

RIVERS WEST ~

PLANE  
MAKING  
WORKSHOP

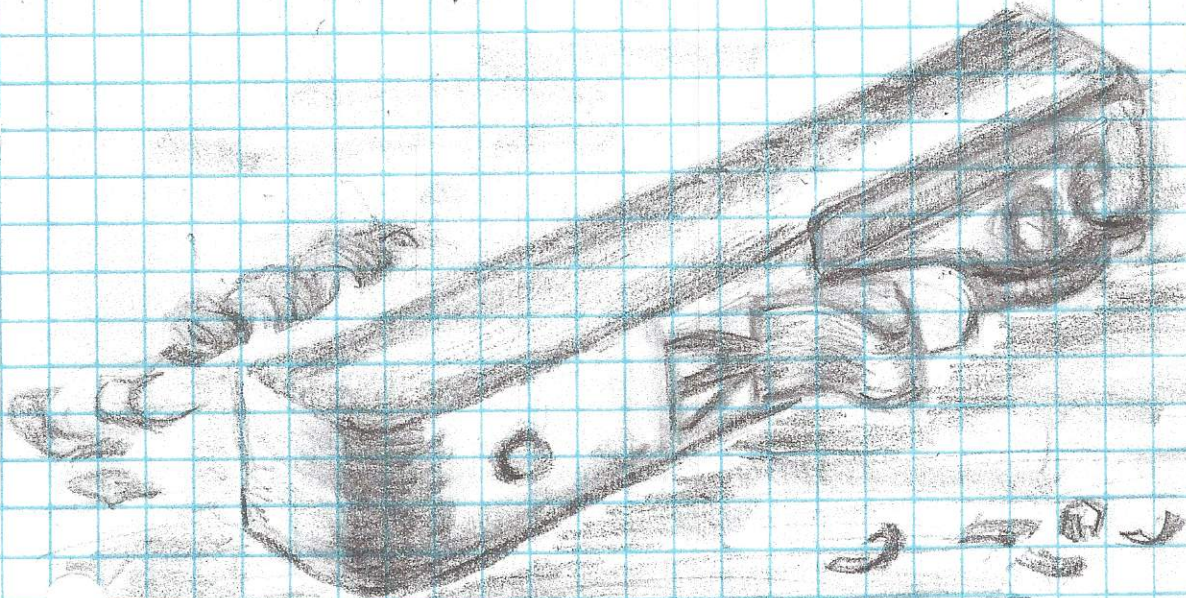
OCTOBER 20, 2012

Facilitators:

John Bouwsma

Mike Simmons

9am-5pm at the Boat Shop





# PLANE MAKING WORKSHOP

Rivers West Boat Shop

October 20, 2012

**Schedule:** Arrival at 9:00 a.m.; Lunch at around noon; Ending officially at 5:00p.m.

**Demonstration of blade and plane making, when everyone arrives:**

1. How to cut, grind, and heat treat the 3/16 "x 1-1/2"x 3-1/2" 01 steel blade.
2. Sharpening plane blades.
3. Pass out blade blanks and some grinding and sharpening jigs.

**Introduction to plane construction:**

1. Pass out the wooden plane blanks.
2. Show the parts to be cut from the 1-17/32"x 2-3/8"x 9" blank.
3. Demonstrate cutting the parts.
4. Demonstrate truing and smoothing the parts.
5. Demonstrate the clamping, gluing and dowel placement, when the first person completes the cutting and truing operations.
6. Demonstrate the fabrication of the wedge retainer dowel and the optional abutment construction operation.
7. Wedge fabrication is shown at this time as well.  
(All of the operations may be shown immediately, depending on how eager everyone is to get started.)

**Notes:** Due to the limitations on the power tools it may be more expedient for participants to work on plane bodies, blades and retainer parts and wedges in different sequences.

The only constraint is the 1 to 1-1/2 hour glue up clamp time. It would be good to have the plane body glued and clamped by lunch time.

Finishing will be discussed, but you will probably need to do this at home.

## Blade Making

### Shaping the blade blank:

1. Round the top edge using a 2-1/2" radius
2. Flatten the back surface.
3. Grind the bevel to 25° on the belt sander or grinding wheel.
4. Even up the bevel on the disc sander or the ribbon sander.
5. Polish the bevel leaving 1/64" flat on the front edge.

### Heat treating:

1. Harden the blade by heating to 1500° F. (cherry red) in a kiln or with a torch.
2. Quench in oil.
3. Polish the bevel.
4. Temper in a toaster oven to 400° F. for 30 minutes.
5. Allow to cool in the oven.

### Final sharpening:

1. Flatten the back of the blade. Some roughness can be left on the back for a better grip.
2. Finish the bevel checking that it is square on the blade.
3. Hone progressively to at least 1200 grit with wet/dry paper or sharpening stones.

## Making the Wood Body

1. Check the blank for squareness on all six sides.
2. Resaw the side pieces and smooth them to a fat 1/4" thickness.
3. Smooth the sides of the central core block to 1-17/32" square cross section.
4. Mark and cut the forward and rear blocks. Look at the drawing. (Save the cutout.)
5. Smooth and square the angled surfaces of the two blocks.

## Gluing Up the Body

1. Clamp the forward and rear core blocks onto the marked and waxed alignment board. Look at the drawing.
2. Clamp the sides to the core and mark the front and back edges of body on the sides.
3. Mark and drill 1/2" deep holes on sides.
4. Glue side and core pieces and dowel pins, 1/4" dia. dowels. (Dowels cut 5/8" long.)
5. Sand dowel pins flush with the sides.
6. Drill sides and insert shaped 3/8" dia. cross pin. OR cut out, adjust and glue abutments.
7. Trim front and back to the line of the front edge of the forward block and back edge of the rear block.
8. Trim the front and back ends of the body to a 2-1/2" radius before gluing on the palm piece. Palm rest is glued 1/4" back from blade bed.

## Sanding and finishing

1. Round off the corners of the front and back of the body to around 1/4" radius.
2. Shape the palm piece.
3. Ease and round sharp edges to suit.
4. Finish with boiled linseed oil, shellac, or "Watco Danish oil".
5. Wax with paste wax. (This could be the only finish that you use.)

### Tools that you will need to provide:

Safety glasses, ear plugs, well fitting work gloves.

Bench chisels

Combination square

Protractor

Compass

HB or softer fine point graphite pencil

Fine point black "Sharpie" permanent felt marker

3"-4" c-clamps (The cheap 6" quick release clamps from Harbor Freight work.)

### Items good to have:

6" bastard or mill/ bastard flat file

Sharpening jig and stones, (especially the jig.)

Two cheap plastic small pincher clamps.

Any other favorite small hand tools (mechanic's square, etc.).

### Sources and Resources:

David Finck, Making and Mastering Wood Planes. Sterling Publishing Co., Inc.: N. Y., 2005.

ISBN 0-8069-6163-5

John Wilson, Making Wood Tools. Home Shop Books: 406 E. Broadway Hwy, 2011.

ISBN 0-9729947-4-2

Hock Tools, 888-282-5233, [www.HockTools.com](http://www.HockTools.com) (plane blades)

Horton Brass, 800-754-9127, [www.horton-brass.com](http://www.horton-brass.com) (brass stock)

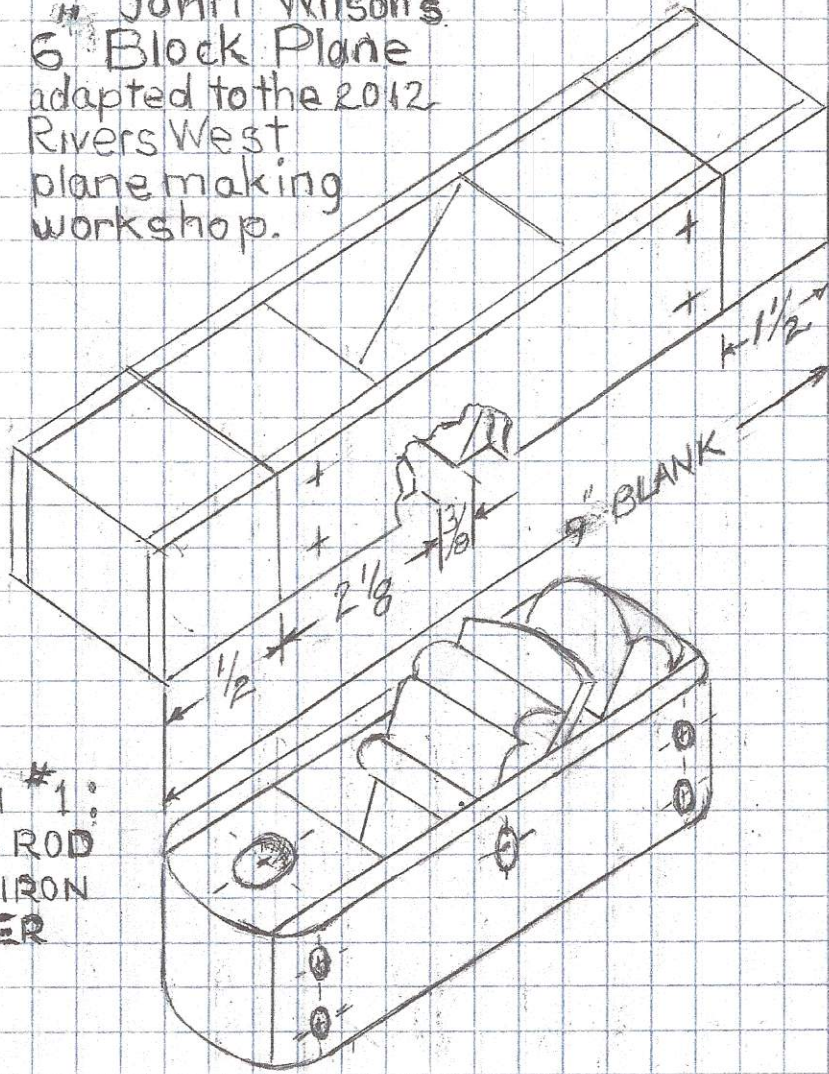
Lee Valley, 800-871-8158, [www.leevalley.com](http://www.leevalley.com) (plane blades)

McMaster-Carr, [www.mcmaster.com](http://www.mcmaster.com) (steel and brass stock)

Metal Express, 800-657-0721, [www.metalexpress.net](http://www.metalexpress.net) (brass stock)

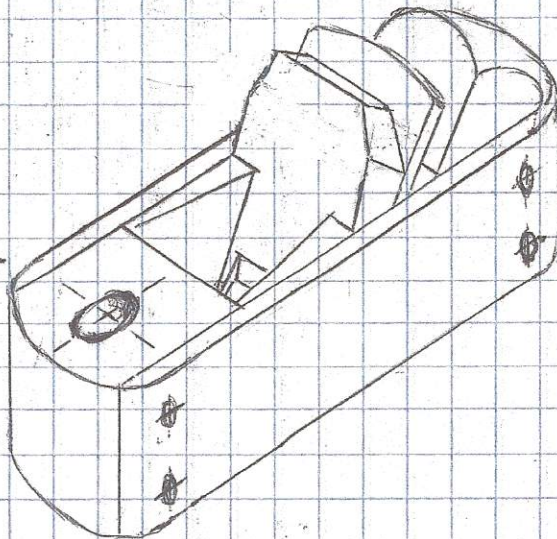


John Wilson's  
6" Block Plane  
adapted to the 2012  
Rivers West  
plane making  
workshop.



OPTION #1:  
BRASS ROD  
PLANE IRON  
RETAINER

OPTION #2:  
WOOD ABUTMENT  
MODEL

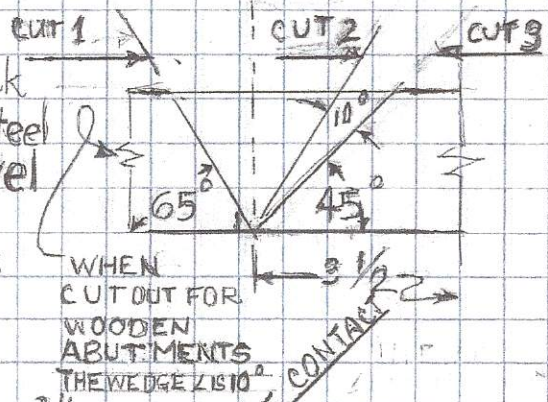




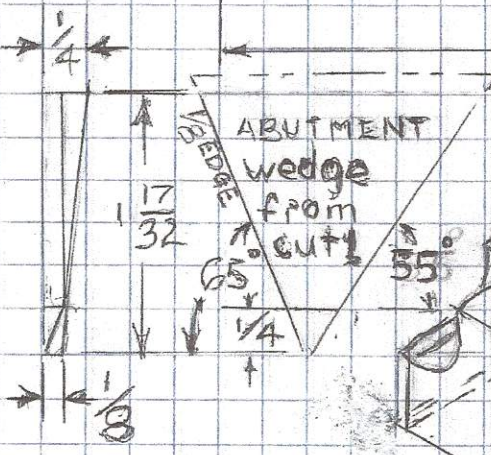
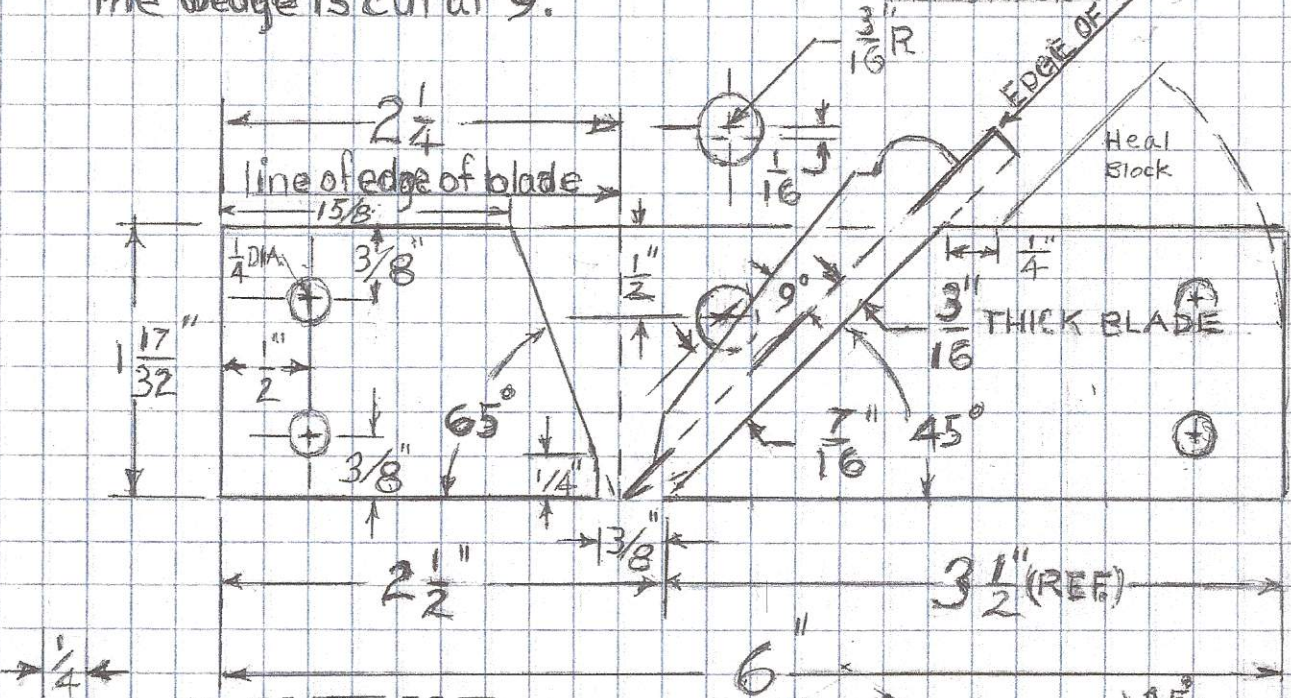
# Wooden Block Plane

## MATERIALS

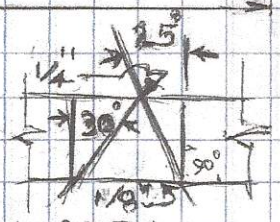
- Core Block:  $1\frac{17}{32} \times 1\frac{17}{32} \times 6$  hardwood (blank:  $1\frac{17}{32} \times 2\frac{3}{8} \times 9$ )
- Sides:  $\frac{1}{4} \times 1\frac{17}{32} \times 6$
- Wedge:  $\frac{1}{2} \times 1\frac{1}{2} \times 2\frac{1}{2}$   
3 from 6" length stock
- Blade:  $\frac{3}{16} \times \frac{1}{2} \times 3\frac{1}{2}$  O1 tool steel
- Retainer bar:  $\frac{3}{8}$ " hardwood dowel
- Alignment:  $\frac{1}{2} \times 1\frac{7}{8} \times 6$  board  
 $\frac{1}{4}$ " dowel for 8 -  $\frac{1}{2}$  pins



If the  $\frac{3}{8}$ " dowel cross pin is used, the wedge is cut at 9°.

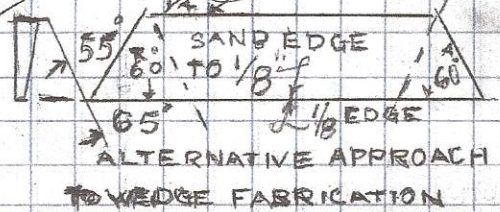


FIT TO SIDES WITH BLADE & 10° BLADE WEDGE IN PLACE.



NOTE: HARDWOOD

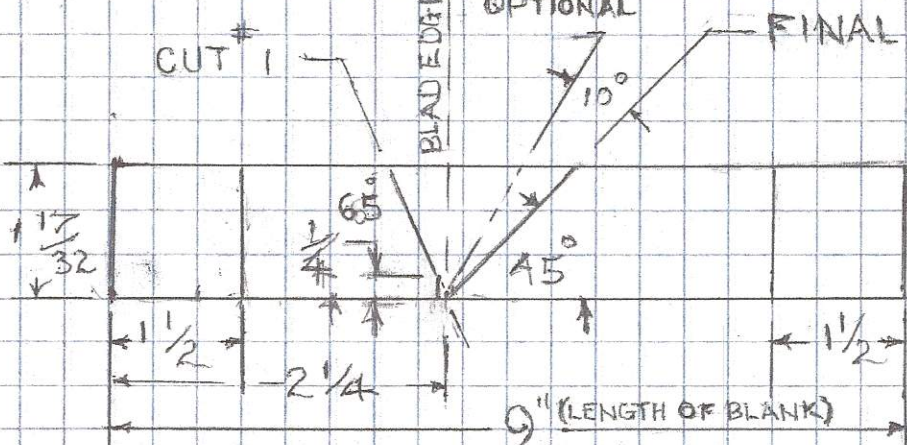
12" OR SO X 1/2" X 1/4"





CORE BLOCK

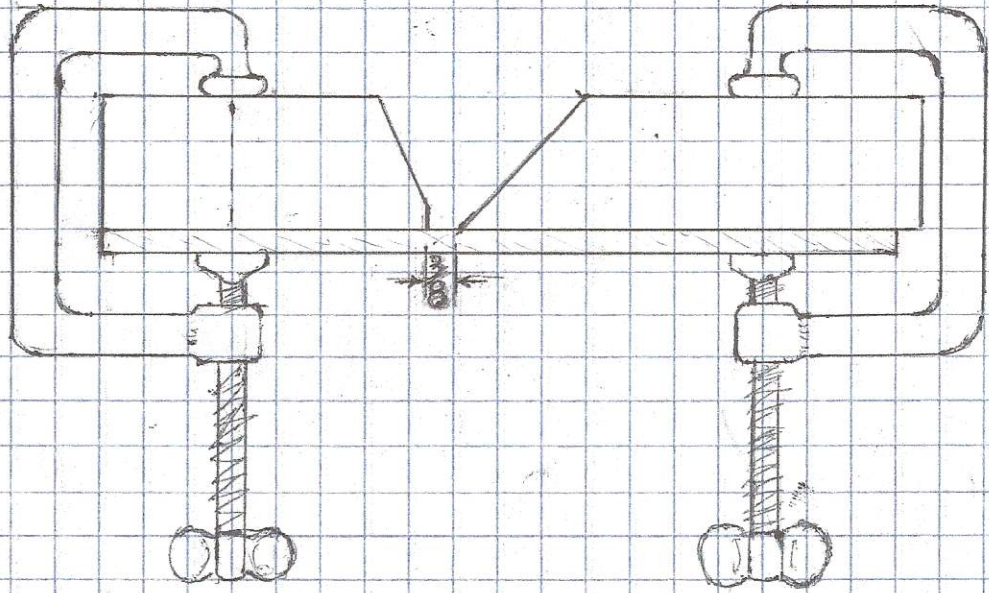
CUT FACES; SAND SMOOTH & SQUARE



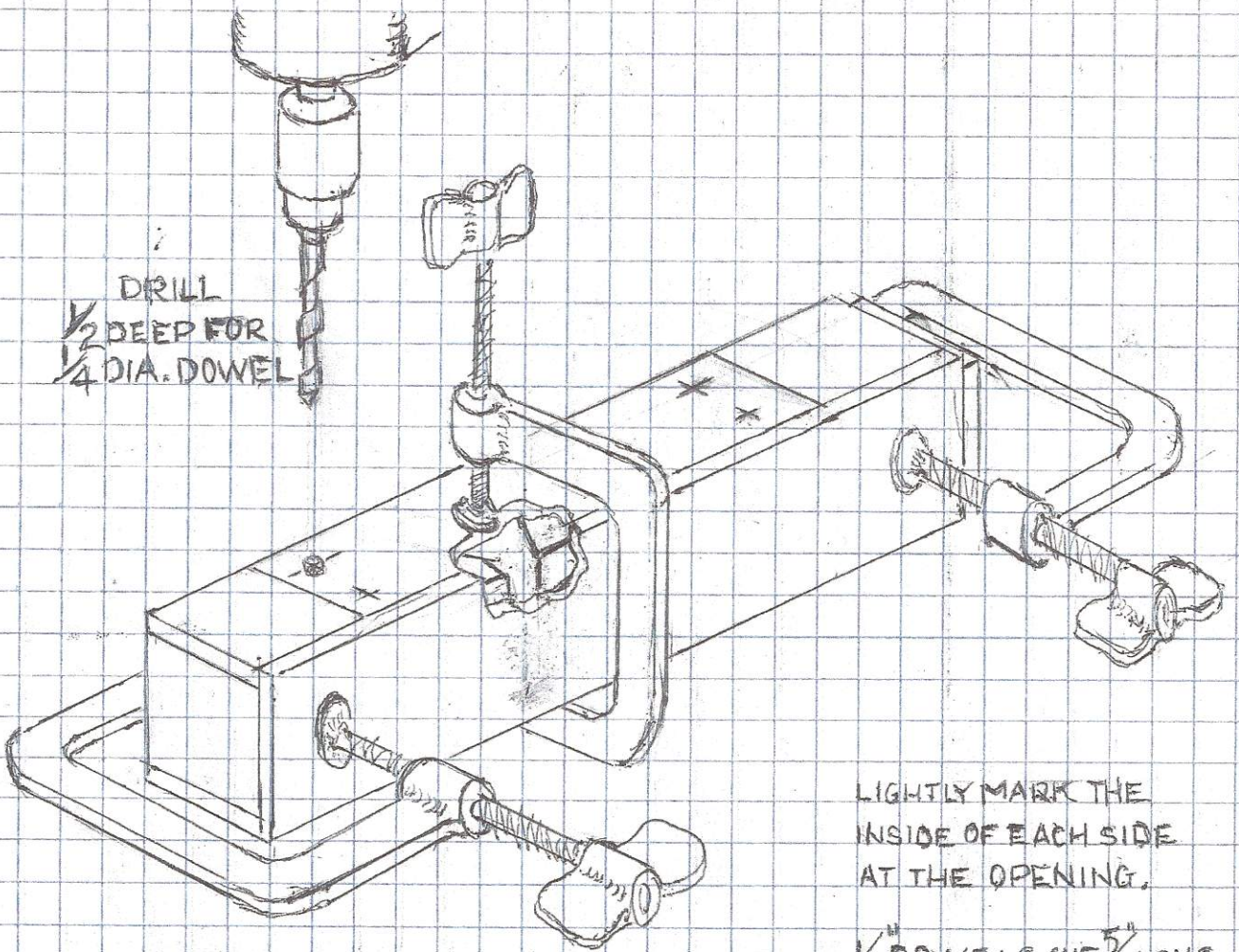
RESAW SIDEPIECES FROM BLANK FIRST



MARK 2 LINES ACROSS ALIGNMENT BOARD & SET UP CORE BLOCKS





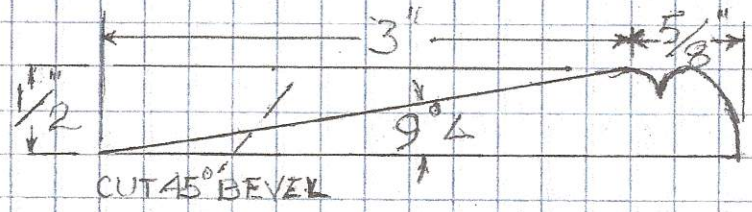


DRILL  
 $\frac{1}{2}$  DEEP FOR  
 $\frac{1}{4}$  DIA. DOWEL

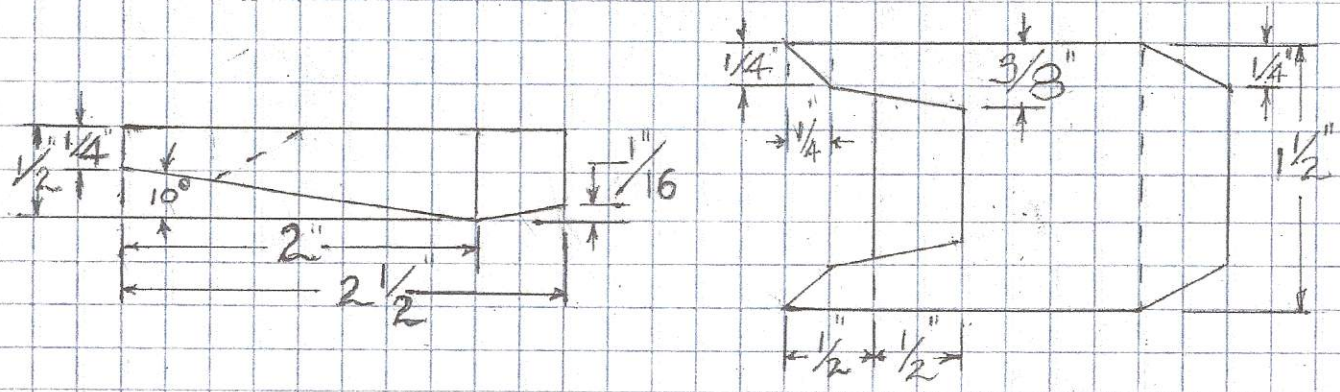
LIGHTLY MARK THE  
 INSIDE OF EACH SIDE  
 AT THE OPENING.

$\frac{1}{4}$  DOWELS CUT  $\frac{5}{8}$  LONG

WEDGE ANGLES SHOULD FALL BETWEEN  $8^\circ$  &  $10^\circ$ .  
 THE CROSS BAR PLANE WEDGE IS  $9^\circ$ .  
 THE WOOD ABUTMENT STYLE PLANE WEDGE ANGLE IS  $10^\circ$ .



$\frac{1}{2}$  WIDE WEDGE

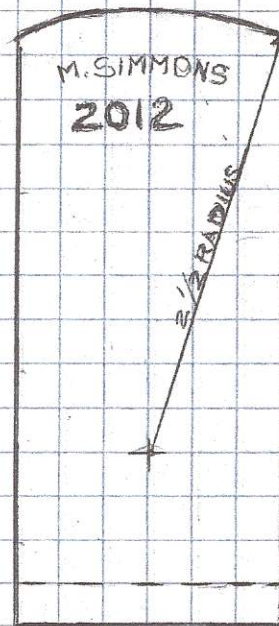
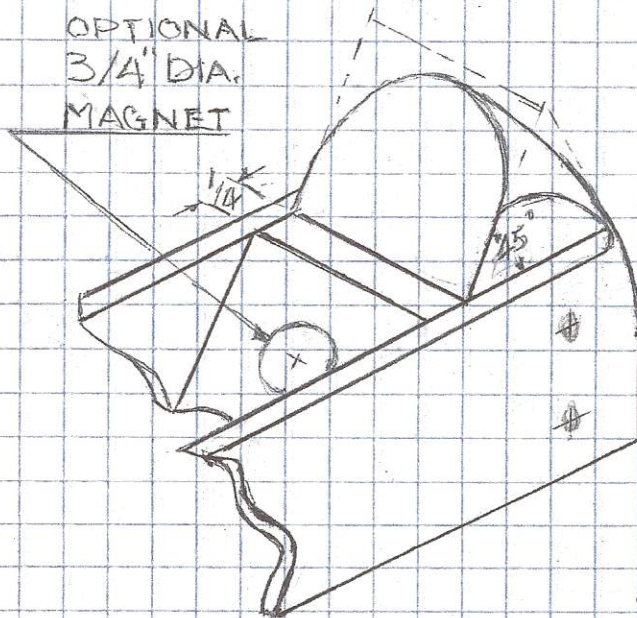




HEAL PIECE

BLADE  $3/16 \times 1/2 \times 3/2$ "

OPTIONAL  
3/4" DIA.  
MAGNET



25° GRIND &  
SAND BEVEL L

### HEAT TREATING THE OI STEEL BLADE

THE BLADE STOCK COMES ANNEALED FROM THE SUPPLIER.

HEAT TREAT WITH A TORCH OR KILN TO 1500°F.  
& QUENCH IN OIL.

TEMPER IN A TOASTER OVEN AT 375° TO 400°F FOR 30 min.  
AIR COOL IN THE OVEN.

### STEPS IN BLADE FABRICATION

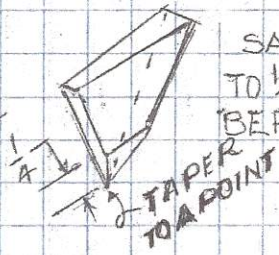
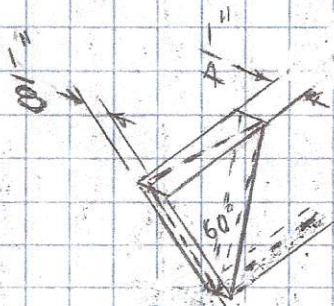
- 1 ROUND THE TOP OF THE BLADE BLANK.
- 2 (OPTIONAL) STAMP YOUR NAME & DATE ON THE BLADE.
- 3 GRIND & SAND 25° BEVEL w/ 1/64" FLAT EDGE.
- 4 POLISH THE BEVEL.
- 5 FLATTEN THE BACK OF THE BLADE.
- 6 HEAT TREAT: HARDEN & TEMPER. (POLISH BEVEL BEFORE EACH STEP.)
- 7 FINISH THE BEVEL. (DISC SANDER & SHARPENING JIGS)
- 8 HONE WITH WET/DRY SANDPAPER OR SHARPENING STONES.
- 9 FLATTEN BACK OF BLADE.

w/ 2 1/2" RADIUS



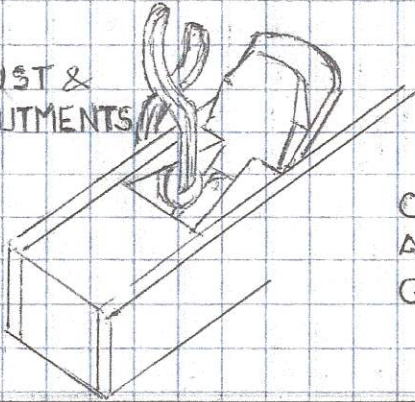
# ABUTMENT FABRICATION NOTES:

ABUTMENT STRIP 1 1/2" WIDE TAPERING FROM 1/4" THICKNESS ON ONE EDGE TO 1/8" ON THE OTHER (A 5° BEVEL ON A TABLE SAW.)



SAND CUT-EDGE TO 1/8" THICKNESS BEFORE CUTTING OFF THE WEDGE.

ADJUST & GLUE ABUTMENTS



SMALL PLASTIC SQUEEZE CLAMPS WORK WELL HOLDING ABUTMENTS IN PLACE AS GLUE DRIES.

ALTHOUGH A BIT TRICKY, ABUTMENTS CAN BE CUT FROM THE CORE WEDGE CUTOUT. (OPTIONAL CUT #2 APPLIES HERE.)

