

**INTERVIEWER:** Today is February 8, 2012. I'm Chris Boebel. Today, we're talking with Larry Sass, Associate Professor of Architecture at MIT.

Professor Sass conducts research in the area of rapid prototyping and its relationship to building construction. His current research projects are focused on design fabrication, using computer modeling and prototyping as representational tools in the design process in place of traditional paper drawings.

Before coming to MIT, Professor Sass worked professionally as a project architect. His work has been exhibited at the Museum of Modern Art and also has been featured in many other exhibitions around the country. He holds a PhD and Master's degree in architecture from MIT and a Bachelor's degree from the Pratt Institute.

Professor Sass, thanks very much for coming in today to talk to us.

**SASS:** Oh, yes. This is an honor to do this.

**INTERVIEWER:** Well, thank you.

**SASS:** I'm really looking forward to it.

**INTERVIEWER:** So let's just talk a little bit about your path to MIT. You grew up in New York. Tell me about growing up?

**SASS:** So I grew up in Harlem. But it's technically Washington Heights. But Harlem was right down the hill from Washington Heights.

And I had two parents. I lived in a two-parent household. My mother was sort of a secretary in a high school. Actually the same high school that Manny Ramirez, the baseball player, went to. And she knew him when he was there. And my father was a clerk in the mailroom, in the mail room of a ad agency in downtown Manhattan.

And I went to local high schools, local high schools up until about the third grade. But that was part of busing program in New York, which I know they also had here in Boston.

And I went to a really nice high school, a high school of music and art. Which is different than the high school of performing arts, which was at the FAME high school.

And then after that I went to-- I actually didn't go straight into college. I went to a small technical school for about two years, called Institute of Design and Construction. And I learned drafting and sort of the fundamentals of construction.

And that was really because I couldn't get into college. I really had a had horrible high school life. And I needed some time to catch up.

And then after that, I went to Pratt. And just had a great time at Pratt. Applied to MIT.

**INTERVIEWER:** So how did you get interested in design? Was it something that was kind of always part of your life, even when you were a little kid?

**SASS:** Oh, no. Definitely not. But see, I'm one of these people, I wanted to be an architect since I was 12. And I wanted to practice in the industry of architecture since I was 12.

And I got into it through an uncle, my uncle Lawrence, who I'm named after. And he really taught me about design. And he was a graphic artist for Shearson Lehman Brothers.

And he explained to me how design worked. Most people never really talk about design. And he could actually really good conversation about it.

And he always had architectural magazines around his home. And I just loved going to his house. He always had beautiful things, well-designed things.

So he got me into architecture when I was about 12. He bought me a T-square and a triangle, one of those plastic triangles that you buy in a store. So that was my introduction to architecture.

**INTERVIEWER:** So for you, it was always design and architecture. I mean I'm thinking back to when I was 12. I don't think I knew what an architect was.

**SASS:** Well, the *Brady Bunch* was on at the time. So I really had a chance to see. Actually I realize there was only one episode that actually showed Michael Brady from above, where they showed the layout of his desk, the compass, the triangles, and I think his electrical razor.

And then I said, wow. That's an architect. That's how people designed buildings. And I really saw that as being very exciting.

**INTERVIEWER:** So I have a friend who is raising kids in New York. And he's got a son who may be a future architect. Who is just obsessed with the buildings of the city, bridges. I mean were you like that?

**SASS:** Oh, yeah.

**INTERVIEWER:** Did you find yourself going around the city?

**SASS:** Oh, yes. New York City, if you like buildings, you will love buildings, being in New York City. Growing up in New York, I rode my bike around the city. After a while, I felt like I knew every single building in the city. I knew all of the details on the buildings.

And I was really fascinated by the intricacy of moldings and how the moldings of the older buildings determined the scale. And the newer buildings that didn't have moldings, they still had scale to them. But they were just really different.

But every single building was fascinating to me, as a child. I was amazed watching a building go up.

**INTERVIEWER:** Were there styles that spoke to you at that point? Or was just kind of omniverse?

**SASS:** No. I think when I was a child, up until high school, I didn't really know what style was and what the variations between the styles were. I didn't really understand the difference between a modernist style and a neoclassical style or sort of the Beaux-Arts styles of New York City. I really didn't know the difference then.

**INTERVIEWER:** So when you went to Pratt, you went there with the intention of studying architecture seriously. I mean that was kind of your--

**SASS:** So when I started Pratt, I was 21. I had also worked at a French restaurant for about three years prior. And I'd worked starting as a dishwasher in high school. And worked my way up to cutting vegetables and working at the stove on a few occasions.

But by the time I started Pratt, I had left all of that behind. And I was really, really engaged in architecture. At that point I felt like I really, really knew that I want to be involved in architecture.

And so I took a lot of studios with every professor whose class I could get into. And I just absolutely fell in love with drawing, making models, learning art and its relationship to architecture. Because that was the really big thing back in the '80s, was identifying artists who had some influence over the industry of architecture. And seeing the correlations between the two fields growing.

**INTERVIEWER:** So let me just follow up with that. Give me an example of what you mean by artists influencing architecture?

**SASS:** So a good example I think might be Donald Judd, who created these beautiful modernist boxes and modern sculptures out of plastic and metal. And seeing other architects who were trying to make these pure modernist buildings with pure, modest details.

If I could think of an architect that was close, maybe of the time. Maybe Gwathmey Siegel or Richard Meier, and how they made these really gorgeous modernist boxes and modernist expressions with different forms, that were very similar to work of people like Donald Judd.

That's a really tough one. Because I think even at the time, people struggled to try to figure out what the relationship was. But New York City, the architecture scene always had a relationship with the museum scene. So whatever was going on as far as paintings and a new painter that would come out, the architecture world at least had some sort of discussion around them. There was always a little bit of a back and forth.

**INTERVIEWER:** So thinking back to the time you were at Pratt, when you were really starting to kind of get serious about pre-professional training to be an architect, what were your ambitions? I mean what kinds of buildings were you thinking about designing? And what kind of career trajectory were you thinking about?

**SASS:** I think at that time, I wanted to be like every other architect I really admired, Richard Rogers and Norman Foster. I hated Frank Gehry at the time. I remember in class, they would show his work. And I just couldn't understand it. I thought it was just God- awful.

And I really wanted to be a sole practitioner. I wanted to do my own work. I wasn't interested in working for other architects. But I knew that you needed to do that in order to get licensed and move on to your own practice. But I wanted to be like everyone else, and do my own work.

**INTERVIEWER:** So of the choices you had or that you could have made, what made you think about MIT as a place to go to?

**SASS:** Oh, I must say actually I hadn't heard of MIT until I was 21 years of age. I heard about it for the first time when these two friends of mine, these two sisters, one of them got into Stanford. And then a year later, another one got into-- no, I'm sorry. One of them got into MIT. And then a year later, one of them got into Stanford.

And I had heard about MIT for the first time at her house. And I asked somebody what it was? And they said oh, that's a really big technical school in Massachusetts.

So by the time that I had graduated from my undergraduate, from Pratt, I knew I needed to go back to graduate school. But it wasn't on my mind.

I had worked for about six months for a small architectural firm. And then I got laid off in, I think it was 1990, the late summer of 1990. But that was during the first Bush years.

And that was a real turning point for me. And that was because I just couldn't find a job. I took my resume around to every architectural firm I could think of at the time. And I just struggled to find work.

And by the time the winter time rolled around, my unemployment insurance had started running out. And I had very quickly just ran out of money and started on public assistance for a little while.

And that was really painful, because my parents were on public assistance when I was a child. And to go back to that and sort of relive, still living in Harlem and still living in the same building that I grew up in, was just a really painful time.

So then I started looking very hard at one of two options, either going to graduate school or working. Really, really trying hard to get a job at an office somewhere in New York. And I took a trip up to Massachusetts with a girlfriend at the time.

And we looked at Harvard and Yale. On the way up, we looked at Yale. And then I arrived at MIT.

And I said wow, this is just a great place. I had met so many just very basic down-to-earth people who were really interested in the social aspects of architecture. And that's really drew me to apply to MIT.

But the first time I applied, I applied to a number of places. And I withdrew my application. I actually didn't send a lot of them in, because I knew my work wasn't ready.

And then I waited a year later. And that was good. And then I managed to get accepted into the program.

**INTERVIEWER:** So I'm really in this idea of the social aspect of architecture, which is obviously a thread that I see that has run through your work. Is that something that from the beginning was there in your mind? I mean when you were at Pratt, when you were training?

Describe what you mean by that and the kinds of issues that you were dealing with or wrestling with?

**SASS:** I think when I was at Pratt, I think I was more concerned with the artistic side of the industry. I was really into the visual aspects of the industry, doing things that were poetic.

By the time I came to MIT I had really said to myself, architecture should have a greater influence over the environment, over the architectural environment for people who were struggling. And that architects are people who can make that environment beautiful.

Little did I know that so much of the environment and design environment of poor neighborhoods really had a lot to do with politics. I assumed that the architect had a lot more power than they really do.

So when I applied to the school, I still really believed in all of the values that I had during my application. The idea of taking really rough streets and turning them into really beautiful works of architecture, socially organizing cities to match the culture, not imposing sort of a broad view of architecture onto one culture. Really looking at the culture very carefully in the planning process.

So those really stuck with me from I'd say the end of my time at Pratt to beginning of my time at MIT.

**INTERVIEWER:** One thing I'm curious about is, and not to sort of sidetrack, but the relationship between architecture and urban planning. And you sort of referenced the role of the architect in these political processes. And I'm wondering what your thoughts are on that?

**SASS:** I was fortunate enough to take a couple of urban planning classes during my early years at MIT. And urban planning I realize over time, there are two parts.

There's the physical design of the environment, heights of buildings, volumes, setbacks. And then there are the social policies that go with cities and states or countries. Those are usually determined by politicians or planners. And they really are different.

An architect can influence both of those. But I think architects tend to fall more into the physical planning. And programming, the organization of how people move through the city.

But it took me a while to realize they are separate things. And over time, I realized my interests were not as broad and as big as that. Although now, they're starting to return to that.

**INTERVIEWER:** So when you were thinking about graduate schools, visiting schools, and you said you sort of really felt you connected at MIT, was there a sense at that point that there were more people at MIT or that MIT was more interested, more preoccupied with these social aspects, broad picture, than at other places?

**SASS:** Yeah, very much so. I felt that Harvard University was more like my undergraduate, where there was a real connection to the arts and the visual aspects of architecture, and not so much the social. I mean of course there are professors there that were very concerned with both. But I felt that the dominant was the visual.

And MIT, I felt that planning and architecture, the two departments were one. At that time, back in the '90s, planning and architecture hadn't made a really big separation. We both shared the same computer labs. Planning students worked alongside of architecture students.

And planning was a big part, or at least talking about the urban scale, was a big part of architecture in general. A good example of that is Government Center here in Boston and how the architects that were part of that really thought of how the building it would be laid out in the environment. It wasn't just a single building, a single block. It was part of a larger scheme and a larger way of thinking about the city.

And that was preceded, not preceded. But that was right after people like Kevin Lynch. And I'm trying to think of couple of other urbanists who are in architecture.

Some of the names escape my mind. But there are a number of people who sort cross between architecture and planning.

**INTERVIEWER:** So what were your initial impressions of MIT when you arrived? I mean did you settle in?

**SASS:** I have to say it wasn't that visually impressive. I mean the place was kind of dirty. And the floor where Architecture was, was sort of like the basement. There were very few windows. It was a pretty dismal place, I must say. Visually, it was not attractive.

But I wasn't really interested in that. I was really interested in the community. And I think when I applied, I really didn't know how big MIT really was, particularly for architecture. Because in my undergraduate, most people talk about Columbia University or Harvard and Yale. Those were the real big architecture schools.

So MIT was not on the map of architecture. To me, it was sort of still like a technical trade school, almost.

But once I arrived, and I managed to get to know the professors and the students, I realized the place was absolutely incredible. Some of the great professors that were here at the time, Jack Meyer, who designed the Boston Architectural Center. And Jan Wampler, who was a real big thinker of urbanism, as well as architecture.

I was just really, really impressed by the way that they thought about architecture and the way that they engaged students in learning and thinking about design. It was really different than my undergraduate.

**INTERVIEWER:** So I wanted to ask you about something that I think was very formative in your career, which was your introduction to computer-aided design at MIT. Can you just talk about kind of where you were at coming in and how that happened?

**SASS:** Whew. Yeah, that's a pretty weird story. When I was at Pratt, I think I took one computer-aided class from this guy, Hans Lischewski. And he was an MIT graduate. But I didn't know that at the time.

And he said in the 1990s, if you want to get a job in architecture, you'll have to learn computers. You'll have to know how to draft on a computer and you'll have to know how to make a three-dimensional model.

And so I think by the time I got to MIT, I sort of took him seriously. I had no idea how to use a computer. I barely knew how to turn one on. And my first class was an introductory computer class with Professor Earl Mark, who was a student of Bill Mitchell's.

And that class just terrified me. I was really afraid of computers. I hated computers actually. I loved drawing.

I was still from the school of drawing and painting. And I really just had very little interest. But I knew I needed to take one to get a job.

So my first class, I learned how to three-dimensionally model a Palladian building. And it's really interesting, because actually I lost the file. I logged out at the time. And I didn't know that when you log out, it doesn't save your work. And so I lost all of my work. And I have nothing from that time.

But the thing that excited me the most I think about computers was meeting Bill Mitchell. That really was amazing. He kind of introduced me through lectures. He gave lectures, one or two lectures in the class.

And then I think I was quite turned on by the idea that you can make a three-dimensional model of a building. And you could print it out in many different views. But I still wasn't like completely thrilled by it. I still kind of had reservations. I still liked to draw.

**INTERVIEWER:** So how did that then progress?

**SASS:** Turn into a career?

**INTERVIEWER:** Yes.

**SASS:** Well, it's sort of a little bit by accident. I had met a really great man, Ike Colbert, right when I came in. And I met him because I felt like it was the right thing to do. A number of people had talked about him and said you really need to meet Ike.

And Ike was in touch with the arts community in Boston. And he knew an architect, Donald Stull, who had designed a monument to memorialize the slave trade. And he wanted to build this in the Boston Harbor, on one of the islands.

And at the time, Ike was insightful enough to know that oh, we could make a computer animation of this monument and use the computer animation as a marketing tool to raise money.

So I met up with Ike the winter that I was here, in January '93. And Ike introduced me to an undergraduate student, Greg Anderson, who at the time was in, I think he was a computer science major. And he was also taking architecture classes.

So the two of us sat down and we met. We met the architects. We met the artists who were also involved with this.

And it was funded by Ike, the project. And Bill Mitchell was the supervisor. His role was to help us figure how to make this computer animation of this monument.

So we all had a meeting that same January. And then afterwards, Greg and I really learned how to computer model. And we both really learned how to render.

And then by the summertime, we learned how to animate. And in '92, '93, that was really new. There were only a handful of people that really knew how to make computer animations. And they didn't have computers that were fast enough to do a lot of really high-powered rendering.

So we really had a big challenge on our hands, because Ike said-- I love his voice-- so he says, I want this video. And I really want to see this done by, I think it was September. And frankly, Greg and I really didn't know what we were doing.

And so Bill, he gave us a few inspirational talks. And he kind of talked about some of the things that we could do.

And Bill had already had students who had animated buildings. And he had an idea of how some of the animation should work. But I still think that at the time, Bill didn't quite know how to turn it into a movie or turn it into a production that could be used for marketing.

So for Greg and I, what we did was we looked at movies and we looked at the animation in general, how people made animated movies. But hand-animated movies, not computer-animated movies.

And then that summer, the two of us really worked very hard. And we rendered and rendered and rendered images. And put them together in one of the production studios in Building 9. And by that September, the two of us had a really nice animation, computer animation of this monument.

And the architect saw it for the first time in the fall. And it was really great seeing the reaction on his face. Seeing how happy he was to see his work in motion. And at the time, all he had was a wooden model and two small drawings, Well, three small drawings of it.

**INTERVIEWER:** It's amazing how quickly that then became something that people took for granted.

**SASS:** Yeah. Yeah. Oh, no one I had seen a computer animation. And no one had seen an animation like that. What we did was we combined still images with moving images. We did a lot of editing work.

Stuff that now people could do in a couple hours on a computer, took us weeks to do. The big problem that we had was rendering time. So to make a rendering, you need 24 frames to make one second of animation. And we knew we needed minutes of animation.

So this was before MIT really had lock-down policies on computers. At that time, you could sit at a terminal and log into a terminal in another building. And someone could be sitting at that terminal, doing email and you could read their email while they were writing it. Stuff you would never think of today.

So what we did was we rendered images in the background, while people were writing email. And people didn't know. But they knew that their computer was going a little slower than they would normally think it would.

But we used just about every computer we could get our hands on, around the Institute, to render images. And that turned out to be absolutely amazing. We really understood what the idea of rendering forms and high-powered rendering was about.

And more importantly, once we put everything together, we could see that people could understand a really complex space. They could understand how it works. They understood how the lighting worked.

They understood the monument in context, because we put it on an island. We were supposed to simulate an island out in the harbor.

And that just completely got me. I knew at that time that I was really interested in computers. I knew that I wasn't that interested in sort of the practicing aspects of architecture. I knew that I wanted to stay and do more.

And I also knew that I really liked Bill Mitchell at the time. And I was just totally, I was totally sold.

**INTERVIEWER:** So tell me about working with Bill? I mean what was so special about working with him? What kind of stories do you have?

**SASS:** Yeah, I have a lot of stories about Bill. but more importantly, I think at the time when I met Bill-- it's really wild. I think at the time, I didn't really know how much he really knew.

I knew he was a really good writer. I knew that he was good at talking about aspects of computing in architecture. But I really didn't quite know how insightful he was. I was not as interested in the research aspects of his work, as I was more in what he was, which is he wanted to talk about architecture or talk about computing in ways that related to ordinary people.

So that's when he wrote books like *e-topia* and *City of Bits*. He had more of a relationship with the public aspects of architecture.

So working with Bill, I think by the time that I got caught up in working on projects with Bill, I knew a lot about how to render. I knew a lot about how to model. But I really didn't know that much about design and computation

Bill was a master of surrounding himself with brilliant people. So I had a chance to get to meet people like George Stiny, and Terry Knight, and Frank Gehry, and Jim Glymph. And just a host of really brilliant people, who knew a lot about computers, knew a lot about how to use them in practice, and knew a lot about how they worked and didn't work.

And I think it was more the people that were surrounded by Bill, that caught my attention, much more so than Bill himself. So I really got to know Bill the most when I took his class.

I had known Bill for about four years before I really, really took a class with him. And then I really got to see how he influenced students. And also how students, who just didn't have the stomach to work with somebody like Bill, sort of left.

Bill was the type a professor who, if you didn't have your agenda, it wasn't a good fit for you. Bill was not going to sit with you and teach you specific things. He more inspired and gave you direction. And that worked really well for someone like myself.

**INTERVIEWER:** So you've mentioned this, but just sort of explicitly, what was your agenda at that point?

**SASS:** It's funny, because I really didn't have an agenda. The irony was by the time I got into the PhD program with Bill, I didn't quite know what I wanted to do with my career. I was sort of at that middle point. And I'm surprised that he actually stuck with me.

At the time, I was really interested in just learning more about computers. But what the big turning point for me was when I took this class with him on Palladio. And Bill loved Palladio, the real first architect. Palladio, some people consider Palladio to be "the architect."

Like no one has built as much as Palladio, relative to the time. No one else had as much of an influence. I still believe this. No one has had an influence on architecture the way that Palladio had.

So Bill's thing was Palladio, computation, and design. And trying to understand how all of them worked together.

And so he surrounded himself also with a great historian, Howard Burns who was an amazing-- he really understood Palladio better. Today, he's still but leading scholar on Palladio.

And so Bill gave me the chance to go to Vicenza. He helped me and encouraged me to go to Vicenza often to model Palladian villas.

And Bill, at the time, really wanted to figure out I think-- I think he wanted to understand the relationship of how Palladio thought, how Palladio built his work. And sort of what Palladio really wanted to do, how Palladio wanted to make these ideal buildings.

And I just got caught up in all of that. And the same thing goes with George Stiny. He also wrote a lot about the topic.

So I really got caught up in modeling Palladian villas. And particularly modeling and becoming obsessed with the ones that weren't built. And trying to learn the relationship between Palladio's rules, how computation can deal with rules. And at the time, also a new thing, which was rapid prototyping.

So I managed to 3D print one of the first little Palladian villas on this machine that Bill bought, in about '98. And the rapid prototyping was sort of the next level up from rendering. And then that was for me, just another new opportunity. And just a great, great moment was printing this little model for Bill.

**INTERVIEWER:** So you are actually taking buildings that had never been built, creating 3D models, and then actually printing the models, just so I understand it?

**SASS:** That's right. So Palladio drew, if I can remember correctly, 23 villas in one of his books. He was the first person to produce a collection of his work as printed drawings, back in 1580.

And some of those drawings were buildings that had never been built. And my job, when I was working with Bill, was to model the ones that had never been built, from the rules in the book.

And the way you verify whether it was a really good model, or the way I verify whether it was a good model, was to make a 3D of it.

But at the time it was really called fused deposition modeling. I think if some of the professors around here knew that I was mixing plastic printing with real 3D printing, which is powder based, they would be pretty upset.

So I was using fused deposition modeling to make prints of the three-dimensional models to verify the designs.

**INTERVIEWER:** So what is fused deposition modeling?

**SASS:** So fused deposition modeling, it's plastic printing. It sort of like a hot glue gun. And it prints out strings of plastic, layer by layer.

But the real field is called layered manufacturing. Three-dimensional printing and fused deposition modeling are both layered manufacturing methods. You make models in layers, over time.

It's just fused deposition modeling deals plastic and heat. 3D printing deals with powder.

**INTERVIEWER:** And that's when people are talking about fabrication now, they're talking about the power.

**SASS:** Right. They're talking about powder. It was also was invented here too by Eli Sachs. So just to be clear, the company Z Corp was started by an MIT student. And it is an MIT start-up.

But over time, I got to use three-dimensional printing to make models. But I had started off fused deposition modeling.

**INTERVIEWER:** One other thing I wanted to ask about, sort of the environment, being a grad student at MIT, being an African American coming here, it's still true today, but even more so at that time, did you feel that you were isolated? Did you feel that you sort of stood out, stuck out? I have talked to others who have expressed that point?

That's a great point. Yeah, I definitely felt that. When I first arrived in '92, there was the Black Graduate Student Union. And there were about 80 black students, graduate students, out of 5,000 at the time.

And we really stuck together. We had events, like the Ebony Affair, where I met my wife. And Ike was a real leader for that.

And Ike, I have to say, Ike was the person who really held all of us together. Everyone knew him. Everyone absolutely adored him. And he really knew how to inspire the black community to stick together as a group.

I think Ike was one of the few people, if you pick a few men that I know that it was all about community. So we had a really good community of black graduate students.

But what was really important for me believe it or not, was my graduate tutor job. I was a resident tutor in the dormitories in New House. And I was the graduate tutor for Chocolate City for seven years.

And Chocolate City is a small group, living group, within the New House dormitory, of 20, I always forget the number, 28 undergraduate, mostly African American, students.

It was always a mixture between students who were mixed, like you had students who were Korean and African American, or Caribbean. You had students that were Indian, that were not African American. We had white students in the group.

But that was really a big source of community for me, to be around these absolutely amazing young men, who on their own time, felt isolated. But we all felt like we had a community once we were back in the dorm. It was a spectacular place.

**INTERVIEWER:** Did you feel that that isolation lessened at all in the time you were here or even since then?

**SASS:** No. Oh, without question, definitely not. It definitely has not. I mean, let's understand a couple of things.

I was the first African American PhD student in my department. I'm also the first African American professor in architecture, in my department.

But you have to look at architecture as-- there are two parts. There's MIT. And then there's the broader community of architecture.

Architecture is not an industry that draws a lot of African Americans. There are less than 2,000 African American architects in the country, licensed architects. And that number has been about the same for two decades.

So the industry doesn't really draw people. So that I knew when I was younger. And I never really looked at the industry for community.

What I have found at MIT over time was that MIT draws people who are just isolated in general. It's sort of like everybody feels isolated in some way. And so after a while, you kind of realize that your issues are the same for most people around the campus.

What makes them special and unique for African Americans, is that we're Americans. We are a people who have been here for hundreds of years.

And it does get a little daunting when you realize how few Americans that of African descent, make it to MIT. And particularly, make it as faculty. There are very, very few faculty of color on the campus. And that part gets pretty lonely, over time.

**INTERVIEWER:** Well certainly, not to jump ahead of the story, and there's only reason we have to be chronological, but the issue of African American faculty is obviously one that's just been really vexing. The fact that the ratio has shifted much, or surprisingly little.

And I was wondering if you have thoughts on what's gone wrong? What's not being done? What should be done?

**SASS:** Well, that's a really tough question. But it's the right question to ask. And I think it is an important thing to talk about.

First, I think you can't ignore that it is difficult to find people to work at a place like MIT, who can sort of have a stomach to be at a place like MIT. And I'm not saying that there aren't a lot of people out there. It's just hard to find them.

There aren't that many African Americans in the industry of architecture to begin with. And of those who are in the industry, to find people who are really interested in teaching full time and making the commitment to move to a place like Massachusetts, is not that easy.

So I can understand why there hasn't been a lot. But that number is growing. I mean there are really good architects out there, African American architects, who are at least applying to positions here. And I am starting to see some change.

But I do think that now the movement has kind of gone. I think that the momentum has gone. And I think that people see it as not as an important issue.

But I think that at some point, it will come back to being an important issue. African Americans I do think symbolize civil rights to begin with in this country. And I do think that they symbolize growth and change. And without that, without at least something at a core level, you're missing out on the spirit of United States.

And I think that that always has to be there, at least in a place like this. So for example, here's a good example I think, seeing students trying to come to MIT from the Middle East. And seeing the difficulties that students have had over the years. And then also when students arrive, seeing how students from these countries, in their own countries, are fighting for their own civil rights.

And I'm more than certain that most of them see me and say, oh, here's a person who probably can identify with fighting for civil rights in a country, against a majority group. And it's kind of interesting now.

I think of an Egyptian student that works with me. And I think of a student I met the other day who was Palestinian. And I realize, I completely identify with both of them. If that wasn't there in the department, I think the department would be losing out.

**INTERVIEWER:** But it's an Institute-wide question or issue, right? I mean it's certainly not confined to architecture.

**SASS:** Not at all. And there are some departments who have never broken the color barrier, like I think mathematics might be one of them. There are a number of places around the Institute who have also done very well with recruiting and including African Americans in their programs, like AeroAstro.

But it's a difficult thing to do. I never feel that people don't welcome the opportunity to make these things happen. But I just feel like it's such a big challenge, that you need a very special person to really reduce color barriers and to make people feel included.

**INTERVIEWER:** So let's sort of talk about your joining the faculty, I guess. First of all, at what point did you think about really seriously that academia would be kind of a calling or a direction that you would want to go in? You said you started out focused on the practice of architecture.

**SASS:** And actually right after I graduated with my PhD, I went right back into an actual office here in Boston. I worked at Shepley Bulfinch. And I thought that I would be there for five or six years.

And I really wanted to try to work my way up becoming a principal and things like that, and getting my license. And going through that part of my life. But I think I very quickly realized that my interests were in learning more about how to produce buildings, than I was in designing them.

Because I do feel like are a number of people out there who are great designers. I don't think are too many people out there that are willing to say, let's figure out how to make this building cheaper. Let's figure out how to produce this as a product, at a lower cost than the way that people were producing buildings before.

I do think that architects think about that all the time in practice. But I don't think that anybody has been thinking about that as a system of production, a way of like revolutionizing or changing the way that we make things.

So my interests very quickly changed, I think when I really got the call from Bill Mitchell, who said that there's an opening and an opportunity for you to work at MIT. And we would like you to apply.

And then once I was here, I think there was always a part of me that had a foot out the door, ready to go back into practice. But I think by the time I was in my third or fourth year as a professor, I realized that I just love research. I absolutely love asking questions and trying to figure out to address them.

**INTERVIEWER:** So when Bill called, I'm trying to recall whether it was faculty or did you come as a research scientist?

**SASS:** Well, what happened was I worked with Bill, first as a postdoc. And then I stuck around for a little while. I worked as a research scientist with him.

And then I admitted to him how much I absolutely hated working in practice. And I think it wasn't the office. The office was wonderful that I had worked with. I thought they were really great people.

I think what I really didn't like was I just didn't like the idea of always being on one side of the equation, always being on the design side. I really wanted to figure out move into the production side.

So becoming a faculty was exciting. I thought it was the thing to do. It was the way to deal with the problem.

**INTERVIEWER:** So you came in with this idea of focusing on the production side, that that was going to be where your career was going to go. And in fact, that's what happened, right?

**SASS:** Yeah, that's exactly what happened. And over time I realized that I love design. I love designing things. But I know that architecture will not change until methods of production change.

**INTERVIEWER:** So let's talk about the methods of production changing and where your work has gone since then. Because it's a really interesting kind of, in some ways extension of the modeling work that you started out doing. But it's sort of ramping it up. And you're really changing the way things are actually built. So just tell me about how that?

**SASS:** I had a moment, I think it was early on, in about 2000, where-- well, first there's just this array now of people who can reduce really nice computer models, renderings, all the stuff I was doing in the '90s. It's just it's just everywhere now.

It's sort of like just the pornography of architecture. And you see movies everywhere. And students who can design these curve-shaped buildings and glass.

And just really absolutely gorgeous stuff. Stuff that I knew over time would become mainstream. But I just had no idea it would become mainstream as quickly as it has.

So by the time that 2000 rolled around, I knew I wanted to move out of that and move more into fabrication and real physical production. And so the big question I always had was, could I take these Palladian models and print them huge? Could I make them the size of real buildings? How do you do that?

And then that started to get into if you want to make something really big from a computer model, you have to change the way it's structured and change the way that parts are made and the way that parts go together.

It really for me, got into the idea of a whole new language of architecture and a whole new language of producing a structure. And that really sort of catapulted into looking at this new thing that I'm into now, which is just-- I call it materializing design. But it's really just a way of manufacturing large objects from computer models.

**INTERVIEWER:** So do you find resistance to this idea, this sort of concept within architecture?

**SASS:** Actually, no. Architects really embrace it. Because they see it as a way of getting their work built. It's the construction industry that gets a little daunting.

And also at this point, I don't think the construction industry really knows enough about what I do to feel threatened. But I think over time, there is that strong possibility.

Because the fact is, you can't change the cost of producing a building unless you reduce labor. So you have to imagine architecture today or construction, is sort of like me taking a photograph of you. Each time I take a photograph of you, I'm actually painting it. I'm painting you.

Every photograph is different. Every painting is different. And the only way to make the process faster is to get more people to help paint your face faster. And in that, there's no economy of scale there.

You're not going to reduce the cost of the painting by adding more people. Or make it faster, by adding more people. You need to change the way that you produce the image of you. And that's the way I look at buildings today.

**INTERVIEWER:** So I'm really interested to ask you about the MoMA exhibit and sort of the relationship to rebuilding New Orleans, Katrina.

I mean it just seems like if you go back to the idea of sort of the social ramifications of architecture, we're talking about something that's pretty powerful there. Tell me about the genesis of that?

**SASS:** Yeah, it's another really complicated one. And it's complicated because at the time I really wasn't interested in looking at New Orleans. The one thing I really hated at the time was seeing how these-- I think there were a number of natural disasters that had happened around the time of New Orleans. I think there was hurricane prior to the Katrina hurricane.

And usually when you see those things, the architects sort of the come out of the closet and start producing drawings and making proposals and things like that. Again, it goes back to the whole architect as putting on the cape, and being Superman, rushing in, and saving the environment.

But at the end of the day, the architect really only produces drawings. They produce the intent of building. They don't build.

So I kind of wanted to stay away from the Katrina thing, once it had happened. But I realized over time that that's something that I had to address in my work. I knew that I had to do something that related to rebuilding New Orleans with a new system and a new method of production.

So the way that that project, the MoMA project happened, it happened in 2008. At the time, I had already built a small cabin as an interlocking set of parts that could go together, just held together by just friction. And it was only produced by computers and machines run by computers.

And I think a student had told the curator about my work. And the curator emailed me and said, we have this competition called Home Delivery. And it was all about the production, the new production of buildings, small buildings and homes.

And he had asked me to submit a proposal of a small building that could go in the museum as a model. And I produced I think two or three proposals, one is a small model and one is a small building.

And he had asked me to elaborate a little more on the small building. So I specifically said, well, here is a great opportunity for me to make a small Katrina cottage. And I knew that a lot of the proposals that they were receiving for the show were modern proposals, complex geometry, and new systems of production, like digital fabrication.

So I said, this is my chance to really talk about what I was really interested in, using technology to serve ordinary people, not to fall into the role of the architect as the artist.

I really wanted to look at myself as the architect, as the producer of common construction. But produce stuff that was really architecturally-- I guess I would say, architecturally right with the culture, going back to the idea mixing culture and design.

So I produced this "shotgun" house, as the proposal. And it was accepted. And I think it was accepted because it contrasts the other buildings that were in the exhibit.

So the inside of the exhibit had models, displays of new wall systems. It had an existing house, like a Lustron house, which was built in the '40s. And it was meant to be, at that time, a sign of new production for buildings, pre-fabricated construction.

And so they also had five buildings that were going to be outside of the museum on an open lot, that was between 54th and 55th street. And those sets of proposals were different than the inside.

And those were to be full-scale buildings, that people could walk through. And they would exhibit in full, all of its detail, how you would produce a building using a new method. In my case, digital fabrication.

**INTERVIEWER:** So tell me about the production of the MoMA exhibit.

**SASS:** So we got the commission to do it in 2007, the summer of 2007. And we knew we had to finish it and have a product completed by 2008-- well, I did. So it was really resting on my shoulders.

And we had to design it. We had to design the exhibit and then we had to get it approved. And we had to fabricate it.

The entire production I think was by far more exciting than the actual show. And the production of it was, first it had to retain the style of, for us, the style of our proposal, which was a New Orleans "shotgun" house. And then secondly, it had to be built out of plywood, a very large structure out of plywood.

And I had no idea going into this just how overwhelming the process would have been and how overwhelming and difficult it was going to be, the logistics of making it.

So we designed it at MIT. We really started the design in November. It was myself; Dennis Michaud, who was a student, but graduate student; and Dan Smithwick; and Laura Rushfeldt. The four of us really were sort of the core people. And I also have a class with a number of students that helped out. And who did a great job.

But the core work was building the structure of the building, making sure that people who go inside, that it wouldn't collapse. And that we knew we could put it together on site.

So we designed the entire building in CAD, in a CAD system. And we had to make a CAD model of every single component. And it turns out that there were 10,000 components by the time we had started manufacture.

That meant that our hands touched or modeled or drew all 10,000 components. And we had to organize them on sheets of plywood so they could be cut.

So we managed to recruit a number of really great people who helped out, from the Industrial Liaison Program here, to some really great sponsors like Shop.Tools, and Boise Cascade. They were really, really good sponsors.

Then there was the physical production of all the parts and components, which was really in the hands of Dan and Dennis. And they just did a masterful job. To this day, I still can't believe it actually worked.

So then here we are. We arrive in New York City, May. We had 22 days to put together all 10,000 parts before the opening. And we arrive with 10 containers of plywood. And we open containers. We started putting parts together, the structure.

We unfortunately had a few days where we missed being there. And of course, the museum called frantically, like where are you? But once we started getting into the rhythm of putting parts together, surprisingly all of the parts fit.

It was a huge jigsaw puzzle of parts about the size of a rug, a small rug. And we were hammering parts together with mallets, clamping them. And to this day I still can't believe it, the core structure actually, all but two parts snapped together.

You're talking almost 5,000 little parts, and the parts are in Virginia. Made in Virginia, on two small CNC machines. They all fit perfectly.

So then we had to put the ornamentation on. And that part got really hard. That really slowed us down. But the ornamentation was everything. The ornamentation is what makes a New Orleans "shotgun" house.

And I remember Dan and myself working on the project, all the way up until the night before the opening, at 2:00 o'clock in the morning. And surprisingly, the whole thing worked out. The four of us really did a great job. I've never been more proud of doing anything than I had that project.

But I will say the design community sort of really didn't-- they received it. It was good and bad. I mean I knew the design community would not understand why I chose to do something like a New Orleans "shotgun" house.

And when I really look back, I realize a lot of people really enjoyed seeing this puzzle-like building put together. But there was no way that I could really describe the significance of the "shotgun" house.

But the real core reason why did it is because it really is the first real piece of architecture in the United States that was produced by African Americans. Slaves taught each other how to make buildings. Slaves often taught themselves how to make buildings without nails. So this also too was a building that was made without nails or screws.

And it was a real unique form. "Shotgun" houses had a real, and they still do, have a real core underlying technology that allows them to survive. They're meant to take on water. They're meant to get wet. Completely soaked, and dry.

And they were really great devices for cooling spaces. So you needed the porch at the front end. Say it's 100 degrees out. Underneath the porch it's about 90, 95.

And for a cool breeze to blow through the house, by the time it reaches the middle of the house, the temperature was about 85 on the inside. So here you have this natural ventilation system, a way to keep harsh light out, a way to cool through air, the air movement. And it was decorated. So that it looked like its own little palace.

So to me, it was just an amazing invention. And I really wanted to figure out how to celebrate and talk about it. Also it had been three years after, no, I'm sorry. I think it was two years after the storm. And the discussion died down.

All the architects that had made proposals for New Orleans were all gone. And so I kind of felt that was an opportunity to begin the discussion again. How should we rebuild New Orleans after Katrina?

**INTERVIEWER:** One of the things that I think is really interesting about this whole process or concept of digital design fabrication is, which I think you've written about, spoken about a lot, is its potential to have an impact in the lives of poor people. People who are not necessarily patrons of sort of high architecture or beneficiaries of that kind of work.

Can you talk about that? Yeah

**INTERVIEWER:** So going back to New York City. Like I lived in an old apartment building. But it had beautiful moldings. It had really nice grand rooms. If the rooms were painted or reconstructed, they were really meant to be really nice spaces for middle-class families.

And with New Orleans, you can almost do the same thing, if you use a different method of production. If you were to use carpenters, you would need to find skilled carpenters who could make or organize moldings, build small cottages at a reasonable price, with really nice ornamentation, or even really grand, great modern design.

It's expensive. And if you produced them by machinery, you stand a chance of being able to produce at scale, a very nice, decorative object, that once put together, should cost not much more than the cost of the material, and material manufacturing.

It is the way IKEA works. IKEA off-loads all of the assembly onto the customer. And the customer does not need expertise in woodworking to put together a piece of IKEA furniture.

I think the industry really needs figure out a way of taking that type of thinking and moving it into the construction industry. I mean it works for everything. Mansions could be cheaper. And small buildings could be cheaper.

**INTERVIEWER:** I think if you go back a few generations in my family, they were farmers in the Midwest. And there were the Sears houses that you could order. Is it sort of like a high-tech version of that?

**SASS:** Oh, yes. In fact, actually Sears got it right. Of all the pre-manufactured housing companies, Sears Roebuck had the right business model. They sold details in the stores. So you could buy a frieze or you could buy a cornice piece or you could buy columns at the store.

And the core building was sold by Sears. And they had over 400 different types of buildings in their catalog. It was an amazing company.

Unfortunately, they went into business, because they offered financing. So over time, more people were making payments on new houses. And there wasn't enough capital to keep the company going, whenever a new house was going to be constructed. They just didn't figure out how to work out a good business scheme.

But Sears & Roebuck had it right, mass-customized products, all different types of styles. And they made all of the parts in the factory. And the factory was connected to the railroads.

So they made them in the factory. Put all of the parts on the railroads. And they shipped parts to the towns. And then trucks took them to their site. It was a great business model.

**INTERVIEWER:** So since the MoMA exhibit where you got to sort of put this into practice on a full-size, where's your work been going since then? What are you doing?

**SASS:** Well, since then I've had to take a little step back from it. Myself and the three of the students that I work with, we tried to turn it into a business model. But we realized that it was just way ahead of its time, meaning ahead of its time along the lines of the culture of the industry.

The industry I don't think is ready for the shock of going from hand labor to machine labor in one year. I think most people one, can't figure out how that would probably work. And I knew that I needed more time to figure out how to explain it to people and come up with examples of how it could work.

So over the last two years, I've been focusing more on writing about it. And focusing a little bit more in coming up with some new ways of producing buildings.

So by next real work is going to be first a book to explain how this all works. That should be coming out in the summertime.

And then the only way that I could really see making this work is to produce it myself. Finding people to partner with and produce small buildings. There really is a need for very, very small manufactured buildings, at the price of a trailer.

So if you think about the FEMA home, what they used to replace homes in New Orleans, they used FEMA trailers because they're the right price. They're about \$50,000. And they have really good technology. They're just symbolically the wrong choice.

But now, I think that with the work that I'm doing, I think there is a way to produce at the same price as a trailer, a really high-tech, beautiful building. And it could be any style, modernist, arts and crafts, a "shotgun" house.

**INTERVIEWER:** And so what about the-- I'm trying to channel construction people. Sort of the whole idea of customization and that kind of issue, when you're talking about a customer. That's just something that you basically are shifting, right, to sort of earlier in the process?

**SASS:** Yeah. Yeah. Well, they can customize and make their own products. I mean the reality is most people who buy a home if-- well, there are two parts. The smaller houses are really meant for developers.

Developers usually buy things in mass. And they do want variety. But they tend to look more towards consumption of large projects, excuse me, a lot of products, a lot of buildings.

If you're talking about someone who wants a custom home on a custom site, those tend to be slightly higher-end clients. People who buy houses that are in the half a million to million dollar range.

And for something like that I don't think that my technology will get to those types of people right away. Although it's interesting, because it slowly starting to come around.

When I look at construction around Massachusetts, I've noticed that they're moving away from dimensional lumber, which are two by fours and two by eights. And they're replacing all of that stuff with plywood. They're making a lot of buildings now that would typically be out of dimensional lumber wood, almost exclusively out of plywood.

**INTERVIEWER:** And the sort of digital fabrication process, is that again sort of relying on 3D printing, or I mean plywood. Talk about the materials?

**SASS:** Yes. The materials can be plastic, wood. Obviously, in plastic, plywood, metal. You can imagine a house that's framed out of metal, plastic, and wooden parts, instead of exclusively wood.

So most buildings are not under the same amount of pressure, consistently. It would be better if places where the loads are light, you use really inexpensive materials. Where the loads are heaviest, you use really expensive material, but use a small amount of it.

And you can control all of that in the design. So you can control cost a lot better.

But the way it really would work is, you could almost imagine the concept of, like I was going back to IKEA, IKEA furniture, at a mass scale, where buildings arrive in boxes, with all the parts and components included.

**INTERVIEWER:** And the creation of the parts is controlled by a computer?

**SASS:** Yeah, that's right. That's right. Yeah. Yeah. And if you look at that, it's funny. Because now you have arts stores, like if you go to an art store, a lot of art stores have these large tables where they can cut a custom mat for a picture frame for you.

And you can imagine some day people who manufacture linoleum, carpet, sheet rock, ceilings, anything, use the same machines. They use machines that are controlled by computers to pre-cut all of the parts, pre-cut carpet. And it's installed, in a very simple and easy way.

**INTERVIEWER:** Once you say it, it sort of seems obvious, doesn't it?

**SASS:** It does seem quite obvious. But it's not.

Like why wouldn't you pre-cut all of the tiles for a bathroom? But you can't. Because the structure is made by hand. So you have to go back and remeasure all of the hand work by the previous contractor.

Now, for a building that's put together by a real master carpenter, real beautiful woodwork, that's great. But most people can't afford that. Only a handful of people can really afford a master carpenter.

**INTERVIEWER:** Just to shift gears, I wanted to ask you about teaching, mentoring. I mean now that you are a faculty member, I mean you've talked about Bill Mitchell and Ike Colbert and people who made a major difference in your life and in your career trajectory. The shoe's on the other foot, now I guess?

**SASS:** In many ways it is. But I think that real teaching and mentoring as one on one. You really need to find that right person, that's ready to be mentored and ready for you at the time.

And I think one of the things that I've had to learn over time is every student is not ready to be mentored the way that I would like to mentor them. And trying to meet them where they are at the right time, with the right emotion is difficult. And it's a challenge.

But that's part of what makes it great, if you could really click with a student. And some students are ready to be mentored. Some students may only want a small amount of advice from you. That's the best part of being a teacher or professor, is finding the right moment with that right student.

**INTERVIEWER:** It's probably hard to generalize, but do you think that students have changed over the years, either in terms of their interests or sort of their expectations or what they think they're going to go on and do?

**SASS:** At the core, no. Students are still the same. I think that at the core, students come here. They're absolutely brilliant. They're ready to take on challenges. They can't get enough of the place. And by the time that they're ready to graduate and leave, they're ready to stay.

Culturally, the Institute has changed a lot. You see a larger population of Asian students. MIT has had a greater interest in Asia over the last 10 years, and Africa and the rest of the world. Much more so than when I was a student.

And I also find that the challenges for faculty are much greater to try to be sympathetic to students who don't come in to MIT with the same interest and understanding of the world that the professor does.

So for example, a lot of students who do come in from Asia, they have a different take on how architecture is produced, how architecture is discussed. And it's hard for some students, coming from abroad and mixing in with the culture.

And I think that it's really a big challenge for a professor to learn from the student, as they teach the student. Because for us, it's an incredible learning experience.

So I do think things have changed. Where the students have come from have changed and your approach to teaching have changed. But the amazing curiosity and absolute brilliance of the students is still the same.

**INTERVIEWER:** I warned you that I was going to ask about bike riding before you leave. Maybe I'll do that soon. I mean this is something that just I think is totally interesting when you sort of find out that people have these other lives, these other things they've done.

**SASS:** Yeah, well bike racing and architecture have sort of been my entire life. The same thing when I was 12 until now. I still love riding my racing bike to Walden Pond. And coming back on a nice, warm summer day. I can even do it, even in the cold. About 35 degrees is my breaking point.

But I love bike riding. And I love bike racing, the sport of bike racing. And I raced for 10 years before I came to MIT.

And I learned a tremendous amount from racing. And more learned a lot about myself and my shortcomings. And what I can do and what I can't do.

I started off bike racing when I was 18, mostly riding around Central Park. And I really started riding, trying to learn about Manhattan and seeing buildings and things like that.

And over time, I took it a little more seriously. Though I was never as good as some of the people that I raced against, the people I was really, really good friends with. I could see that they were really serious. And I always had a foot in architecture.

I was really proud of the fact that I managed to work my way up to doing the Olympic trials in 1992, right before I came to MIT. But the big disappointment for me was the Olympic trials. I really just wanted to go to the final. And I think I got seven in the heat. And they took 6 to the final.

So for me, I've never forgotten that moment of just incredible disappointment. And I could have gone to the final, I think if I had a little more confidence in myself at the time.

So by the time I arrived at MIT, I said that's it. I know I'm not be racing anymore. And I put all of that same competitive energy into being here as a student.

And I think I still have that same competitive spirit. I just definitely don't have the physique to ride like I used to.

But I do miss cycling. I miss racing at times. But I still really enjoy the sport. And when the Tour de France is on in June, excuse me, July. That's it. The television is mine. And I watch the Tour de France from start to finish.

**INTERVIEWER:** So just like that image of you riding Manhattan and sort of like learning to love buildings and biking at the same time, is a great one.

**SASS:** I was saying to my wife, that was kind of a shock to her too. Like there are only really two things-- well, there are three things that turn my head-- the two major things that turn my head are buildings and bikes.

And I really loved seeing a new building go up or seeing a group of bike riders. My wife always calls them, "Oh, those are your kind."

**INTERVIEWER:** So thinking about, back to MIT and you mentioned sort of the cultural changes at the Institute. Looking ahead, I mean how do you see MIT, this is kind of a very big, general question, but how do you see MIT continuing to be part of the conversation in terms of just, there's a lot of angst in the world about inequality and social change and the place of science and technology. And where do we take that one at MIT?

**SASS:** It's a very good question. I have absolutely no idea. But I think that's why I love being here.

That's a really tough question to ask, because I think that now the Institute is starting to look outside of itself. I don't think that the days of turning to the government, like NSF and things like that, exclusively for funding, or looking at corporations as an exclusive funding source, are sort of evaporating.

I think MIT has to be creative in finding funding. It has to be creative in talking about science and talking about technology and engineering. It really has to find a way of connecting with the world that better, outside of the United States.

And I think more importantly, it has to find a way of doing this without being this exclusive place. I think that the best ideas are outside of here now. And we have to find a way of connecting with people outside of the United States and outside of MIT, to find those ideas and bring them back to some of the people who are here.

I really have no idea what's going to happen with MIT over time. I know it'll always be a great place. I think that's what makes it exciting, is that it's an emerging place.

**INTERVIEWER:** As you were thinking about coming in this afternoon to talk, were there things that you thought that you wanted to just talk that we haven't brought up?

**SASS:** No, I think you've covered it all. I think you've covered it all.

But I definitely will say, going back to Bill Mitchell. I think that that's probably the one thing I can never talk enough about is Bill and his influence on the field. His influence in architecture and his influence in design. Boy, he really been a huge mark here.

And I'll definitely say that for me, he definitely really made my time. And so did Ike Colbert. But I really have to say the two of them really made my time here. And I'm really, forever grateful.

**INTERVIEWER:** Well, thanks so much for coming in to talk to us today.

**SASS:** Well, thanks for the opportunity. It was really great doing it.

**INTERVIEWER:** Thank you.

**SASS:** Appreciate it.