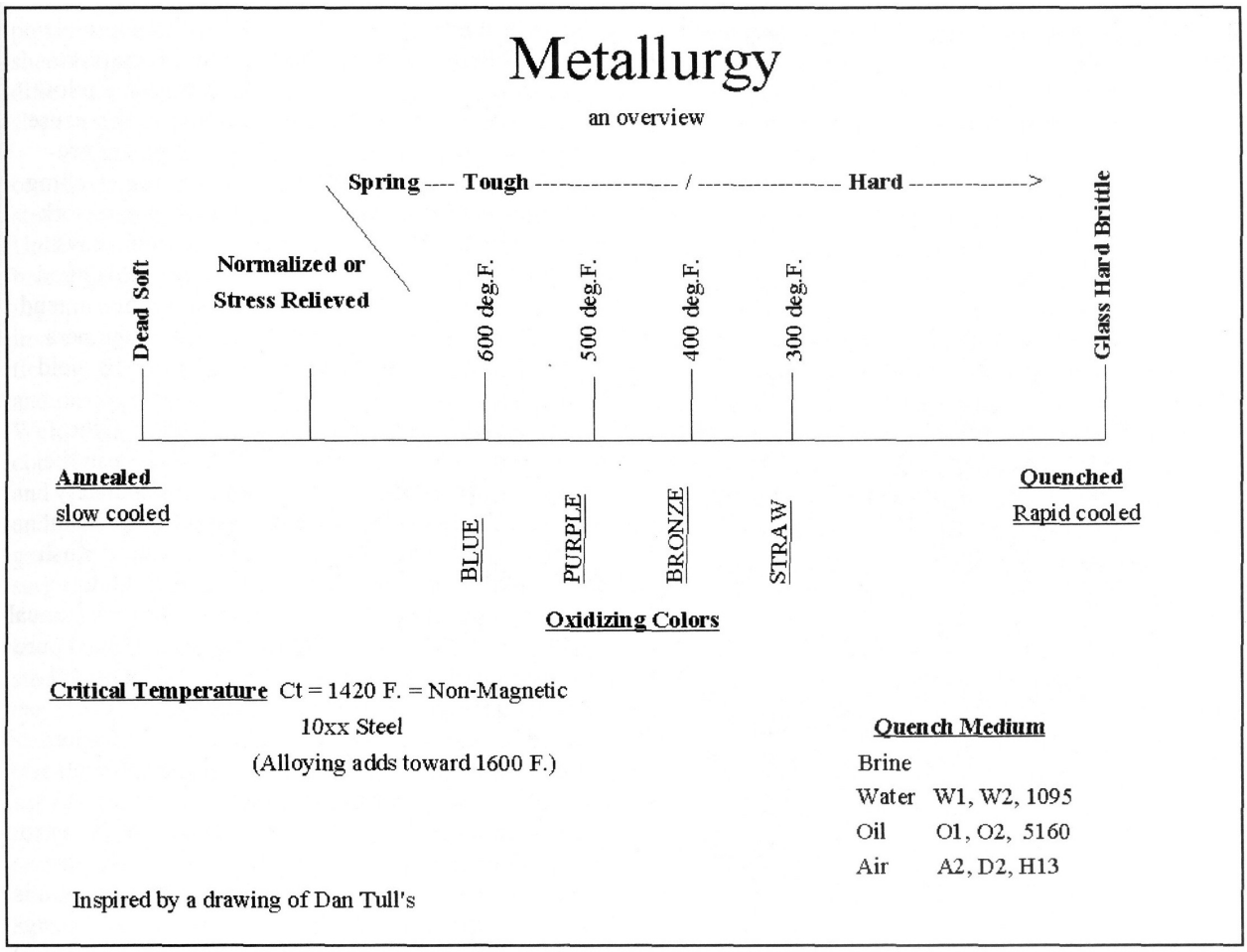



## Aluminum Alloys

Aluminum in the:

- 1000 series has a purity level of 99% or higher.
- 2000 series uses copper as its principal alloying element.
- 3000 series uses manganese.
- 4000 series uses silicon
- 5000 series uses magnesium.
- 6000 series uses silicon and magnesium.
-

Supplied by an Assabet student as part of his Senior Project Presentation. His project was focused on welding aluminum and he was planning to join the U.S. Marine Corps to continue his education in fabrication.

New England Blacksmiths 2005

## Forging Notes for Non-ferrous Metals:

by Brian E Russell, Forging On The River VIII From the River Bluff Forge Council, Memphis Tennessee

Non ferrous metals are defined as those which have little or no iron in their composition. They include aluminum, brasses, bronzes, as well as the precious metals such as platinum, gold and silver. The non-ferrous metals are generally used in alloy form, being alloyed with elements common to the steels, such as nickel, manganese and silicon. Alloying two different non-ferrous metals to create a third is frequently done as well.

Due to their higher conductivity heating in a gas forge rather than a coal forge provides a greater degree of control over the result. A medium heat rather than a welding heat provides more control as well.

## Aluminum

The most commonly available alloy of aluminum is designated 6061-T6. The suffix refers to the level of initial heat treat, with T6 designating solution heat treating and artificial aging. This alloy is referred to as a wrought alloy and has a nominal composition of: .6 Si, .28 Cu, 1.0 Mg, .20 Cr., remainder Aluminum and impurities, always including trace amounts of iron. This alloy is heat treatable.

Forging 6061 -T6 requires considerable attention to the temperature. Forging begins at 750 F and ends at 950 F. As this is below the incandescent range and aluminum doesn't oxide in the same way as steel with temper colors, there is no color indicator during heating. Thus there are a number of methods to determine when the material is ready for forging. A pine stick, such as a paint stirrer or door shim when dragged across the surface of 750F aluminum will leave a black scorch mark. A mark made on the aluminum with a black felt tip pen prior to heating will turn brown in the forge upon reaching approximately 750F. This method seems to have more variability than the pine stick method. Thirdly, there are commercially available "tempilsticks" with highly refined temperature ranges. The pine stick method yields the best results because it requires active diligence in monitoring the temperature. It is very easy to overheat the material, and it is immediately obvious upon beginning to hammer as the material crumbles under the first blow!

Aluminum, because of its unique structure, retains and conducts heat readily. As well, it has a low melting temperature (1220°F). This feature can cause overheating of the work as forging with power progresses. Thin sections can overheat, causing cracking and crumbling. Restraint should be used when working thin sections to ensure that the aluminum stays within the forging range. Gentle heating yields good results when doing scroll work, as aluminum can tend to bend unevenly if not allowed to come to temperature slowly. Again, patience and diligence will yield the best results. Welding aluminum is best achieved with the shielded metal arc process (MIG or TIG). Clean the surfaces by abrasion or wire brushing immediately prior to welding. This is extremely important when welding aluminum. Designate a stainless wire brush specifically for this task. Use 100% argon shielding gas. AC TIG welding is generally preferred for manual welding of material up to 1/2' in thickness. Use a pure tungsten electrode. For DC TIG use a 2% thoriated tungsten electrode. For thick sections MIG welding provides much faster welding with deeper penetration. A spool gun makes it easier, although a short cablehose kept relatively straight (to prevent kinking the soft wire) also works adequately. Refer to a welding manual (see references) for complete information on welding practices. Grinding aluminum is best done with zirconia (blue )discs or specially designated hard discs that reduce loading. Also, belt grease lubricant in conjunction with reduced pressure prevents loading on the abrasives. For die grinding there is a line of special coarser burrs that don't load as much as double cut burrs. Sandblasting and wirebrushing finished works gives an attractive satin finish. The use of solvent dies in acrylic lacquer is another interesting way of finishing. Polished / brushed aluminum should be top coated with a clear acrylic lacquer to prevent surface oxidation.

## Bronze

Two types of bronze useful for forging are silicon bronze and aluminum bronze. . Aluminum bronze C954 has a composition of 85 Cu, 4 Fe, 11 Al. It is technically speaking not a true bronze as it contains no tin but is referred to as a binary alloy. Stock for forging is available as continuous cast and hot rolled squares and flats, sold oversize. This material is rather rough looking and the surface has a pattern of very small fissures that disappear upon forging or which can be removed by rough grinding. It is recommended that stock be purchased oversize and forged under power to the desired nominal size. Alloy 614 is the sheet form of Al. Bronze: 91 Cu 7 Al. Its slightly different composition means that there may be a slight color variation between 954 and 614.

Forge aluminum bronze in the red to yellow orange range. It is very forgiving and overheated stock can be allowed to cool without it disrupting. Unlike most other copper based alloys, aluminum bronze is extremely stiff when cold and straightening pieces when cold is problematic. When worked

in the temperature range the metal shows very little tendency to edge cracking when drawn out thin and during hot bending. It scrolls very smoothly. Weld aluminum bronze with A MIG, using Ampcotrode 10 wire (.035) and 100% argon. Higher wire speeds (amperage) and lower voltage than used in welding steel is generally the case. Preheating is usually not necessary except for very thick sections (1.5' .4 The wire is very stiff and can be run in a regular cable hose up to 15'. Joints should be vee' d wider than steel, to around 55-60 degrees. Thinner sections can also be TIG welded using 2% thoriated tungsten electrodes, DCEP and 100% argon. Grinding can be accomplished with the same materials as used for steel. Aluminum bronze is hard enough that loading of abrasives is not a problem. Drilling and tapping requires sharp tools. A dull drill bit will not work on aluminum bronze. Cutting this hard material on a bandsaw requires a higher blade speed (270 fpm) and more. Aluminum bronze accepts patinas, although testing is a must. The polished material has a beautiful golden hue, more yellow than silicon bronze. Flame oxidizing is another useful finishing method.

Silicon bronze, c655. is available in cold rolled forms as bar stock and sheetplate. It has a reddish hue due to the very high copper content (97 Cu, 3 Si). Working temperature range for forging is slightly lower than for aluminum bronze, generally red to bright orange. It will fall apart at too high temperatures. It exhibits excellent forging characteristics, with little cracking in thin sections and bends. Because it is available in plate as well as bar it is an ideal choice for the construction of sculptural forms. Cold bending /straightening is more forgiving than aluminum bronze, but care must be used to prevent cold cracking. Welding is similar to aluminum bronze and an exact matching MIG wire is available. It will work in a standard cablehose. TIG welding (DCEP) with a 2% thoriated electrode is an excellent choice for sheet and plate up to 1/4". Welds flow beautifully. Vee thick joints to 45 degrees. Because of its softer nature silicon bronze grinds easily and quickly with standard abrasives and burrs without loading. It accepts patinas more easily than aluminum bronze, although it has more tendency to change as it ages due to oxidation, Therefore a clear acrylic lacquer topcoat is recommended.

**Copper**

Pure copper is a joy to forge. It has a very long working range, essentially from cold to yellow. Because of its malleability it is rare for copper to crack during forging or bending. When worked hot there is no need to anneal because there is no work hardening occurring. And when finish working thicker sections cold there is usually no need to anneal. For sheet, anneal by heating through to red, then quenching in cold water. For thin sections cold planishing to work harden effectively adds stiffness and strength. Because of its softness careful planning of the work sequence is necessary to prevent deformation of previously worked areas. Even when cold it is possible to easily bend 1" x1" sections, especially when working in the vise. Copper can of course be soldered or brazed, but these methods lack the strength necessary for joining larger sculptural shapes. Copper can be MIG welded using pure copper wire with a special gas mix tradenamed Blue Shield #5. Preheating is absolutely essential as the copper conducts the heat so quickly and has a high melting temperature (19800 F). For tapping threads into copper a thread forming tap rather than cutting tap works better. Copper can be quite "gummy" due to its softness when machining. When sawing use higher blade speeds (270 fpm) with a coarse blade. Copper is very reactive and receives patinas wonderfully, both hot and cold.

Safety

Welding and grinding non-ferrous metals produce unique pollutants that may have deleterious effects on your body's health. The use of common sense, ventilation and the appropriate safety gear including respirators and safety glasses is essential.

Contact

Brian F. Russell 10385 Long Rd. Arlington, TN 38002 (P) 901-867-7300 (f) 901-867-7843 email: info@powerhammers.com www. brianrusselldesigns.com www.powerhammers.com

New England Blacksmiths 2005

# Beginner's Corner

Blacksmith Guild of Central Maryland
By Albin Drzewianowski

**Physical Conditioning**

As you have come to learn, blacksmithing is a fairly physical activity. Between swinging a 2 1/2 to 3 pound hammer with one hand and tightly holding a pair of tongs with the other hand for a couple of hours can be really hard on the old body; especially if you are a hobbyist who can only forge once in a while. Just like many golfers and tennis players, we are susceptible to the "weekend warrior syndrome". This is a physical problem that afflicts normally sedentary people who go all out on the weekend and then regret it come Monday.

The way to avoid this is to do some exercise during the week, so that when the weekend forging session comes along, your muscles are ready for it. We, as blacksmiths, especially need to concentrate on wrist, arm, and shoulder muscles. I have found that the following exercises have helped me make more of my forging sessions even when they are spread out, less sore muscles afterwards.

Although the following section primarily focuses on the upper body, a complete body physical conditioning regime would not only be good for general health but will add to your blacksmithing experience. Another area that deserves special focus would be the lower back. We are always picking up heavy stuff and a good back exercise program goes a long way to protecting your back. It is really hard to be a blacksmith if you have a "bad" back.

I have found that high repetition with smaller weights is better than a few repetitions of the exercise with heavy weights. I like to use dumbbells for this kind of conditioning. Start with 5 pounds of weights and work up from there. Once you are up to 3 sets of 20 repetitions, increase the weight.

- Military press: Standing or sitting, hold the dumbbells at the shoulder and press straight up. I like to alternate: push right arm up as left arm comes down.
- Triceps extension: Holding a dumbbell straight up over head, bend at the elbow and let the weight come down to the back of the neck, keep the upper arm pointing up, then straighten the arm back up. I like to do one arm and then switch the dumbbell and do the other arm.
- Curl: There are many ways to do this exercise. I prefer to sit on a bench, lean over slightly, rest my right hand on my left knee, then rest my left elbow on my right wrist and then curl the weight up from that position. One full set and then switch arms. This strictly isolates the exercise so that the only thing working is the biceps.
- Wrist curl: Again sifting on the bench I rest my right arm along my right thigh with my wrist just hanging over my knee, palm up. Let the wrist, holding the weight drop and then curl the wrist up. Do a full set and switch arms.
- Reverse wrist curl: The same as the wrist curl but with the palm facing down.

The exercises described above are just a few of the many that will exercise the muscles in question. You could also exercise the same muscles using a barbell instead of a pair of dumbbells. Also there are exercises that use your body weight to strengthen them. The important point is to do some kind of exercise and perform the exercises using good form.

It is important to remember that most muscles operate in opposing pairs: Biceps vs. Triceps, Flexors vs. extensors, etc. So when you do weight training, be sure to always exercise the opposing pairs. If you only work 1/2 the equation, such as only doing curls without doing triceps extensions, you will get out of balance. I have seen pictures of weight lifters/body builders who over did the curls to the detriment of their triceps and they could not straighten their arms.

If any of my descriptions of exercises above are not clear, get hold of a basic weighttraining book and study the sections for exercising the arms and shoulders. Those books usually have good illustrations demonstrating proper form.

Talking about opposing pairs of muscles: We, as blacksmiths, spend a lot of time squeezing/ gripping hammers and tongs. We develop fairly powerful grips. We need to exercise the opposing muscles, the ones in the forearms, which spread open our fingers - the opposite of the muscles that close our fingers and grip the tools. For this, I like to use a heavy rubber band around my fingertips and then try to open my fingers and spread the rubber band. I keep one of these rubber bands by the computer and do this exercise a couple times a day.

This exercise has frequently been recommended in blacksmithing forums to help recover from carpenter's/tennis elbow and from carpal tunnel syndrome. I know it has helped me.

Another helpful exercise is to stretch the muscles, tendons and ligaments in the wrist: Keeping the palm flat, gently bending the palm back toward your forearm as far as it will go. Feel the stretch, but stop before any pain. Bend back and hold for a 20 or 30 count. Do the same with the other hand. Then do the opposite, again holding the palm flat and straight bend forward at the wrist towards the forearm. Use one hand to push the other hand into position. Do 2 or 3 sets. I do these exercises every time I do the rubber band exercises and also before I start forging and often during a forging session while I wait for iron to heat up in the fire.

In general, blacksmithing is a physically demanding hobby. Most of our stuff is HEAVY. A regular exercise program even if just twice a week will prepare our bodies to deal with this kind of physical activity. The more sedentary your "day job", the more you need to consider exercise.

Another problem area for beginners is "soft hands". I see this often in my beginners' classes. By the end of Saturday's class, the student has blisters from hammering or holding the tongs. If you don't normally use your hands as we do when blacksmithing, you need to toughen up the hands. Playing video games or driving a compute doesn't count. I think that working with weights as describe above helps with this. But some other kind of manual activity with the hands is needed to toughen them up to prevent blisters. Here I am somewhat at a loss of what to suggest, but the beginning blacksmith needs to be aware of this and try to find ways to toughen the hands. Forging once or twice a week, even for just an hour or so can help in this regard.

Bottom line: if we prepare our bodies, when it comes time to forge, things will go better.
(If you have any questions about what has been presented in the BEGINNERS' CORNER, send them in and I will answer them in the next issue. Also, looking for future topics for THE BEGINNERS' CORNER. What else would the "wanna-be" blacksmiths like to see explained in excruciating detail?? )

# Shop Tips

By Albin Drzewianowski

At Blacksmith Days this past May, one of the featured demonstrators. IRON MASTERS, had a really neat idea. They used a gas-miser (see below if you do not know what a gas-miser is) for their oxy-acetylene torch. They had attached a really big magnet to the base of the gas-miser. This way they could attach it to their steel welding table where ever was most convenient. If you use a stand, you could simply have a steel plate attached to the top of the stand and then be able to move the gasmiser from stand to table as needed. I know I will be looking for an appropriately large magnet to use with my gas-miser.
May/June Hammer And Tongs

# The Business of Blacksmithing:

Different Views on How to Value Our Work
By Three Different Authors

It was brought up at the last demo that prices possibly should be charged depending upon what the customer could afford, even though the product would be the same.

I disagree with this philosophy. There are different ways to fabricate or forge the same item. The use of tubing and or flat steel without texture is, I think, the simplest of methods. Depending upon the metal worker's skills, these can be very simple or very complex. We all start at a basic level and through practice, practice, and more practice become better, better and better to the point of being one of the best at what we do.

There are a lot of people who can only afford the simplest of metal work. These are the people that give us our "bread and butter" work. They simply cannot afford to spend much money, but do expect the very best from us. They give us our practice years. At this level, we learn our trade through trial and error and repairing our mistakes, (We all make mistakes, no matter what level of ability we have). It takes many, many years for most of us to learn to be good at what we do. If we are very lucky, we get to "rub elbows" with the best in our

trade, and, if we pay attention we will learn from these people. People who can afford better quality and the very best work will seek us out when we always do our best work. More often than not "fancy" will be added to the work and this is when the price goes up. Yes, sometime some of the work is given for free in order to learn more and hopefully, gain a better reputation.

What is the difference between "hot metal work" (blacksmithing) and "cold metal work" (fabrication)? TIME! It takes a lot longer to make a simple 5" foot balcony railing blacksmithing it rather than fabricating it. There are mortise and tenons to make, bar or flat stock to hammer, pickets to create, etc. In simple fabrication most of this is welded together and normally it is not fancy (yes, you can add knuckles, scrolls and other items off the shelf to make it look fancier). It would easily take twice as long or longer to blacksmith this item, and time is money. Most people who would want a totally hand built item are willing to pay for it. If you are trying to sell this customer your abilities to hand forge work and you have sold the same type of piece for a much cheaper price, what is your response when they say "you sold this to my friend for half the price that you are asking of me?" We as metal workers need to treat our customers fairly and honestly. As your skills and quality of work increase, so will your prices. Charge a fair price for a fair day's work.
Jim Sheehan
Metal Worker

**Some (Legitimate?) Reasons to Charge More.**

What is your response when they say "You sold this to my friend for half the price that you are asking me"? Jim raises a good point. Well, if you are making house jewelry - boxes, mirrors, tables, etc. you might not have much justification for inconsistent pricing. However, for architectural work there are plenty of legitimate reasons for a difference in price. Here are a few.

"Your friend paid for custom ironwork, I won't duplicate it for anyone. However, I can do something similar for you. Something that you will like as well or probably better, and it will be your custom iron, not a copy. The price may be different because the work is different. " If no two jobs are the same, (and they never are) they won't cost the same.

"Your contractor is unorganized, doesn't install blocking, and doesn't have a superintendent on the jobsite to address problems. The last time I scheduled an install for this guy, they were paving the driveway; we had to carry the iron and tools 300' over mounds of dirt. There is no power or inadequate power at the jobsite. Besides that, I have to wait 90 days to get paid. So, when I do a job for this contractor, it costs more."

"You want it in two weeks? It normally takes two months to process a job this size. We can do it, but it will cost more."

"We did that job 5 years ago, our shop rate has gone up, and the cost of material has tripled."

"Your friend and I developed a very comfortable working relationship, I really enjoyed working with them. You, however, are a jerk. I've met with you six times and talked to you on the phone at least twice that. You're eating up all my time with your questions and what- ifs. I'm not having fun dealing with you and if I raise the price enough, maybe you'll go away." Actually, I wouldn't tell the customer this, but my bid would reflect my attitude.

"Yes, I did do that job for your friend for half this much. However, I bid it way too low, I could make more money if I closed the shop and went fishing."

"Your friend's job was ten minutes from my shop and he had 20' of straight railing. Your job is an hour and a half from my shop and you have 60" of curved railing. You're getting a deal."

"When I did their job, business was very slow, we needed the work to keep our doors open. Now we are extremely busy and so is everyone else. I try to pick and choose the jobs that will be successful. Like Harley- Davidson, I'm raising my prices until enough customers are chased away that I can meet production. In fact, you are lucky we are even talking to you." I would not recommend actually saying this either, but this is a pretty normal way of controlling workload.

"That was before I appeared on HG TV's Modern Masters, and was designated a Master Craftsman of the Southwest by Phoenix Magazine. Now I can double my shop rate." (Unlike some we know, I haven't actually been able to give this response and probably never will.) If you have a well de-

served reputation you deserve to be paid accordingly.
Dan Jennings
Professional Blacksmith

**The 'B' Word**

How much should one charge for a rail or for door hardware?

Should one total the materials, figure a shop hourly charge, guesstimate the hours to make said project, add some for overhead, add some more for profit and then add the pile up for a price?
I think not.

Car repair is figured by the hour. Ready-made replacement parts combine with specialty tools to create a repair environment which can be measured, quantified and calculated. By that measure; the cost of a couple of tubes of paint, a brush and some canvas, plus the hours (times a rate per) gives you the price for a painting or 'marble plus a chisel times an hourly rate gives you a statue'.

If one makes the design and the work at a level of competence which the market will recognize, then we are not talking shop rates and material costs, we are talking job budgets .... budget - the 'B' Word.

A serious client-consumer (often with a legion of architects, interior designers, contractors and family members in tow) will have established or agreed to a budget for the project at hand. Architects cannot specify to a client without knowing both the client's budget ("!!THAT much!??" to "Cool, when will it be done") range and the market range for the work in mind. They establish a budget.

So, when an inquiry about work lands (style and type is defined or a design is sought), the first question is "what is the budget?"

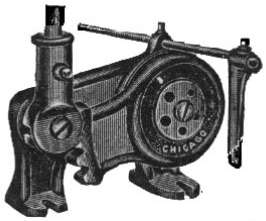
You then talk time frame: "you want it when?" Now, with a dollar figure, a job description and a time frame (faster costs more you can work toward a single, pre-established number and calibrate your work accordingly. More budget allows for more embellishment.

Bidding is a race to the lowest denominator, the low bidder having often lost by winning (they now have the low bid work in shop and have to produce the work for less than you wanted .... pity them). Negotiating is the path to making good work (art) for a good price.

Ask for the 'B' Word next time, every time.
George Dixon
Professional blacksmith and
Illustrator and producer of
The Artist Blacksmith Quarterly

Reprinted from The Anvil's Horn

**Macarco Rod Cutter**



# END OF THE TRAIL BEANS

Submitted for your pleasure by Doug Hawley
(I accidentally cropped where I copied this from, LB, NJBA Editor)
1 can (52 oz.) pork & beans, well drained
1 can (52 oz.) red kidney beans, light or dark, well drained
1'/2 cups onion, coarsely chopped
1 lb. ground beef, browned & drained
14 oz. package of kielbasa, split lengthwise and then into %2-round pieces
1 cup molasses
1 cup brown sugar
1 teaspoon dry mustard powder
1/2 cup ketchup
1 Tablespoon liquid smoke

Dump 1/2 each can of the beans into a crock pot and put 1/2 the remaining ingredients on top of the beans. Add the rest of the beans and pour the remaining ingredients on top. Do NOT stir. Cover the pot and turn it on high until it bubbles. Cut the heat back to low and simmer until it thickens just a bit. Stir before serving.

Notes: This recipe works just as well in a regular pot on the stovetop. The sugar and molasses can be reduced by half, to taste. This dish is always a hit at cookouts and potlucks.

# Blacksmithing Workshops and Classes:

**Peters Valley Craft Education Center**
19 Kuhn Rd., Layton, NJ 07851 (973)948-5200
pv@warwick.net www.pvcrafts.org

**Academy of Traditional Arts**
**Carrol County Farm Museum**
500 South Center St. Westminster, MD 21157
(410)848-7775 (410)876-2667

**Touchstone Center for Crafts**
R.D.#1, Box 60, Farmington, PA 15437
(724)329-1370 Fax: (724)329-1371

**John C Campbell Folk School**
One Folk School Rd.
Brasstown, NC 28902
1-800-365-5724 www.folkschool.com

**Brookfield Craft Center**
286 Whisconier Road
P. O. Box 122
Brookfield, CT 06804-0122
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## Search

I am looking for a
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If you have one for sale or run across one, contact me; Larry Brown, NJBA Editor. (718) 967-4776

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We would like to thank those who joined with our new Business Membership category
Please show them our support

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**609-443-3106 JChob@earthlink.net**
**Grant Clark, GWC Forge**
**PO Box 158 Perrineville NJ 08535**
**732 446-2638, 732 446-2638**
**Eric Cuper Artist Blacksmith**
**109 Lehman Lane, Neshanic Station, NJ 08853**
**908 642-6420 ericuper@msn.com**
**Bruce Hay, Jr.**
**50 Pine St., Lincroft, NJ 07738**
**Jayesh Shah, Architectural Iron Design**
**950 S. 2nd St., Plainfield, NJ 07063**
**jay@archirondesign.com**
**Louise Pezzi, Blacksmith**
**1241 Carpenter St**
**Philadelphia, PA 19147**

## Open Forges

We are looking for members who are interested in opening their forges up to members as a open forge. This does not have to be a weekly forge as is Marshall's the others can meet once or twice a month. Please contact, Larry Brown, Editor.
*We want to encourage all to join us at:*

### Monday Night Open Forge in N.J.

Marshall Bienstock is hosting an open forge in his shop at 7 pm almost every Monday night ( Please call ahead on holidays to make sure , (732)780-0871 )

### Open Forge in Long Island

Sunday from 10:00 am to 6pm.
Starting the 1st Sunday in November until the end of April. Please call ahead to confirm and get directions.
Ron Grabowski, 110 Burlington Blvd. Smithtown, NY
(631) 265-1564 Ronsforge@aol.com

**If any members have a forge at home and work in the evenings or weekends and want to open it up to help a few local guys, let me know, Larry Brown, editor, as we get requests from members who have a hard time traveling to some of the open forge locations.**

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# Join ABANA or Check out other area chapters!

## Northeast Blacksmiths Association

Northeast Blacksmiths holds its meets twice a year at the Ashokan Field Campus in New York State.

The Ashokan campus is located in Olivebridge, N.Y., several miles west of Kingston, N.Y. The meets are held the first weekend in May and in the first weekend in October every year. The main demonstration is in the blacksmith shop and there is a "Hands On" workshop for beginners. A main demonstrator is brought in for each meet, food and bunk-house style lodging are provided as part of the cost of the weekend long meet.

**Contact :** Tim Neu
to register for hammer-ins
or subscribe to the newsletter;
Tim Neu, Ashokan Field Campus,
447 Beaverkill Rd.
Olivebridge, N.Y. 12461 [914]657-8333
For more information check out the web site; <http://nba.abana-chapter.com/>

## Join The Pennsylvania Blacksmiths Association!

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Do you have any particular skills (welder, accountant, carpenter, doctor) that may be helpful to the group or membership?

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**Suggestions for PABA demonstrations**

What is your skill level?

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Send your completed application with $ 20 ( one year dues) to;
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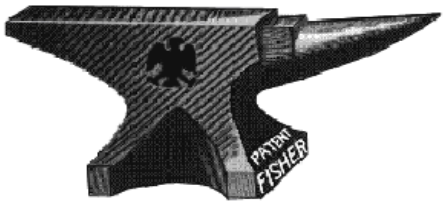
**PABA Membership Application**

Membership is from *Jan. 1 — Dec. 31*

**New Jersey**
**Blacksmiths Association**
**90 William Avenue**
**Staten Island, New York 10308**
**Attn: Larry Brown, Editor**

New Jersey Blacksmiths Association




"EAGLE"
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## How to Join or Renew your Membership in NJBA:

**NJBA Dues are $20 per year.**
**Please make your check out to: "NJBA"**
**Please mail checks to:**
**NJBA, P.O. Box 224, Farmingdale, NJ 07727-9998**

Please include payment with the information listed below. You will receive a postcard confirmation of your membership, and will receive a newsletter within a month. NJBA's "year" runs from June to June. If you join mid-year, the postcard will offer a prorated dues option which will then allow you to extend your membership till the following June. The following information will be listed in a roster available to other members.

Name _____ Home Phone_____
Address _____ Day Phone _____
City _____
State _____ Zip _____
E-Mail _____ Skill Level (optional)_____
Comments _____