

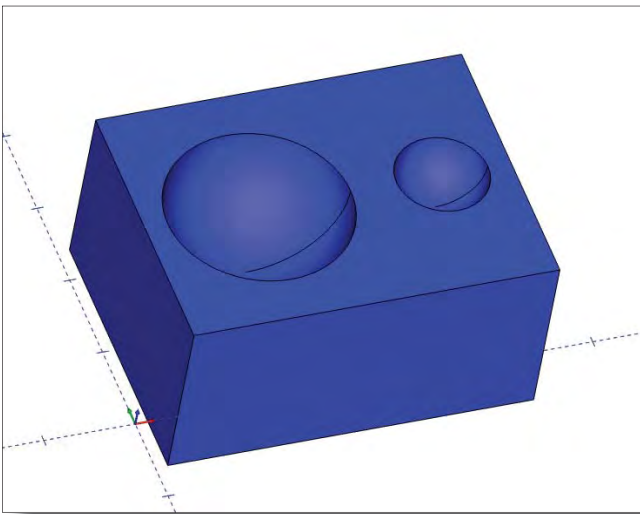


FAQ #43: Why do my mirrored solids render oddly?

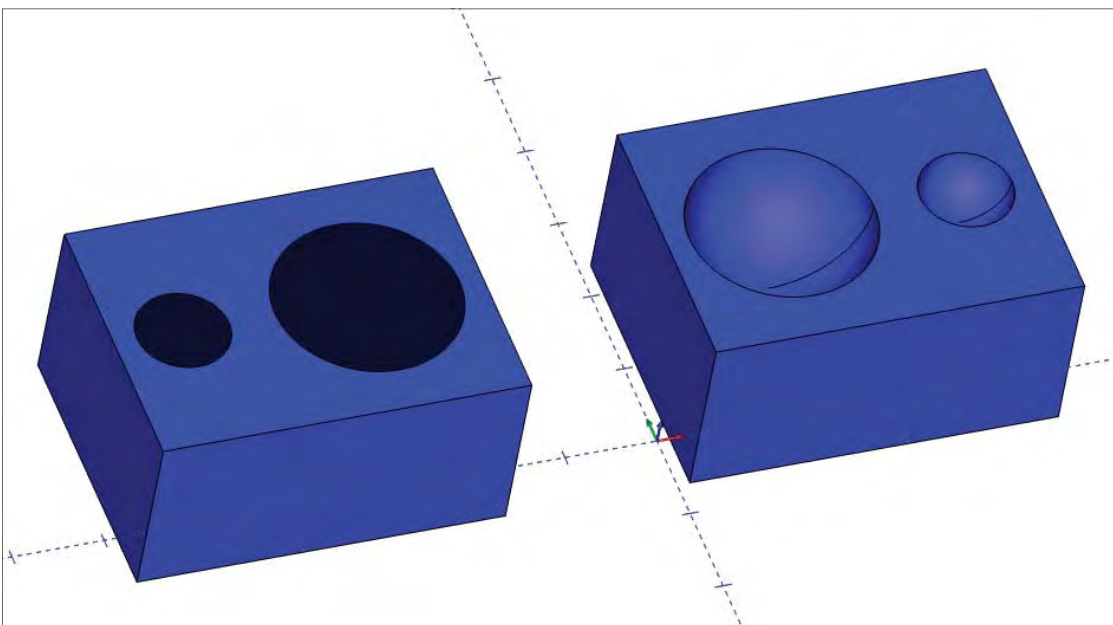
Q: I mirrored a solid (or surface) and now it renders and machines oddly. What causing this, and how do I fix it?

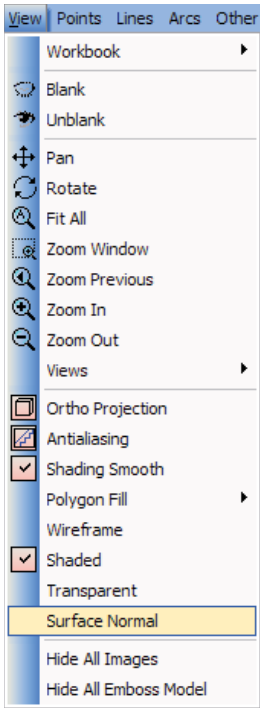
A: When a solid or a surface is mirrored, *everything about it* is mirrored. This also includes the *surface winding* (the directions of the curves used to describe the surfaces mathematically). When the surface winding is reversed, the surface *normal* (the vector that describes the “up” direction of the surface) is also reversed for each surface making up the solid, yielding a part that is in effect “inside out.” It’s simple to fix.

Step 1: Start with a solid model. Any solid will do; this example is just a cube with two spheres subtracted from it.

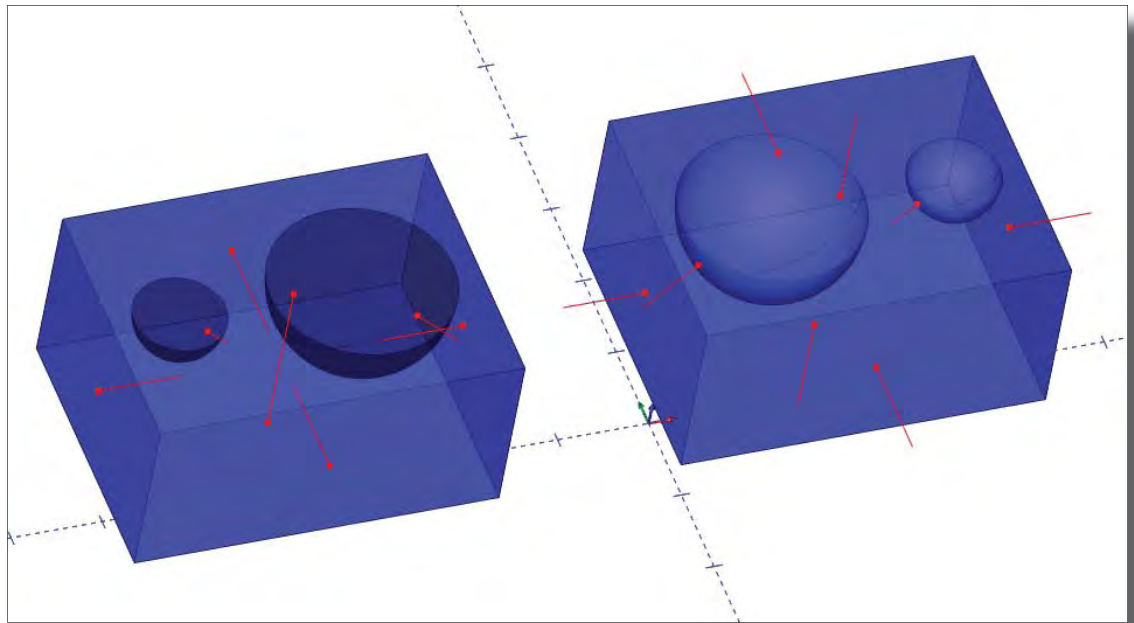


Notice that after mirroring, this solid looks like it has missing surfaces and that the holes in the top surface of the cube are “blacked out.” Different solids may look differently; this is merely how this particular solid ended up after the mirror operation.



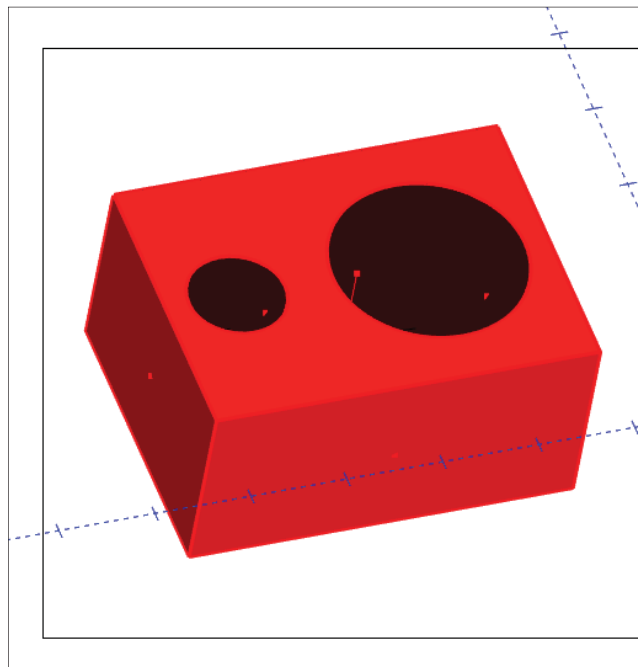
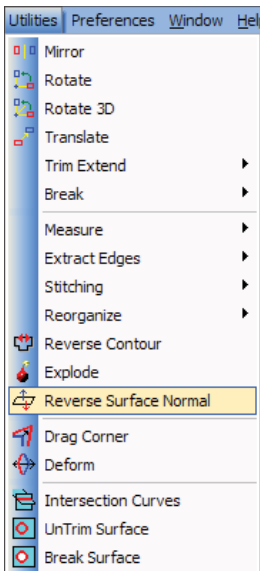


To illustrate what the surface normals look like for this solid before and after mirroring, click on **Views** in the main menu and choose **Surface Normal**. Lines will be displayed on each surface of the solids that indicate the direction of the normal. The solids here also have transparency enabled for the rendering (toggled with hotkey “T” on the keyboard).



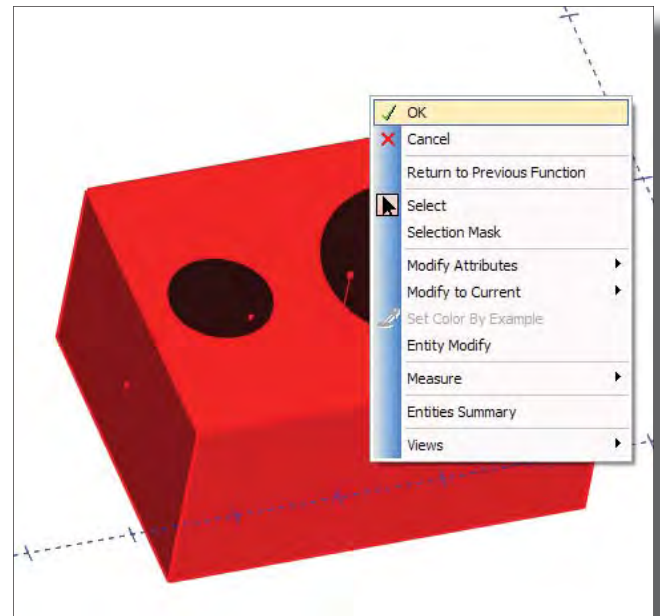
To fix this on any mirrored solid:

Step 1: Click on **Utilities** from the main menu and choose **Reverse Surface Normal**.



Click somewhere a little away from the solid that needs reversing. Hold down the mouse button and drag a box around the whole thing.

When it's highlighted all the way around, right click anywhere in the **Workspace** and choose **OK** from the menu.



BobCAD will reverse the surface normals for the mirrored solid. It will be identical to the original and ready to machine.

