

# Rocky Forge News

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## Next Meeting, October 13

### At Ted's Shop

Fall is here and the leaves are falling everywhere, one of my favorite times of the year, flannel shirt weather. It's time for another "Rocky Forge Hammer-In". The weather gurus are predicting a high of 62. We will wait and see. They still get paid when they are wrong. If that prediction holds true, that will be ideal metal working weather

The meeting is Saturday, October 13<sup>th</sup>, with coffee and doughnuts starting at 8:30 followed by a short business meeting. As usual there are several coal forges and 2 gas forges available. No problem if you want to bring your own forging set-up. I have metal available. Just ask first so you do not use a piece I had plans to use

Lunch will be hot dogs cooked over an open fire, you cook your own. Making a hot dog roasting stick might be a fun project before lunch. Carol asks that you bring something to go with hot dogs. We really appreciate it when you contribute to the meal.

One other thing, Carol said after nearly 16 years of feeding this group, she expects someone or two to volunteer preparing the main dish for the next meeting. You might want to attend this meeting because if you are not here you may get volunteered. Bring items for iron in the hat drawing.

Many thanks to Marty, Dominick, Rob, Robert, and Dan for demonstrating at History Day at the Illiana show ground. Over 400 schoolchildren participated.

The club still has several of the James Morre' books available. James was the lead blacksmith for the Fort Quiatenon group for many years and he made a compilation over the years of his work. The book has several very pertinent, educational and well illustrated sections. The price is the cost of publication, \$15.00 and the family asks that no book be bought with idea of resale

Come on the 13<sup>th</sup> and have a day metal working.

Ted and Carol

## Contacts

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## Dates to Remember

**October 13:** Rocky Forge meeting at Ted's Shop.

**October 20:** IBA meeting at Jennings County Historical Society Blacksmith Shop in Vernon IN.



Robert Werberig demonstrates to a large crowd at History Day at the Illiana show ground in Rainsville.



Rob Durrett tells the story of the Lewis and Clark expedition to a capt audience.

Reprinted from the New England Blacksmiths (Winter 2017) and the ABBA Hammers' Arc.

*Reprinted with permission from the ABBA Hammer's Arc*

## Forging Non-Ferrous Metals

By Jim Guy

There are a number of beautiful examples of ironwork that uses copper or bronze as a way of adding color or contrast to traditional iron work. This is something that I feel will add another dimension to my work. The "Forging Non-Ferrous Metals" class at John C Campbell has provided a good grounding in the basics to make that happen. The instructor, Lucas House, led us through forging aluminum, silicon bronze, naval brass, copper, and stainless steel. Each day begun with a forging demonstration of one of these metals, leaving us the rest of the day to work with a metal of our choosing. Lucas also reviewed other topics which are important to completing any non-ferrous work. These included silver soldering as an alternate means of joinery, finishes and patinas. What surprises me is that once you overcome some key differences with these metals, the process used to forge it is very similar to steel. As a result, the following descriptions will focus on identifying these differences such as the right forging temperature and how the metal behaves.



*Figure 1: Snail (Copper and Stainless Steel)*



*Figure 2 "J" hook in aluminum, copper, naval brass and silicon bronze*

### Silicon Bronze

The most common silicon bronze alloy used by blacksmiths is 655 (also known as C655 and C65500). Silicon bronze is corrosive resistant and has relatively good strength.

#### Forging temperature

Forge silicon bronze at a dull red in a light area.

#### Forging tips and Observations

Silicon bronze does not generate scale. There is a great deal of blacking that must be removed before a finish is applied.

Transfers heat quickly but not as quick as aluminum. Fractures when heated too hot. Works like steel when at temperature

When buying silicon bronze: It is typically priced by pound regardless of shape. Round stock is always cheaper than other shapes.

### Copper

The copper alloy used in class is copper 101, a low oxygen alloy with a copper content of 99.99%.

#### Forging temperature

Slightly cooler than silicon bronze, a faint red.

#### Forging tips and Observations

Will conduct heat instantly. It is a most forgiving metal that can basically forge cold. Copper blackens when forged but does not form scale.

## Forging Non-Ferrous Metals continued;

### Naval Brass

464 Naval has many good qualities such as a pretty color, corrosion resistance.

#### Forging temperature

Slightly cooler than silicon bronze, a faint red (basically the same color as copper's forging heat)

#### Forging tips and Observations

Work small points cold

Butter soft at the high end of forging temperature

NOT forgivable. Will fracture if forged too hot or too cold

### Aluminum

We used 6160 aluminum in our forging. This is one of the most common alloys of aluminum for general-purpose use.

#### Forging temperature

Aluminum at the correct forging temperature does not give any visible sign of temperature. Identify the correct temperature when: a black sharpie marker line on the metal disappears or a piece of wood chars or smokes

aluminum may feel like it hits a sticky place on the anvil surface

#### Forging tips and Observations

Aluminum does not generate scale. There is some blacking, but not much

Transfers heat quickly (in other words, keep your tongs handy!)

Fractures when worked too hot

Aluminum can work-hardened. (bar stock comes work hardened unless ordered annealed)

Anneal by heating and let cool (may air cool or quench immediately after heating, doesn't matter)

Annealed aluminum can be forged cold to some extent.

### Stainless Steel

#### Forging temperature

Forge stainless steel at a bright yellow, almost white.

#### Forging tips and Observations

Stainless requires more heat than steel. It is harder to move metal at forging temperature than steel. It does not transfer heat quickly and blackens when forged.

### Joinery

Traditional joinery techniques apply to all these metals (such as collars, rivets, mortise and tenon joints). Most can be welded via TIG and MIG.

### Finishes

Finishing the metals discussed above follow a similar process. First remove oxides, then apply a patina (optional step) finally apply a finish.

#### Oxide removal

The only option for aluminum is to brush off the black oxides with a stainless steel brush. Use an acid bath with the other metals, it will save a lot of time.



*Figure 3: 3" Aluminum rod forged at too high a temperature*

## Forging Non-Ferrous Metals continued;

The class used muriatic acid undiluted for its' acid bath. Take two plastic containers big enough to hold the items to be cleaned. Put muriatic acid in one and water in the other. Soak the items for an appropriate amount of time, up to a couple of minutes for naval brass, silicon bronze and copper. Then dunk them into water to remove any residual acid and stop further etching. After an acid bath, brush with a brass brush or fine steel wool to remove any remaining black oxide and to polish the surface. Stainless steel is a bit different. You will need to wire brush stainless before the acid bath to remove any loose black oxide, then let sit in the acid bath overnight. Warning: etching stainless steel after etching copper or silicon bronze in the same acid bath will copper plate the stainless steel.

Aluminum will dissolve in muriatic acid if given enough time (5 to 10 minutes). However, if you just dip it in quickly, will etch a nice gray finish.

### Patinas

Copper, naval brass and silicon bronze do not really need patinas and will naturally develop a pleasant patina over time (silicon bronze will turn a nice dark brown).

In class, we used patinas from Sculpt Nouveau. Traditional Black Magic for copper, naval brass and silicon bronze. And Birchwood Casey Aluma Black A-14 for aluminum.

When using patina's, don't just use it out of the bottle. Put it in a cup to minimize contamination. From there, just wipe it on and then wash it off.

With steel: wash off immediately

With silicon bronze, wipe off after a few seconds and then rub with steel wool

Naval brass turns black instantly!

We used liver of sulfur in our recent copper class. This seems to behave similar to the Sculpt Nouveau patinas. Directions for all of these patinas recommend using them hot. We didn't in class and had good controlled results.

### Finish

Most finishes used on ironwork can be applied with these metals: clear lacquer, min-wax wipe-on poly, beeswax and Johnson's paste wax are all good. Consider using no finish to allow natural weathering.

## Sources

### Metal:

Online metals (<https://www.onlinemetals.com/>)

Atlas metals supply (<http://www.atlasmetal.com/>)

### Finishes and Patinas:

Sculpt Nouveau (<http://www.sculptnouveau.com/>)

Source for:

Traditional Black Magic: used in class on naval brass and silicon bronze

Birchwood Casey Aluma Black A-14: used on aluminum

Rio Grande (<https://www.riogrande.com/>) Source for: Silver solder and supplies and patinas

Muriatic acid is available from Home Depot and Lowes. Look for the product used for cleaning floors or adjusting swimming pool ph levels.



As forged



After acid wash



After brushing