SOFA SOUNDS

SOF&A
SOUTHERN OHIO FORGE & ANVIL
Artist-Blacksmiths Association of North America

AUGUST/SEPTEMBER 1985

MARK YOUR ABANA CALANDER: (Unless otherwise noted, all meetings will be at the Studebaker Homestead on Rt. 202, south of Tipp City. Members are encouraged to bring guests and tools or items they have made for display. Please don't park on the grass.)

August 3rd - 1PM — BUSINESS MEETING followed by a demonstration by Duane Wegley of items relating to blackpowder shooting. Work on the homestead gate will start at 10AM and continue after the meeting and demonstration. Come early and bring your favorite forging hammer.

September 7th - 1PM — BUSINESS MEETING followed by a hands-on workshop for beginning blacksmiths in making a pair of log tongs. Work on the homestead gate will continue as previously mentioned.

September 21-22nd — 1985 QUAD-STATE BLACKSMITH ROUND-UP.

October 5th - 1PM — BUSINESS MEETING followed by a demonstration to be announced. Work on the homestead gate will continue as previously mentioned.

November 2nd - 1PM — BUSINESS MEETING followed by a demonstration on making hinges by Larry Wood. Work on the homestead gate will continue as required.

MEETING NOTES:

At the June 8th business meeting, the following items were discussed:

- The group will not be able to enter a float in this year's Mum Festival in Tipp City since it occurs the same weekend as the Quad-State Round-up.

- Photos are still being sought for the 1986 ABANA Calander. Send 8"x10" glossy (if possible) photos to: Cindy Sevin, %3646 W. Lawrence Lane, Phoenix, AZ 85020. Photos should be B&W.

- Ron Thompson announced that he still did not have the didydium safety glasses he has been trying to order for resale to the group at his cost as they have been on backorder since January. He will probably cancel the order and try elsewhere.

- Larry Wood left lengths of 3/4" x 3/4" x 12" stock to be given out. Each member with a forge was requested to make a twist of their choosing in the stock and

to bring it to the next meeting. From these samples, twists for the homestead gate will be selected.

- It was announced that three SOFA members demonstrated at the Boy Scout Jamboree at Greenville. Apparently the kids greatly enjoyed the demonstrations.

- Emmert Studebaker announced that the Buckner Nature Center near Troy is very interested in building an old-fashion blacksmith shop to go along with their other buildings and craft presentations. This should be another opportunity for local blacksmiths to demonstrate in an equipped shop. For further information contact Mark Cusac at Piqua number 473-3625.

- Emmert also reported on the Southeastern Regional Blacksmithing Conference at Madison, Georgia which he attended. He said they put on a terrific conference and brought back some tips for us to use for the Round-up.

The tool raffle brought in $45.50 to support the newsletter. The hot cut made and donated by New Carlisle member Hans Peot was won by Kettering member Ham Hammond. The nicely done pair of tongs made and donated by Lima member Bud Rolston was won by Hans. Vandalia member Dan VanArman won a set of 5" vice jaw jigs and Huber Heights member Dick Franklin won a half-dozen rivets.

Following the business meeting Hans Peot demonstrated making a hot cut hardie from a piece of automobile drive shaft using a hammer and trip hammer. I was otherwise occupied so I didn't pick up any tips to pass along. The completed hardie was donated for the raffle at the next meeting.

Following the demonstration, the Board of Directors met to confirm the elevation of Emmert Studebaker to Trustee Emeratus, with full voting privilages, the addition of Hans Peot and Dick Franklin to the Board and confirmed Hans, Duane Wegley and Ken Scharabok as group officers for the next twelve months.

The board members, group officers and Round-up committee chairmen present also met to work on the Round-up plans. Plans are coming along nicely but we still need a bunch of volunteers for various tasks. Don't be surprised to receive a call requesting your assistance for some task as we are trying to spread out the work as much as possible to make it enjoyable for all concerned. Along these lines, can any member loan or rent us a good PA System? If so, please contact Ron Thompson. For the first time SOFA will sponsor an auction at the Round-up of blacksmithing-related items: 1) donated to SOFA for the auction (as opposed to the tool sale table at which the donee sets the price with all proceeds also to SOFA), 2) items produced by the demonstrators (with all proceeds to SOFA), and 3) on consignment in which case SOFA will receive 10% of the final sales price. Consignors will retain the right to refuse the final bid. Each SOFA member is requested to make and/or donate a tool to SOFA for either the tool sale table or auction. SOFA's proceeds will be used to offset group expenses and for an even better Round-up next year.

Not much work was done on the homestead gate as most of the work leaders could not make the meeting and those who were there needed to attend the meetings following the demonstration. Since the demonstration was intentionally short, this did not leave much action going on for the other members who attended. We regret this occurred as our intent was to provide further demonstrations by working on the gate.

At the July 13th business meeting, most of the discussion centered around the Round-Up. Hans Peot announced that registration forms would be sent out in early August. If you have not received one by the middle of August contact Dick Franklin at 233-4878.

Larry Wood related the following safety tip: he was using quenching oil to quench a large part and had to tip the bucket in order to completely cover the part. When the oil flashed, the bucket tipped over spilling oil, some of which was still burning, on his shop floor and along one stud wall. He immediately reached for his fire extinguisher only to find it empty. Larry was able to put out the burning oil before it caused damage but now recommends keeping a bucket of sand handy for such purposes, as well as regularly checking your fire extinguisher pressure.

Over 40 members and guests attended the meeting. The tool raffle brought in another $40.00 to support the newsletter. The hot cut hardie made by Hans Peot was won by Kettering member Owen Vance. The nail header donated by your editor was won by Cleveland Heights member Art Wolfe. Pandora member Keith Summers won a string tie with a hand-made leaf cincher donated by Emmert Studebaker. Peter Butoracic won a set of vice jaw jigs and Duane Wegley won a half-dozen rivets. For the next meeting the raffle items will be a horseshoe belt buckle donated by Dick Franklin and a brass water dipper donated by Keith Summers. Keith noted that he likes brass dippers in that they can be left in the slack tub without rusting.

Following the business meeting Dick Franklin made the parts of a dogwood flower, demonstrating the various steps. He used a ballpeen hammer over the hardie or pritchel hole to give relief in the flower pedals. He also noted seeing Dorothy Streigler at the last I.B.A. Conference put in the center vein in a leaf by first folding it in half.

Following Dick's demonstration work on the homestead gate continued with work starting on some of the larger frame pieces.

Ron Thompson brought along his proposed twist for the gate. He said he twisted the bar and reforged it flat several times until you could not even tell it had been worked on at all. I am sure his twist technique will become known as "The Thompson Twist". Hey Ron, we have an open demonstration date for October!

THIS AND THAT:

- The plans for the treadle hammer featured at the 1984 ABANA Conference are now available for $6.20 from ABANA, c/o Ruth Cook, P.O. Box 303, Cedarburg, WI 53012. This is the revised version of the hammer and includes many modifications to make it more efficient and safer. Plans include pictures and step-by-step instructions. Limited printing so order as soon as possible.

- If you would like to be listed, or relisted, on the next ABANA Demonstrators List, contact Fred Caylor at 3602 S. 800 E., Zionsville, IN 46077. Provide name, address, a brief description of demonstration instruction and fees. Deadline is Sept. 15th.

- The Anvil's Ring is still in need of material. Please send articles, letters to the editor, etc. to The Anvil's Ring, GA Univ. Station, Box 2534, Athens, GA 30612-0534. Due to the pending resignation of Pete Minier, Editor/Designer of The Anvil's Ring, ABANA is currently seeking qualified applicants for this position. Interested parties should provide resume and portfolio of prior work to Stan Strickland, 1147 Dantel Ct., Stone Mountain, GA 30083.

- I recently heard this story from a local blacksmith who shall remain unnamed. It seems there was once an apprentice to a master blacksmith, who could work magic with metal. As was his responsibility, the apprentice would arrive an hour before the master to clean the shop, prepare the forges, bring out the stock needed for that day's jobs, and set out the necessary tools. Every day he would see the master arrive, go over to a drawer, unlock it, open it partly, read something for about a minute, nod his head a couple of times, lock the drawer, and then go about the day's business.

This went on for several years until it came time for the master to retire and turn the shop over to the apprentice, now a journeyman. Of course, the first thing the journeyman did upon opening the shop the next day was to find the key for the drawer, anticipating some type of inspirational message. What he found was a slip of paper on which had been penned, "Light forge, strike iron".

- The 1985 winner of the Alex Bealer Award is Dimitri Gerakaris of North Canaan, NH. Dimitri was instrumental in founding ABANA in 1973 and has served ABANA as President, Board Member, Editor of The Anvil's Ring, and through promoting blacksmithing in general. The Alex Bealer Award is the most prestigious award given by ABANA. The 1984 winner was our own Emmert Studebaker.

- WANTED: Buy or borrow back issues of the Blacksmith's Gazette, Vols I & II and Vol III, Nrs. 1 and 6. Contact the editor.

- Terry Brown of Franklin (746-3288) would like to purchase several blacksmith leg vices, 4" jaws and up in excellent condition. Contact him if you have any for sale.

- Larry Wood gave me three newspapers clippings. One is that there are 2,500,000 rivets in the Eiffel Tower. The second is that, in the past, monkey wrenches have been both right or left handed depending on how the threads run. The third is an item that one of Ohio's oldest metal bridges was recently saved from destruction by a group who refurbished it as a foot bridge across the Miami and Erie Canal. The bridge was 120-years-old and was a 57-foot, cast iron, bowstring model.

- The British Artist-Blacksmith Association 1985 Conference will be from 5-8 September at Coalbrookdale. For further information send a business size, self-addressed stamped envelope to the editor.

- ABANA has formed a Blacksmith-Farrier Liason Committee headed by Carol Sakowski. The purposes of the committee are to help members of both fields to recognize each has a unique profession, each has a great deal to offer the other in ways which may improve the quality of the work they do, and to improve the public's awareness and understanding of the differences and similarities between the two professions.

- FOR SALE: Complete foundry equipment, all or part. Foundry has been in operation for 55 years and has the capability to handle iron, brass and aluminum. All equipment is in good conditions and in daily use. Carl Dance, owner and operator, is closing business due to health reasons. Contact Carl at P.O. Box 568, Rome, GA 30161.

- ABANA, through Lynn Fieldhouse, now distributes on a monthly basis up coming events relating to blacksmithing in the U.S. Due to the length, I will not reproduce it with the newsletter. However, I will have the latest copy with me at SOFA meetings. If you know of an item to be included contact Lynn at ABANA Calander Up-Date, P.O. Box 245, Middleton, WI 53562.

- In the not too distant future ABANA will be making available for sale to ABANA members a quantity of blacksmithing tools donated to ABANA by Kenneth Lynch, Sr. of the Kenneth Lynch Tool Collection Museum. Watch The Anvil's Ring or a separate mailing to ABANA members for further details.

- As a reminder, the 1915 Sears and Roebuck 148 page "Tools, Machinery and Blacksmiths Supplies Catalog" are moving fast. If you want a copy send $7.80 to ABANA, c/o Ruth Cook at the address previously given.

- In the latest President's Message from Stan Strickland, Fred Caylor praises the blacksmithing facilities at the Appalachina Craft Center at Smithville, TN. For a schedule of classes there, contact the center. Also stop by if you are in the area.

SOURCES:

-French pattern crosspeen hammers with handles are available from The Forge and Anvil Blacksmith Shop (30 King St., St. Jacobs, Ontario, Canada N0B 2N0). For a list of prices and S&H charges, send them a self-addressed, stamped envelope and include $.25 for return postage.

- Frank Alviani (425 McAlister, Waukegan, IL 60085) has the following items for sale: Buker Vertical Milling Machine, asking $900, 24" Gould Crank Shaper, asking $900 (or $1,500 for both) and 50 lb Mayer Bros. Tip Hammer, asking $1,600. Will consider reasonable offers. Phone (312) 675-1600, Ext. 257 or (312) 662-7584 after 6PM.

FINISHES - PART V:

This concludes the series on finishes. If you have had success with a finish which hasn't been mentioned in this or the previous four parts, please send it to me for an addendum to the series.

- Francis Whitaker (Aspen, CO):

Inside finishes are usually flat black enamel, wiped off while still tacky, followed by a coat or two of hard paste wax.

Outside, in my low humidity climate range, from a linseed, turpentine, wax and drier finish to two coats of primer and a finish color coat. I use two different color primers, so I can see where I have been, and on gates and fences use a half and half finish coat of drak brown and black. That gives an off-black tone. Latex is easy to use, very tough, and I can wash up with soap and water.

For a natural finish, I have been introduced to Valspar #30, Voloil Sealer. It goes on very thin, flows under collars and into tight places, dries very hard and glossy but can be rubbed down or allowed to weather. It can also be a primer and another final finish put over it.

- Clem (Malot) Mellott (Harrisonville, PA):

I prefer used motor oil for an all-purpose finish. Prepare the piece warm, dip it oil, return to fire to burn oil in. Repeat three or four times. This cannot take the weather. There I use an epoxy based paint. Also undersirable for cooking utensils, etc. There I use vegetable oil or sunflower oil following same steps. I finish brass and copper by polishing with fine wire brush (electric), then with a good cleaner and coat with a polyurethane.

- Steve Kayne (Kayne & Son: Custom Forged Hardware, Candler, NC):

We use either a burnt oil finish (apply Crisco, tallow, motor oil, linseed, etc. to steel just warm enough to smoke) or Johnson's Paste Wax for a wax finish.

- Dimitri Gerakaris (North Canaan, NH):

For indoor work I rotary wire brush all work clean (after keeping the work clean during the forging process to avoid embedded surface impurities). Heat, then while work is still hot either apply linseed oil and smoke to blacken (avoid the fumes) or, while work is still warm, apply W-D 40 oil.

For outdoor work; 1) make sure design of work calls for no pockets which will trap rain and no large flat surfaces alongside each other for the same reason, 2) keep work clean as mentioned for indoor work, 3) degrease the surface, 4) be sure any weld slag

and spatter are off, 5) apply a thin coat of good quality primer, 6) apply one thin coat of finish paint in shop and one at site after installation (and recheck a few months later for any spots which my have gone undetected - look for rust stains to indicate this), and 7) send client a postcard when you think next coat is due and remind them to protect their investment. Very complicated pieces and/or work which is hard to reach should be hot dip galvanized.

- James Wallace (Memphis, TN):

Outside stuff all gets sandblasted and painted. Inside stuff is brushed, blued, waxed, oiled or otherwise treated. A nice inside finish is WATCO Danish Oil. Apply warm and let dry. It is available from most woodworkers supply houses. WATCO is a mix of turpentine, linseed oil, cocabolo wax and Japan drier. I use it a lot. It is excellent when working with wood/steel combinations. Gummy burnt oil finishes fall in line behind barking dogs, nagging wives and crying children - only slightly ahead of eating crackers in bed.

- Nol Putnam (White Oak Forge, The Plains, VA):

We use several finishes for inside pieces; 1) one part turpentine, two parts boiled linseed oil, one/fourth part beeswax and Japan paint dryer. Heat until wax melts in a double boiler. Brush or wipe on while warm - 250°F. While the piece is still warm to hand, wipe dry with soft cloth, 2) Same as above except after cleaning, put on cold and wipe off, 3) Use Valoil (commercial product) or 4) Use a wood/wax polish.

For outside pieces we do lots of experimentation.

- Paul Boccolucci (Five Acres Blacksmith Shop, West Valley, NY):

My production items are flat blackened with Rustoleum. All else is simply polished and lacquered (cheapo spray lacquer).

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Late addition: BLUING - To put a "bluing" finish on steel boil the articles in a solution of hyposulphite of soda, 1 part by weight in 7 1/2 of water, to which is added in a proportion of 1 in 17, a 100 percent solution of acetate of lead. (From Hardening and Tempering Engineers' Tools).

Approximately 1 1/2 years ago, various finishes were applied to hand-made wall hooks and exposed to the weather as part of a SOFA demonstration. The following are the current results rated from one to ten. A rating of one indicates complete rusting of exposed surfaces. A rating of ten indicates that no detectable rusting has occurred. A medium rating of five indicates that some rusting and/or finish flaking has occurred. Stove black - 3-4; Beeswax - 5; Molycoat spray - 7; Boiled linseed oil - 8; Rustproof black paint - 9, Boiled linseed oil and beeswax - 9. None of the hooks look as good as the day they were exposed to the testing.

SHOP TIPS AND TECHNIQUES: (When a shop tip from one newsletter has been repeated in another newsletter (and I picked it up from there), the original newsletter is cited as the source. In most cases, these shop tips and techniques have been paraphrased from the original write-up or illustrations for consistency of format. While the information presented in this section (and elsewhere in this newsletter) is believed to be accurate, SOFA and ABANA bear no responsibility for injuries or other adverse actions which may result.)

- The following items are by Brad Silberbery from the newsletter of the Blacksmiths' Guild of the Potomac:

-- Magic markers are handy items for the metalworking shop. I use them to put reference marks (for forging lengths) on shiny anvil faces when chalk, soapstone, etc. would not show up. They also will show up longer because they are more resistant to rubbing off. I keep a wide-tipped, blue marker to use as a substitute for machinists layout dye. It's probably the same ink!

-- Don't ignore the lowly cold chisel. Many jobs require removal of small bits of metal - too little to saw out, but too much to file. Cold chisels are extremely useful for such work, and are the simplest tools to forge and heat-treat. Use straight chisels for cleaning out corners and cutting off, cape chisels for flat-bottomed grooves and notches, diamond points for oil grooves and engraving, and round nose for round-bottomed grooves and broaching (cleaning out between drill holes). These tools will last longer and work better if kept sharp with an oil stone and dipped in cutting oil when used. To illustrate, I recently had to make flat grooves for electric wires in the delicate arms of a chandelier. I attempted to forge a groove in a sample piece and mashed it badly. I realized that the metal in the groove needed to be removed, not just pushed aside. Lacking a milling machine, I forged a properly sized cape chisel and found that it worked very well and probably more quickly than the milling set-up would have. It certainly cost less!

-- If you have the luxury of owning more than one anvil, set them up at different heights for different uses. Set the bigger anvil at a height comfortable for heavy work, usually the height off the floor of the web between the thumb and the first finger of your hammer hand when it is held loosely at your side. Set your smaller anvil higher (several inches higher) for light work. This will save bending over the big anvil for tappity-tappity work, and prevent tennis (blacksmiths) elbow which comes from blasting away on an anvil which is too high.

-- Those cheap magnetic pick-up tools are great for testing for critical temperature when hardening tool steel. (A piece of steel will lose its magnetic properties above the critical temperature). The long handle of the magnet will keep you from burning your fingers.

- For a good replacement handle, the wood should be tough, springy and fairly hard. I've found three which fit the bill. They are white ash, hickory and purpleheart. The grain in the handle should run in the direction of the striking surface (face). An excellent source for ash or hickory is store-bought sledge handles. To fit the handle to the head, make the fit at the eye a little oversize and taper the eye fit into the rest of the handle, don't step it. When your fit is pretty close, bake the handle in the oven at 150° for 24 hours or put it real close to your wood stove for a day or so. Then, while the handle is still warm, drive it into the eye. You will be surprised at how much it has shrunk in the oven. Wedge with a wood and steel wedge. Then pour cyanoacrylate glue ("Crazy Glue") or a drying oil (such as boiled linseed oil) over the end grain of the handle exposed thru the eye of the handle. Let the oil or glue harden and you are ready to go to work. Assuming the eye of your hammer is properly shaped (smaller in the center than the outsides), the handle should last for many years to come. (By Phil Baldwin in the newsletter of the Northwest Blacksmith's Ass'n).

- For a convenient flux dispenser put it in a dishwashing soap, squeeze-type bottle with the pop-up cap. That way you can spurt as much as you need and the flux stays dry in the bottle. (By Joe Staley from the newsletter of the Upper Mid-West Blacksmiths Ass'n).

- To drill a hammer head for a handle first mark where the eye will go (be sure to allow for peen expansion if you have not already drawn it out) and drill two 1/4" pilot holes 1/2" apart. Now drill through one of the pilot holes with a 3/4" drill and then plug it with a piece of 3/4" mild steel rod the length of your head thickness. Now drill through the other pilot hole and knock out the remaining plug. You can then use a chisel to cut out what remains between the two holes and drift it to the desired shape. (By Russ Swider from the newsletter of the Arizona Artist-Blacksmith Ass'n).

- For a handy metal marking pencil use a piece of sharpened aluminum rod (perhaps a aluminum gutter spike - ks). It makes a fine line and stays on the metal longer than chalk or soapstone. (By Dick Franklin and Hans Peot).

- Tool steel should be worked at a bright red color, but never so hot that a scale forms on the surface. If overheated, the steel may tend to become crystalline and lose its most valuable properties. Unnecessarily long heating of tool steel will also tend to reduce its carbon content. The work should be transferred quickly from the forge to the anvil so that as little heat is lost as possible. Tempering modifies the properties of the steel to some extent, tending to increase its toughness or density, but the steel should never be allowed to cool below dull red while forging. Never, on any account, hit tool steel when only black hot. Many a tool cracked in the hardening owes its faulty nature to the fact that it has been hammered too cold, and the actual instability of the metal is due to its receiving shattering blows after it has lost its red heat. In dealing with cast steel there is not much latitude in respect of heat in which it can be safely forged without risking fracture in the ultimate hardening. (From Hardening and Tempering Engineers' Tools).

- After suffering a serious hand injury last summer, I have sworn off using a pedestal mounted wire brush on handheld small iron work. What I now use is a cup wire wheel mounted on one of the new 4 1/2" angle head grinders. I hold the work piece in the vise while doing this and wear heavy gloves if the item is sharp, as even this set-up has a tendency to pull the grinder or kick back when applying pressure to the work piece. For this reason, a heavy apron is also recommended. I feel that there is almost no way to avoid an occasional snatching of the work in a wire brush, and I'd rather have my hands on the handle and body of the grinder than on the grip afforded by the typical piece of forge work. The wearing of gloves around moving machinery is to be avoided like the plague, as when a pedestal mounted wire wheel or drill press catches the glove, the chances of keeping all ten fingers is almost nil. With the angle grinder, the gloved hands remain on the machine handles in relative safety. Accessability of the work is better with the new set-up as well. (By Paul Lacy III from the newsletter of the California Blacksmiths Ass'n).

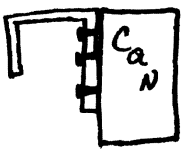
- For me, a speed control and an electric blower is the only way to go. While some have found that they have better air control using a gate to control the air flow from a blower, the motor noise sounds as bad as a vacuum cleaner to me. Of course, putting the blower elsewhere and piping the air to the forge would also take care of the noise. For years I used an ON-OFF switch and a rheostat. The one problem I had was getting the blower to start if I only wanted it to turn slowly. I would have the speed adjusted just right for the work, flip the switch OFF when I worked on the anvil, return the steel to the fire, flip the switch, and nothing would happen. The voltage was too low to start the blower. John Bartelone came to my rescue when he told me to use an ON-OFF-ON switch. This way, I could MOMENTARILY give full voltage to get the motor started, then flip to the other ON position to give the motor the low voltage to keep it turning slowly. If you don't have a rheostat or motor controller, a light dimmer will do. You can mount the switch and dimmer in an electrical box. Two precautions: The light dimmer, etc., must be rated to handle more current than your motor will use. Dimmers and rheostats will only work on universal motors. Don't try it with a capacitor starter or a repulsion motor. (By Bob Thomson from the newsletter of the California Blacksmith's Ass'n). ((The illustration with this write-up showed the dimmer wired between one of the ON switches and the motor and the other ON switch wired directly to the motor. He grounded the switch, dimmer and motor. - ks)).

- For arc welding dissimilar steels (e.g., tool to either mild or stainless, stainless to mild, mild to cast iron, tool to tool or stainless to stainless), I recommend AWS rods E 312-15 (DC only) or E 312-16 (AC or DC). I use the Arcaloy brand (about $4 lb) as it does as good of a job as the higher priced ones which can run $25 to $30 lb.

Remember that most tool steels should be preheated to 400° - 500°. (By Steve Wooldridge from the newsletter of the Indiana Blacksmiths' Ass'n). ((Note: Weiler Welding has E 312-16 rods for $4.28 lb. - ks)).

- Have you ever tried to forge weld three round pieces together for a basket handle only to have the top piece slide between the two bottom pieces, ending up with three pieces side by side? If so, maybe the technique I use for this situation will be of help to you; 1) hold pieces together with wire, hose clamps, etc., 2) bring to welding heat and place in bottom swage or swage block with two pieces down and one up, and 3) strike straight down, pieces will weld together without sliding apart because the sides of the swage holds them together. (By Ken Hamble from the newsletter of the Rocky Mountain Smiths

- If you are hot cutting on the anvil, the slack tub is inconvenient, and your anvil stand won't hold a water can, hang a water quenching can from the anvil by making a bracket to fit into either the Pritchel or Hardy Hole such as the illustration.



(Entire page is from The Anvil's Horn, newsletter of the Arizona Artist Blacksmith Ass'n)

ARC WELDING ELECTRODES

by Peter Sevin

We all know that real blacksmiths do all their welding in the forge. Most real blacksmiths don't even own an electric welder and some of them don't even know what one looks like! However, there are a few of us anvil-owners who are interested in arc welding for its own sake and it is for that small group that I have collected the following information.

All welding rods are classified by the American Welding Society (AWS), according to their applications and characteristics. We are concerned here with the electrodes that are used for welding mild steel and its alloys. All of these welding electrodes are marked with a four digit number near the grip end. On the box that these electrodes come in this four digit number is preceded by the letter "E". This designates that the rod is designed to carry electrical current. (Remember there are gas and Tig welding rods that do not carry electrical current.) The first two of the four digits tell us the tensil strength of the deposited weld head. Tensile strength is defined as the amount of force required to pull apart a bar measuring one square inch.

Let's take for example an electrode with the digits 7014 stamped on the rod. The first two digits are 70 and this means that the deposited weld bead has a minimum tensile strength of 70,000 lbs. p.s.i. Thus, a rod marked 60xx has a tensile strength of 60,000 lbs. p.s.i.

The third digit tells us what position the electrode can be used in. The number 1 means the rod can be used in 4 positions: flat, horizontal, vertical, and overhead. The number 2 means the rod can be used only in the flat or horizontal positions, and number 3, flat only. Thus, whereas a rod marked 7014 can be used in all positions, a rod marked 7024 can be used only in flat or horizontal positions.

The fourth digit tells us a special characteristic of the electrode usually dealing with the flux, the type of current, and penetration. There is a table available which intreprets this last digit but being somewhat complex and superfluous, we'll forget about it. Here is a rundown of some of the most commonly used electrodes:

E 6010 - DC only, this rod gives very deep penetration and high quality welds in all positions. Requires considerable operator skill.

E 6011 - Same as E 6010 but can be used AC or DC.

E 6013 - AC or DC, shallow penetration, nice looking beads, easy to use.

E 7014 - AC or DC, high deposition rate as rod coating contains iron powder, low penetration.

E 7024 - AC or DC, same as E 7014 but higher deposition rate, flat or horizontal only. Called "drag rod."

E 7018 - Called "low hydrogen", hydrogen bubbles in weld bead cause cracking and these rods are used for welding high sulfur, high carbon, or low alloy steels. Very high quality welds.

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MILD STEEL ELECTRODE SELECTION CHART.*

	ELECTRODE CLASS										
	E6010	E6011	E6012	E6013	E7014	E7016	E7018	E6020	E7024	E6027	E7028
Groove butt welds, flat (< 1/4")	5	5	3	8	9	7	9	10	9	10	10
Groove butt welds, all positions (< 1/4")	10	9	5	8	6	7	6	(b)	(b)	(b)	(b)
Fillet welds, flat or horizontal	2	3	8	7	9	5	9	10	10	9	9
Fillet welds, all positions	10	9	6	7	7	8	6	(b)	(b)	(b)	(b)
Current(c)	DCR	AC DCR	DCS AC	AC DC	DC AC	DCR AC	DCR AC	DC AC	DC AC	AC DC	DCR AC
Thin material (1/4")	5	7	8	9	8	2	2	(b)	7	(b)	(b)
Heavy plate or highly restrained joint	8	8	8	8	8	10	9	8	7	8	9
High-sulfur or off-analysis steel	(b)	(b)	5	3	3	9	9	(b)	5	(b)	9
Deposition rate	4	4	5	5	6	4	6	6	10	10	8
Depth of penetration	10	9	6	5	6	7	7	8	4	8	7
Appearance, undercutting	6	6	8	9	9	7	10	9	10	10	10
Soundness	6	6	3	5	7	10	9	9	8	9	9
Ductility	6	7	4	5	6	10	10	10	5	10	10
Low-temperature impact strength	8	8	4	5	8	10	10	8	9	9	10
Low spatter loss	1	2	6	7	9	6	8	9	10	10	9
Poor fit-up	6	7	10	8	9	4	4	(b)	8	(b)	4
Welder appeal	7	6	8	9	10	6	8	9	10	10	9
Slag removal	9	8	6	8	8	4	7	9	9	9	8

(a) Rating is on a comparative basis of same size electrodes with 10 as the highest value. Ratings may change with use.
(b) Not recommended.
(c) DCR—direct current reverse, electrode positive; DCS—direct current straight, electrode negative; AC—alternating current; DC—direct current, either polarity.
*AWS

Original source of chart is unknown.

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