

TAG Grant

3D Modeling and Rendering for Glassmaking

By Jin Won Han

Thanks to the Glass Art Society, I received the Technology Advancing Glass (TAG) grant in 2015. My proposed project was to create a series of video tutorials about how to apply 3D computer modeling and rendering to glassmaking. The contents of the videos will be specially designed for glassmakers. Each clip will introduce a different way of drawing glass objects in a modeling software called Cinema 4D.

The Beginning

The first time I learned 3D modeling skills was in 1992. I started with a program called 3D Studio Max. I was a freshman full of curiosity, and I tried to experience a lot of different mediums such as glass, ceramic, metal, drama, robotics, and computer graphics without knowing how to merge them into my work.

In 2007, at Pilchuck Glass School, I had an opportunity to take a class titled “Mind Meets Matter” taught by Ken Rinaldo and Joe Cariati. The class was about combining two skills, 3D modeling and glassblowing. In the morning portion of the class, we learned how to use Cinema 4D to design objects and create 3D renderings. In the afternoon, we brought our designs into the hotshop to realize our virtual creations.

I was fascinated by the idea of the combining these two media, and I saw the benefits of using 3D modeling for designing glass. Since then, I have been developing new methods for using Cinema 4D to create some of my glass works.

Why 3D rendering?

3D modeling and rendering is a useful tool for designing glass. Unlike two-dimensional sketches, 3D modeled objects can be observed from every direction. Unlike 3D mock-ups with an opaque material such as clay or plaster, 3D rendered objects can have textures with glass-like characteristics such as transparency, translucency, reflection, and refraction. These features give the designer a better idea of what the real glass object will look like.

Once the main body of an object is drawn with the program, modifications can be made quickly, so refining designs becomes more flexible and efficient. The benefits are even greater when you design more complex works such as large-scale structures with multiple components.

Due to the accurate and realistic visualizations, 3D modeling and rendering also become a powerful tool for collaborative and commissioned work. It helps in showcasing and sharing one’s ideas with others.

Glass Boat Project

Glass is a picky material. It rarely allows us to make mistakes. 3D modeling can be a good planning tool to avoid the risks. In 2012, I started to build an eight foot long bubbly glass boat. Before I started, I created rendered images of the boat to figure out how many bubbles and glass bars I would need. With the model, I was able to measure the amount of materials needed and determine the length of time I would need to complete the project.

Mandala Project

Currently I am working on a project, creating geometric patterns with variety of elements, named *Mandala*. For the project, I am using Cinema 4D to help navigate complicated patterns. To create the object, I first drew each element and arrayed multiples. Then, I added more layers by repeating the elements in different sizes and positions. With the computer, I could easily adjust and organize the elements to create complex designs in short time.

Once the design was finalized, I printed the layers separately and used them as guidelines for hot torch assembly. In this type of work, I want to minimize the chance of redoing or fixing since that would create a higher risk of cracking the whole piece. The 3D modeling and rendering helps me not only visualize the object, but also prepare the steps, so the frameworking process becomes more predictable and successful.

Teaching Experience

I have taught 3D modeling and rendering at workshops throughout the country. In 2009 and 2012, I conducted a frameworking demo sessions at the GAS conference introducing this method to glassmakers. In 2010, at Penland School of Crafts, I taught a class titled "From Virtual to Real" that covered both frameworking and 3D computer modeling techniques. I also taught a similar course, "In Your Wildest Dreams," at Pilchuck Glass School in 2014. Through demos and the teaching experiences, I believe that I have developed good insights on how to utilize 3D modeling for glassmaking and how to introduce it to glassblowers.

Let's Draw Glass in 3D

Let's Draw Glass in 3D is a series of video tutorials that introduce how to apply 3D computer modeling to glassmaking. The series is still in process and will be composed of 11 clips. Each clip will be about ten minutes long and will show different ways of drawing glass objects with Cinema 4D. The tutorials were recorded with Cinema 4D R15.

Contents

1. Why 3D rendering? (<https://vimeo.com/101446228>)
2. How to draw solid forms (Primitives) (<https://vimeo.com/170290702>)
3. How to draw blown forms (Lathe NURBS)
4. Deforming (Bend, Twist, Tape)

5. Cold cut (Boole)
6. How to draw linear forms (Sweep NURBS)
7. Assembling (Array, Metaball, Symmetry)
8. How to make glass glassy (Textures)
9. How to make glass shine (Light and Camera)
10. How to make glass explode (Simple Animation)
11. Fun effects (Stained glass, Bas Relief)

In the first video, *Why 3D Rendering?*, I explain the benefits of using 3D modeling for glassmaking and provide some examples of my work, designed with the software, to motivate the viewers. From the second video to the last, I am introducing basic skills to create glass objects. I am trying to make each lesson simple and easy enough to encourage beginners. As an application, some of the clips will show how to make glass pieces by famous glass artists.

The final videos will be available on Youtube, Vimeo, and the GAS Video Library (www.glassart.org/VideoLibrary.html) in November 2016.

Maxon, the producer of Cinema 4D, offers a 42-day free trial version of their software, and you can download it from their website, www.maxon.net. For students, you can download a 18-month trial when you submit proof of being a student. You can also check Maxon's tutorial series titled "Getting Stared with CINEMA 4D" at www.cineversity.com.

People often say "every material speaks its own language." I think every technique speaks in different ways and results in different outcomes. For me, adapting different techniques is always thrilling. 3D modeling has been helping me develop unique designs in flameworking. Through ongoing experiments, I believe I can create many exciting hybrids of 3D modeling and glass.

I hope that my video series initiates more interest in utilizing 3D modeling, and I hope it helps more glassmakers step into a world of new possibility.

Jin Won Han was born in South Korea. After finishing a BFA and MFA in metal crafts at the Seoul National University, she moved to the U.S. to study glass at the Rhode Island School of Design. After she received an MFA in glass, she taught at Rochester Institute of Technology and worked as an adjunct research professor at the University of Western Ontario. Han has presented many visiting artist lectures and demonstrations internationally. She is currently working as a lecturer at the University of Sydney. Since 1992, she has been interested in a variety of materials and methods, including metal craft, ceramics, glass, performing arts, robotics, and computer graphics. She enjoys interdisciplinary works. Currently she is mainly working with 3D modeling and flameworking.

