



***FastShip* Technical Note**

Using the Radius Macro to Generate a True Radius on the Inside or Outside Corner of a Surface

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1.0 Introduction

A *FastShip* macro has been written to automatically modify a surface to insert a radius of a desired size. A typical use for such a macro might be an inside or outside corner of a portion of a superstructure surface, or the creation of a bilge radius. The macro is a combination of *FastShip* commands and PERL.

2.0 Description

The macro, *radius.mac*, assumes that the surface is quadratic in the direction that the radius is to be inserted. The user may specify the extent of the radius; in other words, the radius does not need to extend for the entire length of the surface, as in the case of a bilge radius.

3.0 Technique

Using the radius macro consists of building an appropriate surface, and then indicating the area to be radiused, and the desired radius.

Once the surface has been created, type
Read-macro radius.mac and hit ENTER.

You will first be prompted for the surface to be modified, and then the first and last columns (or rows) to be included in the operation. Next, you should select a vertex to indicate the direction of the radius. Finally, you are prompted to enter the radius, in the current units.

The surface must be quadratic in the direction of the radius. It may be any order in the other direction. It must have a surface interval that will be the radius, and this interval must be bounded on each side by a doubled knot. The easiest way to create such a surface is to start with a linear surface in the direction to be radiused, and to create the basic

shape. Next, insert another net line on top of the row or column of interest. Finally, raise the degree of the surface in that direction to quadratic.

In the following example, we will create a radiused corner on the top, outboard edge of a superstructure-like surface. In this case, the radius will be in the transverse direction, and will travel longitudinally down the entire length of the surface.

Figure 1 shows the basic surface that we will begin with. It is cubic longitudinally, and linear in the transverse direction. It was created by selecting Parts/Create, and indicating a degree of 3 in the length direction, and 1 in the height direction. Two intervals were specified in each direction.



Figure 1a



Figure 1b

Figure 2 shows the same surface, with the shape modified to model a superstructure-like surface. Notice that the surface is still linear in the height direction, so we are creating a box-like representation of the surface that we eventually want.

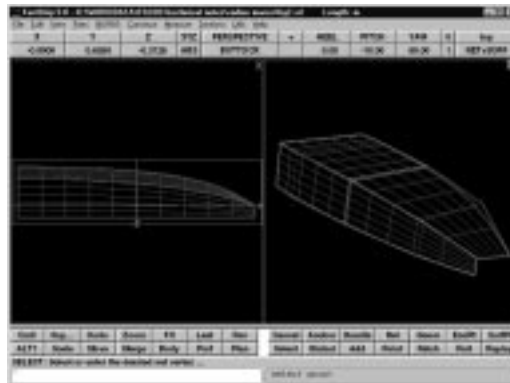


Figure 2

Figure 3 shows the insertion of an extra row on top of the middle row of the surface. This is because the radius requires a full interval in the surface for the radius. This is done by

selecting NURBS/Insert Net/Specify, entering 0, and clicking on vertices {2,1} and {2,2}, to indicate a new row that is 0% of the way from row 1 to row 2 (note that the index of the bottom row is 0).

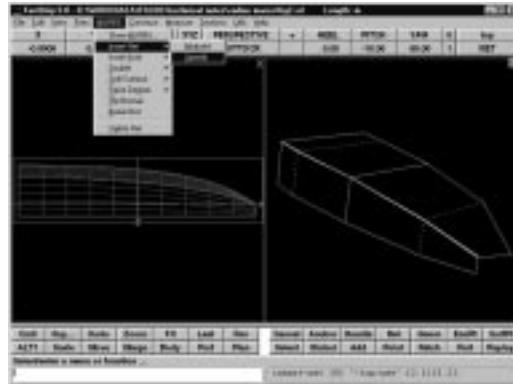


Figure 3

The degree of the surface is raised to quadratic in Figure 4, by selecting NURBS/Raise Degree/Column, and clicking on the surface. Note the two new dashed lines in the surface. There is also now a dashed line buried with the two solid lines at the corner.

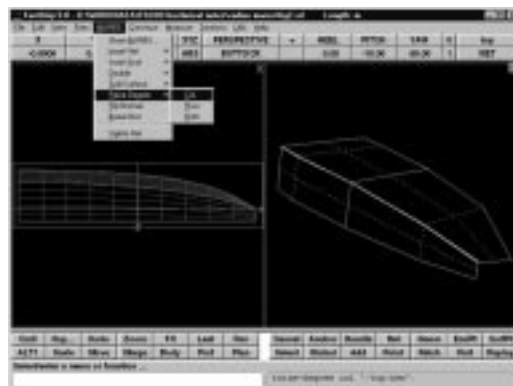


Figure 4

At each column, the radius will be tangent to the line segment from the dashed row to the solid row, as indicated in Figure 5.

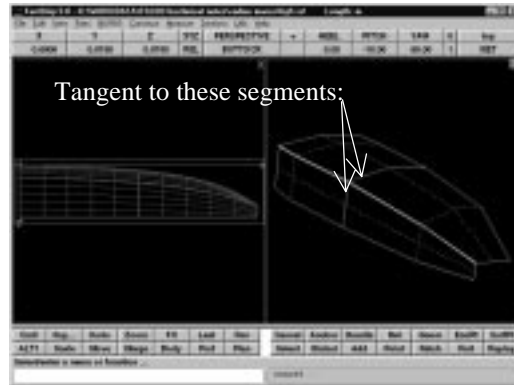


Figure 5

Figure 6 shows the locations for clicking for responding to the prompts in the radius macro. Click 1 simply indicates the surface that we are dealing with; click 2 indicates on end of the radius, click 3 indicates the other end, and click 4 indicates a point on the same

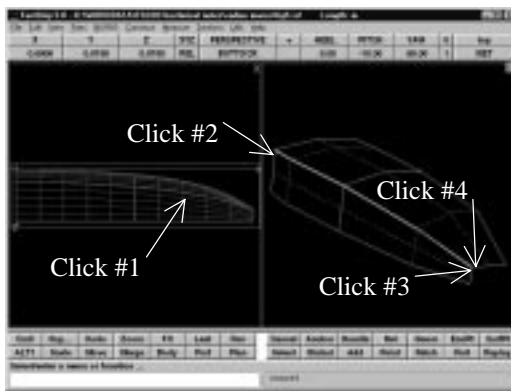


Figure 6

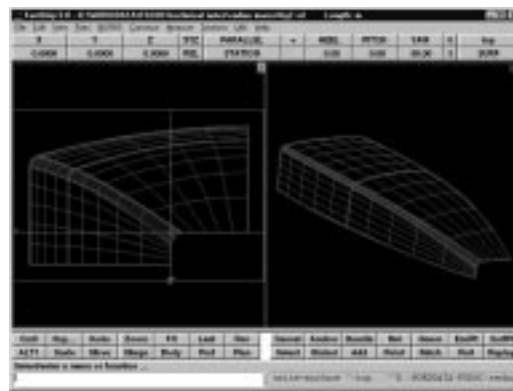


Figure 7

column as click 3, showing the direction for the radius. As the last step, the radius is entered, and the final surface looks like Figure 7. This surface can be further modified, and the radius macro run again as necessary.

Rather than following the above procedure, you could start with a quadratic surface that has an interval in it for the radius, and make the edges of this interval into multiple knots (Net/Insert Knot/Row). Note that for a quadratic surface, you only need to insert one extra knot, rather than three, which is ordinarily done to create a chine in a cubic surface.

Figure 8 shows a new cubic by quadratic surface, with three intervals in the height (quadratic) direction. In Figure 9, additional knots have been added to the existing knots (thick mesh lines), so that the interval to be used for the radius has multiple-knot boundaries. Finally, in Figure 10, the surface has been shaped, and the radius has been inserted.



Figure 8a



Figure 8b



Figure 9

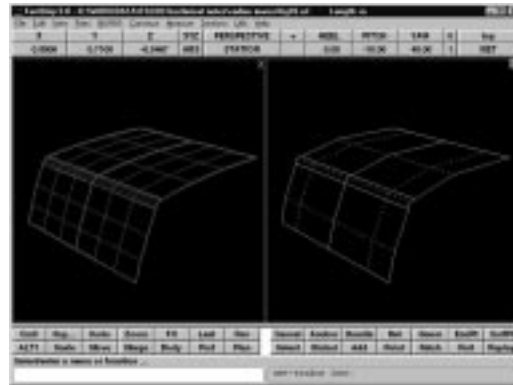


Figure 10

4.0 Potential Problems

The modifications that this macro makes are not reversible via UNDO or RECOVER. Therefore, you should save the surface before running the macro, so that you can revert to it if you are not satisfied with the results of the macro.

If the surface is not quadratic in the direction of the radius, and does not contain the proper number or location of surface intervals, the results are unpredictable.

The radius is a true radius in local plane of the mesh in the direction of the radius. Therefore, if the mesh is not normal to the surface in the other direction, an ellipse will

result in the other direction. For example, in the case of a radius to be inserted in the transverse direction, on a surface that slopes down as it goes forward, if the surface mesh columns are vertical, the radius will appear as a true radius in bodyplan, but will be an ellipse in the local plane of the surface. In this case, a pipe could not be cut and used to build the surface.

5.0 Questions & Comments

Any questions or comments regarding this macro or this technical note may be addressed to:

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