Lumber Milling

EDGE-TO-EDGE GLUING PROCESSES
The Lumber Milling Process With Edge and Face Gluing

Often times, a wide panel made of solid wood is needed – or perhaps a thick, wooden component is needed. In these situations two or more pieces of wood can be laminated together to form a wider or thicker component.

The lumber milling processes used for producing laminated or “built-up” components are similar to that of the single piece processes, but with a few key differences.

- The steps must be followed in sequence to ensure the laminated wooden components produced are: structurally sound, flat, straight, square, and to the specified size.
Considerations Behind the Process

Due to the nature of wood and its movement with changes in humidity, wide solid-wood boards are susceptible to warp. They are especially prone to a type of warp termed “cupping”.

Because solid wood boards over 5” to 6” wide are prone to warping in the “cup” direction, edge gluing narrower boards together to create a wider board will reduce the amount of warp potential and produce a more stable component.

Thick boards are difficult to dry successfully and therefore you will rarely see solid wood boards over 2” to 3” thick. If a thick, wooden component is needed, for a turned stair post for example, it is necessary to laminate two or more boards together face-to-face to achieve the required thickness.

Whether you are gluing boards edge-to-edge or face-to-face it is important to know that properly machined glue joints are stronger than the wood itself!
Edge-to-Edge Process – Step 1

Cutting the individual boards to a rough size is the first step.

• When rough cutting the stock, remember to allow enough extra width on each individual board for jointing both edges. This will ensure the glued-up assembly will still be oversized so it then can be machined down to its final size after the glue has dried.

• For aesthetics, try to match the grain and the color of the individual boards used in the glue-up. Rough cutting all of the individual boards out of the same board will help for grain and color matching.

The individual boards have been “rough-cut” - oversized in thickness, width, and length.
Calculating Rough Cut Sizes

Calculating the rough cut sizes will vary depending on the final use for the glued-up panel and the number of individual boards used to make up the panel.

• If aesthetics are not important, than the best yield should be considered and the panel can be made from individual pieces varying in width.

• If aesthetics are important, than all of the pieces used in the panel should be approximately the same width.
Edge-to-Edge Process Step 2

A semi-flat face is needed to start the process. That means rough joint one face on each board to about 90% clean.

• The goal here is to leave the board as thick as possible. Only remove the minimal amount of material necessary in order to have a 90% smooth and flattened surface. You will be running the entire glued-up panel across the jointer again after the glue has dried.

• Do nothing with the edges at this point!
Edge-to-Edge Process Step 3

Rough plane the opposite face to 90% clean. Again, you want to leave the stock as thick as possible at this point.

• **DO NOT PLANE THE MATERIAL TO IT’S FINIAL THICKNESS.** You will plane the entire panel after the glue has dried.

• It is helpful to make all of the individual pieces to be used in the glue-up the same thickness if possible.

• After all the boards have been planed, layout the order in which the boards will be glued-up. Match grain and color and mark on the boards the desired orientation.

Notice the triangular shaped mark and numbers written on the boards. This helps to identify the face side of the glue-up and also the order in which the boards will be glued.
Now that both faces of the board are 90% smooth, flat, and parallel to each other, the edges of the boards can be made straight and square to the faces.

- With the jointer fence set square to the table, run both edges on the board across the jointer. This step removes any warp along the edge of the board and makes the edge square to the faces.

- For best results, alternate which face of each board rides against the fence of the jointer. This will ensure the glue joint will be tight even if the jointer fence is not set at exactly 90° to the jointer table.
Before applying glue to any of the edges, check that you have tight joints between all of the boards.

- If you have any gaps, these need to be corrected before the glue is applied. Forcing the boards together in order to close any gaps will only build stress into the glued-up panel. Any internal stress can compromise the integrity of the glued-up panel.

- Apply a generous bead of glue down the center of the edge. The clamping pressure will spread the glue out evenly across the joint. Work quickly, most wood glues only have a 2-3 minute open time.
Before Moving on to Step 6

The water contained in wood glues adds moisture to the wood. When wood gets wet, it expands. The wood along the glue joint needs to dry before any machining is done to the panel. Let the glue-up cure for a minimum of 24 hours before any machining. This will prevent “sunken” glue joints.

• Scrape off the dried glue squeeze-out before starting any machining processes. The dried glue is very abrasive to cutting tools and it will also impact your ability to flatten-out the laminated panel.

Here the dried glue has been scraped-off
Edge-to-Edge Process Step 6

After the dried glue has been scraped from the faces of the panel, a flattened face can be machined on the panel. Using the jointer, flatten the face by taking light cuts.

- Remember to only take-off the minimal amount of material needed to flatten the surface. Removing too much material will result in your glue-up becoming undersize in thickness. If it becomes undersized in thickness – you have just made firewood.
Edge-to-Edge Process Step 7

Place the flattened face of the panel down on the planer table and begin to plane the panel down to its final thickness. It may take several passes through the planer to reach the final thickness.

- Remember to alternate the cutting face on the panel after the initial face has been planed.
Edge-to-Edge Process Steps 8, 9, & 10

Step 9 - One edge of the panel can now be straightened and made square to the faces.

Step 10 – With the straightened edge against the rip fence on the table saw, rip the panel to it’s finished width plus 1/16”.

Step 11 – Using the jointer set to 1/16” depth of cut, remove the saw cut marks from the ripped edge. The panel will now be at it’s finished thickness and width dimensions.
Edge-to-Edge Process Steps 11 & 12

Step 12 – Make a trim cut on one end of the panel. Remove only the necessary amount of material to give the panel an end that is perfectly square to edges and faces.

Step 13 – Crosscut the other end of the panel to the finished length dimension.

Here is the panel after the trim cut and final crosscut. The panel is now at its specified thickness, width, and length.
Final Outcome

• Following these lumber milling steps in their exact order will ensure you are producing laminated parts that are flat, straight, square, and to the specified thickness, width, and length.

• Be sure to allow adequate curing time for the glue. Typically, PVA wood glues reach 80% of their strength after only 30 – 40 minutes. This however is not enough time to let moisture from the glue evaporate from the wood. Sunken glue joints are the result of machining before the wood has dried.

• Lumber milling is THE essential first step in countless woodworking tasks. You will use these steps throughout the course and in your career as a professional woodworker. Taking care to perform these steps accurately will save time, material, and frustration. These steps will become easier with repetition and experience.

• Remember: producing parts that are almost square or almost the right size will produce parts that almost fit.