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

Open Forges

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.

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 , (732-221-3015)

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

In Northern Delaware and Southern NJ, contact Kerry Rhoades or John Chobrda
Kerry (302) 832-1631 John (302) 838-1960 (609) 610-3501 (cell)

Business Members

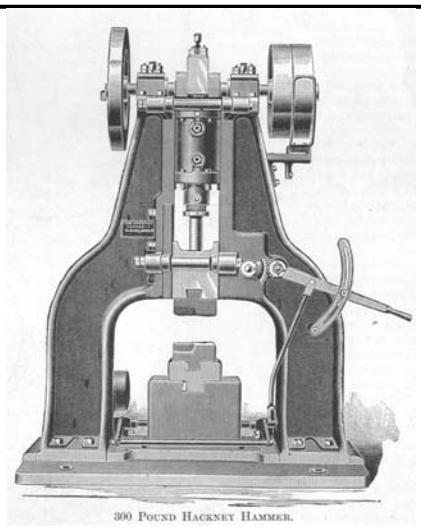
We would like to thank those who joined with our new Business Membership category .
Business dues are $40
Please show them our support

Marshall Bienstock, Marshall's Farms
663 Casino Dr., Howell, NJ 07731
732-221-3015 jlfmib@optonline.net

John Chobrda, Dragon Run Forge
P.O. Box 315 Delaware City, DE, 19706
302-838-1960 jchob@verizon.net

Eric Cuper Artist Blacksmith
109 Lehman Lane, Neshanic Station, NJ 08853
908 642-6420 ericuper@msn.com

Bruce Hay, Jr. Jansson L.L.C.
50 Pine St., Lincroft, NJ 07738
732 747-4758


300 Pound Hackney Hammer.

BLACKSMITH TOOLS FOR SALE!

John Chobrda

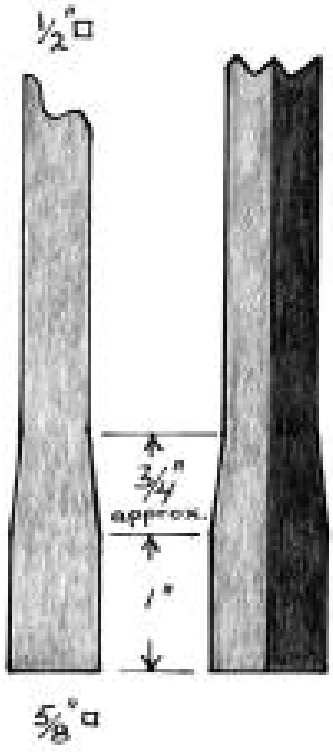
Has a large selection of tools for sale.

Anvils – Forges - Leg Vices—Blowers
Tongs – Hammers
and/or resurfaced Anvils

Call John for prices and availability
(302) 838-1960 cell (609) 610-3501

Controlled Hand Forging Lessons 7 & 8

Upsetting



The Finished Shape

By Peter Ross
Illustrations by Tom Latané

Lesson Number Seven–Upsetting

Definition: Upsetting increases the cross-sectional area by deforming existing material instead of adding material. Upset 1" of the end of a 1/2" square bar by 25% (drawing of finished shape)

Intent: The student will learn the basic principles for upsetting the end of a bar efficiently, practice the methods, and be able to produce accurate results. Tools needed: basic tools only, including a square.

Materials: 14" of 1/2 " square mild steel

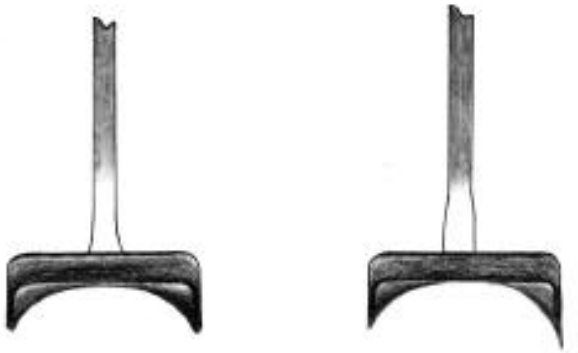
Method: The bar is hammered end-on. This shortens the bar and causes it to swell where it is hot. In order to work efficiently, the following conditions must be met:

1. The bar must remain straight.
2. The bar must be at a very high heat
3. The bar must be hit hard

Managing these factors is more difficult than it might appear. This is one process where almost everything works against you. Since hot steel bends so easily, it is very likely for a bend to start even while striking on end. Once even a little bend starts, almost all upsetting ceases and the blows simply cause more bending. (If you have ever tried to drive a nail once it has bent even a little bit, you will understand the situation.)

Very little is accomplished unless the bar is at its softest. At a medium-orange heat or below, results are almost negligible. Therefore, it is crucial to start at the highest heat and work quickly.

As a practical example, try to make a small section of rope swell by pushing from both ends. If you hold too far apart, the rope will bend. It only swells when you keep everything straight and localize the work area. Also, compare the resistance between upsetting and bending the rope. It will bend with much less force. This illustrates the necessity of following the three requirements when working steel.



Upsetting with lighter vs. heavier hammers

Factors to consider when upsetting:

1.The size of the hammer affects the results. A light hammer can be used faster, but since it has less mass, the blows work only the very end of the bar.

A heavier hammer will have a deeper effect. If too heavy, the hammer cannot be used fast enough, adding extra heats.

For this exercise, a hammer between 1 1/2 and 2 pounds will be adequate.

A bar end that is out of square causes bending

2. The length of the heat is very important. If too long a heat is taken, the bar will bend rather than upset.

3. The end of the bar affects straightness. Even though the end of the bar will deform during upsetting, how it looks at the start is crucial. If the end is not square to the bar length, the first blow will cause bending. Additional blows only exaggerate the condition.

If this continues, there is no easy way to correct the problem.

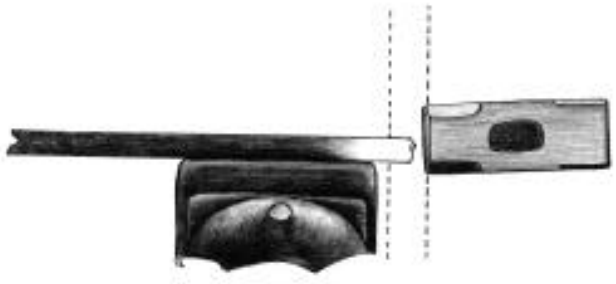
The likelihood of any smith holding and striking the bar perfectly plumb every time (or even once, for that matter) while working as quickly as possible is slightly less than winning the lottery.

Most experienced smiths count on the bar bending frequently. There is almost no way to prevent this. The object is to notice bending as soon as it occurs and correct it right away. The sooner a problem is noticed, the simpler (and faster!) the correction can be made. This sometimes means only one or two upsetting blows between straightening, so the key to upsetting is to work quickly and make constant corrections.

4. How solidly the bar is supported will determine the effectiveness of each blow. A bar backed against the anvil will upset much faster than one supported in the hand. A bar can be held in the vise for upsetting. However, there are some serious drawbacks to this method. For one thing, the vise will pinch the bar (especially at very high heat) and leave scars. For another, it is awkward to straighten a bar while it is clamped in the vise. Proper straightening is best done at the anvil, and it is quite slow clamping and unclamping the work every two or three blows. Finally, the vise is an effective heat sink, and cools the work appreciably.

5. You have the choice of holding a short bar with hot end up or down. If down, the length of the bar absorbs some of the blow, so less is accomplished. If the hot end is up, the blows fall directly on the heated end, which is good. However, it's much harder to hold the upper end steady if you grip at the bottom and strike at the top. You will also get many scale burns on your wrist. Holding the cold end up with the heated end down on the anvil face is the best compromise.

Note: it may be tempting to use tongs to hold the bar, enabling you to hold the hot end up after all. This sounds like it solves all the problems, but in fact it can slow down the quick changes from upright to straightening to upright so much that extra heats will be necessary. It is better to learn the proper hand grip method.



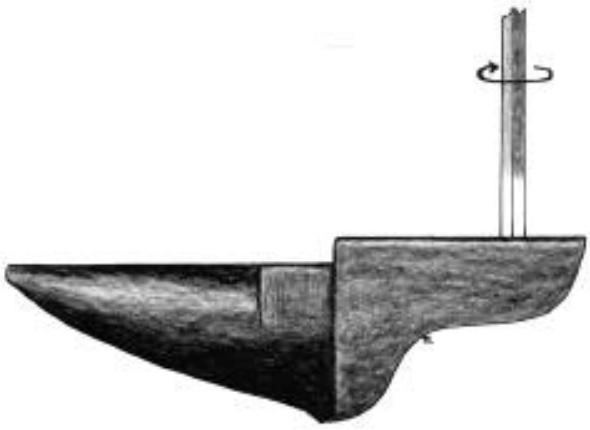
Bar and hammer in position

Now for the real work. Take a near-welding heat on the end of the bar. It is important to heat only 1 –2 inches. Even with the best of intentions, the heat is sometimes too long. In this case, quickly quench all but the area to be upset. The fastest method is to submerge the long end of the bar (along with your arm) in the slack tub. This works well with a short bar such as the one in this lesson. If you move the bar around in the water it will cool even faster than holding it still. Remember, wasting time at the tub means the bar will be much cooler by the time you are ready to strike. Best

results come from heating the bar correctly so you can go directly to the anvil.
Target: If you have taken a good heat, you should be at the anvil and ready to strike within 1 or 2 seconds. If quenching is necessary, try to take no more than 3 or 4 seconds from fire to striking the first blow (beginning of step 2).

Step Two:
Hold the bar upright on the anvil and strike the upper end two or three quick, hard blows. Look frequently at the hot end as you are working. As soon as you see the bar bending, stop upsetting and straighten, using as few blows as possible. Overzealous straightening can lead to drawing out the bar… negating your progress. You do not need to get the bar perfectly straight, but close.

As soon as possible, return the bar to upright and strike two or three more upsetting blows. Continue in this manner until you have slightly exceeded the target dimension, taking additional heats if the bar cools below a medium orange.



Holding the bar on the anvil top

Note: While checking for straightness, remember also to keep watching the end. If you see the end of the bar going out of square, you must stop upsetting and correct as illustrated in step 1.

What can be done to minimize the time used in straightening? Many smiths will rotate the bar 1/4 or 1/2 turn between blows to keep minor mistakes from compounding.

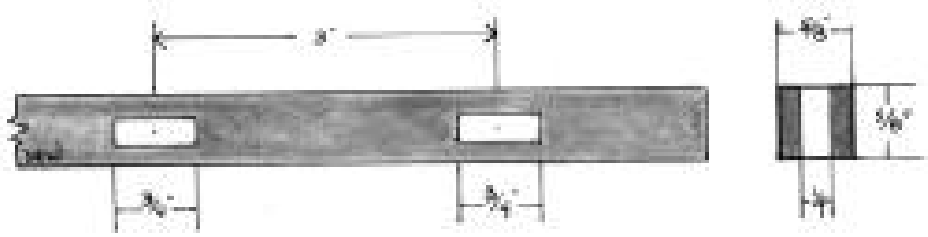
Occasionally, a correction can be done without much interruption. If the bar end goes out of square and causes a bend, bending the bar in the opposite direction will address both corrections (straightening the bar, and squaring the end) at once. Remember, reducing the interruptions to actual upsetting means fewer heats to accomplish the goal. Every second saved counts.
Step Three: Smooth and straighten the upset area, being careful to draw the bar just to size. A lower heat (dark orange to bright red) is best for this step.

Check the bar dimensions to confirm it is square in cross section, straight, and proper size (5/8"). Correct as necessary (see lessons on drawing, straightening, bending)
Target: With practice this exercise may be accomplished in one heat, though a beginner may take two or three at first. The finished upset section should be within 1/32" of the intended 5/8" thickness and the bar should be straight and square.

Splitting

A coffee table by Doug Wilson using the techniques described

By Jay Close
Illustrations by Doug Wilson,
photos by Jay Close
Lesson Number Eight–Splitting
Definition: Cutting a bar by driving a sharp-edged chisel usually parallel to the length of the bar.
Lesson: slitting and drifting two mortises or slots in a square sectioned bar.
Intent: The smith will learn the technique of slitting and drifting a narrow mortise to specified dimensions and how to anticipate the stretching of the bar to position mortises accurately.



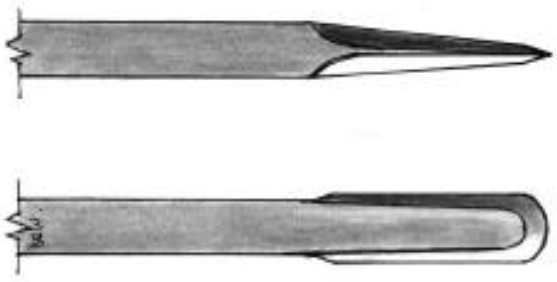
The finished practice piece with dimensions

is curved and thin. Keep it symmetrical—an off-center edge will be hard to drive straight. The length of the chisel edge should be about 75% of the length of the finished opening—in this case about 5/8-inch for an opening 3/4-inch long.

Jay's tooling for this lesson

Materials: 24 inches of 5/8 inch square mild steel.
Tools: In addition to the basic tools you will need a slitting chisel about 5/8-inch wide forged from W-1 or some other appropriate steel, and a drift 3/4-inch wide and 1/4-inch thick.

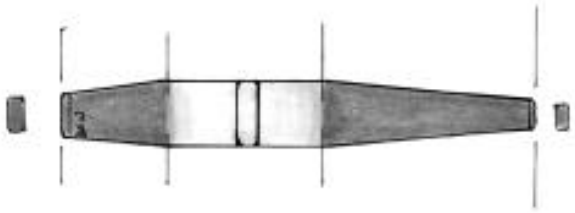
Make the drift of the same sort of steel as the chisel, although a drift of mild steel, carefully used, will work for a few repetitions of the lesson.



A slitting chisel

If the chisel is short, you will need chisel tongs to hold it. A pair of pick up tongs will be useful dealing with the drift. Make the cutting edge of the chisel to approximate the drawing above. The edge

Make the drift to resemble the drawing. Provide a long, lead taper, a parallel section and a driving taper a bit longer than the bar thickness. To avoid sharp inside corners in the material, file or grind a slight chamfer on the edges of the drift. Round the top where the hammer hits to minimize mushrooming.



A drift

Method: Overview of the Process: When a narrow slot or mortise is needed it is often slit and drifted rather than punched. This is particularly true when it is desirable to retain the full thickness of the bar stock around the opening

In the process taught here, a slit is cut then a drift inserted into the slit. This drift works like an internal anvil as the sides of the bar are progressively forged thinner on either side of the slit and the ends of the slit squared as the drift is driven in further.

Step One: Measure the overall length of the bar you are starting with and record that measurement.

One inch from one end of the bar place a center punch mark deep enough that it will be readily observed on the heated bar. Center the punch mark in the middle of the bar.

Roll the bar 180 degrees and place a corresponding center punch mark on the opposite side.

These two marks will guide the placement of your chisel as you cut from both sides.

Step Two: With tools ready at the anvil, heat the end of the bar to a full yellow. Make sure that the area around the center punch marks is hottest.

Place the heated end of the bar in the middle of the anvil with a center punch mark facing up.

Put the chisel edge centered over the punch mark aligned with the length of the bar.

Tip: If you have difficulty seeing the punch mark, rub the side of your hammer across the bar surface. This will scrape the surface free of scale, but scale will collect in the center punch mark and make it visible.

Steady the end of the bar you have been holding against your thigh. Pick up the hammer.

Hit the end of the chisel to leave a distinct but light witness mark to your chisel placement.

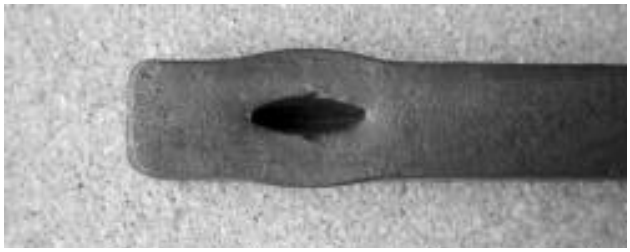
If necessary, correct the placement of the chisel and drive it hard into the bar a little more than half way. Hold the chisel vertically. Hit the chisel vertically, and you will cut vertically.

Do not allow the chisel to stay in the cut! If it softens in use, it stops cutting and begins to deform. As a starting point, three quick hammer blows to the chisel and then get it out of the cut.

Jay Close steadies the bar against his thigh.

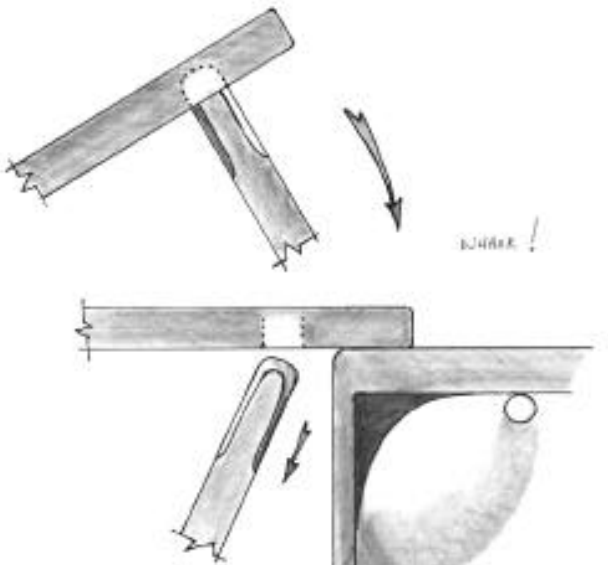
A "witness mark" centered on the centerpunch mark

Especially for a W-1 chisel, as soon as you notice it turning red, quench the edge. Residual heat in the rest of the tool will slightly draw the hardness, keeping the tool from becoming brittle.



The cut halfway through

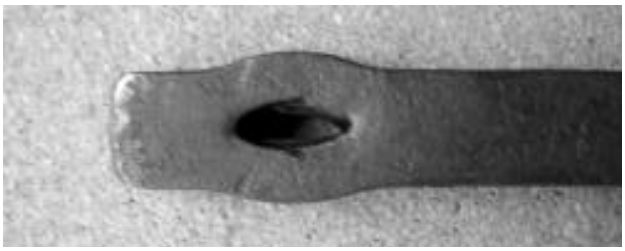
Tip: If the chisel sticks, twist it to slightly widen the slot and it should pull free. Sometimes tapping the sides of the slot will knock out a reluctant chisel. Or turn the work upside down and swat the end of the bar on the end of the bar on the edge of the anvil to use momentum to pull the chisel free.



Removing a sticky chisel

With the cut a little more than half way through, put the bar back in the fire.

Tip: Inspect the chisel. If it has deformed on the edge, correct and resharpen before continuing. Unless you need to resharpen the chisel, resist the temptation to thoroughly cool the chisel. It will cool in the air as you reheat the bar and will have enough remaining heat to not overly cool the bar as you continue cutting.



The completed slit

Step Three: Repeat step two chiseling through from the opposite side until the two cuts meet halfway through the bar. You should see a clean opening all the way through with the sides of the slit bulged out.

Step Four Prepare your tools so that the drift and pick-up tongs are handy. Take a good yellow heat on the bar around the slit. Tap the drift into the slit until solid resistance is met, i.e., until you are beginning to reshape the ends of the opening just by driving in the drift.

The lead taper of the drift should extend through to the opposite side of the bar. Make sure you are hitting it in over the hardie hole, the pritchel hole, a bolster block or open vise jaws. The trick is to support the work as closely around the slit as possible.

Tip: An unsupported bar can collapse into a wide pritchel or hardie hole, so hold the bar along the side of the hole where one edge at least will receive support. If you are hitting the drift a number of successive blows, move the bar left, right, front, back around the square hardie hole or around the circumference of a large pritchel hole.

Once you meet resistance, forge the bulge of the sides against the drift working both sides evenly. Knock the drift in further to continue squaring the ends and bulge the sides again.

Supporting the bar with the edges of the pritchel hole

Remember, you are shaping the sides of the slot with the hammer working against the drift, but the ends of the slot can only be cleaned up by driving the drift in against them.

The exact balance between forging the sides with the drift in place and driving the drift deeper to clean the ends of the slot is a matter of experiment. The variables include the width of your chisel, the taper of your drift and how aggressively you pursue each shaping option.

Repeat the forging of the sides and then remove the drift by tapping on the end of the lead taper or tapping the lead taper on the anvil surface.

The sides will stretch longer and thinner. This is good. But the wall around the slot will also stretch wider. This is bad. The undesirable stretch must be forged out with the drift knocked free of the slot.

Do this now. A couple of hammer blows on each side should suffice.

WARNING: the drift is now VERY HOT and can only be handled with tongs!

If the drift has taken on a red color, quench it quickly to black but not down to hand-holding temperature.

If the bar is still at least orange, put the drift in from the opposite side of the slot and repeat the forging in of the bulge and resetting the drift.

Do not work below a clear orange to bright red heat. Do not allow the drift to get red and soften while in the slit. Get it out and keep it relatively cool. A soft internal anvil is of little use.

Resist the temptation to cool the drift to hand-holding temperature. This will rob heat from the workpiece and slow down the pace of the work.

Handle the drift with tongs.

When the bar is red, remove the drift, forge in the unwanted stretch in width and get it back in the fire.

The drifted slit

Step Five Complete the drifting of the hole using the same procedure outlined in Step Four:

Tap in the drift until the drift squares the ends of the slot. Forge in the bulge on both sides evenly. Remove the drift and dress the top and bottom of the slot. Re-set the drift from the opposite direction and work the sides evenly again.

As a final sizing step, as the bar cools to red, drive the drift through all the way from one direction. The sides should not bulge.

Then, drive the drift through from the opposite direction as the bar loses forging heat. If necessary, do some low heat dressing of the bar surfaces and tap the drift through one final time.

Step Six Now that you have slit and drifted a mortise, measure its overall length with the bar at room temperature.

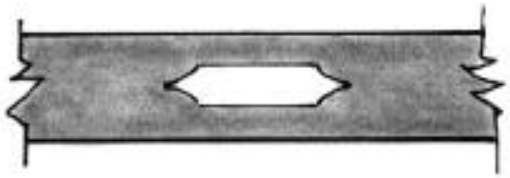
Compare that to the overall length of the bar before the mortise. The difference will tell you how much the bar stretched to create a mortise of that size.

Knowing this stretch factor, mark the center point for another mortise that will end up 3 inches from the center of the first one.

For example, say you started with 10 inches of bar. After you made the first mortise the bar grew to 10 and 1/2 inches. From the mortise center, the mortise pushed the bar 1/4 inch forward and another 1/4 inch back. If you want a second mortise a specified distance from the first, you must anticipate this 1/4 inch stretch center to center.

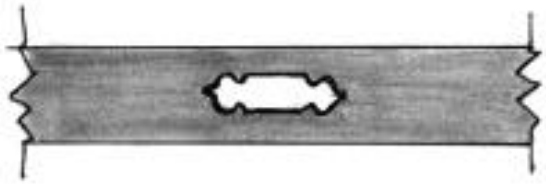
Mark the center of the second slot half the overall stretch of the material closer to the first slot than the needed final dimension.

Slit and drift the second mortise just as the first. **Troubleshooting:** Your mortise should look like a rectangle reflecting the cross-section of your drift. If it looks like the drawing below, the drift never had a chance to square the ends of the slit. This came about because either (1) the length of the chisel cutting edge was too long compared to the width of the drift, or (2) you did not drive the drift in far enough before stretching the sides of the slot.



Results of a chisel too long for the drift

If your mortise looks like this, you have overstretched the sides of the slot so that on the final forging the drift was not completely filling the mortise.



Results of overstretched sides

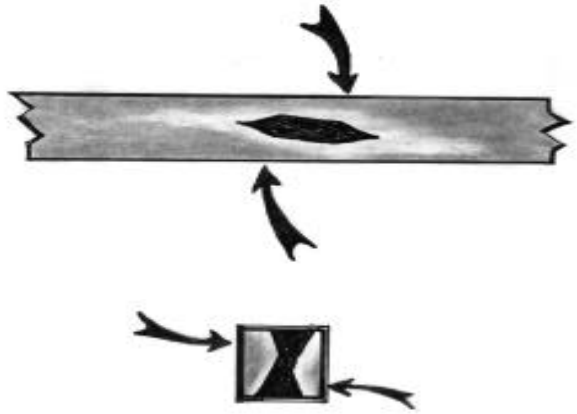
You can also create a mortise that is fairly rectangular but too long. This comes from overstretching the sides of the slot. With a careful heat localized around the slot you can upset the slot shorter and then re-forge and drift. Remember to adjust the balance between stretching the sides and driving the drift on the next mortise. If this does not help, you probably need a narrower chisel.

Sometimes the chisel cuts are centered in the bar but misaligned along the bar length. Often this problem will sort itself out in the drifting. You can also put the drift in—it will enter at an angle—and tap it more upright as you forge in the sides. Do a little at a time from both sides taking advantage of the stiffness of the drift "on edge."

Chisel cuts not centered in the bar will leave uneven material in the mortise walls. You can help

the problem by concentrating your hammer blows on the thicker sections and avoiding the thinner ones. In the drawing below with two off-center chisel cuts, hit where the arrows point.

A similar correction can assist if the slit is angled away from the axis of the bar. Work the areas shown below more.



Correcting off center chisel cuts

Tip: A poorly shaped chisel edge can cause much frustration. Even if centered on the bar and struck vertically, an asymmetrical edge will lead the chisel at an angle causing poorly centered cuts. Inspect the cutting edge of the chisel often.

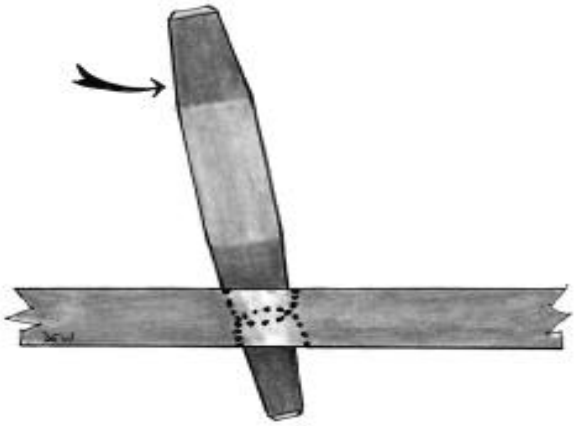
If your mortises are not 3 inches apart, you will need to adjust them—hopefully, just slightly. For greatest accuracy, remember to make your assessment when the bar is at room temperature. For your own interest, record the measurement both while the bar is red and when it is at room temperature and note the difference.

If the holes are a little far apart, take a long heat in the middle. Make certain the two slots are cool and carefully shorten the bar by upsetting. With care this can be done without producing an obvious bloating of the middle of the bar.

If the distance between the slots is short, you'll have to draw out the middle to lengthen the bar. Again, take a long heat and distribute your efforts over a long section of the bar so as not to produce an obvious thinning.

TARGETS

Time Targets: With experience and confidence you will be able to cut the slit in one heat and drift it in perhaps two or three more. For your first efforts, cut half way in one heat and take a second heat to complete the slit from the opposite side. Then allow four or even five heats to complete the drifting and a final one for clean up.



Chisel cuts angled away from the axis of the bar

Shape and Dimension Targets: The dimensions of the slot will be largely determined by the size and shape of your drift, i.e., 1/4- inch by 3/4-inch. This should be "on the money," no more than a 1/16-inch longer than the drift is wide.

The bar should remain the same dimensions through the slot as the rest of the bar. A straight edge laid along the flats of the bar should show no particular swelling or cavity around the mortise.

Tip: Hot-rolled bar often has slightly rounded corners. The area around the two mortises has been bulged, stretched and reforged enough that the corners are likely quite square. The contrast of square corner areas and round corner areas can often fool the eye into "seeing" a change of dimension where none exits, so observe carefully when testing the sides for straightness.

The slots should be centered in the bar with even wall thicknesses. The distance between the two slots should be 3 inches plus or minus 1/16-inch.

If you upset or drew out the bar between the slots to achieve the proper dimension, any dimensional change in the bar should be spread over as wide an area as possible and not be immediately obvious. The bar should be straight along its axis.

NAME _____

ADDRESS _____

CITY_____

STATE/PRO V. _____

COUNTRY_____

ZIP (+4)/POSTAL CODE_____

PHONE # _____

EMAIL _____

Order Online, Mail, Call or Fax your Check or Credit Card Payment to:

ABANA Central Office

259 Muddy Fork Road,
Jonesborough, TN 37659
Phone: 423-913-1022
Fax: 423-913-1023 Website; www.abana.org Email; centraloffice@abana.org

ABANA

___ Regular Member	$55.00
___ Senior Citizen (Age 65+)	$50.00
___ Full Time Student	$45.00
___ Foreign Member	$65.00
__ Public Library-USA	$45.00
___ Contributory	$150.00

MASTERCARD OR VISA ACCOUNT NUMBER

_____-_____-_____-_____

EXPIRATION DATE _____ _____

Join ABANA or Check out other area chapters!

Northeast Blacksmiths Association

Northeast Blacksmiths holds its meets twice a year at the Ashokan Center in New York State.
The Ashokan Center 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 :
Jonathan Nedbor for more information
Phone:(845) 687-7130
jonned@hvc.rr.com

For more info and to register for meets, check out the web site; http://www.northeastblacksmiths.org/

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?
O Beginner O Intermediate O Advanced O Professional

Membership paid by ___Cash ___Check # _____

Send your completed application with $ 25 (one year dues) to;
PABA Treasurer, Doug Dayger
492 Quaker Lake Rd
Binghamton, NY 13903
(make Checks payable to PABA)

PABA Membership Application

Membership is from *Jan. 1 — Dec. 31*

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

How to Join or Renew your Membership in NJBA:

NJBA Dues are $20 per year.
NJBA Business Dues are $40 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.
"I want to join NJBA, and I am enclosing my check for $20 ($40 for a business) to cover annual membership dues and newsletter subscription. "I understand and acknowledge that NJBA dues are credited from June to June, that I will receive for my first years dues the current volume, and that dues will be payable again in 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 _____