CERAMIC TECH CHAT

Episode 06

Title – "How to Build an Additive Manufacturing Company: Johannes Homa (E06)"

INTRO

De Guire: "I'm Eileen De Guire, and this is Ceramic Tech Chat.

In recent years, additive manufacturing has become a topic of significant interest in the ceramic industry. Compared to plastics and metals, ceramics tend to be more difficult to form with additive manufacturing, but recent advances by various researchers and companies have moved the technology toward commercial viability.

One company that has played a big role in introducing additive manufacturing for ceramics is Lithoz. Based in Vienna, Austria, Lithoz develops and manufactures materials and additive manufacturing systems for producing high-performance ceramics."

Homa: "We developed the so-called lithography-based ceramic manufacturing process, which means we are using light as a structuring method. And so we can build up three-dimensional part in any design which we want, and the advantages are we can make very strong, and dense, and precise parts, which is I think one of the most important issues if you want to print ceramic parts."

De Guire: "That's Johannes Homa, cofounder and CEO of Lithoz. When Johannes launched Lithoz with his cofounding partner Johannes Benedikt in 2011, they were one of the only companies providing machines for additive manufacturing of ceramics, and their lithography-based ceramic manufacturing technology was far from being an accepted forming method in the industry.

So how does someone go about launching a company in a nascent field that has not yet gained acceptance in industry? What must you do to help establish your products as relevant to the future of manufacturing?"

(music)

SECTION 1

De Guire: "Although the science of additive manufacturing greatly interests Johannes, he says the management side of the industry has always been a draw for him."

Homa: "I was starting industrial engineering at Vienna University of Technology, TU Wien, and I was sure I wanted to focus more on the management side of the courses. And then I came across additive manufacturing, or at this time it was called 3D printing, and I got in

touch with Professor Stampfl. And I was so fascinated by this technology so that I stick to that, and actually I did first time, you know, as a student project work and then I was asked to do my master's thesis there and I said, 'Well yes, that's cool, I want to stick with this topic.' And then further on to the Ph.D. and to a post-doc."

De Guire: "So why did you decide that a Ph.D. was going to help you?"

Homa: "Actually, I didn't think it will help me. It was just as a matter of fact that I came into that. So when I did my master's thesis, the very last, I mean, it was like different, different topics I was covering, in ceramics and additive manufacturing, and one of the topics was gel casting. And this was like a feasibility study for a company. And the company was so fascinated by the first results that they wanted to move forward and they handed in for a grant, and they asked me to work on this grant. But I was already negotiating a job offer with a big company to get started in a management curriculum. And they asked me, 'No, please stay there, we wanted to move on with you. And you can then be part of starting a company.' I should not be involved in being a cofounder, but they were offering me to support the foundation of the company on the green field. And I said, 'Well, I mean, that's really cool, that's what I like.' And so I dropped the job offer and started my Ph.D. actually. So it was not on my way, it was like, it just came across."

De Guire: "Right. It was an opportunity that checked off a number of priorities for you."

Homa: "Exactly."

De Guire: "And so in that experience, did you end up helping to start a company with that project?"

Homa: "No. Actually, that was, I mean, basically after two years, the company didn't proceed with this project. Not because it was not technically viable, but they had some whatever internal stuff. And then actually Professor Stampfl told me, 'You know, you just worked two years now on this topic, that's not enough for finalizing a Ph.D. You need to do more.' And you know, we were doing gel casting of ceramics and printing the mold by 3D printing. And then he said, 'You know what? Why don't we just print ceramics. You know, we are printing a mold and then casting it, we can also print it. So, let's go and get started.'"

De Guire: "Excellent. Okay. So can you tell me a little bit about your cofounding partner, Johannes Benedict, and why it was a good partnership? And what happened, what was the birth story of Lithoz."

Homa: "The birth story was actually when he was doing his master's thesis at our institute, doing something completely different, it had nothing to do with additive manufacturing. But when I saw him working, I could see that he's a mechanical engineer by heart. Which I was not, actually. So I met him the other day and we were not really friends, we were just, you know, 'Hello,' when you meet somebody at institute. And the other day I met him and said, 'What's going on with your master's thesis?' and he said, 'I will finish in two

weeks.' And I said, 'Yes, and then?' 'I have no idea yet.' And then I told him, 'You know what, go up to Professor Stampfl and ask him for a job.' And I think 15 minutes later he came back and said, 'Okay, I will start in August.'

And so he was heading into this project, you know I was finalizing my Ph.D., I gave him the project, so he took over the project, and you know I trained him from the very beginning and then he did his own work there, you know, focusing more on the mechanical side. I was focusing more on the materials side. And then you know after I finished my Ph.D., we started to work again together, and then it was more or less, it was crystal clear that we will do it together. And then we made good friends and still we are. And you know, it's good to have somebody, at least for me it was and I think also for him, it was good to have somebody who you can talk to when you're founding a company. I mean, this is a huge step and a very critical step and not always easy. And then it's good if you have a partner where you can rely on, a partner which you can trust. Simply sometimes somebody you can talk to and discuss your sorrows and your problems with him. It was actually perfect decision to do it together."

De Guire: "Excellent. Great."

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SECTION 2

De Guire: "Before launching a company, you must first identify an opportunity or gap that offers a competitive advantage in the marketplace. And Johannes's experience with industry allowed him to do just that."

Homa: "You know I was working for a while in additive manufacturing at this time so I already knew the market quite well, I mean the general market, and for plastic additive manufacturing, it was already established; metals came up really booming, the new stuff, you know, the laser melting, that this was really going towards industrialization. But ceramic was still lagging behind. And the problem was that so far nobody could meet the high demand of the ceramic industry. And this was basically quality. Quality means strength, density, reproducibility, accuracy, and nobody could meet it, especially strength was one of the most critical issues, which means you should not have any defects there.

And for us, the key was that *if* we want to go on the market, we have to have the same material properties as in conventional forming technology. This was for us the barrier we had to meet; otherwise it would not have made sense for us. And then once we were stepping into this market, it was opening up. Of course, it took some time for the whole ceramic market to develop to understand the advantages of additive manufacturing, but we see it now really kicking off."

De Guire: "So would you say the marketplace has expanded then and is embracing the idea of additive manufacturing?"

Homa: “Dramatically. We see in the last one, two years actually, we see that the marketplace has changed quite a lot. You know, starting with some early innovators and people or companies who want to pioneer this field, we see now that additive manufacturing is going into serial production, it’s going into broader applications. And even customers are asking now for additive manufacturing. Maybe couple, say five, six years ago at the ACerS trade fair at Daytona Beach, people were coming and asking, ‘Oh, you are doing additive for ceramics? Great.’ And now this has changed dramatically to the people are coming with a very specific problem, which can just be solved by additive manufacturing.”

De Guire: “That’s great. One of the promises of additive manufacturing has always been that you can design functional parts that can’t be formed through traditional methods, and that usually means they have some sort of internal structure that you can’t form through casting or injection molding or something. So is the industry embracing that promise? Are you starting to see people making parts that can’t be made other ways?”

Homa: “Definitely, definitely. My perspective is, my opinion is that this is the huge market, to design things which are not possible with other forming technologies. But what I also learned is that humans are good in copying but not so much in creating. And especially in the ceramic industry, which is actually a very traditional and engineering-based industry, changes are being very slow. So it takes time to incorporate these new design ideas, but definitely they are coming up.”

De Guire: “And do you see the marketplace looking at additive manufacturing as an industry-scale process? It kind of started as a prototyping kind of technology, but do you think there’s, are you seeing manufacturers taking it to an industry manufacturing scale?”

Homa: “Definitely I can see it. I mean, from the first, if someone looks at additive manufacturing, the easiest way to think is just make prototypes because that’s so easy to see, that’s a no brainer. But as companies are dealing with this technology, they are building up new parts and new applications, and then they need to do additive manufacturing in order to produce their parts.

So we see here two different approaches. One approach is that people are designing their part so that it can only be produced by additive manufacturing, and then there is no other means then to do it by additive manufacturing. And the other thing is that we see that, for example, the medical industry, like medical device industry, where the lot sizes are rather small like five, ten, twenty thousand per year, that they switch from powder injection molding to additive manufacturing because it’s more cost-effective to produce it by additive manufacturing rather than injection molding. And what is currently state-of-the-art is that our customers are already producing parts in ten to twenty thousand parts per year.”

De Guire: “Great. And I guess that stands to reason, actually, if someone designs a part that must be made by additive, that you have to be able to scale up.”

Homa: “I think scaling up, this is always an issue the industry has. Like, ‘Yeah, with this small machine we cannot scale up,’ but this is not the issue. Scaling up is actually something which has to be done once you know what you want to print. And our experience is that scaling up is always possible and the technology itself in most cases is not the dealbreaker. In most cases it’s about understanding the application, going to the market, and making everything around the production technology. Because producing is not everything if you want to bring innovation to the market.”

De Guire: “And so what is the role of a company like yours in helping the marketplace get educated about the potential and some of these innovation issues that you’ve been discussing?”

Homa: “This is what we are trying to do. First of all, we’re trying to enable things, so since we are not on the market with the parts itself, we can just enable our customers to produce those new parts and these new applications. And so on the one hand we are trying to be not only a machine supplier but we want to be more seen as a partner who supports their customers to be successful with their application. And on the other hand, we of course do a lot of education. So if you look on our website, there is lots of papers, articles, webinars which you can download and watch. What we are trying to do is to tell people what’s possible with additive manufacturing.”

De Guire: “So that leads me to the next question, which is we’ve seen a lot of you at ACerS events, as an exhibitor, as a speaker, other things, so what would you say is the benefit to a company like Lithoz that the Society can help with?”

Homa: “I mean it’s a great network and great multiplier. So as you say, you have the Daytona Beach meeting, which is for us every year a must-be event with the exhibition there as well as the technical sessions. Being in this network is just very helpful and very good and is well to have the cooperation with the short courses and the webinars. So, we are very happy that ACerS is supporting us and is helping us as well as ACerS is supporting additive manufacturing as a new innovation technology. I cannot imagine an American market without ACerS, I mean it’s very important for us.”

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SECTION 3

De Guire: “So, did you always know that you were going to be an entrepreneur? Or did this opportunity kind of just present itself?”

Homa: “Kind of. You know, as I took this opportunity with staying at the university with the Ph.D., I already had this entrepreneurial spirit, let’s put it that way. Rather, you know, to build something up, this was something which was fascinating me. And so I think when I got into that and being more into these entrepreneurial ideas, I think I had a clear vision towards going to be an entrepreneur.”

De Guire: “So, what personality attributes would you say are the key to being a successful entrepreneur?”

Homa: “There are a lot of success factors, and I think there is no single success factor which you can say, ‘This is it.’ I think it depends. You can be an entrepreneur with different personalities, you can be an entrepreneur coming up from different backgrounds. I think you know what’s important is to stand up after breakdown. You know, if things go wrong, just stand up again and do it again and trying to live your dream. And I think you have to work hard, I think this is for sure something which is sometimes a little bit underestimated, but I think the most important one is to stand up after you fall down.”

De Guire: “You know to expect some failure and to be willing to persevere through it.”

Homa: “There are failures everywhere, in every person’s life, in every day. I mean, you know, but as an entrepreneur, you’re just facing a little bit more of them.”

De Guire: “So how old was Lithoz, or what happened when you realized, ‘Okay, this is going to be a success.’”

Homa: “Difficult question. You know when we kicked off, we always say, ‘Okay, whatever happens, we have to be somehow successful. And if not, we just print parts and we stay small but we keep it as it is.’ And then we were starting with two employees and totaled four people, and then you see that the company is growing, and of course you’re facing a lot of problems and the market acceptance was not yet there. And I don’t know when you realize it, but at a certain point…it’s actually I think when Dr. Langer came to us, I don’t know if you know Dr. Langer, but he’s the CEO and founder of EOS, the metal additive manufacturing company, world market leader there. Came to us and saying, ‘You know, we have never seen such good ceramic parts. We want to be part of you.’ And I felt like this must be something really meaningful what we did. And then suddenly you end up being twenty people, thirty people, forty people, and then you say, ‘Okay, it has to be somehow successful at the end.’ And we see now really that this pays off and that the market is really accepting additive manufacturing. And we have been, or we are world market leader in this field, and this shows we have done our things right.”

De Guire: “Another measure of being successful is you start to get competition. So are you starting to see anybody else out there trying to grab a piece of your business?”

Homa: “Yeah. And actually, oh it’s so funny. At the beginning I was thinking of, we were promoting ‘We are the only company doing or providing machines for additive manufacturing of ceramics.’ And then, I don’t know when, a couple of years after we founded, I realized it’s not good being the only one because if you are the only one it shows that there is no interest in the market. And now we see a lot of competition, but still we are the golden standard in terms of quality and technologic leadership.

So I think it’s good to have competition. It drives the market, competition supports your marketing effects, and, you know, if they found an application which is interesting, the

companies will look for other technologies as well. So as long as competition is honest and good, it's part of the business and it's good. Our aim is to stay world market and technology leader in the field because I always say in ceramics, there are three things that matter. And this is first quality, second quality, and third quality. And this is where we think where we are really far ahead of our competition."

De Guire: "Another measure of success is growth, and I think you're up to about 70 employees now. And you've expanded with a subsidiary in the United States called Lithoz America. And you've spun off a company to specialize in metals. I think that they're in Vienna called Incus. So can you tell us a little bit about what was behind those decisions and how you assess opportunities like expanding into a different country."

Homa: "I mean for us it was, we were selling our first system in 2014 or 2015 to the United States, and we realized that there is, and then we wanted to build up some sales partnership and stuff like this. But there's a different attitude in the U.S. than here in Europe. And so we also were coming across the export control and stuff like this, and then we were just saying, 'Okay, it really doesn't work out with the sales partners we wanted, we cannot do all the business there because we cannot do the ITAR [International Traffic in Arms Regulations] control stuff.' And then we decided to build up a subsidiary there, I think in 2016, we were thinking of doing so and looking for partners to do so. And the U.S. is a big market, I mean it's one-third of the ceramic market. And we see a huge expansion there, and we are happy to be there, actually. And I think you have to seize the opportunities as they come along. So we were trying to find a solution and then we met, through our network we met Shawn Allan, who is now managing our subsidiary there in America. And we are so happy to have him because he's a technology expert, having a similar attitude as we have, and that makes great fun to work with him."

De Guire: "Well we enjoy working with him too. As you know, he's been extremely generous with his time, helping us with short courses and workshops to help educate our industry about additive manufacturing. So, we appreciate that.

So what does the future look like for Lithoz? You've come a long way in nine years. Do the next nine years look as big in terms of growth?"

Homa: "I think we are looking into a very bright future. This is what the COVID crisis has shown us. Now much more that you need to have a resilient supply chain. And more companies are looking into additive manufacturing because, for example, the digital production technologies. As we are meeting right now, we are a digital channel, and they have boomed through this corona crisis. We also see that the digital production technologies, like additive manufacturing will be even more successful for the industry to enable them to be more resilient towards shocks and crisis. So I still see a lot of growth, big markets. We have a lot of opportunities coming up, or opportunities we are already working on. So I think it is very bright."

De Guire: "Well that's great. We look forward to watching that unfold in the next couple years."

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CONCLUSION

De Guire: “When it comes to starting a business, venturing into unchartered territory can be intimidating, but having the right partners and being willing to stand up after you fall help make the attempt worth the risk. And unless you try, you’ll never know if your idea may become the next big industrial trend.

I’m Eileen De Guire, and this is Ceramic Tech Chat.”

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“Visit our website at ceramics.org for this episode’s show notes to learn more about Lithoz. Ceramic Tech Chat is produced by Lisa McDonald and copyrighted by The American Ceramic Society.

Until next time, I’m Eileen De Guire, and thank you for joining us.”