CNC Use in Making Segmented Bowls
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Introduction

I have posted three segmented bowls for which I used a CNC to make some of the bowl's elements. This article provides a brief overview of the processes involved in using the CNC. I also used a laser for two of the bowls – this use is described in another article "Laser Use in Making Segmented Bowls".

I have always been intrigued by CNC use in amateur woodworking. A year or so ago, I built two wooden clocks using a CNC to make the gears. For the second clock, pictured at the end of this article, I pulled out my lathe, that hadn't been used in years, to make clock parts. I used segmentation techniques for the weight holder. I decided to pursue segmentation turning bringing with me the CNC experience.

CNC allows me to create bowl elements that I could not use other techniques to do that I'm aware of. First CNC use was making the card suits on the 50th Anniversary Bowl, and shown below. The second use was for ovals on my entry in the Spring '12 Challenge.
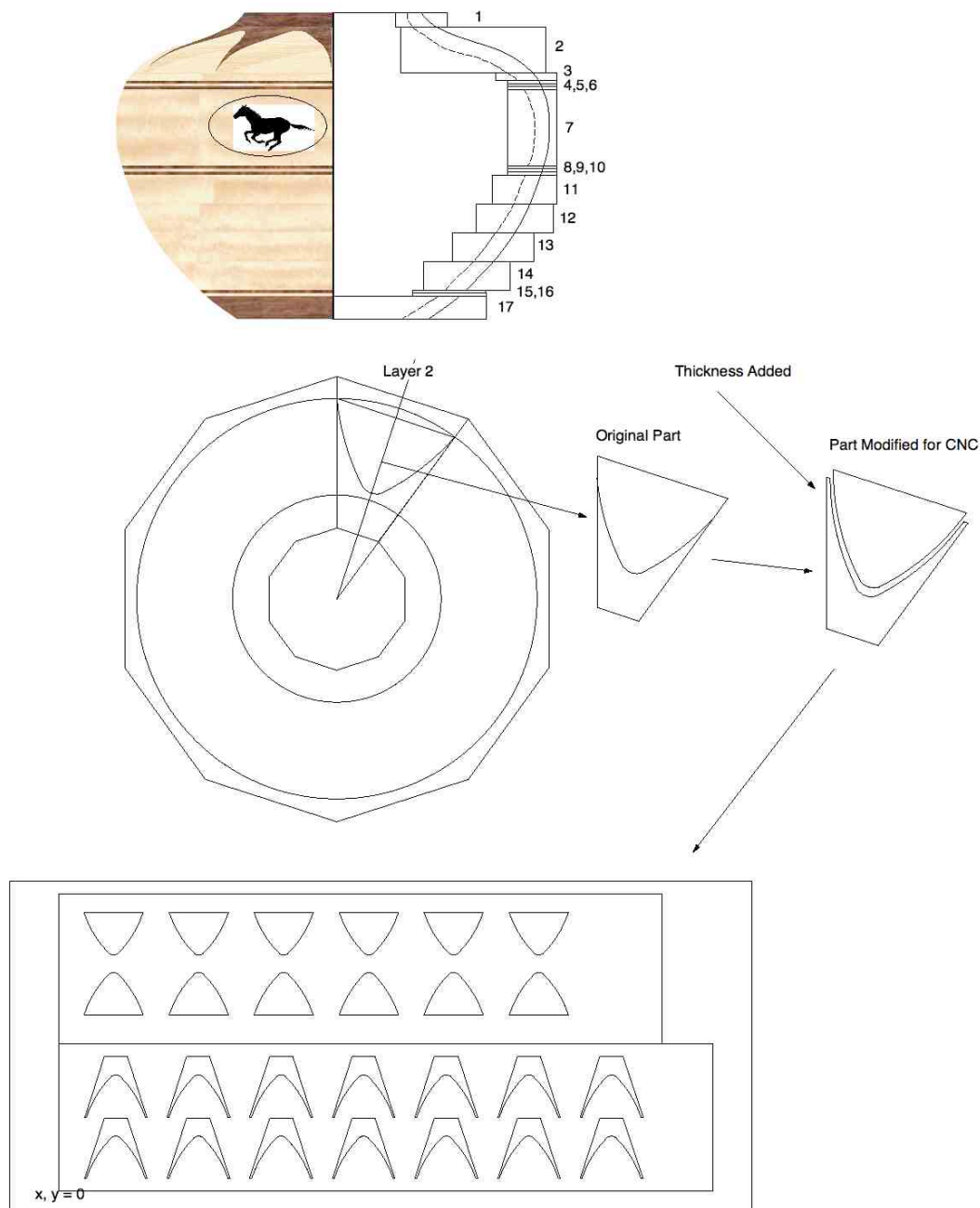

For both the 60th Anniversary and Another 50th Anniversary Bowl CNC is used to make the top scallops, shown below. The scallops are all curved lines – no circles or straight lines. It is the scallop implementation that is described below.


CNC Implementation

I use VectorWorks on an old MAC for bowls design. The "Another 50th Anniversary Bowl" design flow is shown below.

Once the bowl's profile and layers are designed, the layer 2 parts are detailed. In some cases, the part design needs modification if the CNC is used. In this case, thickness is added to the base, allowing additional material for sanding to get crisp scallop points. These modified parts are placed on a separate drawing, replicated, arranged to fit the material, oriented appropriately, and router bit clearance accommodated. It is this drawing that is exported to the CNC.

The CNC operation can be broken down to two top-level steps – generation of the necessary CNC command files and the execution of these command files. ShopBot provides a program, Partworks, to aid in the generation of the command files. The above file is imported and additional parameters are input such as, material size and thickness. Multiple passes are normally required. For each pass, parts or parts of part are selected, bit selection, and cut depth and cut direction are specified. The resulting command file is transferred to the real-time control program, ShopBot Control.

The material is secured to the CNC bed. The router bit is zeroed to the top of the material and zero on the drawing. Typically, I cut one set of parts to make sure everything is setup correctly and if so, remaining parts are cut.
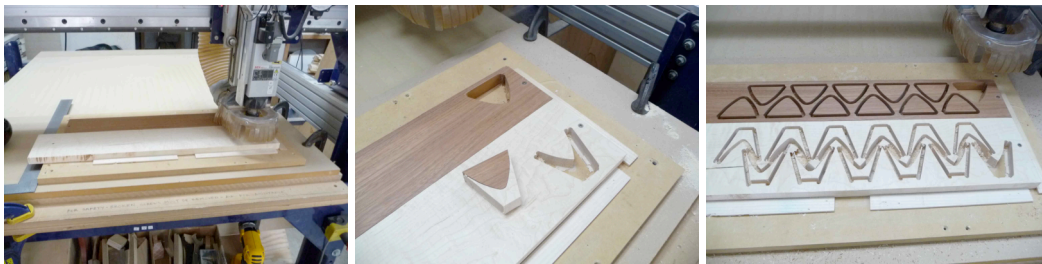
Once the pieces are cut and separated, parts are glued together and sanded to dimension. The process then proceeds normally.

If doing a closed form, card suits or ovals, the process is roughly the same, except the Partworks' inlay function is used which allows the specification of the tightness of fit between the two parts. A typical layout is shown below.
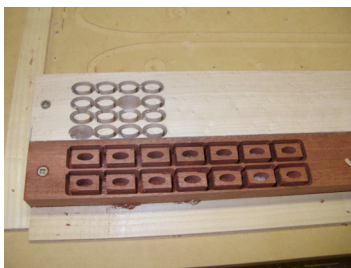
When doing an oval with multiple inserts, the oval inserts are cut, the biggest oval separated, glued in the segment, and another CNC command file is executed to machine the glued insert to fit the next size. The process is repeated for the number of inserts.

Conclusion

Certainly CNCs are not readily available to everyone. However, more and more companies are making tabletop CNCs aimed at amateurs. For the adventuresome DIYers, numerous companies offer CNC components. I have access to a ShopBot CNC through my membership in the Sawdust Shop in Sunnyvale, CA. The Sawdust Shop is a

complete woodworking shop with excellent support staff. At least in the San Francisco Bay area, membership shops are becoming popular.

There is no question that use of the CNC brings with it a whole new set of complexities and challenges (good for my retirement). There is a significant learning curve. Having said this, CNC has allowed the incorporation of unusual elements in my bowls.