~ Student Designed Laminated Project Procedure ~

PROJECT PREPARATION

Prior to beginning the following procedure the following must have been completed:

1. 3D model of your project using Fusion 360
2. 'Working Drawing' produced and printed using Fusion 360

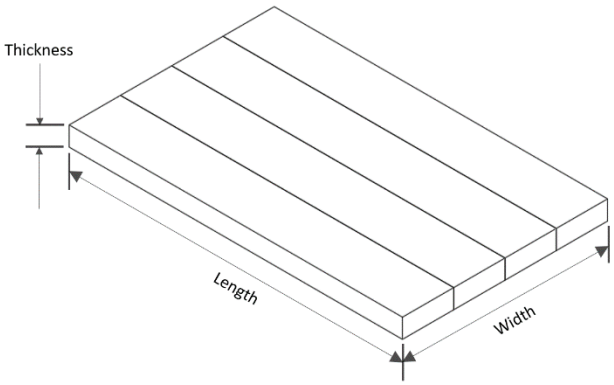
PREPARATION (WOOD SELECTION)

1. Board Selection - Locations

- You are to select wood from the 'Short Ends Bins'
- If you cannot find suitable wood in the short ends bins, you must ask permission to select wood from the wood rack

2. Board Selection – Terminology

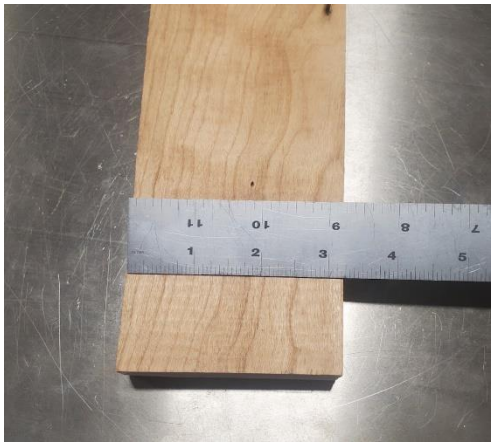
- Note the following terms and what they refer to by studying the diagram to the right.
    - Length
    - Width
    - Thickness



3. Board Selection – Species • When choosing boards pay attention to the species of wood specified on your plan. • If unsure, ask! • The species approved for this project are noted to the right >>>	**Eastern Maple** **Western Maple** **Cherry** **Black Walnut (*limited use*)**
4. Board Selection Cont'd – Imperfections • Look out for knots. Cutting boards and knots do not work well together as food will get trapped in the cracks! • Avoid knots & cracks, keeping in mind that they may be able to be cut off depending on the width required.	
5. Board Selection Cont'd - Length • Choose boards that are <u>at least</u> 1" longer than the size specified on your plan. • Much longer boards are ok, they will be cut later!	

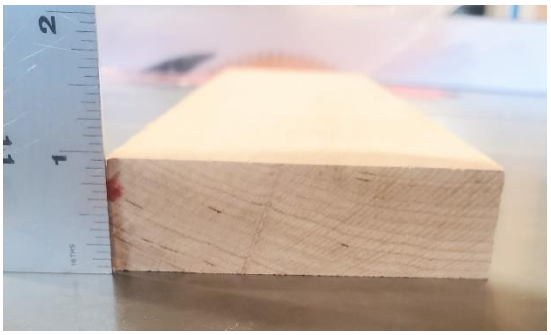
6. Board Selection Cont'd - Width

- Choose boards that are <u>at least</u> ½" wider than the sizes specified on your plan.



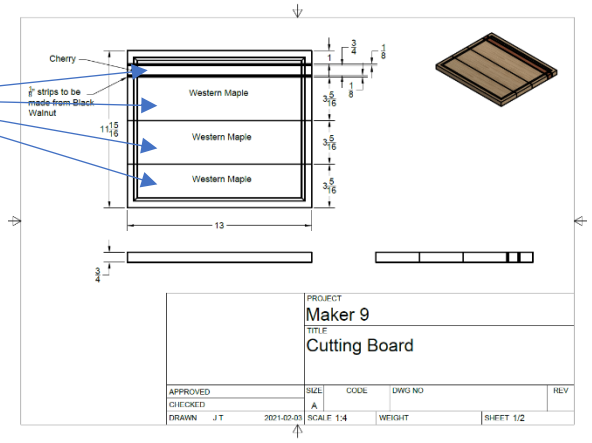
7. Board Selection Cont'd - Thickness

- Must be approximately 1" thick
- <u>Slightly</u> under is acceptable



8. Board Selection Cont'd - Numbering

- On your working drawing, number all boards in order (eg *1, 2, 3, 4…*)
- Write the same numbers on the actual boards to identify how each board is matched to the drawing



9. Board Selection Cont'd - Approval

- Show your working drawing and chosen boards to you teacher for approval **BEFORE** proceeding.

MACHINING BOARDS (*BREAKING OUT STOCK*)

1. Cut to Rough Length

- At the ***Mitre Saw***, cut all pieces to 'ROUGH LENGTH'
- Rough length = 1 inch longer than what will be the finished length specified on the plan

2. Jointing 'Faces'

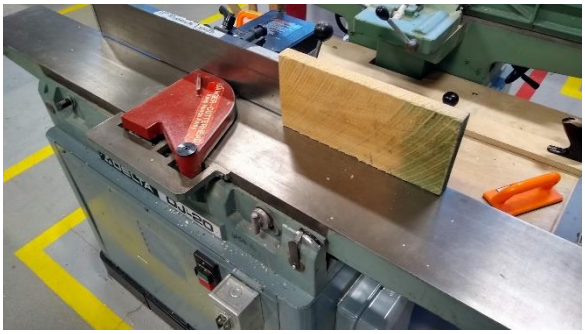
- At the ***Jointer***, joint a 'Face Side' on all boards
- Note
  - push sticks and push pad arrangement
  - narrow boards will need the pad replaced with a suitable push stick

3. Jointing 'Face Sides' cont'd…

- Use a pencil to mark each face side with the accepted symbol
- Note the symbol should touch the edge that will be the 'FACE EDGE'

4. Jointing 'Face Edges'

- At the ***Jointer***, joint a 'FACE EDGE ' on all boards
- Make sure that the 'Face Side' is held against the jointer's fence when machining
- Note:
  - Board above fence height = 'hitchiker technique'
  - Board below fence height = push sticks front and back



5. Jointing 'Face Edges' cont'd…

- Use a pencil to mark each FACE EDGE with the accepted symbol (pointing to the face side)

6. 'Rip' to Width

- Safety Note – boards thinner than 1 ¼" will require teacher assistance!
- At the **Table Saw**, rip all <u>INSIDE BOARDS</u> to their finished width
  - *'finished width' is the width specified on your working drawing (plan)*
  - *Face Side goes down on table*
  - *Face Edge goes against fence*
  - *Set correct blade height*
  - *Use a push stick & correct technique*
  - *Ensure workpiece stays against fence during cut*
- Rip both <u>*OUTSIDE BOARDS*</u> ***½"*** larger than the finished width noted on your plan

7. Plane Parallel Faces

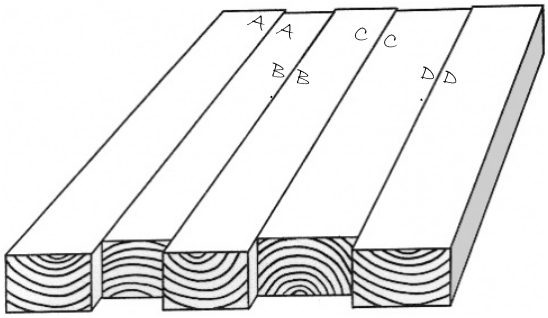
- At the Thickness Planer, plane the side opposite the 'face side' parallel (ensure Face Side is down)
- Only plane until smooth/flat. KEEP BOARDS AS THICK AS POSSIBLE!
- Plane all boards to the same final thickness (on final setting pass all boards through)

GLUE UP

1. Inspect Edge Mating

- Arrange boards on a flat 'true' surface (the table saw machined table is good)
- Arrange in the pattern that will be glued
- Correct any mating concerns using the Jointer that is set to remove the least amount of material
- Number or letter each joint to make re-assembly easy and accurate later

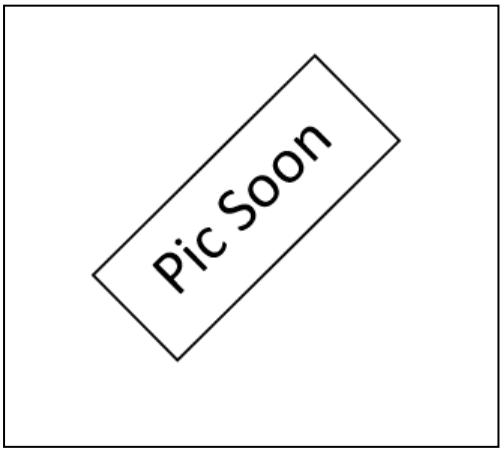
Do not proceed until all joints are <u>PERFECT</u>!



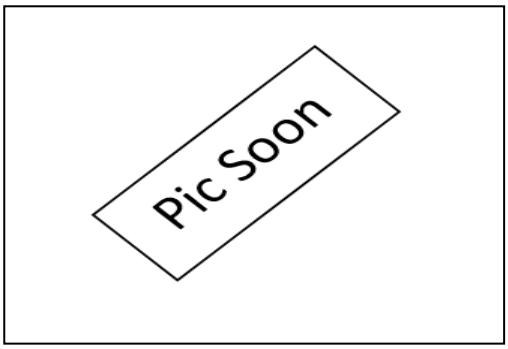
2. Dry Clamp

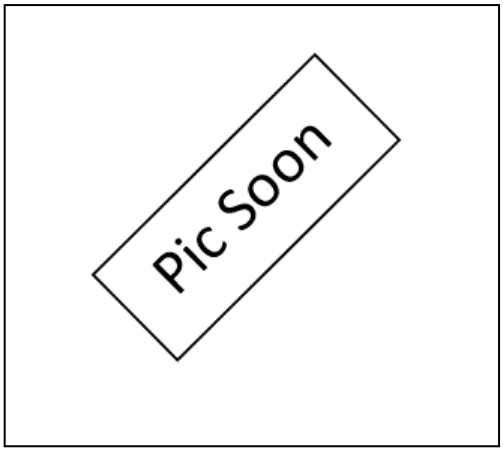
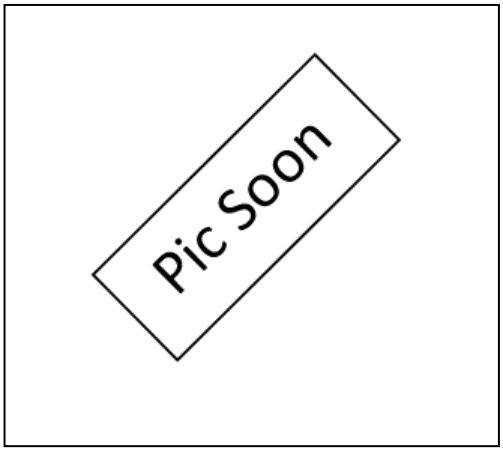
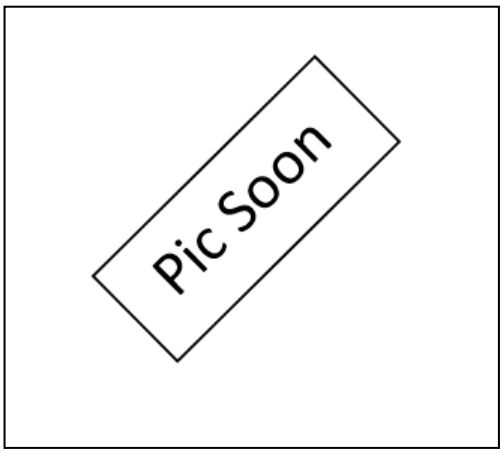
- Use no glue!
- At the glue up table 'dry clamp' your pieces
- Use 'cauls' with squeeze clamps at each to align boards
- Ensure parchment paper is under your boards and in between all cauls
- Make sure all clamps are snugged tight (do not over tighten)

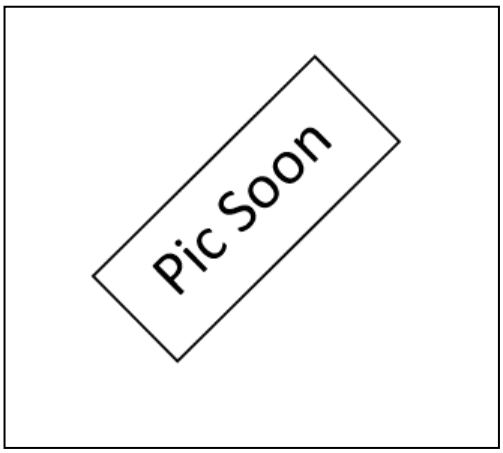
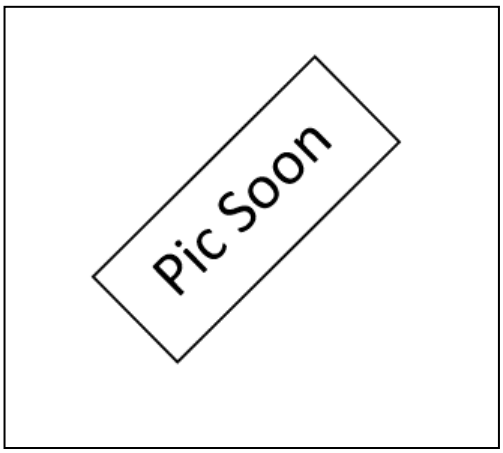
Have your setup approved by the teacher!

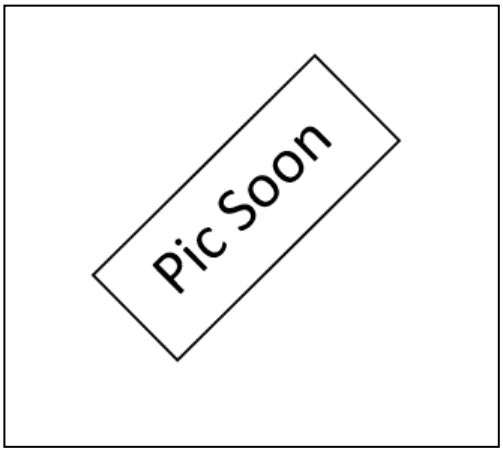
3. Gluing Boards • Use 'Type II" water resistant glue • Disassemble cauls and loosen pipe clamps • Tip boards up one by one and spread glue on the edge of each board • Use your finger to spread evenly • Your finger should glide on the glue, a sticky feel indicates more glue is needed • Clamp boards using the method approved in the previous step • Use wet paper towel, then dry to wipe off excess squeeze out • Write your name on you glue up and either M/W or T/Th depending on your class days • Allow to dry until the next class	
4. Once Dry • Remove and <u>dispose of</u> any attached paper • Using a paint scraper and holding your workpiece in 'dogs' at a workbench, scrape of excess dried glue • A 'card scraper can also be useful for this **Caution – do not scrape knuckles across surface!**	

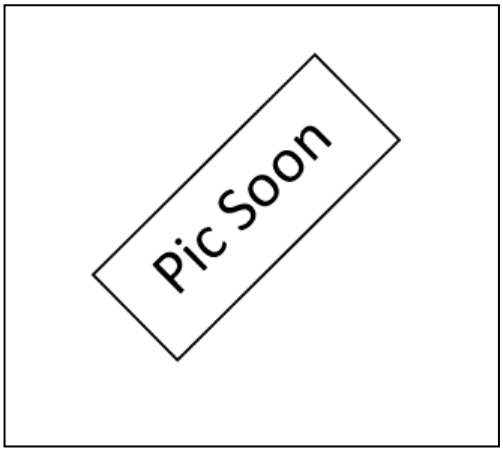
FINAL MACHINING

1. Check For Flatness • Place the board on a <u>flat true surface</u> (machined table of table saw is good) • Lightly press fingers on diagonally opposite corners and attempt to rock • Switch to the other diagonal and repeat rocking • One side must be flat/true • No rocking = proceed • Rocking = see teacher	

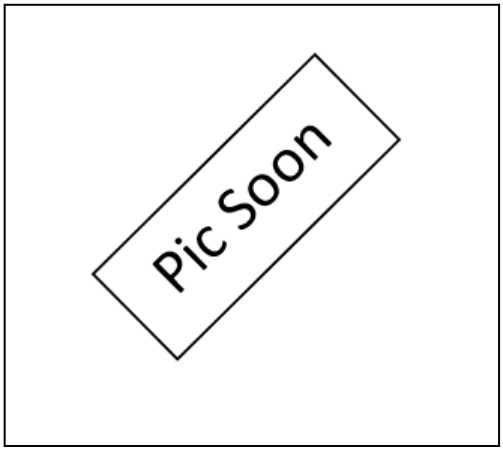
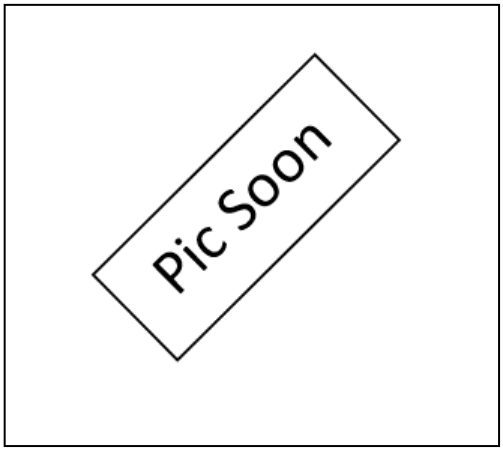
2. Plane to Final Thickness • Measure your board's thickness (thickest place) • Set planer equal to board thickness • Adjust planer to reduce thickness by 1/16" (1.5 mm) (half turn of wheel on 15" planer) • Place good/flat side on table • Apply pencil to up facing surface as indicator • Plane first side. If necessary, adjust an additional 1/16" and repeat using pencil indicator to determine when to stop. • Flip board and continue to plane 1/16" per pass until ¾" (19 mm) thickness.	
3. Crosscut to Finished Length (first end) • Use a crosscut sled and the table saw with a crosscut blade installed • With the board held against the sled's fence, mark the top surface of the board with a mark to indicate the edge in contact with the sled's fence • Position the board to remove as little as possible when cut. • Cut one end of the board. • Examine cut. It should be complete, clean and without burns.	
4. Crosscut to Finished Length (second end) • Measure and mark the leading edge of the board (edge opposite previously marked edge) with the length specified on your working drawing (plan) • Ensure your mark is transferred down the leading edge of the board so that it can be aligned with the blade accurately (use a 'try square' and a sharp pencil • Position board in sled making sure indicator from previous step is against sled's fence and measured mark is aligned with correct side of saw blade. • Cut second end.	

5. Rip to Final Width - layout • Using your plan, measuring tools and a sharp pencil, mark both rip locations on the surface of the board • Transfer these marks down the leading edge of the board using a try square • Complete the cut.	
6. Rip to Final Width - layout • Place the edge of the board that was in contact with the fence in step 5 against the rip fence. • Adjust and lock the rip fence such that the cut mark is aligned with the correct side of the blade. • During the cut, watch the fence not the cut to ensure the board remains in contact • Using the proper technique for boards wider than 6" (hands not push sticks), complete the first cut • Set the fence to the finished width specified on the plan and lock it. • Rotate the board to cut the opposing edge	

7. Sanding (*Stage 1*)
• Always sand '*WITH THE GRAIN*'!
• Sand top and bottom surfaces using a 5 inch **RANDOM ORBITAL SANDER** and 80 grit sandpaper.
• Sand all edges using a block and 80 grit sandpaper.
  ○ Support the board on blocks when sanding.
  ○ Control the sanding block to maintain a square edge
	

8. Router Edges • Using the router table route a 1/8" radius on all edges (not corners!) ○ Ensure the correct bit is installed and that the setup has been checked ○ Use a backup board when routing end grain to prevent grain tear out ○ Inspect when done, repeat if necessary	

CNC MACHINING & LASER ENGRAVING

1. V Carve (programming the CNC) • Open the VCarve app on your computer • Locate the drip groove CNC tutorials on the class website and complete the tutorials. ○ Be sure to save your work: File >> Save, then select the appropriate location (OneDrive Comox Valley Schools >> your class folder) ○ Also Save your 'mmg' program to the CNC flash drive	
2. CNC Routing • Using the guide book at the CNC router complete the routing of the drip groove. • Be sure to stop and have the teacher check your setup at the times noted in the guide book!	

3. Laser Engraving • Use a crosscut sled and the table saw with a crosscut blade installed • With the board held against the sled's fence, mark the top surface of the board with a mark to indicate the edge in contact with the fence • Position the board to remove as little as possible when cut. • Cut one end of the board. • Examine cut. It should be complete, clean and without burns.