

# CNC Machining

Richlite is a very dense product. It is very important to have a specific router bit for cutting it to protect the machine, the router bit and the safety of the operator. CNC machining is an excellent way to fabricate curves and large cutouts. Feed rates with CNC routers and machining centers vary depending on the tool. Please consult your machine tool sales person for more information regarding the specific application of cutting cellulose sheet phenolic resin panels.

The following technique is a good baseline to start:

- Machine example is MultiCam® 5000 Series.
- 1" to 2-1/4" – rough cut with Her-Saf® 1/2"+.015", or Vortex 5853, leaving an "onion skin" vacuuming out the dust from each pass, and finish with 1/2" compression. Feeds and speeds are 175 ipm (inches per min. or 4400mm/min.) and 16000 RPM for both.
- 1/4" to 3/4" – rough cut with 2 flute 3/8" down cut spiral or Vortex 4250 at 18000 RPM and 300 ipm leaving an "onion skin" vacuuming out the dust from each pass, and finish with 2 flute 3/8" compression bit at 18000 RPM and 200 ipm.
- Max depth of cut is 1/4" per pass. Rough cuts are 1/64" over-sized from final dimensions. Final pass cuts the 1/64" at full depth in a single cut, and the length of lead in (and lead out) of the cut are twice the thickness. Typically for all parts processed we do not cut all the way through the material until the finish cut. Leave a small "onion skin" (about 0.02" thick) at the bottom to help hold smaller pieces in place. Always lead in and out of cuts at a 45 degree angle with a 1.5" lead in.
- Drilling: Rotation 4000 RPM, lowering speed for 5mm bit is 1500mm per minute, slower for larger bits.

## Recommendations & Other Experience

Her-Saf® bits are good to use for the roughing process. These bits are designed with a removable down cut head 5/8" in length. The cost of the head is about half of the solid carbide spirals, and are interchangeable with other sizes. Primary bit is the #H-0515 (1/2"+.015") on a 1/2" shank. The extra .015" is intended to make a full dado cut in a single pass for 1/2" material. That extra size also makes a good amount of clearance for the rest of shaft when cutting deeper than the cutting head. One can use two different lengths of 1/2" shanks to mount the bits. The #HA-50AL is a 2-3/8" shank that is good for material up to 1-1/4" thick, and the #HA-50AT at 3-1/4" length works for material up to 2-1/4" thick. ([www.hersaf.com](http://www.hersaf.com))

When using the Her-Saf® bits (or any downcut bit) to cut Richlite – Remove the dust from each pass. Vacuum it or blow it out with compressed air – removing the dust from the cut on each pass will double the life span of your downcut bits. Spraying bits with Bostik® Bladecote™ (formerly known as DRICOTE®) will also lengthen tool life considerably.

For the finish bit use Onsrud® #60-172 1/2", 2 edge compression bit, 1 5/8" cutting edge to remove the final 1/64" at 16,000 rpm and 4,400 mm/minute. This gives a very good finished edge for material 1" to 1 1/2" thick material, and lasts much longer. This bit will not work on 3/4" or thinner material because of its cutter configuration. For the 3/4" material use Onsrud® #57-320 (3/8" 2 edge downcut spiral) for rough cuts and Onsrud® #60-123MW (3/8" 2 edge Compression bit 7/8" cutting edge) for the finishing cut.