

# Laminated Furniture Components

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Fritz Smith Furniture Maker  
Dec – 2010

Eastern Massachusetts Guild of Woodworkers

# Simple Round Cherry Table



Fritz Smith

Cherry - 2008

# Snowboard Bench



Fritz Smith  
White Oak  
Snowboard - 2009

# Fritz Smith Shell Table 2009



Fritz Smith

Wenge and Aluminum - 2009

# Alvar Aalto



Model 36 - 1936

# Alvar Aalto





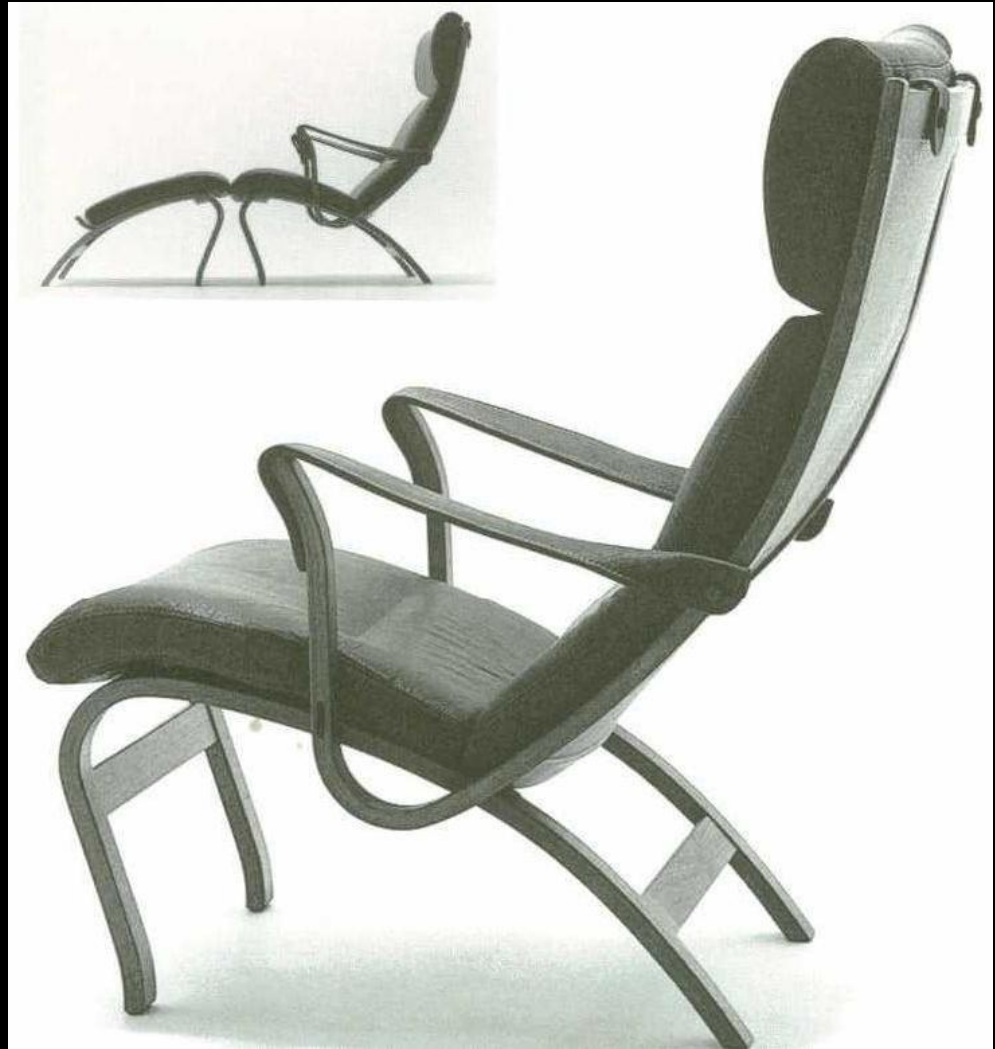
# Alvar Aalto

Model 60

1932 - 1933



# Ebbe Gehl & Soren Nissen



Clipper Easy Chair - 1978



# Magnus Olesen



Chair 1981

# Jere Osgood –

- *Stand Up Writing Desk* 1997 Australian lacewood, Indonesian water buffalo calf leather 47x30x21"



# Jere Osgood –



# Jere Osgood -



Writing Desk 1986

# Fritz Smith - Inspired by Charles Rennie Mackintosh – Hill House Chair 1904

- Glue-lam maple intermediate and seat posts.



# Attributes of Laminated Components

- Design Characteristics –
  - Flowing serpentine shapes can be created without visible joinery
  - Figure and Grain flow with the final shape
- Strength - stronger than members created from solid wood.
- Eliminates the need for steam bending - More reliable than steam bending – fewer failures
- Quicker than bricking and veneering
- They are FUN TO MAKE!
- Stuff – You need lots and lots of clamps



# Shortcomings of Laminated Components

- Time – Require multiple steps slower than solid wood construction
- Process requires several jigs and forms
- Waste – all the stock is consumed – lots of sawdust and no nifty looking cutoffs. Count on 50% waste.
- Stuff – You need lots and lots of clamps

# Forms

# Transfer Design



- Cut, Smooth – this is a good time to tweak the shape.
- Any irregularities in the template will be telegraphed on to the form then to the finished component



- From full sized drawings make templates of  $\frac{1}{4}$  or  $\frac{1}{2}$  inch Birch Ply or MDF.

# Build Forms



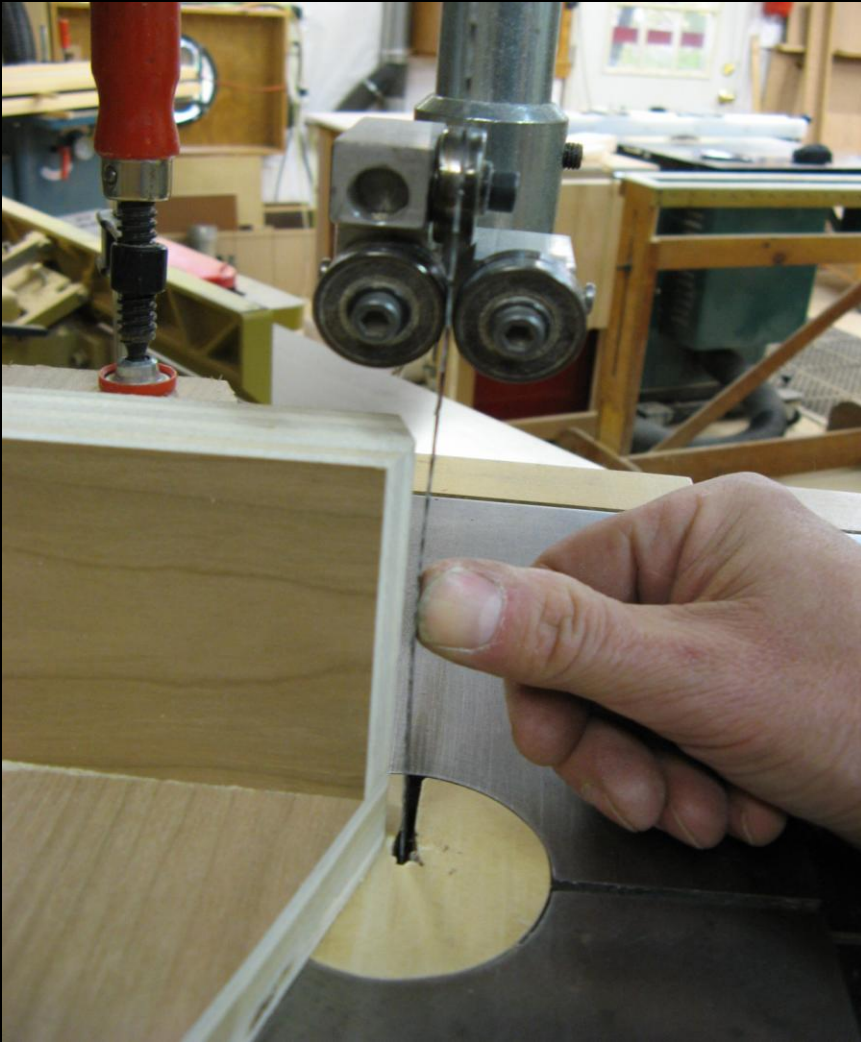
- Transfer shape to form-stock and rough cut plies needed for thickness.
- Glue, staple or screw plies together.
- Flush cut
- Repeat till final thickness achieved
- Using clear packing tape as glue resist.



# Milling Laminates



# Band Saw Tune-up



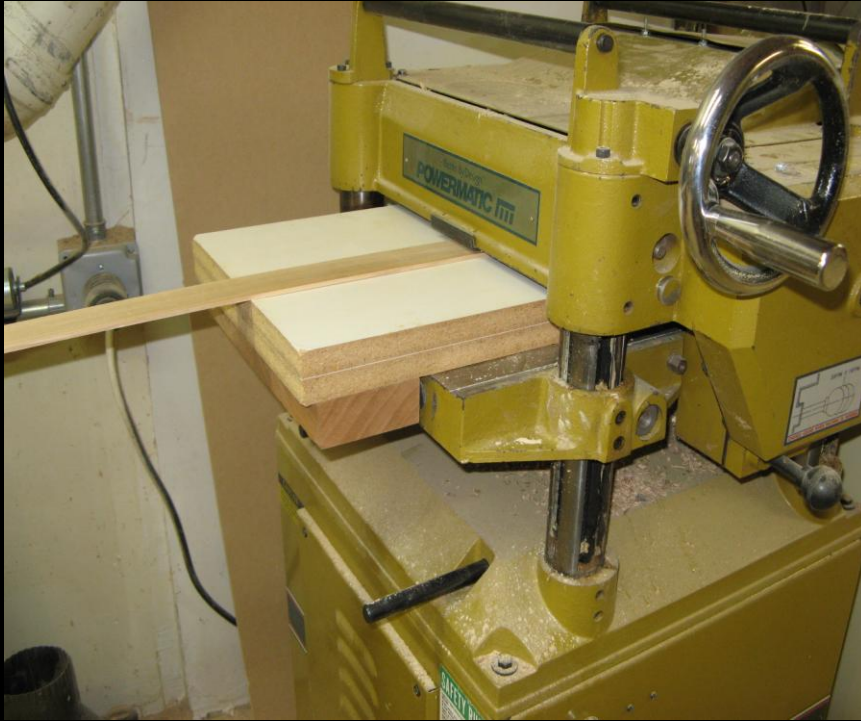


# Set the Fence

- Set “drift” with each new blade and width setting.
- Strike a line on a scrap piece of wood.
- Cut to the line without the fence.
- Due to the set of the blade the stock will need to be fed at a slight angle to follow the line.
- Stop the cut half way through the scrap.
- Position the fence parallel to the kerf.
- Re-cut and check



# Dimensioning Laminates



This prevents the leading edge of thin stock being sucked into cutter head.

Use a cheater board to bridge bed rollers made of plastic laminate covered particleboard  
[Or use a planer without bed rollers]



# Dimensioning Laminates

- Sand to 120 grit
- It is possible to cut laminates with a table saw equipped with a smooth finish blade. Sawing may leave gaps and visible glue lines in the finished part.



or



# Dimensioning Laminates



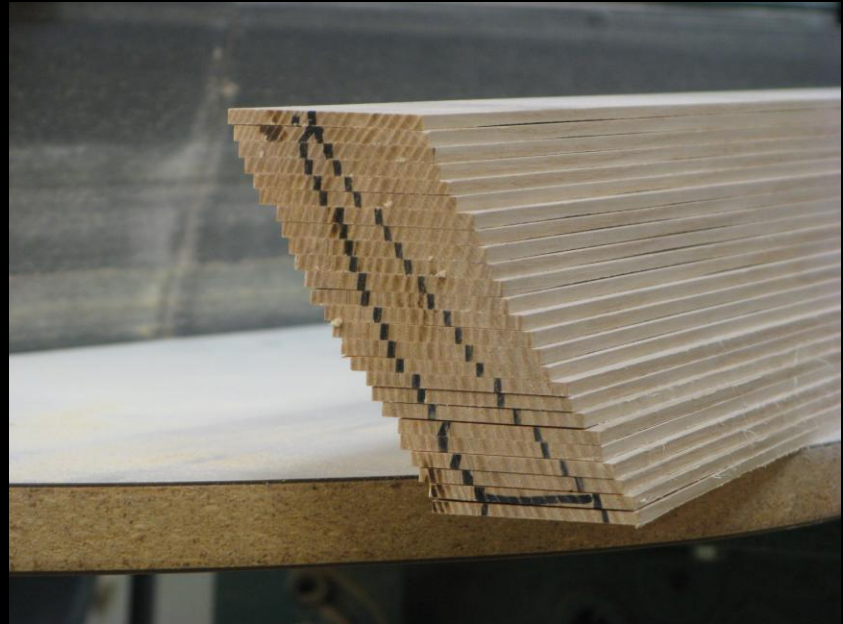
- Rough stock rule of thumb –
  - Width - Add  $\frac{1}{4}$  inch to each edge of every ply [ $\frac{1}{2}$  minimum]
  - Length - Add  $1 \frac{1}{2}$  to 2 inches to each end [3 inches minimum]
  - Thickness - Depending on the number of plies count on doubling the finished thickness.



# Keeping The Grain Straight



- Mark your stock
- After every operation check your marks!



# Check Ply Thickness

- Test individual lamination thickness by
  - Mill a test ply
  - Centering the ply on the form and clamp center
  - Fold ends of ply around form
  - A properly thickened ply will require very moderate pressure to conform to the form
  - I am able to bend the ply with two fingers





# Glue-up

- Be prepared! Have cauls, blocks, clamps, glue, roller, wiping rag all within reach.
- Keep plies in order
- Strike a witness mark on both edges at the center of all plies.
- For difficult or large shapes I do a dry run.



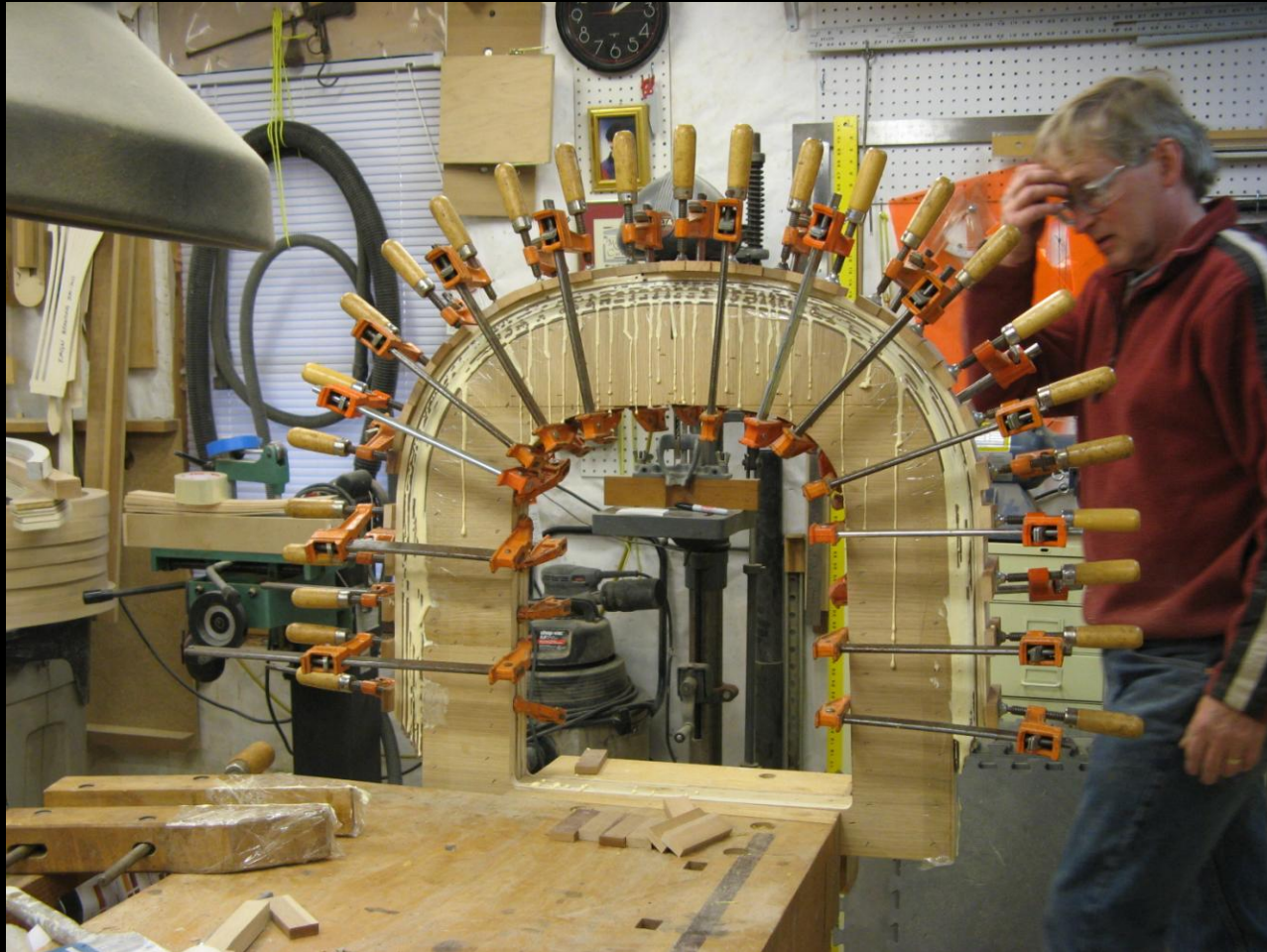
# Glue-up

- Add cauls to stack
- Center glued plies on form
- Clamp lightly on witness mark
- Center stack using hand screws
- Add blocks and clamps
- Watch for squeeze-out
- Clamps should be firm but not over tightened [*over tightening will cause dimples on finished piece*].
- Work swiftly – 20 min. for PVA glue





# Finished!



■ Man...That was close!

# Trim

- For simple shapes
- After glue sets – but not cured 1 to 2 hours
  - Remove from clamps and joint one edge
  - Return to form and firmly snug in place just enough to hold the shape
  - Leave in form 6 to 8 hrs
  - Above steps save time and prevent nicks in jointer knives
- For complex shapes leave in form for 6 – 8 hours
  - Scrape/joint





# Trim



# Tapered Laminations

Exactly the same process as non tapered except....you taper the laminates.



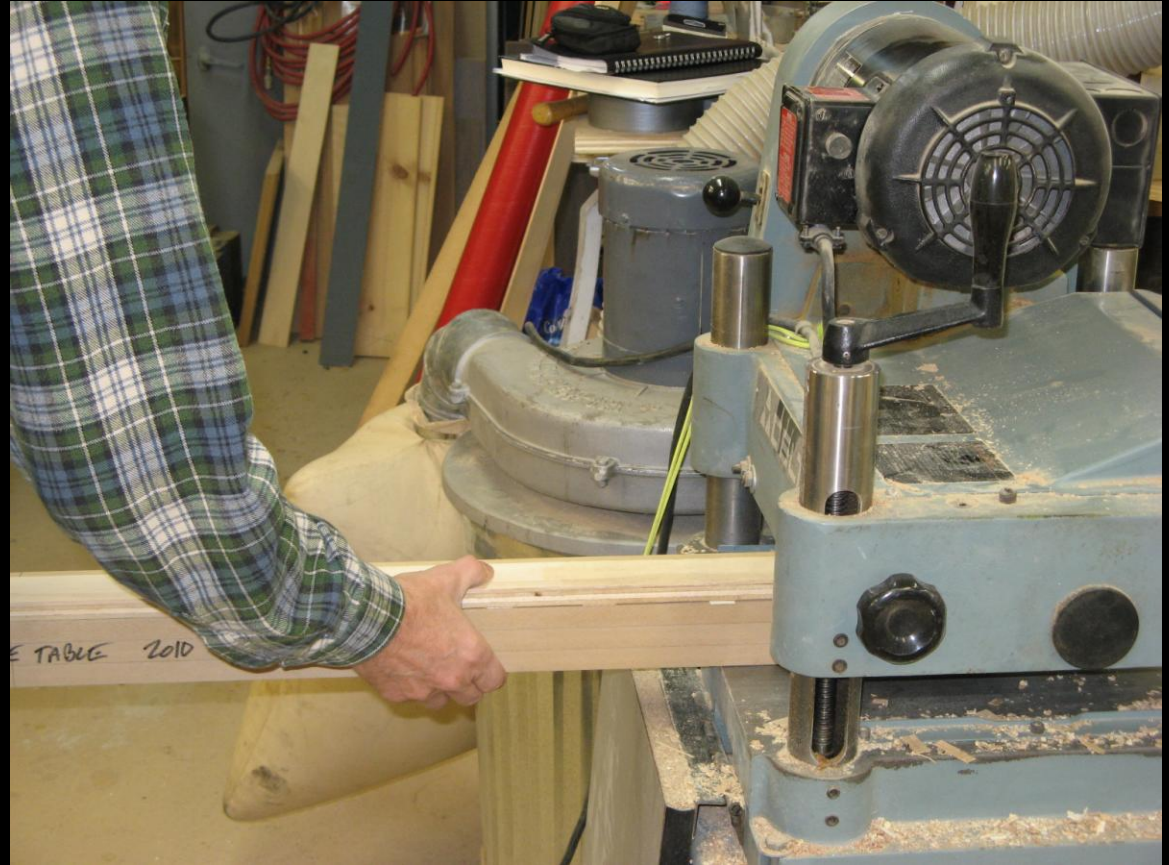
# Milling Tapered Laminates

- Build a sled of plywood or MDF strong enough to resist bending.
- Use shims to create a ramp according to your design.
- Glue and staple 3 inches apart [glue and clamps OK]
- Keep metal away from cutter head – countersink everything
- The sled pictured has a double taper of 1/16 inch by 24 inches –
- Final dimension 2 x 48 x 1/16 - 1/8 – 1/16



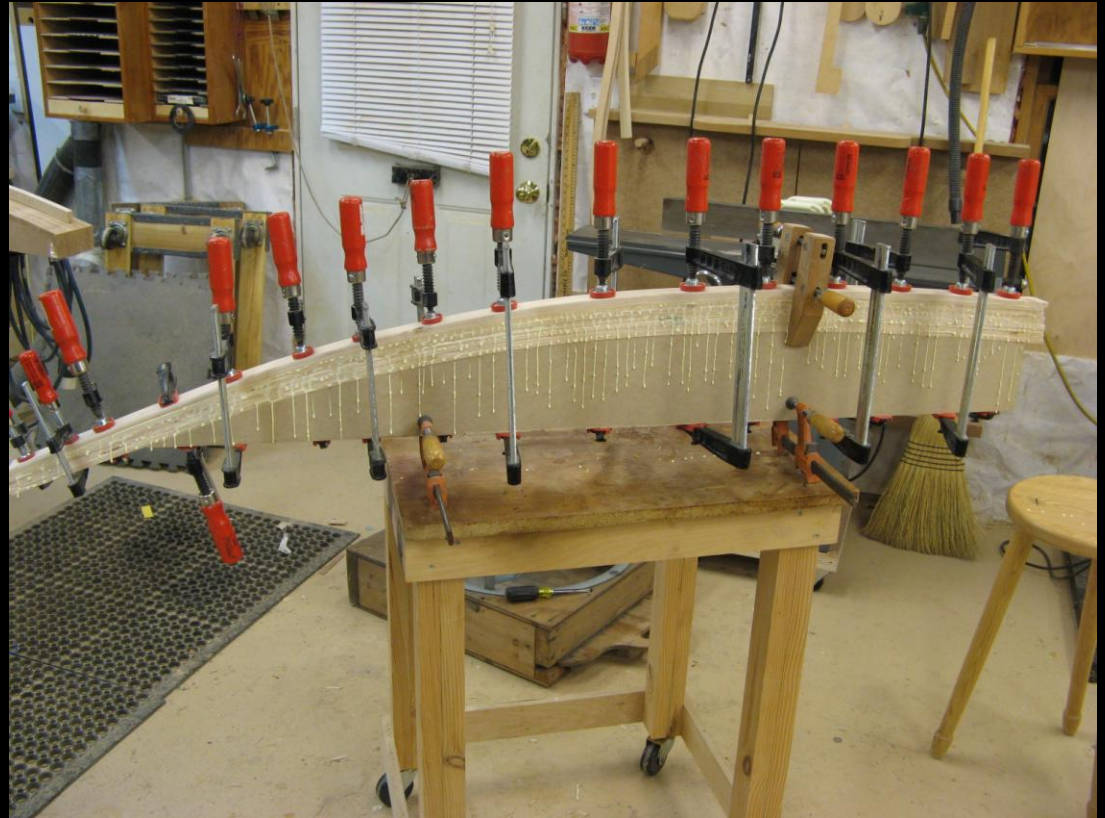
# Milling Tapered Laminates

- Place milled blank on sled
- Hold firmly
- Run through planner
  - If planner has bed rollers – use cheater board
- Expect the trailing end to exhibit snipe and tear out – cut the rough ply stock 2 – 3 inches longer than finished



# Tapered Lamination Glue-up

- Glue up is accomplished in exactly the same manner as standard laminations
- Cauls – Lots of clamps and moderate pressure
- Be aware - tapers may skid if you use too much glue and too much clamp pressure.

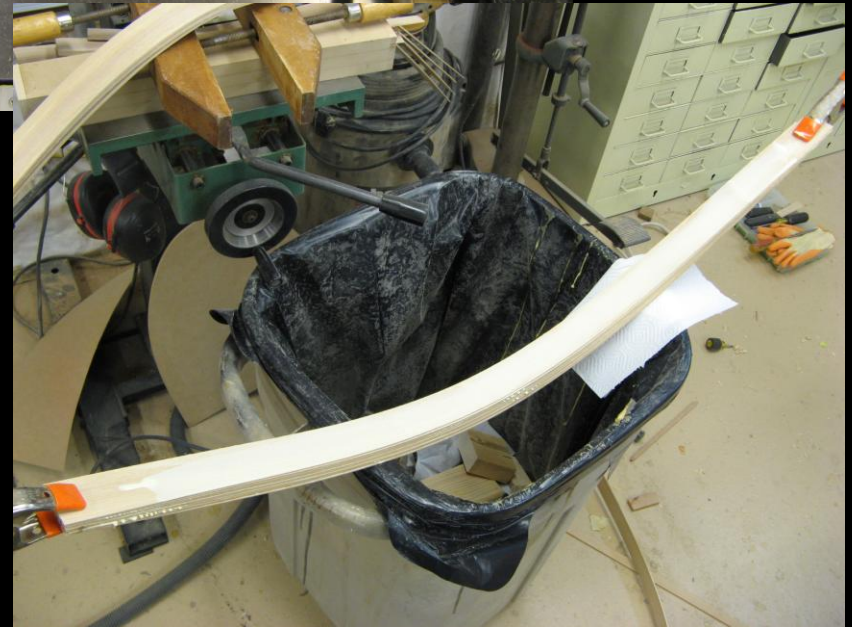




# Sharp Bends



- For forms requiring sharp radiuses, pre-bend plies
  - ❑ Hold ply stack under hot tap water and bend over form
  - ❑ Clamp with a bar clamp across width
  - ❑ Remove from form and let dry



# Sharp Bends

- Build a mating caul to guarantee uniform clamping pressure on tight curves.
- Use full sized drawings to determine mating curve
- Line with ¼ inch cork
- Lay-up plies and glue
- Lots of clamps moderate pressure





# Crest Rail Glue-up – Additional Material

# Crest Rail Glue-up – Additional Material



- Apply packing tape to hand screws

# Crest Rail Glue-up – Additional Material

- Glue stack



# Crest Rail Glue-up – Additional Material

- Center stack
- Add hand screws





# Crest Rail Glue-up – Additional Material

- Apply pressure using blocks to distribute force.
- Watch for even squeeze-out





# Crest Rail Glue-up – Additional Material

- Clamps evenly distributed
  - Lots of clamps
  - Moderate pressure

