



# N.J.B.A. Newsletter

**NJBA Volume 12, Issue 1 05/01/07**

## **Editors Soapbox**

Happy Spring to all. We have a good calendar of events set for the rest of the year and are working on next years already so try to put them on your schedules and get out and bang on some iron. Sign up for the hood workshop, this is a great opportunity to get a long lasting piece of shop equipment. Larry Brown, Editor

## **Upcoming events for 200**

Get you calendars out and mark these events down. Please bookmark our web site and check for updated meet information. Remember most of our meets have an "Iron in the Hat" drawing, so be sure to bring something. Meet information starts on this page and continues on page 3.

**May 19 2007** - Forge Hood Workshop, Marshals Farm, Howell NJ. Will use previous design but with 18 gauge stainless. David Macauley is the co-ordinator. Information on this page.

**June 30—July 1st**— Historic Cold Spring Village This is our annual event. David will bring down the NJBA trailer David Macauley

**Jul 21st** - Delaware City Day Hammer in and barbecue Kerry Rhodes and John Chobrda

**July 25 -29th** - Monmouth county Fair ? Will be trying to get a demonstration area for us – not confirmed yet. Check web site before event or contact David Macauley

**August 19th**—Red Mill Hammer in Hammer in and picnic Robert Bozzay Eric Cuper, Adam Howard

**September 14th – 16th** - Delaware Valley Assn. Engine Show Washington Crossing State Park John Chobrda

**September 29th** - Peter's Valley Pig roast, tickets \$25 before Sept 1st, \$30 after. More info to come Bruce Ringier

**October 7th** - Walnford Day We usually do a demo Jeff Morelli?

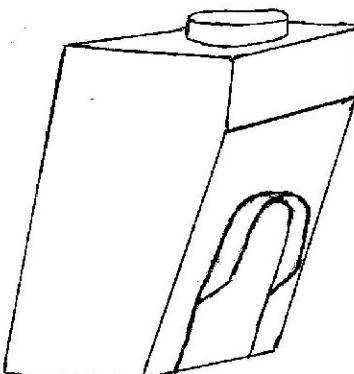
**November 3rd** Randy McDaniel demo Demo by Randy McDaniel on wizard and animal heads – Eric Cuper's shop in Easton Pa. Coordinator—Tim Suter

**December ?** Holiday Party, Date not confirmed



## **Forge Hood Workshop May 17 at Marshall's Farm**

A forge hood workshop is organized for May 19th. We are making the same design as last time but we are making them out of 18ga. stainless steel this time. The price will be \$175/hood. A deposit of \$50 is required as soon as possible to ensure that you can buy a hood. The number of hoods being planned is limited. For more information contact: David Macauley, [drmacauley@att.net](mailto:drmacauley@att.net), 732-206-1568.



# New Jersey Blacksmiths Newsletter

## The NJBA Web Site!

The NJBA Web Site is up and running at:

<http://njba.abana-chapter.com/>

The Newsletter is at:

<http://members.bellatlantic.net/~vze25jcc/index.htm>

or the site may be linked to from the NJBA web site.

## Official NJBA Address

**NJBA**

**P.O. Box 224**

**Farmingdale, NJ**

**07727-9998**

**Rather than use room in the newsletter,  
All correspondence between  
ABANA and NJBA is now being posted  
on the NJBA web site.**

**If you cannot access it there, contact me  
and I will send you copies**

## NJBA Board of Directors

**Marshall Bienstock**, June, 2007  
663 Casino Dr., Howell, NJ 07731  
732-938-6577 732-780-0871  
[jlfmib@optonline.net](mailto:jlfmib@optonline.net)

**Larry Brown**, Editor, Membership, June, 2007  
90 William Ave., Staten Island, NY 10308  
718-967-4776  
[lp.brown@verizon.net](mailto:lp.brown@verizon.net), [brownln@hotmail.com](mailto:brownln@hotmail.com)

**John Chobrda**, June 2007  
231 Morrison Ave., Hightstown, NJ 08520  
609-443-3106  
[jchob@verizon.net](mailto:jchob@verizon.net)

**Eric Cuper**, June 2007  
109 Lehman Lane  
Branchburg NJ 08853  
908 369-3913, 908 642-6420 [ericuper@msn.com](mailto:ericuper@msn.com)

**Tom Eden**, June 2007  
152 Oak Lane, Hightstown, NJ 08520  
609-371-0774  
[njirrigation@msn.com](mailto:njirrigation@msn.com)

**Bruce Freeman**, June, 2007  
222 Laurel Place, Neptune, NJ 07753  
732-922-8408, 609-716-2827  
[freemab@pt.fdah.com](mailto:freemab@pt.fdah.com)

**Bruce Hay, Jr.**, June 2007  
50 Pine St., Lincroft N.J. 7738  
732-747-4758

**Thomas Majewski**, June 2007  
165 Robertsville Rd., Freehold NJ 07728  
732 462-2453 [v2e4mab9@verizon.net](mailto:v2e4mab9@verizon.net)

**Adam R. Howard**, June 2007  
Red Mill Forge  
56 Main Street, Clinton NJ 08809  
908-735-4573 [kunstschmeide@aol.com](mailto:kunstschmeide@aol.com)

**David Macauley**, Chairman, Treasurer, June, 2007  
4 Patricia Ct., Howell, NJ 07731  
732-206-1568, 732-949-8422  
[drmacauley@att.com](mailto:drmacauley@att.com)

**Jeff Morelli**, June 2007  
234 Rahilly Road, Wrightstown, NJ 08562  
609-723-5990, 732-494-9061x1162

**Daniel O'Sullivan**,  
110 Midland Ave., Glen Ridge NJ 07028  
973- 259-9873 [danandbeckyos@netzero.net](mailto:danandbeckyos@netzero.net)

**Bruce Ringier**, June, 2007  
346 Rt.565 Wantage, NJ 07641  
973-702-8475 [yrlwbrnfrm@aol.com](mailto:yrlwbrnfrm@aol.com)

**Tim Suter**, June, 2007  
1112 Ladner Ave., Gibbstown, NJ 08027  
856-423-4417

# New Jersey Blacksmiths Newsletter

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## Cold Spring Village in Cape May

June 30th—July 1st. David Macauley will be bring the NJBA trailer down to the shop at the Village. This is a good event for South Jersey members to get out to without having to travel too far, and for other members who want to visit Cape May, so come out and have some fun.

## Delaware City Day

Kerry Rhodes and John Chobrda are inviting all smiths to a BBQ/hammer-in on July 21st at his shop (Forged Creations) in Delaware City DE. This event will be held in conjunction with Delaware City Day, a day of parades, food, and fireworks. Contact John if you are coming down to help give him an idea of how large to make the BBQ.  
John Chobrda 609-443-3106 jchob@verizon.net

## Monmouth County Fair East Freehold Park, NJ

July 25—29th. WE are not officially scheduled for this event. David is trying to get a location at the fair with Pine Creek Railroad and the NJMT. Please check the web site for updated information or call David Macauley, drmacauley@att.net, 732-206-1568. Also check with David as to the times and locations to help with the setup and teardown on Sunday. We really would appreciate any help setting up and tearing down.

### From Garden State Parkway:

Garden State Parkway to Exit 100, Hwy. 33 west. Follow Hwy. 33 to Kozloski Rd., turn right. Follow signs to Park. State Hwy. 9 to Hwy. 33 east, south of Freehold. Follow Hwy. 33 to Halls Mill Rd. North exit. Follow Halls Mill Rd. north to intersection. Road name will change to Kozloski Rd. Follow Kozloski Rd. to Park on left.

### From Rt. 18:

Rt. 18 to Exit 22, Rt. 537 west. Take Rt. 537 west to Kozloski Rd., turn left. Follow to Park on right. It has also been recommended that to avoid traffic approach from Rt. 537.

## Red Mill Hammer In August 19st Hammer In / NJBA Picnic

More details on this event next newsletter. Red Mill Museum; Take exit 15 on I-78 onto old route 22 going North (routes 513 and 173), make a left onto main street before bridge. Museum straight ahead.

## Old Time Engine Show September 1<sup>4</sup>, 15<sup>th</sup>, and 16<sup>th</sup>

NJBA will again be at the Delaware Valley Old Time Power and Equipment Association's "Days of the Past" Engine Show at Washington Crossing State Park, in Titusville, New Jersey. Come on out and bring the family, there are hay rides for the kids, a metal heads flea market, and a lot to see. We will have a couple of forges going so bring a hammer, also if you have some items for sale we will have a table out. Come on out and join the fun. For more information check out their web site <http://daysofthepast.com/>

### Directions:

The Engine Show is located in Washington Crossing State Park off of Rt. 29 (River Rd.) South of Lambertville and North of Trenton signs are posted to show the way.

## Peters Valley Pig Roast Sept 29th

Peters Valley will be holding its seventh Annual Pig Iron Fest. More information next newsletter. **Only \$30 per person kids under 12 free!**  
**Tickets \$25 before September 1st**

Presented by Jimmy Clark, Dick Sargent, Bruce Ringier and the Staff  
*All proceeds to benefit Peter's Valley Blacksmithing Department.* Call for details 973-948-2393 shop, 973-948-5200 office. 1:00 PM Hurricane or Shine

## Randy McDaniel Demo

**November 3rd** - Demo by Randy McDaniel on wizard and animal heads — Eric Cuper's shop in Easton Pa. Coordinator—Tim Suter

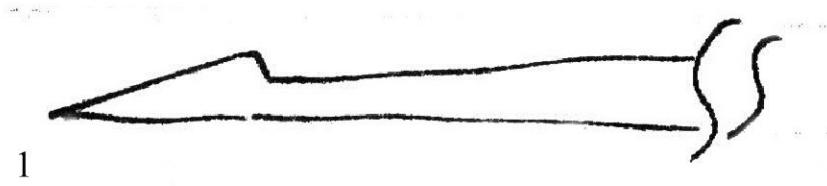
Mark your calendars!!!

# New Jersey Blacksmiths Newsletter

## Squid Demo by Eric Cuper, 17 Feb. 2007 Meet at Eric's shop in Easton, PA by Bruce Freeman

Eric began with a comment that this demo was in part to demonstrate Jonathan Nedbors "Black Magic Flux," and throughout the demonstration, that is the flux he used, liberally.

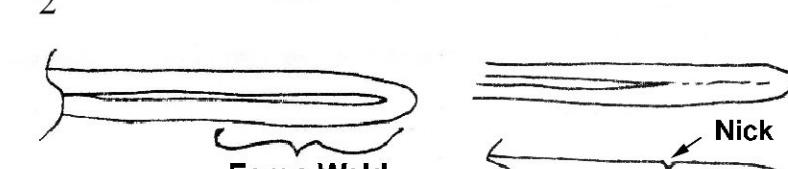
1. For the two arms, Eric started with about 18" of round stock, perhaps 1/4" or 5/16" diameter. He tapered the end and used half-faced blows to isolate perhaps the last 1.5" for the fluke, as is done to make a leaf. He then tapered the "arm" behind the fluke.



2. He flattened the end to form the fluke, a symmetric or asymmetric leaf-like form. He then quenched the end, and repeated these steps on the other end of the same rod.



3. Next he bent the rod in the middle (with the flukes oriented as shown in figure 7A) and forge welded about 5" or 6" back from the fold.



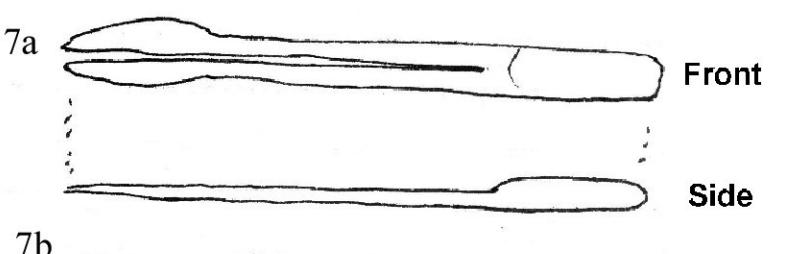
4. He nicked the side of the forge welded end, then...



5&6. Folded it over and faggot welded it together as shown.



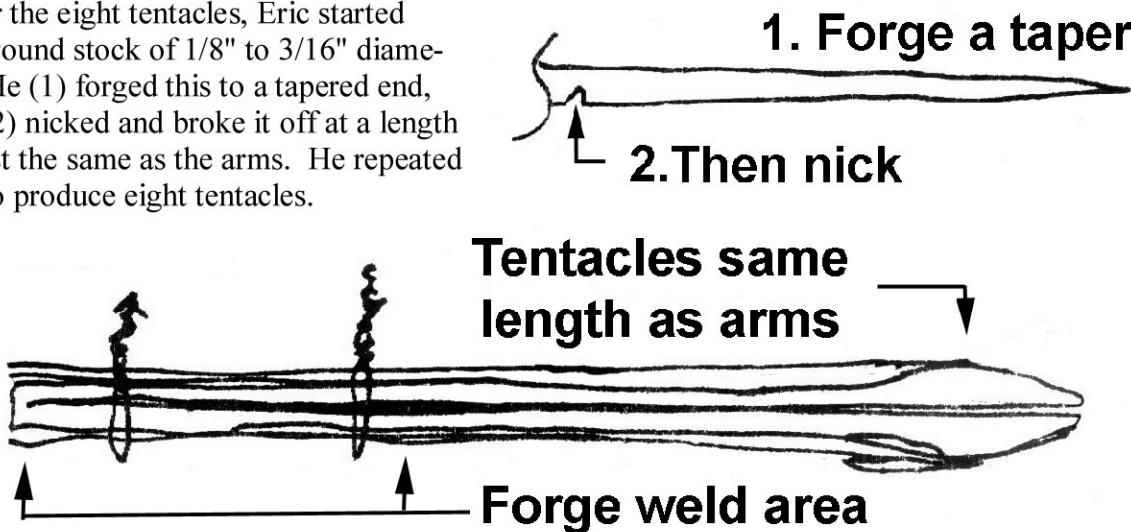
7. (A and B) He worked the forge-welded end as shown in preparation of the next step. As the forge-welded end cooled, he wire brushed it to eliminate scale as it formed.



For smaller stock (1/8" - 3/16") keep anvil close and warm

# New Jersey Blacksmiths Newsletter

8. For the eight tentacles, Eric started with round stock of 1/8" to 3/16" diameter. He (1) forged this to a tapered end, and (2) nicked and broke it off at a length almost the same as the arms. He repeated this to produce eight tentacles.

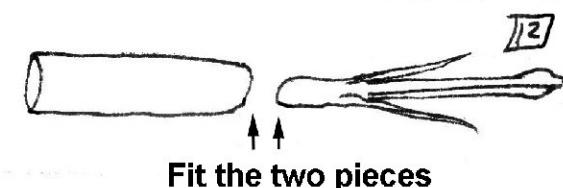


9. Eric then carefully bundled the tentacles around the arms with annealed steel wire. He slowly and carefully heated this bundle so as not to burn the tentacles before the arms were up to welding heat. Then he forge welded the tentacles to the arms.

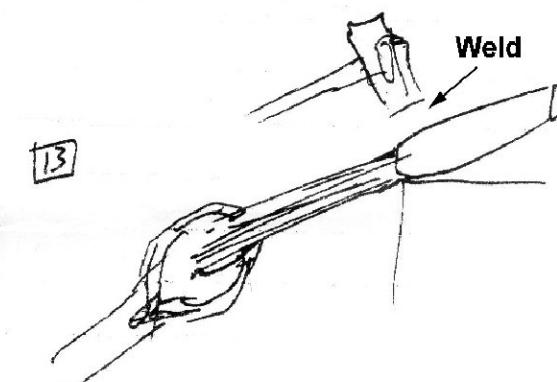
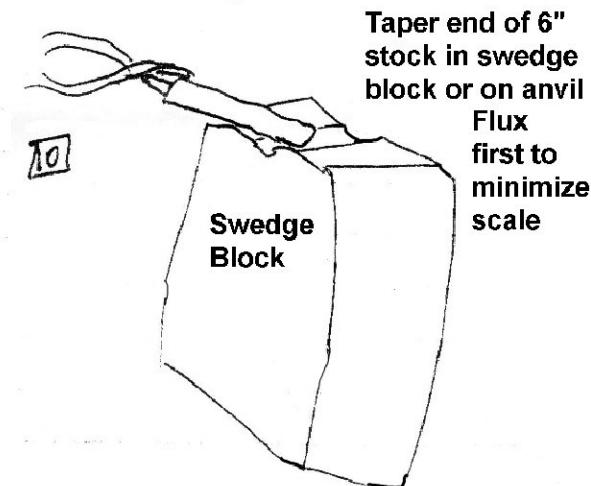
10. For the body, Eric started with perhaps 3/4" schedule 40 black pipe. He swaged down one end slightly...

11. ...as illustrated.

12. He then test fitted the tentacle weldment to the body piece.

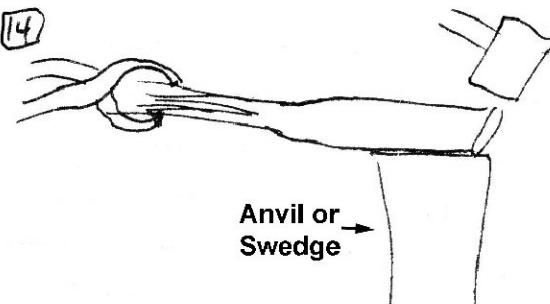


13. Once satisfied he welded the body to the tentacles weldment. He cleaned off the scale right away with a wire brush. He followed up with a second weld, but noted that this is a low-temperature (no sparks!) forge weld, because structural strength is not needed.

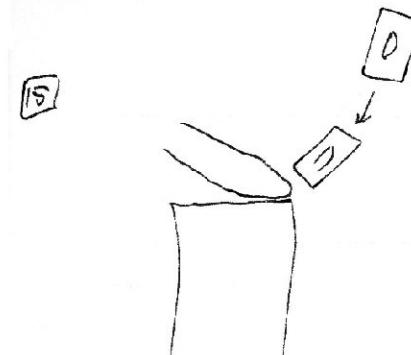


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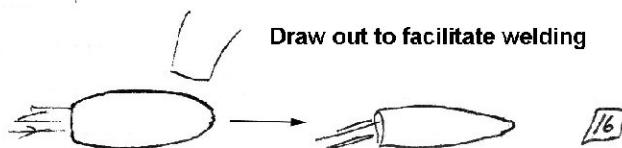
14. Next Eric forged down the opposite end of the body tube. He emphasized that when forging pipe, one does not forge "SOR" (square-octagonal-round). (The reason is that SOR forging is intended to prevent opening up a channel in the center of a solid rod being forged down. For pipe, this is not a consideration.) He used flux during this operation to reduce scaling.



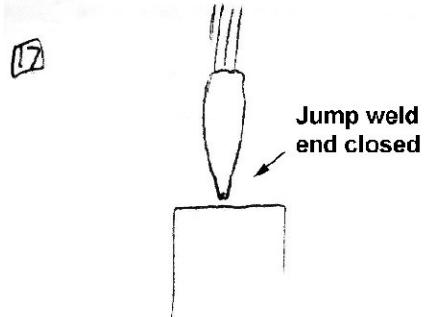
15. He closed up the end of the body in preparation for welding...



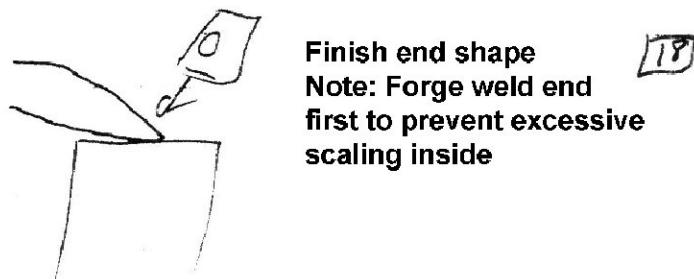
16. ...and drew it out to a point to facilitate welding.



17. After reheating to welding temperature, Eric used the jump-welding technique to weld closed the end.

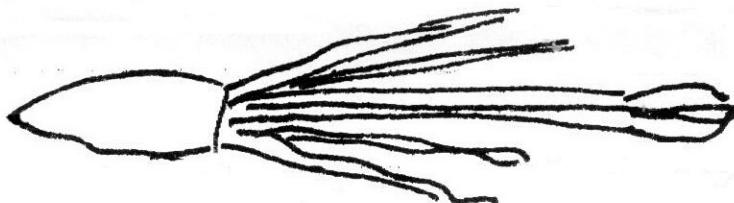


18. Then he finished the shape of the end to his satisfaction. He mentioned that the weld should be made as soon as possible in this process so as not to excessively scale the inaccessible interior of the tube and jeopardize the weld. He also mentioned that the forging can be done over the anvil or the swage block, but he prefers the anvil because using the swage block forges scale into the metal.



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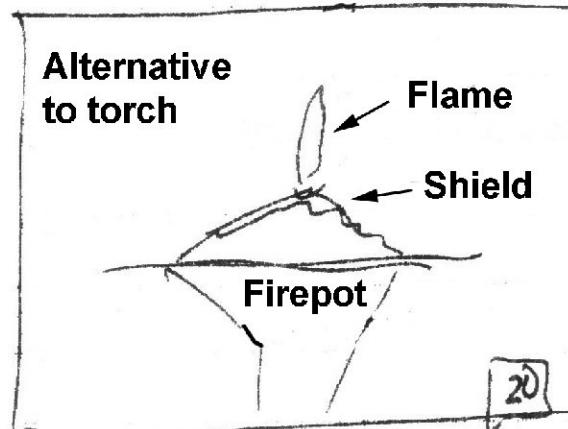
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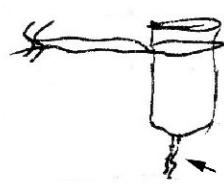
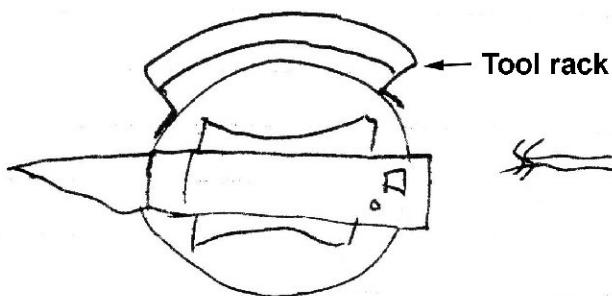
**Bend arms and tentacles with scrolling pliers**

19. Finally, he bent the arms and tentacles to the desired shapes. He emphasized (A) don't overheat these small pieces of steel, and (B) don't work them too cold.

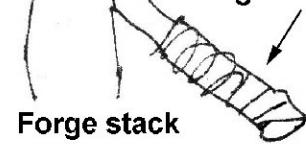
20. He mentioned putting a cone of sheet steel with a hole in the middle over the forge to make a "torch" of the coal forge. (I have done this without the sheet metal by punching a hole through the coal to the tweer.)



## Shop Tips from Eric's Shop



Idea; Flex pipe like an elephant's trunk to capture out of forge smoke



Water stream  
for spot cooling

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## Tenon Forging Table by Len Ledet

Recently Mo and I had an upscale railing (in conjunction with Phoenix Forge) to construct. Each picket required a tenon on each end. The pickets were forged utilizing 5/8 inch square bars. First step was to calculate the length of bar needed to forge the required tenon. I had made this calculation on other occasions (volume of bar and volume of cylinder). Why have to make the calculation each time? Why not construct a handy TABLE and make it easy to determine the bar forging length. The table below includes bar sizes 1/2, 5/8, 3/4, and 1 inch, with varying tenon diameters and lengths. Hope this makes this calculation easier. Please note, I suggest you always construct a sample for the tenon to verify the forging process.

### TENON WORKSHEET      Len Ledet Phoenix, Arizona

Bar Size	Tenon Diameter	Tenon Length	Amount needed to forge tenon
1/2	3/8	1/2	0.2209
		3/4	0.3313
		1	0.4418
	1/4	1/2	0.0982
		3/4	0.1473
		1	0.1964
5/8	1/2	1/2	0.2513
		3/4	0.3770
		1	0.5027
	3/8	1/2	0.1414
		3/4	0.2121
		1	0.2827
3/4	5/8	1/2	0.2727
		3/4	0.4091
		1	0.5454
	1/2	1/2	0.1745
		3/4	0.2618
		1	0.3491
1	3/4	1/2	0.2209
		3/4	0.3313
		1	0.4418
	5/8	1/2	0.1534
		3/4	0.2301
		1	0.3068

$$\text{Volume of Square Bar} = (\text{width}) \times (\text{height}) \times (\text{length})$$

$$\text{Volume of Cylinder} = (.7854) \times \text{diameter} \times (\text{diameter}) \times (\text{length})$$

$$\text{Volume of Square Bar} = \text{Volume of Cylinder}$$

$$\text{Bar Length Needed} = (\underline{.7854} \times \underline{\text{diameter}} \times \underline{\text{diameter}} \times \underline{\text{length}}) \\ (\text{width}) \times (\text{height})$$

Example: 3/4 inch square bar and need to put a 5/8 diameter tenon on the end is to be 1 inch long.

From the above table you need to forge 0.5454 (approx. 9/16 inches) of the 3/4 inch bar, to get the tenon.

The Anvil's Horn, Arizona Blacksmiths

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## Tenon Table

Use the tables to determine the amount of increase per unit length of a tenon.

Example: If you have a 5/8" square bar and want a 1/2" round tenon on it, Table 2 tells you that the finished tenon will be 2.0 times longer than the shouldered piece. So, if you want a tenon that is 1 1/2" long, shoulder the piece 3/4" from the end. This should give you enough material for a tenon of the desired length ( $3/4 \times 2.0 = 1 1/2$ ).

Use the tables to determine the amount of material to shoulder off for a tenon of desired length. The italic non-bold numbers are less than 1 indicating a negative length gain for upsetting.

Table 3 on next page.

### Round to Round and Square to Square—Table 1

	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1
1	<b>16.0</b>	<b>10.2</b>	<b>7.1</b>	<b>4.0</b>	<b>2.6</b>	<b>1.8</b>	<b>1.3</b>	<b>1.0</b>
7/8	<b>12.3</b>	<b>7.8</b>	<b>5.4</b>	<b>3.1</b>	<b>2.0</b>	<b>1.4</b>	<b>1.0</b>	<b>0.8</b>
3/4	<b>9.0</b>	<b>5.8</b>	<b>4.0</b>	<b>2.3</b>	<b>1.4</b>	<b>1.0</b>	<b>0.7</b>	<b>0.6</b>
START	<b>5/8</b>	<b>6.3</b>	<b>4.0</b>	<b>2.8</b>	<b>1.6</b>	<b>1.0</b>	<b>0.7</b>	<b>0.5</b>
	<b>1/2</b>	<b>4.0</b>	<b>2.6</b>	<b>1.8</b>	<b>1.0</b>	<b>0.6</b>	<b>0.4</b>	<b>0.3</b>
	<b>3/8</b>	<b>2.3</b>	<b>1.4</b>	<b>1.0</b>	<b>0.6</b>	<b>0.4</b>	<b>0.3</b>	<b>0.2</b>
	<b>5/16</b>	<b>1.6</b>	<b>1.0</b>	<b>0.7</b>	<b>0.4</b>	<b>0.3</b>	<b>0.2</b>	<b>0.1</b>
	<b>1/4</b>	<b>1.0</b>	<b>0.6</b>	<b>0.4</b>	<b>0.3</b>	<b>0.2</b>	<b>0.1</b>	<b>0.1</b>

### Square to Round (Table 2)

#### Finish (Tenon)

	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1
1	<b>20.4</b>	<b>13.0</b>	<b>9.1</b>	<b>5.1</b>	<b>3.3</b>	<b>2.3</b>	<b>1.7</b>	<b>1.3</b>
7/8	<b>15.6</b>	<b>10.0</b>	<b>6.9</b>	<b>3.9</b>	<b>2.5</b>	<b>1.7</b>	<b>1.3</b>	<b>1.0</b>
3/4	<b>11.5</b>	<b>7.3</b>	<b>5.1</b>	<b>3.5</b>	<b>2.0</b>	<b>1.3</b>	<b>0.9</b>	<b>0.7</b>
START	<b>5/8</b>	<b>8.0</b>	<b>5.1</b>	<b>3.5</b>	<b>2.0</b>	<b>1.3</b>	<b>0.9</b>	<b>0.6</b>
	<b>1/2</b>	<b>5.1</b>	<b>3.3</b>	<b>2.3</b>	<b>1.3</b>	<b>0.8</b>	<b>0.6</b>	<b>0.3</b>
	<b>3/8</b>	<b>2.9</b>	<b>1.8</b>	<b>1.3</b>	<b>0.7</b>	<b>0.5</b>	<b>0.3</b>	<b>0.2</b>
	<b>5/16</b>	<b>2.0</b>	<b>1.3</b>	<b>0.9</b>	<b>0.5</b>	<b>0.3</b>	<b>0.2</b>	<b>0.1</b>
	<b>1/4</b>	<b>1.3</b>	<b>0.8</b>	<b>0.6</b>	<b>0.3</b>	<b>0.2</b>	<b>0.1</b>	<b>0.1</b>

# New Jersey Blacksmiths Newsletter

## Round to Square (Table 3)

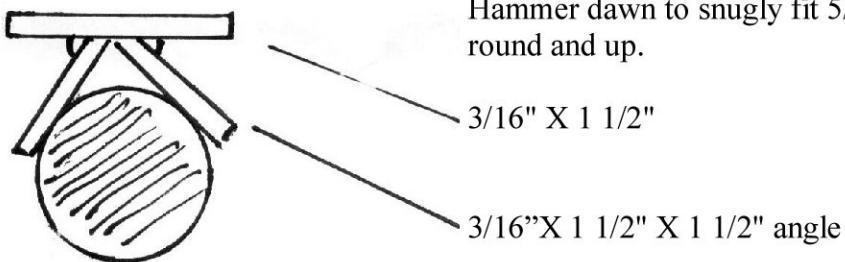
### Finish (Tenon)

	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1
1	<b>12.6</b>	<b>8.0</b>	<b>5.6</b>	<b>3.1</b>	<b>2.0</b>	<b>1.4</b>	<b>1.0</b>	<b>0.8</b>
7/8	<b>9.6</b>	<b>6.2</b>	<b>4.3</b>	<b>2.4</b>	<b>1.5</b>	<b>1.1</b>	<b>0.8</b>	<b>0.6</b>
3/4	<b>7.1</b>	<b>4.5</b>	<b>3.1</b>	<b>1.8</b>	<b>1.1</b>	<b>0.8</b>	<b>0.6</b>	<b>0.4</b>
START	<b>5/8</b>	<b>4.9</b>	<b>3.1</b>	<b>2.2</b>	<b>1.2</b>	<b>0.8</b>	<b>0.5</b>	<b>0.4</b>
	<b>1/2</b>	<b>3.1</b>	<b>2.0</b>	<b>1.4</b>	<b>0.8</b>	<b>0.5</b>	<b>0.3</b>	<b>0.2</b>
	<b>3/8</b>	<b>1.8</b>	<b>1.1</b>	<b>0.8</b>	<b>0.4</b>	<b>0.4</b>	<b>0.2</b>	<b>0.12</b>
	<b>5/16</b>	<b>1.2</b>	<b>0.8</b>	<b>0.5</b>	<b>0.3</b>	<b>0.2</b>	<b>0.1</b>	<b>0.1</b>
	<b>1/4</b>	<b>0.8</b>	<b>0.5</b>	<b>0.3</b>	<b>0.2</b>	<b>0.1</b>	<b>0.1</b>	<b>0.0</b>

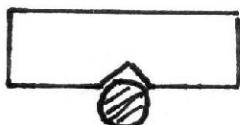
## SCRAP CORNER

Have you ever had trouble, securely "C" clamping a round shape to a flat? Try this simple gadget.

Hammer down to snugly fit 5/8" round. Good for 5/8 round and up.



3/4" X 1 1/2" bar  
File or fuller right angle 3/16" deep. Good for 1/2" round and smaller



Tim Suter

## Small Angle Grinder Safety

by Doug Kluender  
From The Anvil's Horn

Although not a Blacksmith's tool, the small angle grinder (4 to 5 inches in diameter) has become an indispensable part of our tool kit. While easy to use, this tool is also very easy to misuse and abuse. This little tool is capable of inflicting some very serious injuries. What follows is a review of some basic safety precautions, along with a discussion of the proper use of some of the more common accessories and abrasives. The small angle grinder has been used for shaping, cutting and finishing a wide variety of materials including metal, wood, plastics, ceramics and glass. The following discussion will focus primarily upon metal shaping and finishing applications. Precautions that apply to all power tools.

- Avoid accidental starting. Make sure the power switch is turned off before plugging the tool into an electrical outlet.
- Periodically inspect electrical cords. Repair or replace if they are damaged.
- Keep the work area clean and uncluttered.
- Dress properly: Do not wear loose clothing or jewelry. Contain long hair. Keep hair, clothing and jewelry away from moving parts.
- Do not wear gloves when operating rotating equipment. If the work is too hot to handle, cool it. If the work is dirty, clean it. Gloves are easily caught in saw blades, drills and grinders.
- Use appropriate safety gear. Always use ANSI rated protective eyewear with side shields. Hearing protection is also strongly recommended. Respiratory protection may be necessary when using grinders.
- Do not remove guards or disable safety devices. Support and secure the work. Do not hold the work piece with your hands. Use appropriate clamps and fixtures.

### Precautions specific to small angle grinders

In addition to the foregoing, there are some precautions unique to the operation of small angle grinders.

- Always use the proper guard with grinding wheels. This protects the operator from disintegrating grinding wheels. The guard may be removed for certain sanding and wire brush operations; otherwise it should remain in place.
- Inspect grinding and cutoff wheels for damage before use, especially if they have been dropped.
- Always use the side handle. The handle on most grinders can be installed in several positions suited to various operations. It provides a firm grip and control of the machine.
- Accessories must be rated for the operating speed of the grinder. Check the product label to ensure compatibility.
- Know where the sparks are going. Sparks can damage other equipment, cause fires and injure others.

# New Jersey Blacksmiths Newsletter

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## Abrasives and other accessories

- Hard grinding wheels.

Intended for rapid stock removal. Most common are the Type 27 depressed center designs. These wheels should be operated at an angle of 10 to 20 degrees. They are not intended for use as a cutoff wheel.

- Edge cutting wheels

Available in both depressed center and flat designs and thickness ranging from .045 to approximately 1/8 inch. Care must be taken to avoid binding the disc in the kerf of the cut.

- Abrasive sanding discs

This is probably the most widely used of all small angle grinder accessories. Discs are available in a large variety of materials and grits, designed for use on all types of materials. They range in cost from a few cents to several dollars each. Abrasive discs usually used with some type of backing pad. Some users stack used or worn out discs in lieu of using a backing pad. These discs are designed to be used with a 10 to 15 degree angle of attack.

- Flap wheels

These are a versatile and widely used alternative to abrasive sanding discs. They are available in both flat and depressed center styles. As with abrasive discs, they are available in a wide variety of materials and grits. They typically last a little longer than abrasive discs and are more expensive. They are also designed for use at a 10 to 20 degree angle. Flap discs with worn edges are useful for smoothing welds made in corners.

- Cup wheels

This accessory is not appropriate for small angle grinders. Although they sometimes may appear to fit, they are not rated for the speed of a small angle grinder.

- Wire wheels

Wire wheels are perhaps the most dangerous and misused accessories available. They are well known for their ability to grab everything nearby. They are equally adept at snaring shirts, shop aprons and flesh. Use only knotted wheels. Crimped type wheels are notorious for launching small diameter missiles. Wire wheels are available in both cup and flat styles.

- Non-woven abrasives

Non-woven abrasives are used primarily for deburring and polishing operations. They consist of a synthetic mesh that has been impregnated with abrasive material. Typically they are specified as a degree of coarseness, (i.e. Fine, medium, coarse rather than by grit. Attachment systems vary by manufacturer and are often not compatible between brands. One of the most versatile is the "hook and loop" system often referred to under the trade name "Velcro", offered by several manufacturers. This system allows for rapid pad changes.

- Other Accessories

There exist a large number of specialized attachments and accessories for small angle grinders. Among them are Chain saw blades, Wood rasps, Diamond impregnated cutting wheels, Buffing pads, and rubber or plastic pin type attachments for polishing or stock removal.

# New Jersey Blacksmiths Newsletter

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## "WRABA Tips and Techniques" The Weekend Metallurgist

by Don Klessner

This article is a follow-up to the Beaver Creek event in August, where I provided an overview of the metallurgy of hardening steel through quenching.

Hardening requires two steps: heating steel to austenite, and then quenching to obtain martensite. Steel is a combination of iron and a small amount of carbon. At low temperatures (below 1300 F.), in the unhardened state, the carbon and iron atoms form two phases, ferrite and cementite (together they are called pearlite). As steel is heated above 1300°, the iron atoms begin to form austenite, which has the ability to dissolve carbon atoms - like sugar dissolving in iced tea. All steels must transform 100% to austenite before they can be hardened. It is widely, but falsely, believed that austenite has formed when steel loses its' magnetism; that is, when a magnet will no longer stick. Steel begins to form austenite around 1333°, and loses its magnetism around 1430°. However, many steels are not 100% transformed to austenite until they reach 1500° or even 1600°. A reliable, but low cost, method to ensure proper heating temperature is a Tempil® stick. The stick will melt above its 'rated temperature' - and for most steels, 1650° minimum is a good starting point for hardening.

Once austenite is formed, it can be quenched to form martensite. Under normal cooling conditions, the iron and carbon atoms transform back to ferrite and cementite as the temperature falls below 1333°.

When steel is cooled rapidly however, carbon atoms don't have time to move out of the austenite solution, and another steel phase is formed called martensite. Martensite is hard and brittle because the carbon atoms act to strengthen its structure. (By adding a heat to martensite, the carbon atoms gain energy, begin to move out of the structure, and form ferrite and cementite again. This softening process is called tempering.)

The phases of steel are summarized below:

Steel condition	Low & medium carbon steels	High carbon steels (>0.60% C)
At 70° (unhardened)	ferrite & pearlite, magnetic	pearlite, magnetic
Heated to 1300°	ferrite & pearlite, magnetic	pearlite, magnetic
Heated to 1350°	ferrite & pearlite, austenite, magnetic	pearlite & austenite, magnetic
Heated to 1450°	ferrite & pearlite, austenite, non-magnetic	austenite, non-magnetic
Heated to 1650°	austenite, non-magnetic	austenite, non-magnetic
Slow cooled to 70°	ferrite & pearlite, magnetic	pearlite, magnetic
Quenched to 700	martensite, magnetic	martensite, magnetic
Semi-quenched to 70°	ferrite, pearlite & martensite, magnetic	pearlite & martensite, magnetic

The maximum hardness of quenched steel is fully dependent on how much carbon is in the steel; higher carbon enables higher hardness. Hardenability, on the other hand, depends on both carbon content and alloy content. Two steels having the same carbon content, but different alloy content will quench to the same maximum hardness. However, the steel with the higher alloy content (chromium, nickel, molybdenum, vanadium, etc.) has better hardenability, or ability to be hardened'. Alloy steels are more hardenable because the alloying atoms slow the movement of the carbon atoms out of austenite during quenching. If sufficient alloy is in the steel, the movement of carbon atoms is so slow that it can be quenched in oil, or even air - these are oil hardening or air hardening steels.

Quenching involves rapid removal of heat. During quenching, only the steel surface is being rapidly cooled as it is in contact with the quenchant - water, or oil, or air. Inside the steel, heat has to move to the surface so that it can be removed in contact with the quenchant. Because this process takes time, the interior of the steel cools more slowly than the surface. The bigger the part, the slower the interior cools.

# New Jersey Blacksmiths Newsletter

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As a result, martensite may form at the surface of the steel, but the inside cools too slowly, and only ferrite and cementite result. Alloy steels are better able to harden into the center

Low alloy and carbon steels require a very fast quench to remove heat quickly, such as water. As the water contacts the hot steel surface, it is heated and forms steam. The formation of steam draws a lot of heat from the steel. Unfortunately, once the steam is formed, it also forms a vapor barrier around the steel and slows the quench process. To obtain an effective quench, the blacksmith must stir the part during quenching to break the vapor barrier. Violent agitation, obtained by adding water pressure, is even better. If a water supply is available, a simple way to add pressure is to use a water hose or faucet with a pressure nozzle.

There is much interest in the effectiveness of 'superquench' (a solution of water, salt, soap and wetting agents) for improving the hardness of steel during quenching. It is well known that salt does somewhat improve the quenching ability of water (brine), and soap significantly decreases the quenching ability. In order to compare superquench with other available quenches, we heat treated some test pieces during the Beaver Creek demonstration. Later these test pieces were hardness tested with a Rockwell hardness tester.

Two sets of samples, made from a plain carbon (approximately 0.20% carbon) and a low alloy (grade 4140, with 0.40% carbon) steel, were heated in a coal forge. Prior to quenching, the temperature of the bar samples were measured using a 1650° Tempil stick to ensure austenite was formed. The parts were randomly quenched in one of three solutions: water with salt (brine), ice water & salt, or superquench - two sets in each quench. The samples were cut apart, ground slightly with a water cooled knife sharpener (to remove any decarburization), and tested with a calibrated hardness tester in three locations - for a total of 72 hardness readings.

The average hardness results are summarized below:

Steel Type	Quench	Outside Hardness*	Inside Hardness*
plain carbon	water & salt	37.5 Rc	37.2 Rc
plain carbon	ice water & salt	42.0 Rc	36.8 Rc
plain carbon	superquench	18.2 Rc	19.7 Rc
4140 alloy	water & salt	56.2 Rc	52.7 Rc
4140 alloy	ice water & salt	56.2 Rc	50.3 Rc
4140 alloy	superquench	53.7 Rc	52.7 Rc

\*Outside is the surface touching quenching solution. The inside hardness is about 1/4" deep on the plain carbon steel, and 3/8" deep on the 4140 steel.

From metallurgy literature, a 0.20% carbon steel (such as hot rolled bar stock), can have a martensite hardness of about 44 to 46 Rc. The ice water was able to get an average hardness of 42.0 Rc (note one of the 6 readings on the two samples was near the maximum of 46 Rc) on the outside surface - this was the best result for the plain carbon steels. The inside surface was about 37 Rc - this is due to marginal hardenability of the plain carbon steel. The superquench did not harden the plain carbon steel at all, having an average hardness of about 18 to 19 Rc (the hardness of ferrite and pearlite).

The expected hardness of the 4140 steel is about 56 to 62 Rc (the variation is due to the allowable tolerance on carbon content). All of the quenches were capable of quenching the outside surface of 4140 to near the maximum expected martensite hardness. Inside hardness dropped only a little, indicating that 4140 steel has good hardenability for this size part. From some blacksmithing articles that I have read concerning superquench, it is not recommended for use on alloy steels because of its severity, however, in this test, the results were similar to that of plain water with salt.

Originally published by PAABA

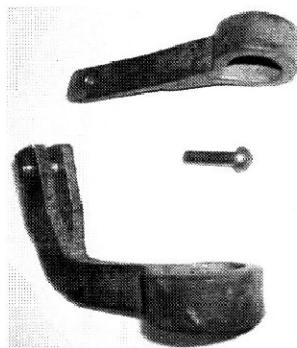
# New Jersey Blacksmiths Newsletter

## With A Little Help from My Friend

by Bob Selvaggio

### List Of Materials

- 1 piece of 3/4" x 24" round bar;
- 1 piece of 3/4" x 20" I.D. black iron pipe
- 3 pieces of 1/2" x 9 1/2" rebar
- 1 piece of 3/4" x 1/4" x 7 "1/2" flat bar
- 1 piece of 3/4" x 1/4" x 12" 1/2 "flat bar
- 1 - 1/4" x 1" round headed rivet .



I wish that I could take credit for this handy little Blacksmith Helper. I received this stand from a fellow that got it out of the Allegheny County Workhouse, which was located in Blawnox, Pa. The workhouse had a blacksmith shop as well as many other shops. When the facility was closed my friend gave me the stand. It is a handy little thing, just right for keeping off to the side and moving it into position when forging long items that need to be supported. Being lightweight, reaching for it, and adjusting the height can be done with one hand while holding onto the material being forged.

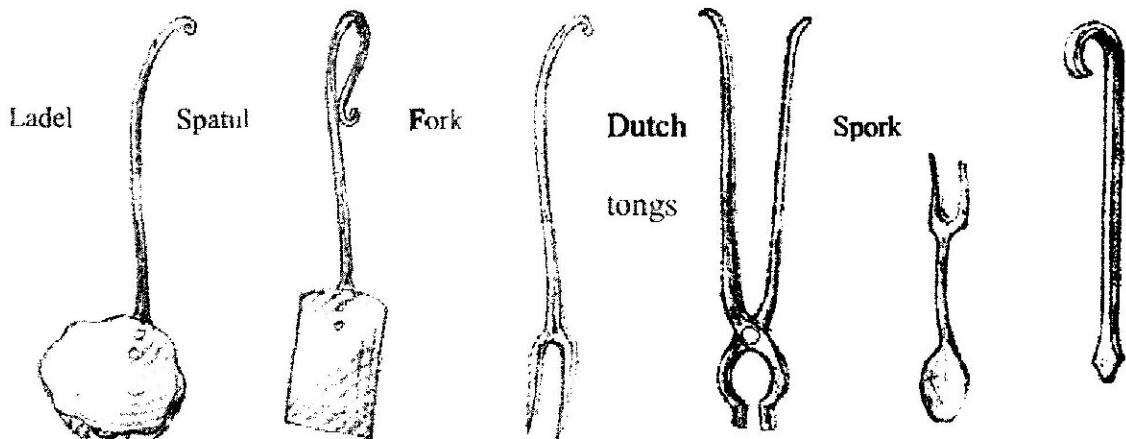
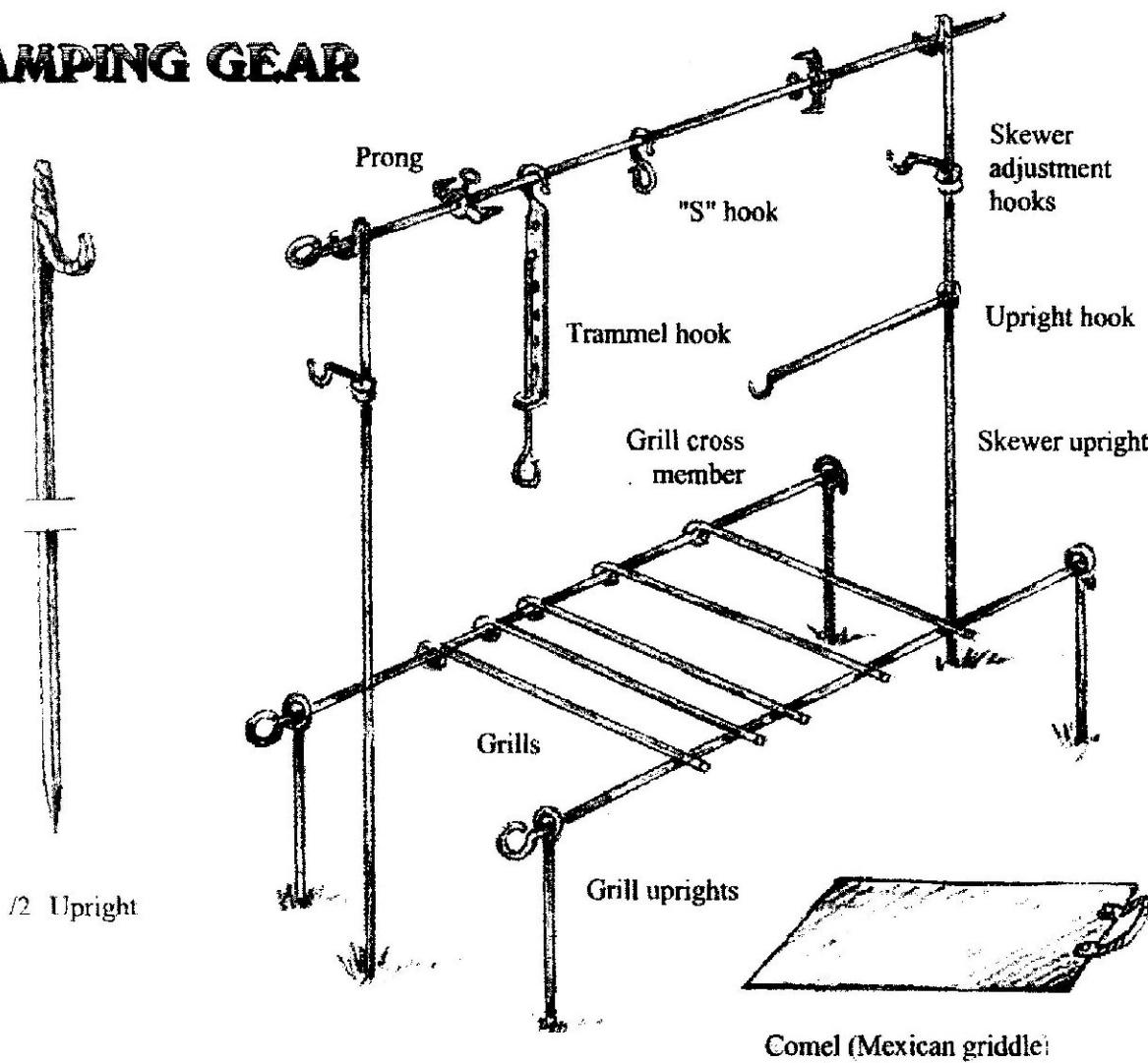
The original stand is a mixture of traditional forging and newer arc welding. I decided to keep it that way when reproducing a couple more. The way the support piece moves up and down through the adjusting device, it is locked into place by the downward motion of the top bar.

To make this helper, begin by making the feet. Take the three pieces of 1/2" rebar and forge the ends over. The one end is forged over 1" and the other is forged in the opposite direction at 1-1/2". The three one inch ends will go up into the pipe, of which a small flair is forged. The flair permits the three pieces of rebar to fit. The 3/4" round bar is split back 4" on the one end and forged into the "T". For the adjusting device, I start out with a longer piece of the 3/4" x 1/4" bar so that I can hold onto it without using tongs. The piece that goes around the top of the pipe I measure back 5" and center punch on the edge and measure up from that mark 4" and center punch again. At these two marks, I forge it to a somewhat 45 degree bend and forge it around to match up the marks. I have found 4" to be enough to slip over the pipe. At this point, you should have an eye large enough to fit over the pipe and the remaining materiel should be overlapped onto itself. The piece is then brought up to a welding heat and forge welded about 2" back from the eye. The pieces are welded together just enough to stick, no need to reduce the size down at all. Heat the piece up again past the 2" section and clamp in the vise and put about a 80 degree bend starting at 2" from the eye. This remaining piece should not be welded together and will be opened up later to accept the top piece. Open up between these two pieces so that the top bar will move freely between them. The top piece has a smaller eye, one that should take about 3-1/4" of material for the eye. First forge a taper on the end, measure back about 1" or so, center punch once again on the edge, measure from that mark 3-1/4" center punch again and forge into the eye. This eye needs to be large enough to allow the 3/4" round bar to travel freely; so if it is tight you need to forge a bigger one! This top bar is riveted to the bottom bar, line them up when they are placed in a parallel position to each other and mark for the holes and drill. Tack the feet pieces together, place the pipe over the rebar and weld the pipe to the feet, use a level to get it plumb. Weld the bottom "eye" piece to the top of the pipe, rivet the top "eye" piece to the other and slip the "T" support bar into place.

Originally published by PAABA

# New Jersey Blacksmiths Newsletter

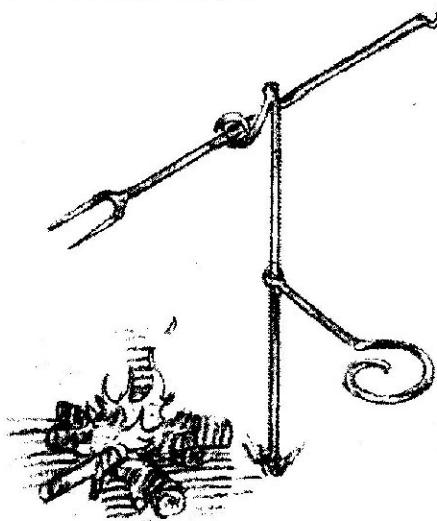
## CAMPING GEAR



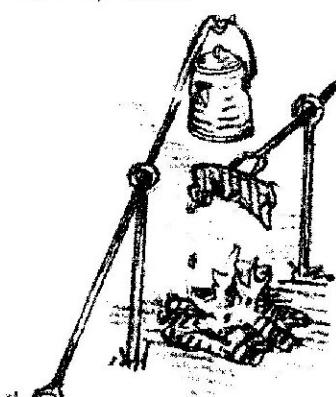
Originally appeared in The Hammer's Blow, Winter 1993/94

# New Jersey Blacksmiths Newsletter

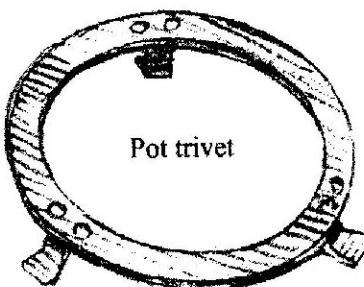
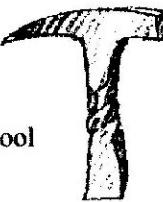
Packers small camp kit



Squirrel cooker



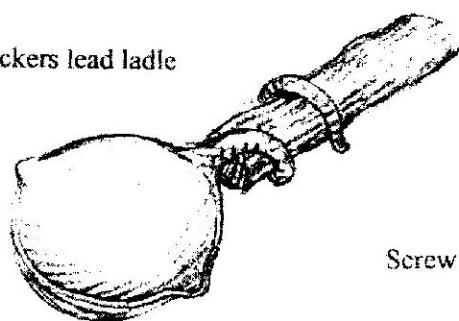
Musket tool



Cavalry  
picket pin



Packers lead ladle



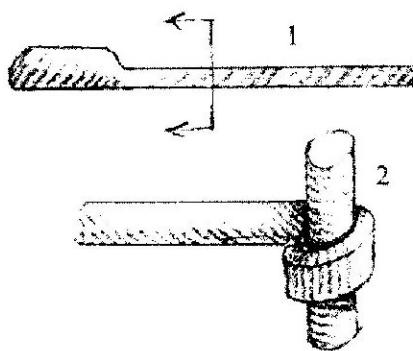
Screw driver



Trammels



Making bar locks for skewer adjustment, and  
upright hooks. Wrap drawn end of hook (1)  
around  $\frac{1}{2}$  upright (2).



3/16"x 3 1/4"

3/16"x 1 1/4"

3/16"x 1"

1/4" Round

Reprinted from the  
Illinois Valley Blacksmith  
Assn. TUYERE  
May/June 2002

# New Jersey Blacksmiths Newsletter

## 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**  
**Carroll 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  
203.775.4526

## Search

I am looking for a #250 fisher anvil in good shape. If you have one for sale or run across one, contact me; Larry Brown, NJBA Editor. (718) 967-4776

## BLACKSMITH TOOLS FOR SALE!

**John Chobrda**

Has a large selection of tools for sale.  
Anvils – Forges - Leg Vices—Blowers  
Tongs – Hammers  
Will also repair and/or resurface Anvils  
Call John for prices and availability  
Evening 609-610-3501

## Business Members

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

**John Chobrda, Pine Barrens Forge**  
231 Morrison Ave., Hightstown, NJ 08520  
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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STATE/PRO V. \_\_\_\_\_

COUNTRY \_\_\_\_\_

ZIP (+4)/POSTAL CODE \_\_\_\_\_

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EXPIRATION DATE \_\_\_\_\_



## 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!

Name \_\_\_\_\_

Address \_\_\_\_\_

City, State, Zip code \_\_\_\_\_

Home / work Phone # \_\_\_\_\_

E-mail (optional) \_\_\_\_\_

New Member  Renewal \_\_\_\_\_

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

### Suggestions for PABA demonstrations

What is your skill level?

Beginner  Intermediate  Advanced  Professional  
Membership paid by  Cash  Check # \_\_\_\_\_

Send your completed application with \$ 20 ( one year dues) to;  
PABA Treasurer, Buzz Glahn  
1667 Wyomissing Rd.  
Mohnton, PA 19540  
(make Checks payable to PABA)

## 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**



**Index For NJBA  
Volume 12, #1  
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Stand 15,  
Camp Gear 16-17,  
Ad Page, page 18**

### **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 \_\_\_\_\_