VIRTUAL ORNAMENTS
Robert J. Krawczyk

A few years ago I began to investigate the concepts of art-to-part and single part custom manufacturing. The original designs were created on a CAD system either manually or by algorithm and then machine produced without any manual intervention. Rapid prototyping and laser cutting technology were both reviewed and the later selected for possible use. I also had a long time interest in geometric design. At that time one of my CAD classes took some of their window designs, created from a complex series of overlapping circles, arcs, and splines, and had them laser cut. The results were astonishing.

With the holidays not too far off, and being an avid ornament collector, I thought that laser cut ornaments would be an interesting way to try this technology. The ones I had first seen were created from wood with a thickness of 1/8" to 1/4". They were very bulky compared to the fine cuts that were used to create them. I also wanted to use wood, but wanted the material and designs to match the precise cutting that was possible. After some experimentation, I settled on 1/16" mahogany, with each ornament being approximately 3" in diameter. The result was a very delicate almost lace-like quality design. The laser cut burns the material, so the edges of the cut are black while the faces remain the natural finish. The burning also gives off an unique aroma, even a year later.

The initial set of designs were based on abstractions of Russian and Egyptian Ornamental, Polish Paper Cut, Prairie School and Victorian Stained Glass designs. Other included Snowflake, Chinese Ornamental, Arabian Stone and general Geometric designs. The current series can be viewed at the www.netcom.com/~bitart website.

The current series was accepted into the Illinois Artisans program and as time went on a few fine art craft shops around the country purchased them. This last season, I intended to add to these designs, but started to think about a three dimensional version. To investigate this possibility I decided to craft them digitally before attempting to construct them physically.

The three dimensional digital designs became increasingly more interesting than actually making them, that at this time they only remain in their digital forms. These ornaments are composed from their laser cut counterparts by assembling them across the major axes of a sphere. The starting point was usually two vertical elements and one horizontal element. Since the symmetry varies, some of the vertical placements were made across the diagonal axis. The Prairie School Stained Glass design was formed by crossing two designs and then placing four other ones around the edges in a boxlike arrangement. Also for the holidays I “painted” them traditional holiday colors; the actual ones would remain a natural wood finish.

Depending on the original design, the intersecting edges became increasingly more complex, as did the center of each ornament. The ability of digitally joining these designs is far more capable than what may be physically possible. Some of these will not be possible to actually reproduce using their original laser cut pieces. But using self supporting rapid prototyping technology, all might be possible. I will have to wait till next season to see how that might turn out.

Robert J. Krawczyk is a Lecturer in the College of Architecture at the Illinois Institute of Technology in Chicago. He has been teaching digital courses for the last sixteen years; from 2D and 3D CAD and image composition to animation and CAD programming in form generation; and advisor in the Doctoral program in digital applications. His work was recently accepted in InterSculpt’99, the 1st International Digital Sculpture Competition and Exhibit held in Paris.