can share, and this is the purpose of SCHSM. Please contact President Doug Walker to make arrangements to give a presentation.

SCHSM met in Classroom AJ115 on the first floor of the Industry and Technology building of El Camino College, 16007 Crenshaw Blvd. Torrance, California, at 2:00 p.m. on the first Saturday of every month until March of this year. Meetings are now held via Zoom. This will continue until at least October of this year.

If you would like to contribute an article to this newsletter, or make a comment, contact the editor, Ron Gerlach. He can be reached via the SCHSM Groups.io Group, or at r7734g@hotmail.com.

Find us on the web at www.schsm.org.