

# The Art of Engineering with Denise McIntosh

Episode 016: [Sandra Bachamp](#), Director of Engineering at [DPS Group](#)

*Denise McIntosh:*

*Welcome to the art of engineering, where we speak with some of the top women in engineering about their process principles and personal stories. I'm Denise McIntosh, CEO of custom powder systems. The containment company today. My guest is Sandra Bachamp, who is the director of engineering for DPS in Kansas.*

*Sandra Bachamp:*

*Every meeting, he would remind us, I know this is a lot of work and we're struggling to figure this out because we're a really small team, but we're going to save children's lives. If children don't get this product, they will die. By the time they are two years old or they will live to be seven and they will be on a respirator. And it was so inspiring. And I'm like, I've found my passion...*

*Denise McIntosh:*

*Sandra, welcome to the art of engineering.*

*Sandra Bachamp:*

*Thank you. Glad to be here.*

*Denise McIntosh:*

*So I've started most of these podcasts because I've really been interested in having women share their stories about how they got to engineering and to other things mostly in manufacturing. So tell us how you came to be here.*

*Sandra Bachamp:*

*Yeah, absolutely. I think it's interesting because when you're in the moment, you tend to take the path of least resistance. Right? So looking back on it now, it's like, wow, these people were so meaningful in my life and I didn't even realize it at the time. But my dad was a police officer. My mom was an administrative assistant, so nothing to do with engineering or manufacturing, but my uncle was an architect. And so when I said, Hey, I'm really interested in architecture. I like to draw. I like math. I think this would be a good fit. He was like, architecture is great, but here's all the things that I've experienced in my career. I think you should consider engineering. Oh, okay. So then I'm in high school and I'm thinking about this and we did a career day and a local engineer came in and partnered up with me.*

*And so I got to go to his office and see what his day to day was like. And he said, "Hey, I need someone to do filing on the weekends. Would that be something you'd want to do?" Sure. Sounds great. You know, so I did that for a while and then I interned during the summers and it just kind of just fell into it. Right. This was the opportunity that was in front of me because of that opportunity.*

*I went to architectural engineering program at K state. And then again, you're there for three or four years. I don't really know what an architectural engineer does. I'm kind of taking this on blind faith, doing the best I can in my classes, having a great time. Then you get a couple of internships and you start to see, oh, I'm going to design plumbing systems or I'm going to design air handling units that, okay, this sounds fun. I'll do that. And then you get out of college and you interview and, and now I'm designing clean rooms. And it's just so interesting, right? Because it wasn't necessarily a conscious decision. It was just all these people I met in my journey that pushed me into something that I would have known nothing about*

*Denise McIntosh:*

*Good. We're going to continue this whole conversation on cleanrooms. So first tell us what a clean room is and does.*

*Sandra Bachamp:*

*So a clean room in my situation with pharmaceuticals is where they manufacture medicines. And specifically, if it's a medicine that's going to be injected into your bloodstream versus being delivered orally, it has to be aseptic. So it has to be very clean, no bugs, no microbials. And that means you have to have a very good envelope around your, your clean room system. And then you have to make sure that the people going into the clean room are well covered so that there's no potential source of contamination.*

*Denise McIntosh:*

*One of your journeys, I see, took you to Texas A&M and to G-CON, which is, which is, this is, this is how small this world is Sandra, because we actually built a piece of equipment for that same facility where those G-CON pods are. So can you talk about those a little bit?*

*Sandra Bachamp:*

*Pods are modular clean rooms. So envision that I'm building a clean room and I'm worried about the walls and the ceiling and the floor. And then I'm thinking about the equipment that's going into that space. Well, if you, if you look at G-CON modular pods,*

*that's a disruptive technology where I'm building all of that in a factory and then shipping it to a site where they're all hooked together. So now when I walk into the room, I don't feel like I'm in this modular pod. I just feel like I'm in a regular room.*

*So the construction's a little bit different, but it's disruptive technology because now I'm not looking at the same project execution strategy. I'm looking at a system where the workers are trained. They do the same thing every day. They're in an air conditioned environment. They have control over their inventory.*

*They build the whole thing there. They can test it there. And then when you ship it to the site, you still have the same crew that's putting it together, but you've built this whole thing in a place that's much more quality controlled. So similar to you building your equipment, you know, you've made sure it works before it gets to the site. We've taken all that labor off of this construction site. It's dirty and chaotic. And you know, it's not necessarily what the guys were building a year ago or two months ago, and we've put it all in this factory environment.*

*Denise McIntosh:*

*They were fascinating to look at.*

*Sandra Bachamp:*

*Well, it's interesting because it's on so many markets, right? It's not just clean rooms. G-CON does clean rooms, but prisons are built the same way. Hotels are now being built the same way*

*Denise McIntosh:*

*In modular fashion. So you can just put the pieces in place and hook them together.*

*Sandra Bachamp:*

*And then if you take it even a step further, it's not just building it for one site. Now I can make it deployable. So let's say that we're making a vaccine for a pandemic response in Kansas. We've cured that now there's a pandemic in North Carolina, hypothetically, I could disconnect the whole system. So it's not just the equipment. I can disconnect the rooms, put them on a flatbed truck, ship them to North Carolina, hook them back together and make the medicine there. And*

*Denise McIntosh:*

*We can do that worldwide. That's the most exciting thing. We just had an inquiry from a group in Maryland that's looking at making those pods even smaller for even use in military situations where they need that kind of innovation right there on site.*

*Sandra Bachamp:*

*Yeah. I really feel like those things start with military, right? I think the military has got this modular, they figured it out. So it's just fascinating because it's, for me, innovation isn't necessarily something new. It's more often when you take something from a different market or different industry and you apply it in your industry.*

*Denise McIntosh:*

*And I've probably told this story in podcasts, but I started in the ag industry, actually in the plant food fertilizer area and the whole concept of blending. So dry material handling which is what our company still does a lot of ...that whole concept of making sure your blends are consistent and they don't desegregate. And you get all of the actives where you want them in every pill or capsule that you take... was really begun in the fertilizer industry and was in the Tennessee Valley Authority. Yes. All of that blending technology was begun right there. And now it's been carried over to so many other industries.*

*Sandra Bachamp:*

*And, and really, you know, talking about mentors... these last couple of years, I've met a lot of subject matter experts in the industry. And I've also been exposed to people who worked for the owner side. So people who were on the floor, working with the equipment or working with the room, maintaining the space, I really feel like those were the growth moments because it's one thing to do the design, take a pretty picture, step away. It's another thing to talk to the person who lives in that space and realize just by making some changes, how much more functional it can be.*

*And another interesting thing for me was, I want to say six or seven years ago, they came out with fan array technology, which is basically instead of one big fan in your HVAC system, you have a bunch of smaller fans. And it was for energy conservation and redundancy and all these things. And we put our first one in and I was in the clean room with one of the operators because we were trying to figure out an ergonomics thing. And he goes, "why is air handling unit Not on?" I go, "it is on" now when it's on it's loud, like I could barely talk to you. And I mean, that wasn't even a design consideration for me. I had no idea that this space was normally so loud. Could you imagine working in a loud environment every day? Yes. Wow. I had no idea. And so it's just like, oh, aha. Wow.*

*Denise McIntosh:*

*Yes. So we're engineering and operations meet.*

*Sandra Bachamp:*

*Yeah. I think what's interesting about your podcast and the story is everyone has a story and you don't realize by sharing your story, how it could impact other people because they're hearing something different than what you're even sharing.*

*Denise McIntosh:*

*Yes. So tell me about your career and the evolution to where you are today.*

*Sandra Bachamp:*

*So again, that, you know, the path of least resistance... I went from my uncle telling me to go into architectural engineering. I did that. I had my mentor. I went and worked in an office environment. So I just immediately thought, okay, I'm going to go work for a consulting engineering firm happened to be doing pharmaceutical type projects. And I stayed at that company for 20 years. It was a great culture. I always felt like my boss was looking out for my best interests. A lot of my coworkers and my boss had been there for 20 plus years. I mean, I think there are some that are at 40 years now. It was just a culture where people stayed. We, we helped each other out. We taught each other. We always tried to do the best quality that we could. And I felt very blessed because I've had three children. So three different times I got to take maternity leave. And each time you come back and you're very refreshed, plus you left this list of items that have to be done. And absolutely none of them were done in the three months you were gone. So, have I been creating false deadlines for myself? Because I feel like when I'm working every day, something is due. Right? And I feel like it must be really, really hard for men because they don't get that break ever. They just are constantly going. And, you know, it's just so refreshing to take those sabbaticals and to step back.*

*And so the last time I did that, I realized I really identify myself with my career. I'm very proud of my children. I, one of my joys is seeing my children develop and how they interface and interact with the world and all of those experiences. But I am a terrible teacher. I tried to teach Sunday school and those little kids didn't listen to me for anything, you know, but then the person who's a teacher comes in and does this clapping thing. And they're like, "we love you!" So, that, wasn't my calling, right. But I really feel like engineering is a place where I'm contributing to society. I feel like that's my mission to use what I've learned to make the world a better place. And I've talked to other moms in that situation. And I said, you know, it was the same thing. Like I love being home with my kids, but I didn't feel like I was fulfilling my bigger purpose.*

*So, you know, I'd been at the same company for 20 years. I think 15, 16 years in, I was working with a client I'd worked at, at a big pharmaceutical company. And he had gone to this small startup doing a gene therapy product and every meeting he would remind us, "I know this is a lot of work and we're struggling to figure this out because we're a*

*really small team, but we're going to save children's lives. If children don't get this product, they will die. By the time they are two years old or they will live to be seven and they will be on a respirator." And it was so inspiring. And just being on that project and seeing how all of those people were motivated by the same purpose I was inspired. And I'm like, I've found my passion. I knew I was doing engineering because I had a mission, but my passion is to help cure cancer, cure disease, bring these products to market. And since I'm not a scientist and I can't make the medicine, I can help develop project execution strategies and templates and designs, whatever I can to help the scientists bring their product to market. And that's my passion.*

*So again, that same project we use the G-CON pods, and I could see where this was a great technology. And the pharmaceutical industry is so slow to accept new things, but they jumped on modular, clean rooms, loved it. And I was working with G-CON and it became obvious. They were just experiencing explosive growth. They needed to be able to train up their staff. I needed one of those breaks from the day to day. I needed that sabbatical. And my company was like, you know, if this is what you feel like you need to do, go do it. And so I went down to G-CON, A&M was an experienced, man that place is steeped in tradition. And I worked with a really young group of engineers to help them better support the manufacturing of these pods. And it was fascinating. It was fascinating to see how the construction industry is, is similar, but different from the manufacturing industry. It was fascinating to take kids right out of college and teach them something that I had learned over 20 years and just to see their excitement to be part of that. And that was the same time COVID hit. So it was really interesting to see how they reacted to COVID and coaching them through those moments. You know, you need to go to the store, you need to buy toilet paper, you need to buy rice because none of this stuff is going to be there. You need to figure out your, what your insurance is and how it's covered, and, you know, to be that support network for them.*

*Denise McIntosh:*

*So you really are, you are a teacher,*

*Sandra Bachamp:*

*Well, I'm better with adults than kids. Except for my kids. So anyway, the reason I came back from G-CON was my oldest was going into high school. And so I had sold this as a big adventure. We're going to Texas for a year. "All right, let's do it, mom." My husband supported me, you know, but it was a year. So we were very happy to come back to our village in Kansas City. And then I had a hard choice to make, because I knew I had a passion for bringing these products to market, but I also had a passion for teaching and developing staff.*

*And so I had to decide, I couldn't, I wasn't in a situation where I could do both. So I ended up going to a different company, which was a really, really hard choice. But I had a lot more exposure to potential types of projects and clients. And, you know, I'm trying to build up this knowledge so that again, I can leverage that knowledge to help the startup companies. And what I discovered in that situation was it's also really important to me to be part of a team again, with COVID and working remote you, you can develop that team, but it's not the same as being, face-to-face going to the client's site and, and hearing their story and figuring out a solution.*

*And then what I found was this really good group of people that I wanted to grow with. And so, as we decided we were gonna do something slightly different, and that's what we're doing now, where we're working together, where I'm growing a new office here in Kansas city, we're developing a staff and a culture that is all about not just us, not just where we are right now and being the best that we can be. But how do we make a company where our people can grow and develop, and it will live on past us? And let's say we cure cancer. There's going to be something else after that. So it's not really about just pharmaceutical or just carrying something it's about a culture and an environment where we will grow with whatever the problem is.*

*Denise McIntosh:*

*Well, it is the DPS group, right, right. Which has been around for 46 years.*

*Sandra Bachamp:*

*Yep. They started in Dublin and they were just doing process stuff and kind of the same thing, you know, as the clients brought challenges to them, they tried to grow with that. And they've been in the United States for 10 years now. It's great. Because again, I'm surrounded by subject matter experts. They're very strong in that cell and gene therapy market where we're focused on cures, not just treatments. So I feel like there's a really strong support network there, but there's also the opportunity to grow our own Kansas city office and develop those relationships in that staff.*

*Denise McIntosh:*

*So what does your, what do your days look like these days?*

*Sandra Bachamp:*

*Well, it's crazy right. Trying to grow something new. It's really hard because everybody's very busy and everybody does have a lot of job security. I've lived through lean years where you become as lean and mean as you can, because there's not a lot of work out there. And right now we're in this huge boom where there's a ton of work out there and you know, all these, all these companies are great. Really. I feel like so many*

*companies share the same values. I feel like we're just all on different paths of that growth curve and trying to do what we can every day to respond to our client's needs, have some kind of work-life balance, develop our people. So again, for me, it's, it's mostly recruiting right now. It's trying to pull in people who have common values and, and, and want to do the same kind of work stream I do have that same work-life balance*

*Denise McIntosh:  
and be part of a team*

*Sandra Bachamp:  
and be part of a team, be willing to come into the office. We're still looking at flexible hours. I think our culture has changed in that way. We've proven we can work from home, but we've also seen the advantages of being together. Yes. I spent a lot of my days still working with those startup companies, which I really enjoy and then spending a lot of time with this team and, you know, getting to know each other and make sure we're on the same page and, you know, really build something. So it's, it's fun.*

*Denise McIntosh:  
So let's explore one of those topics we didn't get to, to address in our ISPE group, which is advocating and negotiating for ourselves because you had a very interesting take on that.*

*Sandra Bachamp:  
Yeah. So again, you know, for 20 plus years, I had always just gone with the flow of my bosses, looking out for me, I'm doing the best. I can obviously I'll be rewarded fairly for putting in 110%. And, I never felt like I was treated unfairly by any means. But when I, when I was, you know, looking at I'm coming back to Kansas City, maybe I should look around and just see what opportunities are there. All of a sudden I got, you know, a financial incentive to make a change. And it made me question my value, you know, am I was the first company thinking I wasn't worth as much as the second company or is it is the second company confused about my worth? And they're over valuing me, like, how does this work? And so I have a friend in HR and she goes, no, that's, that's just how it works. When you switched companies, you get a raise. And if you want to get raises, you switched companies. And it just seems counterintuitive because for me, loyalty would be far more important than money. And I never felt motivated necessarily by money, but it really made me question my self worth.*

*And, I think the other thing I also encountered was getting to the top of the leadership of a company. Obviously it's a lot more competitive, there's less roles, there's less opportunities. And you really have to start developing those relationships with other*



people in the company. And it's, it's a strategy at that point where if you have an idea, you have to populate the idea and present it and sell it and it takes effort. You can't just take for granted that everybody's going to say, yeah, that is a fantastic idea. Let's do it Sandra. And you don't really learn that, you know, in an engineering role. And so I feel like that was another thing with switching companies. All of a sudden your history is gone. Nobody has these preconceptions about what you know, or what you can do. Anything you present, all of a sudden has more value because it's an outside view and, and you have to be prepared to leverage that. So it's been really exciting the last couple of years too, because I've been more intentional about how I spend my time and what I propose, because I feel like it, it has more impact on the people around me, but it's kinda sad to me that it wasn't as impactful in the past. And maybe it's because I was taking things for granted, not because the opportunity wasn't there.

*Denise McIntosh:*

You know, when we started this company in 2005 ...funny story, we just went around the room cause there are five owners and we all had a, you know, yellow, legal pad, what are we going to do? And who's, who's taking this and you know, we split it up. And, you know, at the end it was like, okay, who's going to be the CEO. And they, and they said, "well, I guess Denise, because her list is longer." But, the simple fact is I'm one of those people who just don't, I just don't let things fall through the cracks. And, and I'm I'm, I'm, I'm intentional. And I will also tell you that working in a group of mostly men, it has taken these past at least 10 years to understand and really get the feeling that I'm seen as a CEO.

*Sandra Bachamp:*

Really?

*Denise McIntosh:*

Yes. Now, so some of that could be me, right. Because do we do we have the self worth and value ourselves? I had never heard that term that Shannon or someone brought up in our, in some of our conversations before our, our group together

*Sandra Bachamp:*

Was it our perceived, was it our perceived value or

*Denise McIntosh:*

Yes. Or feeling for somewhat like fraudulent.

*Sandra Bachamp:*

Yeah.

*Denise McIntosh:*

*And I don't know that I've ever felt that way, but when she said that, I was like, well, perhaps it's more me and not the people I'm working with because I've also had employees say to me, you are the best CEO I've ever worked for. So it's, you know, what perception is it? Is it our own or those we work with?*

*Sandra Bachamp:*

*Yeah. And for me, it always comes back to when Sheryl Sandberg said, women will only apply for a job if they feel like they're 90% qualified, whereas a man will apply if he's 50% qualified. And, and that's not saying anything about men and saying about us, that we feel this need to under to be a hundred percent of everything, right? Yes.*

*Denise McIntosh:*

*Yes.*

*Sandra Bachamp:*

*We're our own worst critics. Right. We feel like, oh, I'm not doing as much as I could, even though maybe the people working, you're a great advocate for whatever it is I'm trying to do.*

*Denise McIntosh:*

*Yes. Well, and I have something on the wall of my office that says "done not perfect." And I know where I got it from. I got, I'm not sure where it came from initially, but, but it, it, it is. We take things I think sometimes too far when it would be perfectly acceptable and probably a hundred percent correct. Just to stop at some point and move on.*

*Sandra Bachamp:*

*Yes. I, and, and I think that's where it falls with the startup companies too. You're so invested in making it perfect. And it's like, does it have to be perfect because your goal here is to save lives. Yes. Needs to be a risk-based decision. And, you know, it needs to meet requirements, but you can overthink things for so long. You can just be paralyzed by this analysis process. And what I enjoy is pulling people out of the paralysis and just, you know, this is enough. We can move forward ... let's you can make changes.*

*Denise McIntosh:*

*Yes. But keep it moving. Yeah.*

*Sandra Bachamp:*

*And I see that with my kids too, as they're very independent and they're very comfortable with using their electronics, but "oh, I have to call somebody to make an appointment. No, I can't do that." And it's just so interesting how it's, it's an easy teaching moment, but they're so like paralyzed by this fear of making that phone call.*

*Denise McIntosh:*

*I know. I, yeah. And that has so changed in our, and these generations.*

*Sandra Bachamp:*

*It has. And I just can't imagine, I just can't imagine coming into this industry is, you know, a scientist who has no idea how to do building design and it must feel like, oh, that must be the most complicated thing ever, just going to go to a CMO because they've already got this all figured out. And for me, it's like, wow, you are hearing something. And I'm just doing bricks and mortar, but we all have our part to play. And we all have this ability to mentor and teach others. And another thing I heard recently is, you know, a lot of reason we have trouble pulling people into pharmaceuticals is because they've never been exposed to it. Yes. And so I'm talking to that. It*

*Denise McIntosh:*

*Seems scary, but it isn't,*

*Sandra Bachamp:*

*It isn't. And so I'm talking to my kids and my kids think, oh yeah, I can do what mom does. She's on the phone all day. And she does some meetings and she does some drawings. So I'm talking to my friends, my kids' friends. And, you know, they're hearing about this opportunity that they wouldn't have otherwise heard of. And I feel like all of us just have this opportunity to, to teach the next generation and, you know, make it so it's not scary. And it just seems obvious. And maybe for them, it does become the path of least resistance. And now we've brought more people to the solution.*

*Denise McIntosh:*

*Well, and that really is how these podcasts have evolved. You know, we started with engineers and yet it was very apparent, very quickly that we need all the parts and pieces. We need people in quality and we need people in a manufacturing role and we need people doing counting, and we need people doing business development. So we've expanded this. So we're including all of those, so that any young people who are looking can see opportunities where we are*

*Sandra Bachamp:*

*Agreed. And people already in the industry. I mean, again, I can't imagine never having those maternity leaves or never taking a, but if you get burnt out on one thing, there's so many other things you could be doing within our industry to make a parallel move and, you know, just regain that passion, rekindle that fire.*

*Denise McIntosh:*

*Yes. So Sandra, what brings you joy?*

*Sandra Bachamp:*

*Well, like I said earlier, my kids, my kids bring me joy. Seeing how they develop and interact with the world brings me joy. Reading brings me joy. I find if I'm not reading a book, I get really agitated. Like I've got to get out of my own head once a day and think about something else.*

*Denise McIntosh:*

*And have you thought about somebody you'd like to be stuck in an elevator with?*

*Sandra Bachamp:*

*No, I don't know. I was going to say interacting with other people brings me joy, but truly I'm an introvert, so I need like that 50 50 mix. So I feel like I like being alone on the elements.*

*Denise McIntosh:*

*Well, I did think of one what'd you think of Ruth Bader Ginsburg would be one that I would like to be stuck in an elevator with for a long time too late for that now, but maybe in the next life*

*Sandra Bachamp:*

*I do read some like Brené Brown and nonfiction books like that, because I feel like sometimes they help bring my optimism back up and give me a different perspective. So somebody like that, I would be, it would be interesting to just hear them.*

*Denise McIntosh:*

*I'd like to meet Brené Brown. The whole "awkward, brave and kind" is, is just, what's a mantra for me.*

*Sandra Bachamp:*

*I just would be worried she'd be analyzing us the whole time. Like "you're an outlier."*

*Denise McIntosh:*

*I think it'd be okay if we analyzed her too. Well, Sandra, this has been delightful as I knew it would be. And you and I are going to meet in person before too long. I can't wait. And thank you again for joining me on the art of engineering podcast.*