Ep.3.46 - Thomas Schuelke

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SPEAKERS

Thomas Schuelke, Ed Clemente, Announcer

A **Announcer** 00:01

Welcome to The Michigan Opportunity, an economic development podcast featuring candid conversations with business leaders across Michigan. You'll hear firsthand accounts from Michigan business leaders and innovators about how the state is driving job growth and business investment, supporting a thriving entrepreneurial ecosystem, building vibrant communities and helping to attract and retain one of the most diverse and significant workforces in the nation.

E **Ed Clemente** 00:29

Hello, I'm Ed Clemente, your host, and we're fortunate to have Thomas Schuelke with us. He's the president of Fraunhofer USA Inc. Welcome to the show, Thomas.

T **Thomas Schuelke** 00:38

Hello, Ed, thanks for having me.

E **Ed Clemente** 00:41

No, I found out about you and I will give a plug, was from Tom Alley, out of Automation Alley, sorry, not Tom Alley, Tom Kelly, out of Automation Alley. But he talks so highly about your organization and about you that we had to get you on of the show. And why don't you kind of tell people what Fraunhofer is first?

T **Thomas Schuelke** 01:02

Yeah, Yeah, thanks. So Fraunhofer is a, you know, it's a not-for-profit research organization. So

Yeah. Yeah, thanks. So Fraunhofer is a, you know, it's a not for profit research organization. So it originates from Germany, it was founded in 1949. And it has since grown quite substantially from an initial single institute. It's now something like 76 research institutes in Germany, it's got like 30,000 people, 3 billion in research expenditures, and it's present in 80 countries. And it's a US affiliate, Fraunhofer USA, Inc., as you introduced us, is the largest and the oldest affiliate of Fraunhofer that's in a foreign country. And yeah, it's gonna turn 30 years old in 2025.

E **Ed Clemente** 02:03

The USA one is going to be turning [The USA one, yeah.] And we were the very first country that they did it with, you said.

T **Thomas Schuelke** 02:10

That's right. Yeah, in terms of an affiliate, yes. So you have some different forms of engagement in different countries. And meaning, you know, you have in some countries, you might have a sales office or something like that, or representative office. Whereas if you have an affiliate, it's really an independent corporation in that particular country. And the United States one was the first one, and is the oldest one and also the largest one of those affiliates. And that's what we have here in the US. And it was incorporated originally in Rhode Island, but it's headquartered in Michigan, basically since the beginning.

E **Ed Clemente** 02:53

And I mean, this sounds naive, and I should have asked you this, but is Fraunhofer like a city or does it mean something?

T **Thomas Schuelke** 03:00

Oh, well, that is a very interesting question. Fraunhofer is actually a name [Oh, a person, okay.] It's a person and it's very cool, the organization is named after Joseph Fraunhofer. He was a Bavarian, and he like combined in one person, the spirit of a scientist, and of an entrepreneur. So what he did is he basically developed methods to produce glass lenses for telescopes. And on the scientific side, there's something called the Fraunhofer lines, these are spectroscopic absorption lines in the sun spectrum. And in order to better analyze them, and better evaluate them, you then actually develop these production methods and then ultimately founded a company to produce this and then that's the idea behind Fraunhofer, it's an applied research organization. So everything Fraunhofer does has to serve some kind of a practical purpose. And I like to quote one of the sentences of Joseph Fraunhofer, he said, I have to set aside everything in my scientific endeavors, which does not further the product. And so that's a key of Fraunhofer as opposed to somebody who does only basic research, or somebody who improves an already existing manufacturing process that that's a way out there. So Fraunhofer is always somewhere in the middle of the technology readiness level equation, and as such, it has a very unique place in Germany. And if it were a US company from the beginning, it would not have

been Fraunhofer because few people know him. It would have been Edison, which kind of represents the same idea and that's why I like the Henry Ford exhibition with the Edison laboratory. That's right up what Fraunhofer is doing.

E Ed Clemente 05:09

And I mean, it's obviously altruistic too, not that it's doing pure benevolence. But it's doing something very unique that other organizations don't do. But can you explain a little bit how that works, that process?

T Thomas Schuelke 05:26

Yeah, that's true. It's like, for example, in terms of how you control it, you always have to look out, if you look at the research expenditures, for example, Fraunhofer is funded in a 1/- 1/3-1/3 type of scheme. So 1/3 is some unencumbered based funding that comes from the government. So that gives you the opportunity to look at internal research and look at new things and do investments in equipment, for example, which is often industrial equipment. And then and the other two thirds are contract research of which half comes from the government, also could be any competitive government funding, and the other half from industry. And if you think about it, that's almost a billion in research at Fraunhofer that's just done with companies, from very small ones all the way to the big ones. And that's the money side of it, and how you can steer, Fraunhofer will always try to keep that balance, and that makes it unique. And, from the topics, what you choose to do is, you would basically have to, I mean, 3 billion sounds maybe a lot, but that's a budget of a common university. So you have to limit what you're doing. So you look at, what are the societal needs, whatever you need, affordable health care, you need security, resilience, those type of things that are also worldwide problems, that's why it makes sense to be a worldwide presence and then you tailor your research fields into certain categories that can provide potentially answers in those kinds of needs, for those kind of impact goals, and then you do your research. And then you'll work with companies, because in the end, who's gonna make the impact, it's not the researcher, that's gonna make the impact it's a product that a company develops. And so Fraunhofer then works with those companies to bring these things as fast as possible from the laboratory to the market, if you will. And at the same time, if you have a Fraunhofer laboratory, like the ones we have in Michigan, they are equipped with industrial equipment. So a company can come and look at these machines and try them out and decide, oh, yeah, this is the right thing for me, that's what I want to have, so I do the investment, and they can try it in real life, so to speak. And that makes the Fraunhofer approach unique for for many companies. So for example, it's just make up a company. But say you're a company that was somehow doing something in the mobility sector for engines or something like that. Would they approach you to set up the sort of three way kind of split thing? Or how do they reach you and find you? The company doesn't really worry about the three way split. But yes, for example, we are here in Michigan, there's a reason for that. When Fraunhofer first started in the United States, they came to the Midwest region. Why? Because its automotive manufacturing, its production technology, that's where they are big. I mean, Fraunhofer, with 76 institutes they are covering a lot from energy to health to IT to production to surfaces, materials, all of that kind of thing. But in the US, it was such a natural move. There's General Motors, Ford, Chrysler at the time, and that's where we work, and companies hear about us, they come to us with a specific problem. Let's say for example, friction in a mechanical assembly, which could be a machine or an engine. And can you do something

about it? Because you have a laboratory that does surface engineering? And yes, so we would start a project with the company, would be proprietary, so confidential, and we would work with them. At the same time, we might have a R&D program with the Department of Energy that would be the public side of funding, where we work on ultra-durable surfaces, for example, which we've done in the past with, I believe it was EERE, some some energy department component and we collaborate with other research organizations. So in that case, it was Argonne National Lab, for example, where we develop an extremely durable surface, and that then gets published somewhere, and then comes a company who says, Hey, we read about your stuff, would that work for my particular problem, and then we try to adapt it and make it work for that particular client.

E **Ed Clemente** 10:21

So do the best practices from around the world, then, you could bring those to the table sometimes to help people, even if it's not maybe specifically for your niche in Michigan, but there's other places around the world that can also help with your other problems.

T **Thomas Schuelke** 10:35

That is actually a very acute observation. Yes, you have a big miss-fit between the capacities that are available in Germany, you know, 30,000 people, and then our little Fraunhofer USA with, you know, we have a little bit more than 100 people, but they are split over three states. And about half of that is in Michigan. And so we work with our German colleagues and try to find the best solution and the quickest solution for our customers do in the United States.

E **Ed Clemente** 11:14

And you did mention two other states. I think he told me they're both on the East Coast, I think, right?

T **Thomas Schuelke** 11:20

Yeah. One is Massachusetts. And we have a laboratory in Boston. And then the other one is Maryland. So we have a couple of competencies here in the US in Michigan, it's, you know, heavy duty manufacturing, lasers, additive manufacturing. And we have surface engineering, I mentioned that we do materials, semiconductor electronics at the laboratories that are located at Michigan State University. And in Boston, we do automation, lots of automation, energy research is being done there. Also some medical devices, and software's done in Maryland, and they focus on AI and how to combine AI with manufacturing. So all in all, we can bring those things together, I always joke around and say we developed the materials in Michigan, and then we built the machine for it in Boston, and the software comes from Maryland.

A **Announcer** 12:16

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E Ed Clemente 12:32

I should have mentioned that you're also, are you a full professor at MSU? Are you a visiting professor? I don't know.

T Thomas Schuelke 12:38

Yeah, no, I, I'm a full professor at Michigan State University in the Department of Electrical and Computer Engineering. And I was there full time employed when I ran the center at Michigan State and now as a president, I'm 80% Fraunhofer employee and 20% Michigan State employee.

E Ed Clemente 13:00

Do you do classes still or no?

T Thomas Schuelke 13:02

Yes I do every so often for graduate students. And those classes are basically, you know, applied plasma physics for applications ranging from surface engineering to energy to all kinds of different things where you can use modified surfaces.

E Ed Clemente 13:25

Yeah, I mean, you know, it's sort of interesting to that you work with the National Labs, and sort of whenever I get people on the show, like you, that do both applied and basic research, right, you're sort of, you evolve with both somewhat I'm guessing, right?

T Thomas Schuelke 13:41

Well, if you want to bring stuff to market, cross that gap. On the left side, you've got to collaborate with universities, that's why we're actually on campus. So when I came here, I was used to that from Fraunhofer in Germany, and we did try to find a proper university partner that does a PhD level research in the laboratories. And at Michigan State, we found that so at any given point in time, we employ probably at least 20 undergraduate students in our laboratories, we fund a couple of PhD thesis there. So you need that interaction with the ongoing basic research in order to connect it with real world. I mean, to me, that's very fastenating. But I'm not like most people, I think, but I find that so helpful, like things in tech transfer, and all those kinds of things, how that really helps innovation for the country. Well, everybody, right? Yeah, that's the goal. But it's also interesting for I mean, imagine you're a student in our laboratories, you get thrown into the pool as if you're an engineer. Now go work and for a real customer,

maybe a company, maybe it's General Motors or anybody and you know, for an engineer, or scientist like myself, it's very, very interesting because you have on the one hand, your basic know-how and let's say vacuum processes, semiconductor processes, whatever, but you get to apply your knowledge to anything from biomedical implants to electronics to cars, or whatever, wherever it's needed. So it never gets boring in Fraunhofer laboratories.

E Ed Clemente 15:38

I would imagine even the advantage of having students is they look at things because maybe they don't have the baggage that I have, you know that they look at it very differently then maybe and that must make it a little bit more exciting that they come at it from a different angle, maybe sometimes.

T Thomas Schuelke 15:53

That's right, I always say, the advantage of a student is they don't know yet that it doesn't work. That's why they get it to work.

E Ed Clemente 16:02

And so is there any other partners you work with? I know, you probably have some companies and other organizations, I'm sure, because that's how I met you originally, like I said, with Automation Alley.

T Thomas Schuelke 16:13

Automation Alley is a very strong and also very interesting partner for us, because they are connected to more than 1000 local manufacturing companies. And they have a focus on Industry 4.0 and Industry 4.0 is something that actually originates out of Fraunhofer, the whole terminology and the concepts formulated around that. And because of that, we really like the setup of Automation Alley, it complements us quite well. And so we try to do what we can. And that's why Tom Kelly, who you mentioned before, also serves on Fraunhofer USA's Science and Technology Advisory Council. And we do this kind of thing to have people looking at our operations from the outside. If you are in your own soup bowl, so to speak, day in day out, you need people to look at it from the outside and say, Hey, you know what, guys? Have you ever thought about this, or we do it like that. And so we really appreciate that kind of insight. And we have, I think maybe 12 people or so on this council, and National Lab people are there, there are people from energy companies, former CEO of BMW Manufacturing, South Carolina, is on there. So that's a really interesting way of interacting with local entities. And I think also the key, or one of the really critical elements of Fraunhofer USA's success is the partner universities that we have, because every laboratory is really tightly connected to a major research university, here's MSU, then Boston University and University of Maryland.

E Ed Clemente 18:10

So you probably have explained this somewhat in some of your answers already. But is there

So you probably have explained this somewhat in some of your answers already. But is there any sort of future other trends you think people should be aware of? Because obviously, it's an evolving field all the time.

T Thomas Schuelke 18:21

Yeah, so every few years, some new trends come up. But right now, it's lots of talking about AI, artificial intelligence, and our view is, essentially, human intelligence is predicting what's next and AI does that too. And meanwhile, the computational powers there that well-trained AI can do things that humans might not even be easily able to do, and no matter what we think this is not a fad, it'll stay. And what we try to do is make make the best use of it that we can for the processes we are developing. So I find that very interesting. And, of course, risks and so on, everything needs rules, you know, and yes, there will be rules, and there will be behavioral rules, what you can and can't do with it. There will be technical rules, that's all fine, but it won't go away.

E Ed Clemente 19:29

I almost think of AI sometimes almost as like, augmented sort of versus a virtual reality because it's more like an assistant that might know more than you but the system is still an assistant. And you sort of control that.

T Thomas Schuelke 19:44

Absolutely. And it's sometimes astoundingly powerful. And I'm not talking about ChatGPT or something. I'm talking about, let's say, predicting a manufacturing process. We grow diamonds at Michigan State for semiconductor purposes. And we have worked with AI algorithms to see if the crystal that comes out looks great. And that works quite nicely. And we just filed a patent on that. But that's something where I see a lot of potential, where we would have had traditionally difficulties to monitor those type of processes.

E Ed Clemente 20:17

Yeah, and as this field evolves, I've seen it growing actually, from what I've talked to some other people, is mainly, not in your field as much as biology. Like, there's a lot of things I know they're doing in health research that humans couldn't have done. If they tried to find out how to process elimination or deductive reasoning. It goes a lot faster with AI than humans trying to go through every experiment kinda.

T Thomas Schuelke 20:47

Yeah. And I like your comment that it's a tool, just like the automobile is a tool that makes you go from A to B faster. AI is a tool and it will help a lot.

E Ed Clemente 21:02

Well, your last couple of questions are a little easier, Thomas. Again, our guest is Tom Shuelke. He's the president of Fraunhofer USA Inc. So what would you tell your 17 year old self? How long have you been here in America? I didn't even think about that. But you've been here quite a while, right?

T Thomas Schuelke 21:21

Yeah, I came to the United States in '98. So it's quite a while?

E Ed Clemente 21:26

So you were a student, though, in Germany when you were 17? I presume? [Right.] So what would you go back and tell yourself to do for a career?

T Thomas Schuelke 21:34

Well, in terms of a career, I would do exactly the same. I mean, when I was 17, I knew I wanted to become a physicist. And I would do the same thing again, just simply because it's so interesting. Now, when I was 17, as a student, I was in East Germany, what I didn't know is that the Wall would appear and that the world suddenly would become a very interesting place. Wait, you came here before the wall or after the wall fell? After the wall. The wall disappeared when I was at university.

E Ed Clemente 22:11

Oh, interesting. So you were going to school somewhere in East Germany back then?

T Thomas Schuelke 22:16

That's right. I was born and grew up in the city of Berlin.

E Ed Clemente 22:20

Oh, on the east side, yeah. Oh, wow. Interesting. I didn't know that. I would probably talk to you just about that for a whole show. But that would probably be another time. So that must have been very interesting for you to come here to America too, just in general, not even going to Germany, West Germany, but coming to the US then.

T Thomas Schuelke 22:45

Yeah, I mean, when I when I first came to the US, it was just for an experiment. I had a friend at Lawrence Berkeley Lab in '95. I went there for three months, because we wanted to photograph

Lawrence Berkeley Lab in '95. I went there for three months, because we wanted to photograph some plasmas and I really enjoyed it. I really liked it and eventually led me back to the United States. Well, three years later, already.

E Ed Clemente 23:08

Well, and your last question, because I know both you and I share a passion for the Henry Ford Museum and Greenfield Village. But what else do you like doing in Michigan too, anything else with your family?

T Thomas Schuelke 23:21

Yeah, well, my hobby is motorcycling. I like to ride around on my motorcycle in Michigan, up and down the road left and right. And you know, on a motorcycle, every state becomes small. But yeah, Michigan is just a cool state. What people don't realize is that it's actually on an elevation of about 900 feet or so. And it's a flat plane with a lot of lakes. But because it's on an elevation once in a while it gets deep down and you get even curvy roads in Michigan, you just have to find them. And that's my hobby in my free time.

E Ed Clemente 23:57

He sound like someone who wants the autobahn. I don't know what the speed limit is there but everyone always jokes that it's sometimes doesn't have a speed limit. I don't know if it does. [Well, it doesn't.] No, it doesn't. Okay, I wasn't sure.

T Thomas Schuelke 24:10

No everywhere, but it's also, well, be careful what you wish for.

E Ed Clemente 24:18

Yeah, I would imagine. Well, anyway, once again, our guest was Thomas Schuelke, he's the president at Fraunhofer USA Inc, here in Plymouth, Michigan. And thanks again. And it sounds like you guys are doing a fantastic job there and keep up the good work. And thanks for doing this today, Thomas.

T Thomas Schuelke 24:35

Yeah, thank you for the opportunity. I appreciate it.

E Ed Clemente 24:38

Oh, it was a good conversation. I appreciate it as well.

A Announcer 24:42

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