Carvel2Clinker

By Kingsley Robinson 2011

Introduction

Gregg Carlson's hulls program (available from: www.carlsondesign.com) is hull CAD program, one of its main features is that it lofts the shape of panels of sheet material e.g. plywood which are joined together by a construction technique such as "stitch and glue" to create the designed hull shape. The program is designed to loft the panel shape for hulls to be created with each panel butted end to end to create a carvel hull, it has no function to loft the panels for a clinker (also known as lapstrake) construction.

Carvel2Clinker is a program which manipulates the hull design data file to adjust the lofted panel sizes so that it is suitable for clinker construction techniques. It does this by inserting a "virtual" panel between each real panel, this virtual panel adjusts the dimensions to take into account the overlap between each real panel. See figure below.

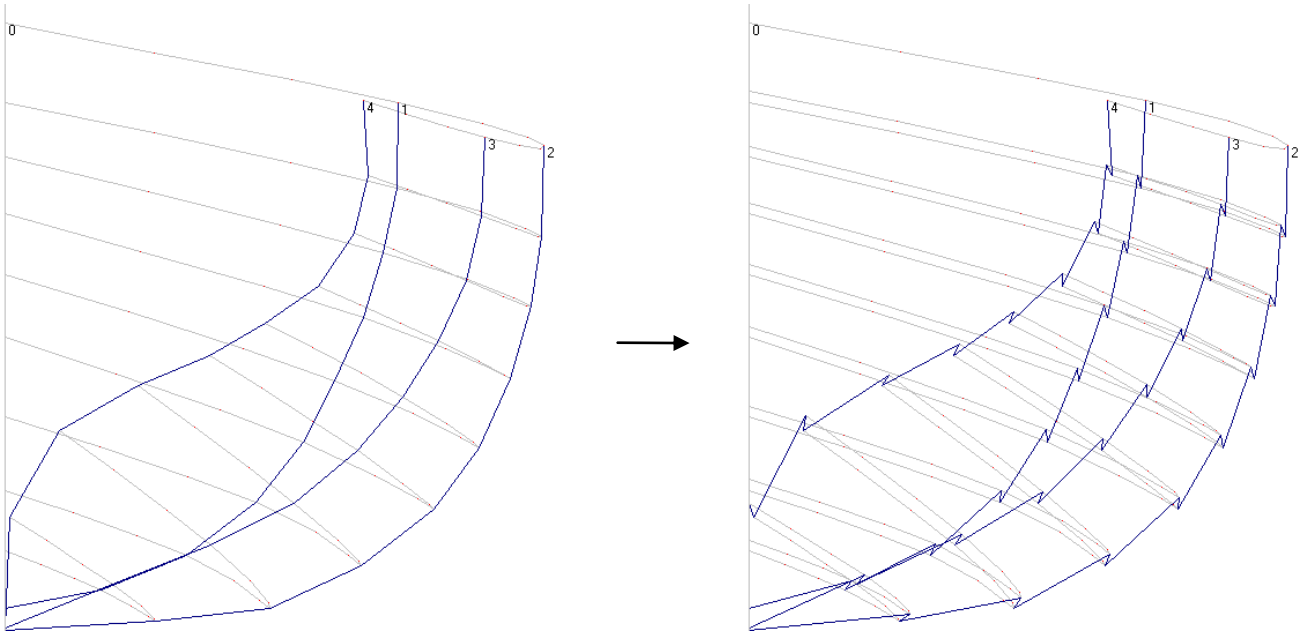

Figure 1a – Section view of carvel hull.

Figure 1b – Section view of the same hull converted to clinker by addition of virtual panels.

When you come to nest the actual panels using the program Hulls only the real panels are nested (those with odd numbers), the virtual panels (even numbered) are ignored.

How to use the program

Save Carvel2Clinker within the folder containing the data files for the program Hulls, double click on the icon and follow the on screen instructions.

Once Carvel2Clinker has created the new hull file you will need to reopen Hulls so that it can find the new hull design file.

Clinker construction techniques

There are three different joints commonly used in the construction of clinker plywood hulls, Butt joints, chamfering the edge of the lower plank and using a rebate in the upper plank (known as Lapstitch ™) Carvel2Clinker can perform calculations specifically for the first two of these methods. We will now look at each of these joints in detail and how Carvel2Clinker models them.

Butt Joint Construction

As the name suggests this method of construction simply overlaps the two planks with a butt joint as shown below in Figure 2a.

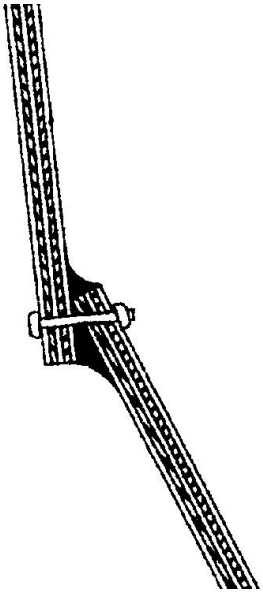

Figure 2a – A Clinker Butt Joint, Source: US Patent 6142093

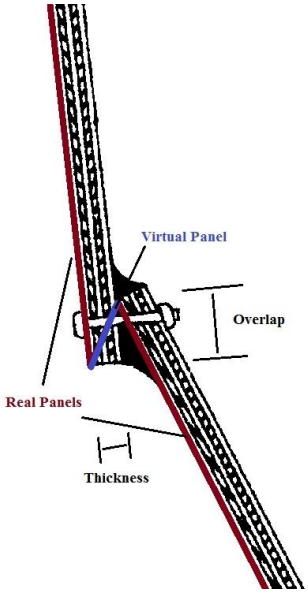

Figure 2b – Carvel2Clinker model of a convex butt joint

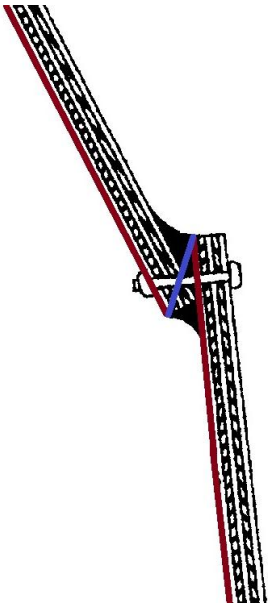

Figure 2c - Carvel2Clinker model of a concave butt joint

Figure 2b shows how Carvel2Clinker models this joint with two real panels along the outer edge of each physical panel, between them is a "virtual panel".

In some areas of some hulls the panels meet in a concave shape instead of the convex shape shown in figures 2a and 2b. This often occurs in hulls with a wineglass stern or a full keel. Figure 2c above shows how Carvel2Clinker models this situation.

Chamfered Edge Construction

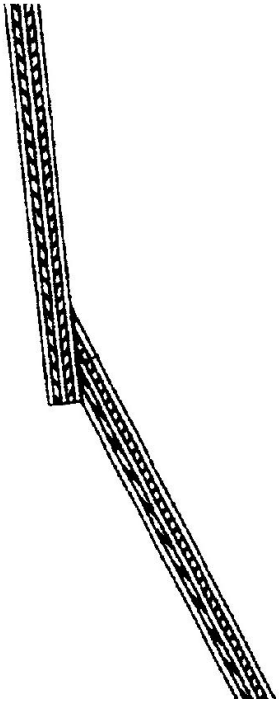

Figure 3a – A Clinker Chamfer Joint, Source: US Patent 6142093

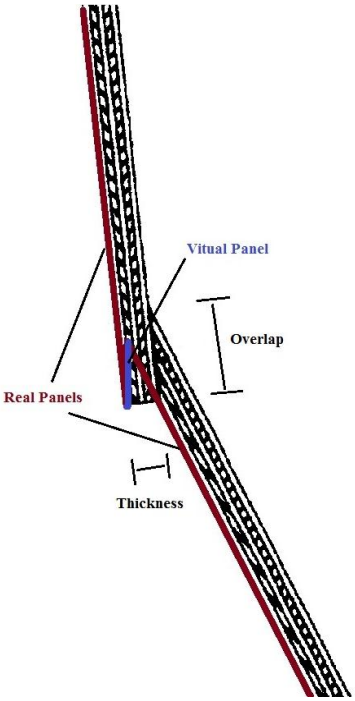

Figure 3b – Carvel2Clinker model of a convex Chamfer joint, less than max overlap.

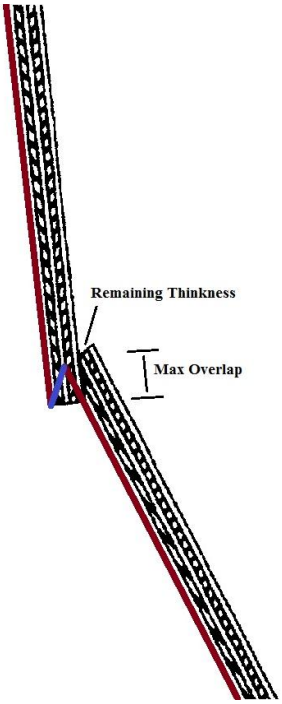

Figure 3c - Carvel2Clinker model of a concave Chamfer joint, greater than max overlap.

The chamfered edge construction works by cutting the upper edge of the lower plank at an angle so that it joins with the side of the upper plank, as shown in figure 3a above.

To model this Carvel2Clinker asks you for the maximum permitted overlap. In situations when the calculated overlap (which is dependent on the angle between the planks and the thickness of the planks) is less than the user inputted maximum the joint shown in figure 3b is modelled.

In situations where the actual overlap would be greater than the user inputted maximum Carvel2Clinker models the situation in the manner shown in figure 3c.

When in the chamfer mode any concave joints are modelled using the same arrangement as for the butt joint shown in figure 2c above with an overlap set to the value of the maximum overlap imputed by the user.

Chamfer File

When using the chamfer mode of construction Carvel2Clinker also offers the ability to produce a file which provides the details of the size of the chamfer to be cut off each plank. This file is called "Chamfer.txt" and will be overwritten each time this function is used.

The file gives the dimensions of the chamfer at 13 locations along the upper edge of each plank starting at the bow (these positions correspond to the coordinates given by the Hulls program's "Nest" file for hand plotting the nested panels).

At each location the "width" of the chamfer (the dimension down the outer face of the plank) is given decimal inches and (mm). Similarly the "remaining thickness" (see figure 3c) of each plank is given in decimal inches and (mm).

Lapstitch ™ Construction

The third common arrangement of joint employed on clinker plywood hulls is the Lapstitch ™ arrangement which uses a rebate in the edge of the upper plank to help locate the lower plank when using the stitch and glue technique, see Figure 4 below.

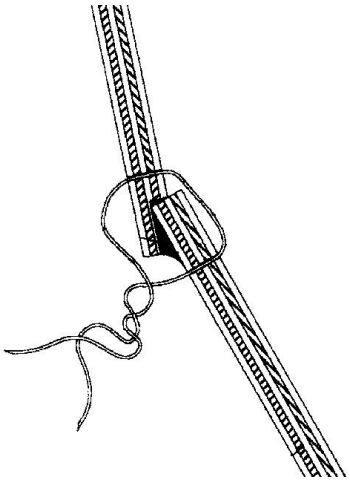

Figure 4 – Lapstitch construction. Source: US Patent 6142093.

Clinker2Carvel does not provide an option for calculating the dimensions of panel used for this constructional method. However a very good approximation can be achieved by using the Butt joint algorithm using the thickness of the sheet material minus the thickness of the rebate, instead inputting the total thickness of the sheet material. In the majority of situations it is likely that the error produced by doing this would be less than the accuracy with which the hull panels can be produced.

Deficiencies of the Modelling Process

Because Carvel2Clinker is a workaround solution and not a completely new program written for designing clinker hulls there is a deficiency in the process of modelling the stem.

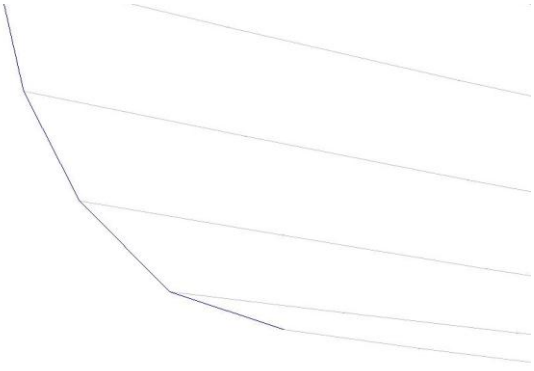

Figure 5a – View of bow of a carvel hull.

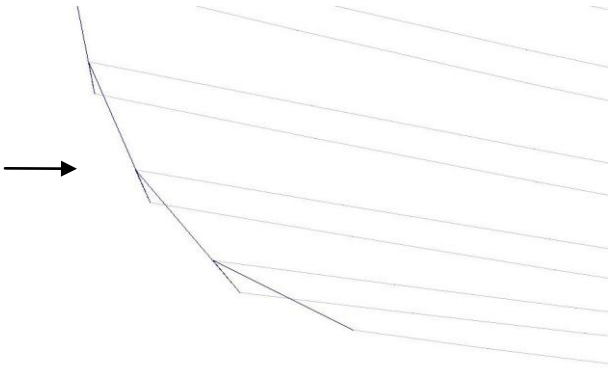

Figure 5b – View of same bow converted to clinker, illustrating overbite of panels.

Figures 5a and 5b show how a stem is converted from a carvel design to a clinker arrangement by Carvel2Clinker, you should note that the clinker version of the stem includes steps. If you were to construct a clinker hull using the panel shapes created by the program Hulls you would end up with a bow with a different profile to intended. To get round this I suggest that when constructing your boat you leave some waste material at the ends of each plank so that you can shape the bow properly during construction.

Support

Whilst this program has been tested on a variety of hull designs no guaranties can be made to the accuracy of the results.

NO WARRANTY

BECAUSE THE PROGRAM IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

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