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This is an abridged transcript of a conversation between Nikolas Weinstein and Aaron Willette, a graduate student in the Masters of Science in Architecture, Digital Technologies, and Material Systems program at the University of Michigan on February 20, 2012.

Aaron Willette: In your work does the tool become an active player in the design process? I'm personally interested in the idea of machines and software participating in the design process rather than just being a production tool.

Nikolas Weinstein: We're a top-down as well as bottom-up practice. By that I mean we usually don't try and figure out what we can make for a space based on what we already know how to do. I'd say design is the principal driver. But at the same time it's an iterative process where we'll come up with an idea and then try and figure out how to make it; the technological constraints and possibilities push back and change the design and it keeps going back and forth.

Frei Otto is an obvious example of someone designing and doing a lot of monkeying around in the studio, trying things and letting the design evolve based on what he's learned. That's probably a pretty good description for how we work here. I obviously like technology a lot and we use it here a lot, but the technology is not really a part of the final piece. It allows the final artworks to be produced but it's not a subject of the finished sculptures.

I'd say that here the way that the technology plays itself out is that the final pieces are expressions of the problems we find interesting. If we come up with or encounter a weird process or a cool mistake we'll try to understand it better and play with it. To that extent the technology drives some of the design, but it's really secondary. A very important element, but still secondary.

AW : Your studio is the only precedent we've been able to find for someone doing similar work with these [types] of technologies.

NW: There's a company called North Sail that does stuff like this and there are technical precedents in the auto industry for forming windshields with a type of pin mold.

AW : At what level do you personally engage with the technology in the design process?

NW: When we were a smaller shop and everyone was less competent, I was more principally involved throughout the whole project. Now that we have a strong team and they know my shtick, a lot of the projects are informed more by whom I have working for me than the technologies I'm interested in. The projects tend to develop around core competencies. If we're strong at one point in a mechanical mode of thinking, the projects tend to develop around solutions that are mechanical. If we're strong in coding, a lot of the solutions will tend to develop around that. We're usually doing a couple of projects at once so the structure of the studio is probably more like a traditional professional arts studio where you'll have a

design director, like me who articulates the aesthetic intent and technical approach, and project managers, who help the project through logistics and completion.

AW : Now that you've invested the time to develop and explore these digital processes, how often are you or your team working without them?

NW: Most of the processes that we come up with are never completely controlled solutions and I'm not really interested in creating completely controlled solutions. As a designer, I don't find the idea of developing an idea and then exactly producing it overly interesting. I'm not interested in making projects that are exactly rendered in the computer and then exactly expressed. For example, technologies like rapid prototyping don't interest me beyond their use to make a component to work with. I tend to think of most of the projects we do as setting up a sculptural ecosystem along with the rules that govern that ecosystem.

It's helpful to think of it like a closed terrarium where there are some basic laws of physics and a couple of different organisms that you lock up in a box. Once you've defined those parameters, you control the rules of the game but you don't control what the outcome is. However, I'm not interested in it in the same way that Brian Eno or John Cage would be interested in it. I don't find the idea of random play interesting in itself.

In 19th century literature, there was a school called Naturalism where you would choose your characters and consider their attributes - —the novel itself was putting those characters together and letting them write their own plot. That's a slightly romanticized description of what we do here, but it is in a sense how I think of it. Part of what I do is try to generate some kind of fundamental sculptural DNA for a project and let the architectural space establish physical parameters for it to express against, for example, the art needs to be wide here and tall there. As a more specific example, we might arrange a pattern of glass tubes tilting to the left here and to the right there based on what the sculpture is supposed to do in that area, and then close the kiln door, get it hot, and let gravity play itself out and effectively sculpt the glass.. We usually try to not take charge of every single aspect of the forming process. We often have a lot of bad mistakes along with some very good ones. So in terms of whether I'm beholden to technology, I feel like the projects we come up with are complex enough and have enough undetermined elements that a hands-on crafty element is always there.

AW : When Ruskin talked about the Gothic, he took an "I can't say what craftsmanship is but I know it when I see it" approach. How would you identify craftsmanship within your own work?

NW: I don't know if I'd call it craftsmanship. I certainly think that's a component but I esteem a project's success by whether it feels "alive," if on some level the sculptures are able to transcend their own construction. So that when you look at them you don't firstly perceive that they're an agglomeration of glass tubes, more that your first impression is, "Look at that wild, crazy billowing whatever it is," and then maybe your second or third impression is an assessment of how it's working or what it's made from. If you're able to transcend the means of construction then I think you've been successful on some level. I don't think that's a reasonable litmus for whether it's got craftsmanship or not but for me it's very closely tied to it. Potters would say that a pot has craftsmanship if you can feel the touch of the hand in the final piece. To a similar degree I assess whether a piece has been successful if it feels alive unto itself.

AW : Like I said earlier, so far you're the only identifiable precedent for us regarding the method. Do you mind talking about why you decided to take up the automated pin-tooling kiln as a means of production? According to your website you outsourced its fabrication—did you have a clear idea of what you were looking for from it?

NW: I didn't have a clear idea, it was not a logical progression toward a preconceived idea of how to solve something. There were a lot of problems that lead to it and I was trying to

collapse two or three different processes into a single process. Having a dynamic bed allowed you to shortcut the whole idea of using one kiln for one thing and then putting it in a different kiln for another thing. If you could combine those processes by having a dynamic bed it was a huge time saver. It also had some very profound benefits in terms of the fragility of the glass and the constructions we were doing at that particular time. Making it into a single process solved a bunch of problems in terms of time, breaking, and mold expenses. It was a solution that came about after a lot of head banging. It was one of those moments that seemed to simultaneously solve about five or six problems and engender about seven others!

AW : Has the kiln itself become an ongoing project? Have there been modifications to it over time?

NW: We're constantly drilling holes in it, ripping it apart, making different beds for it. It's been Frankenstein-ed.

AW : Has there been any interest in controlling the individual movements of the pins or to automate the setting process?

NW: We've thought about that a lot. Honestly, for what we do, we ultimately decided that while it may be sexy it doesn't get us further faster. In some ways you have more control not having them automated. We've had lots of conversations about all the kind of things you could do with it, but you could also do a lot more by just climbing under the kiln and grabbing a peg and pushing it up or down and twisting another one. If you mechanized that, it would take a really long time (laughs).

AW : You mentioned North Sail earlier as an industry company using similar technologies. Are you familiar with any instances of this approach outside of industrial production?

NW: I don't know of any. Craftspeople in general have a lot of ingenuity but it's usually not harnessed toward higher tech solutions. It's usually more about jury rigging things and coming up with smart stopgap solutions and personal timesaving devices. This is not the kind of crew where they spend a huge amount of time investing in avant-garde technologies.

AW : What level of connection is there between your software process and the kiln?

NW: We've automated or digitized everything other than the setting of the pegs. It's more elegant with Grasshopper but up until this point we have not put more time into refining the process because, quite honestly, after we figure something like that out we get bored and want to do something else (both laugh). We did a couple of projects with that kiln and then I started getting frustrated with the limitations of slumping. It always looks dead because it's just gravity dragging it down and you can never get past a 90 degree draft in a mold. We played around with it, and I'm not even sure we got a second project out of it before I started getting frustrated with it. We still use the kiln bed but now the bed has become the first step in a series of processes.

This happens with everything, whether it's the kiln bed or other projects we do. We'll get through one and be like, "Yeah, wow, that was cool." About two-thirds of the way through we'll be like, "Oh, but if you did this, then you could get that," and then we're heading off in another direction. Which isn't to say that refining the kiln bed wouldn't be great and I wouldn't love to do it, but my brain was already heading in a different aesthetic direction. That's probably a fundamental difference between where you're coming from and where I'm coming from. The principle engine for me is the sculptures and your principle concerns are tricking out the machine to be as tight and functional as you can make it.

AW : Stepping out to a much broader scale, do you see this mode of working we're talking about as an emerging trend within the craft arts, or is your studio more of an anomaly in the overall landscape?

NW: You know, I don't know if I'm particularly well placed to answer that. But I don't think this kind of stuff's going to go away. I do think the way we work here is a little anomalous. It's not that there aren't entrepreneurs or artists all over the place who developed their own technologies, be it mixing egg yolks with pigments to make their own paints or making some custom computer controlled machine, but I don't think there's anyone else doing it in glass and at the scale that I do it with regard to architecture. Yes, I think there are people who use these technologies and, yes, I think they'll continue to be emergent, but I think we're in a weird, highly specialized niche where I have essentially created a market and a sculptural process that's really just about what I'm interested in. I think it's unusual that you've got a couple of different things working together in the same space as there are plenty of architects who are "design/build" but not in the way you're talking about.

Someone once took me over to Edge Innovations. They built the whale for *Free Willy*, the snake for *Anaconda* and dolphins for *The Life Aquatic*. They need to make everything to do what they do: build their own machines, write their own software packages, do their own crazy mold casting and build their own robotic assemblies. They're unbelievable. I only bring them up because it's not just software and it's not just mechanics. There's an artistry to it. It's a different sort of geek but they are coming at it from an artistic perspective and none of the stuff they do to get there is obvious in the final object. You don't really appreciate or even see all the technology that goes into it because the technology is in service of a different end.