Megumi Naitoh's *Basket of Mushrooms*, 4 ft. (1.2 m) in length, slip cast, 2017.

DIGITAL BY DESIGN

by Adam Chau

Over the last few years I have seen a large paradigm shift for how ceramic technology (and interest in technology) is talked about and used. While industrial design is becoming more established within the university system in the US, ceramic programs across the country are also adopting ceramic design courses. Fablabs and digital maker spaces are popping up and it seems like every school is trying to keep up with the Joneses. With this rapid increase in infrastructure, I am wary of the perhaps overzealous interest and potential lack of resources to appropriate software, troubleshooting, and (most importantly) foundation in design theory. Contextualizing the design field within the ceramics community, seeing the ways it is being blended with art and craft, and exploring the new creative genre that blends both digital manufacturing and handmade craft can help artists avoid the potential pitfalls.

Prior to the boom of design interest, the circles of makers I know had seen mass production as an opposing force that had little capacity for creative output. I remember frequent conversations about how to broach the subject on why handmade was better than industrial ceramics and the need to educate the consumer market. This sentiment emerged for two reasons: mass-produced ceramics was not tapping into high-quality designers and studio makers did not fully understand the process of factory production. Since then, I have seen great strides in corporations hiring artists and designers with branded/identifiable aesthetics (Marcel Wanders for Target or Molly Hatch, Linda Fahey, and Bean and Bailey for Anthropologie). I have also seen an exponential increase in makers using industrial techniques like ram pressing, slip casting, and decals. The next step is figuring out how digital technology fits into all of this.

What is Design Anyway?

Design is a fleeting term with multiple uses. It often gets batted around when an object looks clean, linear, or is part of a series. This mix up can be illustrated in the work of Donald Judd, which has an industrial aesthetic that was not streamlined and took an exceptional amount of effort to produce. Design is a plan including calculated concepts and fabrication decisions that is made prior to creation. Think of someone throwing a vase—have they already thought about exactly what it will look like in the end or do they

go with the flow and make formal decisions while making? Some potters, of course, employ both of these strategies; however, the former approach is the calling card of design.

Digital technology seems to fit into design perfectly because setting up files, exporting to machinery, and having a hands-off approach to fabrication seem removed from intuitive and on-the-spot decision making. In the translation from machine to object there is an area that needs to be explored further because it allows for alteration to the finished piece. The following artists illustrate this idea as well as expand on their experiences in blending the nexus of art, craft, and design.

Digital Technology Changes Our Perceptions

Megumi Naitoh, an associate professor of art at Emmanuel College, dissects how digital technology changes our perception of communication, composition, and curation. Previously investigating visual imagery bit-by-bit by compiling mosaics to reference pixels on a screen, she has now developed a technique titled *Orime Ware* that celebrates traditional crafts while simultaneously referencing and pulling from digital culture.

Orime Ware is made with 3D models and an Origami-like technique combined with slip casting. Naitoh models a three-dimensional form and then digitally unfolds it into a two-dimensional pattern. Once printed on paper, the cut-out pattern will be folded into a voluminous form that is the real-life representation of the digital model. Plaster is poured into the cavity of this shell to create a plaster positive of the digital form. From there, the traditional mold-making process takes place for slip casting.

Not only is the technique based on innovative digital processes, but the content is also ripe with commentary on the digital world. We all know that internet searches can bring up random content that is far removed from what we are looking for; this is exactly what Naitoh exploits. Open-source digital models also have their own search engines and Naitoh searches everything from mushrooms to peaches, and consequently comes up with results that include both the fruit and the character Princess Peach from the Super Mario video game. Context is essential because the only connector to these disparate things is the Internet. Naitoh combines both technique and content, creating the perfect storm to consider how digital spaces are mediating our daily lives.

When asked about how institutions can adopt new technologies into their programs, Naitoh replied:

"The ideal scenario is that the major of study should be more fluid. This means less major requirements and more electives. However, this requires a certain environment where a variety of classes are offered. It is difficult to introduce these technologies into a specific traditional curriculum without covering all the other components of study. I introduce these technologies into my traditional foundation classes and entry-level ceramics classes. Three-dimensional printing takes a long time and without the availability of support or technical assistance, I can only demonstrate these to my students; they can't all get involved in modeling and printing at the same time. This requires a lab setup with suitable support and tech support available."

2, 3 Katie Bunnell's *Chongonka Series (alternate view)*, 7 in. (18 cm) in diameter, handbuilt Parian porcelain, digitally inlaid color slip, 2015.

Augmenting Our Field with Digital Technology

Across the pond in England is a maker and educator invested in the evolution of craft technologies. Katie Bunnell, PhD has been at the forefront of this conversation since the 1990s. Recently she led "All Makers Now," a conference at Falmouth University looking at how digital technologies can augment the current creative industry; it was hosted by the research cluster Autonomatic that Bunnell founded in 2003.

While studying Industrial Design, I found Bunnell's research and Autonomatic group when I began doubting the field as pressures in the pursuit of perfection were mounting. Bunnell's research offers an unmatched balance between production and one-of-a-kind works. I reached out to ask what inspired her hybrid way of working and how that fits in with the educational institution.

"When I first started playing with digital technologies in the late 1990s I was excited by the potential advantages they had to offer in enabling new scales of production from bespoke to mass and with a huge amount of flexibility between," Bunnell explained. "We have very few ceramic courses left in the UK; I think it is important that students are taught design skills that enable them to produce objects of great beauty and worth, using whatever technologies are appropriate. The development of low-cost and DIY digital production technologies has improved access and first-hand experience of them for art and design departments."

"If the focus of a course is on ceramics as a specific material, then learning how to work with that material is first and foremost and skills should be learned through experiencing them as part of a real studio project. Showing examples of the most exciting works, both historical and contemporary, made using digital processes is always a great influencer. It is also vital to have teachers who are practitioners with experience of technologies working alongside excellent technicians. Students need to have the creative space to explore and experiment with materials and process in order to develop innovative ways of working and new visual aesthetics."

Bunnell's own work plays between digital and physical space through the surface of objects in a profound way. Unlike traditional techniques of adding or removing material to incorporate surface, she builds it into the object. Much like how throwing lines create surface, Bunnell's *Minecrafting* vessel has graphic images that are made with the relief images in the mold. By computer numerically controlled (CNC) milling onto a board, casting in silicone, then wrapping the silicone in a cone, she was able to create 3D volume using a 2D drawing.

Even more difficult, her *Chongonka* series uses slip to create thin slabs for building. Discussing the project, she explained, "Always on the hunt for possible ways of creating variation, complexity, and depth in ceramic surfaces produced using digital design and manufacturing processes, I experimented with using digital drawings to create low-relief surface patterns. I wanted to develop a system that involved more direct interaction with clay and made use of my CAD drawing skills. So working with a technologist I made a Superslippy machine, a low-cost, homemade CNC ceramic slip-trailing machine. I used the Superslippy to draw my CAD designs in porcelain slip onto a large plaster bat and then poured slip over the design to make a sheet of clay for handbuilding a pot."

Hybridization of Technique

Both Naitoh and Bunnell's ways of working uses tremendous knowledge of hand skill and digital design; both are needed equally in order to complete the task at hand. These examples show a hybridization of technique that can be applied to industrial and creative endeavors. Not a completely new concept, Malcolm McCullough's 1998 book *Abstracting Craft* lays the foundation for digital craft theory.

"Ultimately the computer is a means for combining the skillful hand with the reasoning mind. We never had such a tool . . . . Our use of computers ought not to be so much for automating tasks as for abstracting craft."

Megumi Naitoh's *Princess Peach Orime Ware*, slip-cast porcelain, soda fired, 2012.

This sentiment is an important step for craft theory. Without the adoption of digital technologies in its repertoire, the small and mid-production field is lacking contemporary knowledge to compete with its mass-production brother. McCullough argues that by seeing digital technology/fabrication as a craft we can extend its uses as both a tool and a medium. Implementing this into our education systems does not detract from traditional techniques, but augments the toolkit so craftspeople can more easily navigate the modern marketplace.

A Cyclical System

Paul Smith, Director Emeritus at what is now the MAD Museum in New York, New York, shared his thoughts on how students interested in technology should get a well-rounded education. His first curated exhibition at the museum in 1964 was, after all, titled "Designed for Production: The Craftsman's Approach."

"Cultivating a design focus is an important aspect of creating objects made for use and should be available as a choice of study in ceramic programs. New technology should be included as design software, 3D printing and other digital forms offer an expanded resource to traditional techniques for creating with clay."

Smith's curatorial history shows that this conversation isn't new. After his 1964 exhibition he opened a show named "New Tools of Design" in the 1970s that featured digital software including an interactive weaving program that created custom textile patterns—both a spectacle and a subversive message to the community at large to educate themselves to the evolution of the field.

Design and technology continuously evolve; as industry grows and changes so must the education system. Both Megumi Naitoh and Katie Bunnell are examples of how artist/educators are thinking of how new systems can be implemented in the studio and the classroom. Dissecting what design is and means is the first step for the institution, and afterward the infrastructure (both in curriculum and physical space) for digital technology must be built. This is a cyclical system as our understanding of process will keep on advancing and our eagerness for the next level is never satiated.

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