



LEFT: Del Harrow shows students how to take accurate measurements for use in creating the CAD model. Photograph: Kim Hudson, 2014. BEHIND, RIGHT: A sketch of Del's ideas for the interior design of the Artstream, 2014.

The first pot I ever bought was from the Artstream. I was living in Austin, Texas, and the Artstream Nomadic Gallery came to the city at the invitation of the Art of the Pot, an Austin-based pottery collective. I probably visited the Artstream three times before I decided that I had to buy that teapot. The following year, I was lucky enough to meet Alleghany Meadows, Artstream's founder, at a workshop and to learn a little more about the history and philosophy of his traveling gallery.

Three-and-a-half years after buying my pot, I moved to Fort Collins, Colorado, to do a postbaccalaureate year at Colorado State University. One of the exciting aspects of joining the program for me was having access to the digital fabrication lab that Del Harrow has helped build there. I became the teaching assistant for Del's digital fabrication course and was ecstatic to learn the focus of the class would be to design and build an interior for a second Airstream trailer. My role was unique: I got to be a student at some moments and a teacher at others. Like the students, I had never been involved in anything like this before. I felt a personal connection to the Artstream, and I was thrilled to be involved in designing how a new group of people would view ceramic art.

Del had a detailed syllabus and schedule for the class, but since the premise of the class was new for everyone involved, he and I were constantly changing and adapting the plans. One of the biggest challenges was the number of methods, techniques, and ideas the students had to learn to navigate the project from start to finish. Del and I often talked about how we could use a whole semester just to teach any one of the skills that were needed: learn the computer-aid-

ed-design (CAD) software, develop design methodology and processes, work as a team for a client, and learn the skills required for building the final product. Del made sure the students understood that all of these aspects were important and connected and that they influenced each other.

At the beginning of the course, the students met with Alleghany to learn about the first Artstream and what he wanted for the new one. None of the students had experience in ceramics, so part of what they learned was what the Artstream does and why it is important to the ceramic community. In conjunction with Alleghany's visit, each student researched and presented a project that used digital fabrication. These presentations spanned everything from outdoor pavilions to clothing.

In this first meeting, we all began to understand some of the design considerations and problems we would be tackling. One of Alleghany's main requests was that our design be modular, allowing it to be taken out of the trailer and displayed. After a lot of brainstorming, we decided that other important design considerations were the successful display of ceramics, durability, the shape and feeling created by the interior space, the comfort and experience of the Airstream's visitors, the Americana theme inspired by the classic Airstream trailer, and the role of digital fabrication in its creation.

With these design considerations in mind, Del and I started teaching the students some of the technical knowledge they would need, such as how to use Rhino, the main CAD program we were using. When they had learned the basics of building, combining, and altering three-dimensional shapes, we had them measure the Airstream

trailer, then make a scale model of it in Rhino. Because the Airstream is made from flat sheets of aluminum, the students were able to build scale models out of laser-cut paper, and later out of sheets of aluminum that were water-jet cut and riveted together. They were learning about the process, challenges, and rewards of taking something from theoretical computer model to physical object. During the semester, the students brought in material samples to test how they behaved and how they might work in the final design. Moving back and forth between initial design ideas, building the CAD model, and producing physical models were major parts of the class. It became clear that all three stages greatly influenced each other, and if we were going to build an interior for the new Artstream by the end of the semester, we would have to find a synergy of the three stages.

Unlike most college art courses, where students work mainly on their own projects, the goal of this class was to work as one group to design and finish one project. Before we settled on the design, Del broke the class of seven students into two groups, and they used all the design and technical information they had gathered to put together a presentation on their group's design for the Artstream 2.0. Alleghany, Del, and I would then decide on one design. These presentations required the students to show a cohesive design concept with research, drawings, CAD models, and 3-D-printed models. From this part of the course, the students got the invaluable experience of presenting ideas to a client and getting feedback, both positive and negative.

The students put a lot of work into their presentations and models, but their designs crowded the Airstream's interior and called

Schuler and Nettie Thompson took it upon themselves to learn Rhino thoroughly, and they produced extremely detailed and beautiful CAD models. We used these models to build a scale model of the interior fitted for the aluminum Airstream model. Kim Hudson and Madi Morris focused on the color scheme, lighting, and fabric details, while Cierra Lorenz and Luc Raschbacher were in charge of documenting the whole process and compiling a presentation. The students realized that with so many elements working together, someone was needed to oversee and organize scheduling and communication between different areas; Cydney Hurt took on this role.

The students presented the new model to Alleghany, and once he approved it, the class turned its attention to the challenge of building the full-scale version. We decided to use the Computer Numerical Control (CNC) router to cut all of the parts out of plywood. Some people have a misconception that just because something is made using digital fabrication, it is fast, easy, and a machine does all the work. This was definitely not the case. Each sheet of plywood needed to be set up carefully, and we needed to check that the code we gave the machine was correct. It took from one to two hours to cut one piece of plywood. We arranged a schedule of students to set up and monitor the CNC router while it cut the sheets, and then we had to hand sand every piece, and glue and screw it all together.

When we were handling and assembling our final product, there were moments when we realized that if we had changed some aspect of our design in the CAD model, it would have made assembly easier. It was

important to see how all of the decisions made while making the CAD model manifested themselves in the physical world. One of the challenges of using digital fabrication is to connect the theoretical world of the computer to the real world, where the product must function as intended. When we installed our full-scale design in the Airstream, we felt a sense of accomplishment in transforming an abstract idea, to a picture in the computer, to a tiny model, to a full-size functional gallery.

As the teaching assistant in the class, I saw how the students interacted and worked together in groups as well as how Del oversaw the class as a project leader might oversee his team in a real-world setting. Del adapted the overall plans as the semester progressed and recognized how the different strengths of each student could be employed to reach our objective. Working with a client (Alleghany) and experiencing the back and forth between the design team and the client required us to make decisions about when to change our design, or when to stick to our guns and convince the client that our solution was the best for the situation. I also gained an incredible amount of technical knowledge. I had had some experience with Rhino before the class, but helping the students I learned so much more. The amount of detail behind a project like this was something I could not have imagined before this class.

When the students had mostly finished the CAD model, it was handed to me to make final touches, such as making sure the slotted

attachments between the shelves and trusses fit and transferring the files to the CNC router. I had no idea beforehand how many times I would have to tweak little things in the CAD model and how much thousandths of an inch would matter. The advantages of using digital fabrication to build – precision, easier assembly, complex geometry and design, repetition – were not realized without putting in an incredible amount of work hours.

As I look forward to my life in ceramics, I know I will carry many of the things I learned in this class with me. Of course, the technical knowledge will be useful in my work and life, but I have also become acutely aware of how these experiences build important personal connections and open doors for opportunities. I never could have imagined three years ago when I bought my first pot from the Artstream, that I would get to know Alleghany so well and be a part of building the Artstream 2.0.



ABOVE: Interior construction of the Artstream 2.0. From L to R, Alleghany Meadows, Del Harrow, Camila Friedman-Gerlicz. Photograph courtesy of Alleghany Meadows.