

Model Shipwright Guild of Western NY

Shop Notes: Laser Machining

This is an overview of laser etching and machining; its general steps and some rules/operations based on a current manufacturer visited on 1/9/2016. Treat this as a “work in progress” and as we gain more experience and exposure we will modify this shop note with ever increasing specificity. The Corel Draw tool set will not be uniquely discussed within this document at this time. Corel Draw is described here because of vendor tool set compatibility

User Development Procedure:

- The modeler creates parts fabrication files in Corel Draw. A current version is Corel Draw Suite 7, a student version for up to 3 users, is about \$90
- One can either create drawings using the Corel “draw” tool set directly or input a graphic such as a jpeg image as a template. Scaling prior to file input may be a wise decision.
- The tool set allows one to create enhanced “objects” that can be uniquely defined and stored as a work product file. A body plan drawing of a vessel is used as an example to describe the process.
- The user obtains a body plan (set) in a format understood by Corel Draw. In this case a jpeg image format. Other formats are compatible and will be described in the future.
- The users’ jpeg image is a template to overlay a drawing that describes, for example, bulkhead #1 (1/2 of the full bulkhead is recommended). The user adds detail such as the keyway that will allow the bulkhead to be inserted onto the false keel. The user may also define deck camber and bulk head rise. The user may also wish to add construction support member rabbets or dados or even witness marks as further examples of detail.
- Bulkhead curvature can be achieved through mechanisms such as a “drag and drop” feature (not the Corel descriptor) to fit curves to conform to the complex shape required. Techniques are also available to develop more complex curves such as a serpentine curvature by defining sub-nodes for a change in curvature. Again, the developer need only replicate ½ of a bulkhead.
- The user makes this element an object.
- Magnification of node areas can identify multiple elements that converge on a node that do not connect completely. The “snap” feature is useful for this. This is important as the laser machining may not create the desired output and may cause un-necessary laser head movements and wasted time.
- Magnification of a line can also ensure that line thickness is correct.
- The mirror image tool is handy to guarantee a perfectly symmetrical and complete bulkhead. It is basically an image flip and careful alignment. This element is then defined as a final object and stored as a work product file. Use of the node area checking may be a good idea to once again ensure correctness.

- The completed file is named and stored for export. Export can be via e-mail or via a memory device.

Vendor Production:

- The vendor will load the customer file set onto his computer. This vendor will perform the necessary file review before submission to the laser machine. The vendor will check once again for node correctness, line thickness, and other extraneous anomalies that may have crept into the customer files.
- The vendor will at some point define the laser “knife” power for each operation. Vendor uses several different color lines in the drawings because the printer driver allows each color to be set to different Laser power level and different travel speeds. Thus if a line is green they have the power set low, and the speed high, and the laser makes a line on the wood, but does not cut through. A red line is set to lower speed, and higher power, and thus cuts through. Lots of variations are possible. Also lines are “lasered” in color order, creating other possibilities. How this information is conveyed is not understood at this time.
- The vendor will place a material blank onto the laser bed. In this case the bed is 12 X 24 inches. Material normally used is a 1/8 inch ply. The user may wish to supply material of guaranteed quality as ply anomalies can affect the process outcome. Ply core knots for example will not result in a complete cut out.
- The vendor is experienced in material real estate usage and may prefer to make piece part placement his option unless there is a compelling reason for the user to input this request. Grain direction is well understood by the manufacturer.
- The resultant objects will be cut through unless one prefers to add “spur” additions to the object.