[00:00:01] Jeremy Frank: We've saved our customers over $4 billion to date by addressing these machine health issues proactively. We've certainly saved people's lives, like, literally saved people's lives, certainly saved thousands and thousands of injuries.

[00:00:16] Ryan Newman: This is dare to disrupt, a podcast about Penn State alumni who are innovators, entrepreneurs and leaders, and the stories behind their success. I'm your host, Ryan Newman, and on the show today is Jeremy Frank. Jeremy is co founder and CEO of KCF Technologies, a technology company based out of State College, Pa. KCF Technologies provides proprietary machine health optimization hardware, software, and services to industry and military clients. Under Jeremy's leadership, KCF has pioneered advanced mints in wireless, vibration sensing and machine health monitoring. Today, the company is a global leader in predictive maintenance monitoring over 80,000 machines across numerous industries, driven by Jeremy's vision of eradicating unplanned downtime and enhancing industrial safety. Jeremy graduated from Penn State in 1997 with his bachelor's in mechanical engineering and in 2001 with his PhD in mechanical engineering. He also received his MBA from Penn State in 2005.

Well, this is a first for us. Jeremy, you are the first guest we've had on data disrupt who launched and is currently running their business right here in state college. We're happy to have you on, and we're excited to be recording this interview with you here in person in the Eric J. Barron innovation Hub in downtown State College. Welcome.

[00:01:40] Jeremy Frank: Thank you very much, Ryan. It's a pleasure to be here. And it's interesting that we just walked past the office where we first were located, just a stone's throw from where we're sitting right now. So we're certainly in state college.

[00:01:51] Ryan Newman: It's incredible. Well, normally we thank our guests for traveling great distances to come be with us or coming to State college specifically. In your case, you didn't have to travel very far, did you?

[00:02:01] Jeremy Frank: Two blocks.

[00:02:02] Ryan Newman: That's amazing. We're going to get into all of that. But before we get ahead of ourselves, why don't we start as we normally do, which is at the beginning. Can you tell our listeners where you grew up and what your early formative years were like?

[00:02:14] Jeremy Frank: I grew up in Pittsburgh. I was actually born. My parents lived in Greencastle, Pennsylvania. My father worked for Grove Cranes, which is now part of Manitowoc, but they shortly thereafter moved to Pittsburgh because my father started a company that came out of the work he was doing at Grove with two of his professors from Carnegie Mellon.

[00:02:29] Ryan Newman: So let me get this straight. Your dad started a company with professors at Carnegie Mellon, and you also started a company with professors at Penn State.

[00:02:37] Jeremy Frank: That's true. And my dad was an alumni of Carnegie Mellon, so. Yes, very similar. Although, ironically, we can get to this later, perhaps. But when I told him that I was going to start a company with my professors at Penn State, he promptly told me he thought it was a terrible idea and I should get a job instead, which, honestly, was pretty good advice in some ways.

[00:02:54] Ryan Newman: Well, we will definitely get. We will definitely get to that. Give our listeners some insight. What were you like as a young boy growing up, and what was it like growing up in Pittsburgh?

[00:03:01] Jeremy Frank: Yeah, I grew up in the. I was in downtown. I was in the south hills of Pittsburgh, Mount Lebanon, as a suburb, about 7 miles south of Pittsburgh. Really nice town. My parents moved there, you know, really as bootstrapped engineers. It's a nice place to live, but they moved there for one reason, which was the schools. Mount leavenwen has really, really great school system. Grew up in living kind of an idyllic childhood. Playing on the street, playing outside. We had woods right behind my. My house, bmx bikes, all that kind of stuff. I just had. It was idyllic in a lot of ways. Pittsburgh was a great place to grow up.

[00:03:32] Ryan Newman: So you're growing up in Pittsburgh, and at some point you decide to go to Penn State. What was that decision making like, and how'd that go over in your house?

[00:03:40] Jeremy Frank: It went great in my house. I'm laughing because, first of all, I had worked at Pitt, and I grew up as a Pittsburgh, you know, die hard Steeler fan, pirate fan. I grew up watching Barry Bonds play baseball. I grew up watching Pitt. And I certainly would have thought that Pitt was a much more attractive school. I ended up getting an internship working at Pitt when I was in high school, and there was a grad student in the lab from Penn State who had some Penn State things on the wall, and he was loathed by everyone in that office, including me. And subsequently, I applied to a few schools, and I applied to MIT, Cornell, in Carnegie Mellon, and Penn State. Of those schools, there were people, including my guidance counselor. My math teacher was really encouraging me to pick one of those other schools. My father was just a very focused, practical person with good financial sense. Really thought Penn State, and specifically the honors college, was a much better ratio, value to cost. So with my dad, this was a very easy choice. I was adamantly against the idea of going to Penn State until my senior year. I had a friend who had an older brother that was at Penn State living in a fraternity house. We came up for a visit without our parents and just spent the weekend at Penn State. That was a pivotal experience. I never even thought twice about it afterwards. I was going to Penn State, and there was no questions about it.

[00:04:57] Ryan Newman: So you decide to come to Penn State, and when you were going to Penn State, what were you thinking? You wanted to study? And watching your father as an entrepreneur, did that kind of sow any seeds of interest in terms of that as being a career path you may want to pursue?

[00:05:10] Jeremy Frank: I majored in mechanical engineering, mainly because that's what my dad had been in, and I enjoyed physics. I was good at math, and I wasn't terribly drawn to anything else. It was kind of by default. It ended up being a great fit for me. I wasn't really very focused on my education, other than just being in a program and getting good grades, because, I mean, even as late as my senior year in undergrad, I thought about applying to med school. I was really not specific about what to do. My dad, as I said, had a business, not just a business, but he was a forensic engineer. So he had started this business with Carnegie Mellon professors who were expert witnesses investigating industrial accidents and other types of high profile accidents, and ultimately testifying in court about the responsibility. I worked for him when I was in high school. I helped him do the books. I was doing spreadsheets on computers in the early to mid eighties, when they were pretty new, because I was learning that in school. And so I helped him do the books. I got familiar with business. I also went with him on investigations to investigate accidents, which was formative, of course, when we get to what I do for a business now.

[00:06:11] Ryan Newman: And what do you think was the main source for either, depending on how you want to look at it, lack of commitment to say you want to be an engineer, or your wide varying interests and a variety of other things. What was really driving at that?

[00:06:26] Jeremy Frank: I think the main thing was just an overdeveloped sense of autonomy. I've

never actually applied for a job. I've never in my whole life applied for a full time job.

[00:06:34] Ryan Newman: Jeremy, how old are you?

[00:06:35] Jeremy Frank: 48.

[00:06:36] Ryan Newman: You're 48 years old and you've never applied for a job?

[00:06:38] Jeremy Frank: And I've never had a normal full time job.

[00:06:40] Ryan Newman: Wow.

[00:06:41] Jeremy Frank: Yes. I worked at Pitt. I worked at a pizza place. I was a pizza delivery boy. I was actually a very successful newspaper delivery boy. Before that. I actually earned a good bit of money. I was good at making money, but I really had almost zero interest in a normal career, quote unquote normal. And if you think about my experience. I was watching my father live a very independent, not carefree, you know, he was an entrepreneur, and so I understood the rigors of doing that. But the freedom that he enjoyed in running his own business is what I grew up with. And so the idea of getting a job was actually would have been kind of countercultural to what I grew up watching.

[00:07:14] Ryan Newman: So you get to graduation as an engineering student, and what are you thinking in terms of the next step for you? You clearly aren't going to apply for a job.

[00:07:23] Jeremy Frank: No, I never did. Never did, and I did. One thing that's really important to mention is along that way is actually at a dance marathon meeting my sophomore year. I met my wife at that first meeting. Well, we didn't get married for another bunch of years, so that was a factor when I was deciding what to do next. But mainly, I did kind of what you might imagine would be a natural thing as I just kind of punted it down the road. And I went to grad school. Mechanical engineering is kind of divided into two sides. There's the fluid and thermal side, and then there's the mechanical machines and dynamics side, and I was definitely interested in the latter, the machine side. That much I knew. I was really interested in devices. My Schreier thesis was really a neat thing. I was working for a professor who was doing research at the Larson Transportation Institute, and the project was to crash a car off the side of a road into a guardrail to test these guardrails that break away when you crash into them. So my job was literally to spend the summer figuring out how to launch a car off the side of a road at 60 miles an hour without someone in it, which was really neat. And I just. That was my first exposure to genuine grad school. And so by the time the next year came around, I wasn't going to apply for a job. I started visiting some of the grad labs in Penn State, mechanical engineering and at the applied research lab, and there's just some amazingly cool things happening there at the time. There was, and there still is. And through that process, I got to meet a professor who I just absolutely connected with.

[00:08:49] Ryan Newman: Amazing. So you decide to enroll in a PhD program, and what was the experience like, focusing on the mechanical side, systems, machines, et cetera. What was that experience like through your PhD program?

[00:09:01] Jeremy Frank: Well, right from the get go, the professor that I met with, who ultimately is the co founder of my company, Professor Gary Koopman, he was running a lab called the center for Acoustics and Vibration. It was actually the noise control lab within the center for Acoustics and Vibration. But Professor Koopman started the entire center. He actually brought it here from the University of Houston. Gary's lab, I just absolutely instantly fell in love with. It was just the coolest technology. It was just the kind of things that I was just extremely interested in. It was

just something I wanted to jump into with both feet.

[00:09:34] Ryan Newman: Very cool. So you start working with Professor Koopman and in the form of the lab, working your PhD. So what was the topic of your dissertation?

[00:09:44] Jeremy Frank: Something I sometimes say is that I was doing AI 25 years ago, which was the third time. It was cool. There was a big wave of AI in the sixties. There was a big wave of AI in the eighties. The third big wave was in the late nineties, when I was in grad school, and I was doing nonlinear optimization algorithms to optimize various things. And it was designing a very specific type of smart material actuator.

But the real application was on a submarine propulsor. It was part of a wider project to make submarine propulsors vibrate less, which is a very important thing for the.

[00:10:17] Ryan Newman: So less detection, basically.

[00:10:18] Jeremy Frank: Less detection.

[00:10:19] Ryan Newman: So as you, near the end of your PhD program, had the vision of what you were going to do next taken hold, or did it not really come until after you actually formally were conferred with your PhD?

[00:10:29] Jeremy Frank: So, no, we were planning on getting married. So my now wife Amy and I had continued dating that whole time. She had taken a job. She was also in Penn State, also in. Shrier had taken her first job at Accenture in Philadelphia, but was traveling all over the place.
We had been dating remotely for three, three and a half years. And our plan was to get married and hike the appalachian trail. That was our plan until we had bought all the maps, we had bought all the gear. We actually got married in March in snow in Pittsburgh, so that we would have enough time to get down to Georgia and start the appalachian trail. And that was all scheduled. But what happened was Professor Koopman and I, Gary and I were. He was invited by some professors from the Tokyo Institute of Technology to teach a semester there. He needed a grad student to go along with him. Asked if I would do it, I instantly said yes. So Gary and I went to Tokyo. I lived there for the better part of a semester, helping him to teach this class on basically applying AI, like nonlinear optimization algorithms to optimize structures and noise at the Tokyo Institute of Technology.

During that process, we got to know each other particularly well. We were living there for months and months. And sometime toward the end of that, this was all the summer prior, so I was engaged the summer prior to planning our wedding and hiking the appalachian trail. We hatched the idea to start the company and ended up switching to that.

[00:11:51] Ryan Newman: Amazing. So you're with Doctor Koopman, you're having a great time, you're connecting well, you really like his research. So what was the earliest go to market business idea for the business that sort of got you to launch a company?

[00:12:06] Jeremy Frank: I'll tell you, but it's not a good one. It's sort of embarrassing. Our idea. So I haven't talked about Doctor Chen yet. Doctor Huiqing. Chen basically ran the lab, ran the noise control lab. Great guy. We worked together, we've been working together on this DARPA project. There's some deep expertise in China, in the area of vibration that we're in, that he had connection to. So the plan that we hatched was to buy those devices and sensors that were manufactured in China for chinese markets, import them to America, and then resell them to labs and universities and things in the United States, which sort of makes sense because that was our expertise and we knew how to, we were using these devices and we had special access

to them. And so we actually had some revenue doing that. But we quickly moved on to the next part of our plan.

[00:12:51] Ryan Newman: So at that stage, you mentioned Professor Koopman, you just mentioned Professor Chen. I assume you're obviously Jeremy Frank. So that is the KCF.

[00:12:58] Jeremy Frank: That's KCF.

[00:12:59] Ryan Newman: So now you've got a name for a company. You mentioned that the original location was a short block from where we are here at the Eric J. Barron innovation hub. And so you're off to the races, running the company all straight arrow up. Is that how the experience went off?

[00:13:13] Jeremy Frank: Well, yes. I mean, no, but kind of. But we had revenue, literally, we incorporated on a Friday, we had revenue on Saturday. Literally. We had a consulting job. We flew out to California and we were doing vibration testing on this cool project that a company that we'd aligned with, and that's kind of what set the timing of starting the company. So we were right out of the gates. We were doing that now, I should say the importing of products and selling them was the main, that was the main impetus to starting the company. But even before we got started doing that, we had formed two other legs of a three legged stool, and one of them was consulting, just basically going out and putting our expertise to use in the kind of things that I had been doing in grad school. And that Professor Koopman had been doing for decades by then, which that's what we started doing right away. And then the third thing, which I had also had experience in a little bit, but Professor Koopman had a lot of experience, is getting R and D grants for the government, specifically the Department of Defense. So we started doing the consulting right away. That's actually how we got the company going and developed up to where we had a couple hundred thousand dollars of annual contracts to do consulting, which was good, but it wasn't scalable, and it was just clearly not going to go anywhere where I wanted it to go. So that ultimately led us into what happened next, which was getting defense contracts and doing kind of larger chunks of technology development work.

[00:14:36] Ryan Newman: So before we get into the defense contract part, we have to circle back to something you said at the start of the podcast, which is your dad was not exactly a big fan of this idea, despite having done something very similar himself. So can you talk about what that conversation was like when you went to your dad with this great idea for a new business?

[00:14:52] Jeremy Frank: Yes.

I'll probably get a little bit emotional because it was good advice. It's advice that I think is really important.

I came back, this would have been. So I spent the spring in Tokyo with Professor Koopman.

Toward the end of that, I came back and we had hatched the idea to start a company, but we started actually wrapping our heads around it. We ended up incorporating in November, November 4 of 2000. So somewhere between somewhere that fall is when I had this conversation with my dad. He knew I was getting ready to graduate in the spring. We were going to get married, hike the appalachian trailer. But I told him that we changed the plan and we were going to start a company. I was kind of expecting him to say, wow, that's great. That's just what I did, starting a company with two professors following in my footsteps. How fantastic. It was the total opposite. He said, why would you do that? You've earned this PhD. You could get a good job. Why in the world would you throw that away to just start a company, which anybody could do.

He didn't phrase it quite like that, but he definitely, that was his reaction. And I said, well, it's a good opportunity. I really like the people that I'm working with, and we have something. We're in a space that's of interest. I love the work, and what's the big deal if I start the company?

If I do it for a few years and it doesn't work, then I'll get a job, if it fails, it's not that big of a deal. That's what he said was a really interesting part. He said, and he's totally right. He said, that's not how you fail.

It does make me emotional.

He said, failure is devastating.

You really, truly, if you're going to try something, you run it until the point where you can't do it anymore. And it's devastating and it's difficult.

You know, it wasn't that he was even encouraging me to not do it. He was just encouraging me to not take it lightly because he had been doing it by that time for 20 years, he'd been doing entrepreneurship, and it's not something to be taken lightly. People talk about fast failure and pivoting.

People that have actually failed in business don't talk about it like that.

[00:17:02] Ryan Newman: Wow, it's incredible.

It's so amazing to think about what you've just described, this idea of failure, right? Because people talk about this idea that you can't really understand and know success until you failed. Or if you look at somebody that has succeeded, it's marked by amazing, different notions of failure along the way. On the one hand. On the other hand, we just got done reading your bio at the start of this podcast, and there was nothing on here about any failure that you had in your bio. And by the way, that's typical of everyone's bio.

[00:17:30] Jeremy Frank: Why would we put that in the

bio?

[00:17:32] Ryan Newman: So isn't it amazing to think how much we sort of package what we do as a society as successful, when yet behind it? It's really all the failure. And because we talk about failure, it almost becomes desensitized. But as an entrepreneur sitting here, you've clearly lived through a lot of trials and tribulations to get where you are.

[00:17:51] Jeremy Frank: And not just me. I think anybody that's taken a legitimate crack at entrepreneurship has very similar experiences. Every single person I've ever talked to. You have to. It's the only way you're ultimately successful. I speak to the entrepreneurship classes at Penn State.

A professor at Penn State once gave me great advice. Rick Wire has been involved in Penn State launchbox and entrepreneurship for a number of years. And I had done some of these classes at Penn State, and they were fine, but they were never very engaging. And I came away from it thinking like, was this really worth my time? Until I was having a conversation with him. And I just asked him that question. I said, how do I make this more interesting? What do you think the students are interested in? And he said, just talk about your failures. I said, what do you mean? He said, literally, just write down a couple. If you've had any failures that you've had experienced along the way and setbacks, I mean, it doesn't have to be a complete failure of the business, but anything that felt like a failure, just write down some of those stories and talk about

that.

That's the only thing I ever do. Now I wrote it. I mean, I literally, I had that conversation with him. I wrote down a list. I got to, like number 30, and I was still writing. And so I had. It's so easy to come up with that list, and that's all I ever talk about when I talk to students now. And it's so much more compelling and interesting because you can learn things from.

[00:19:04] Ryan Newman: It, help our listeners understand this sort of juxtaposition of the allure of freedom that you witness from your father that comes from being an entrepreneur, which is a highly gratifying experience.

Yet that's offset by, quite frankly, the shackles and burdens of having the obligation to provide payroll to your employees, which is the ultimate failure, I would presume, is not being able to make payroll to the people who are relying on you to feed their own. It's one thing for an entrepreneur as a founder, not amass great wealth. It's another thing to literally have a business that operationally fails to the point that you can't provide payroll to your employees. Can you talk about that juxtaposition?

[00:19:42] Jeremy Frank: Yeah, and, I mean, there's stages of failure beyond that, even. I mean, there's.

You can never stop failing. I've been, and I'll tell you, just to set kind of the reference point, I've had many stages of failure that we've been through as a business and have never. The one thing we've never gotten to is missing payroll for employees. I've missed payroll for myself lots of times in the early years, but never got to the point. But I've been perilously close to it. But people are people, and people have families. If you can't make payroll, they leave.

That's why it's really the most catastrophic thing, even worse than defaulting on a loan or being sued or any number of other things that can happen. It really comes down to your personal wiring. I think some people should start businesses and some people shouldn't. And it mostly comes down to the way your personality is wired. We use a surveying tool for employees that gives you a pretty good read on this.

And statistically, about 85% of the people are fundamentally wired in a way that would make them poorly suited for entrepreneurship. They'd rather be part of a team rather than have all the pressure on their back. For example, they like being a part of a system rather than feeling this intense desire to break systems and change things or start from scratch, things like that. And it's a tool that discerns that. And I think it's actually one of the most devastating things I've seen. And it's one of the things that's dangerous about entrepreneurship being a bit of a fad is if people who aren't genuinely wired for that true autonomous independence, if people who aren't wired for it take on the burden, it can be really, really destructive to them. I've seen it.

[00:21:17] Ryan Newman: So we talked a little about failure. Let's talk about some successes in the business. You obviously had to pivot the business. You talked about early days where you started. We started again on the military path. As we sit here today, what is KCF today, and what are the. Give us some of the highlights of the business, both operationally and from a customer impact standpoint. And what are you actually doing today, which is probably a lot different than what you were doing when you started?

[00:21:40] Jeremy Frank: Very different, although in many ways very, very similar. Again, I was working for my father in the eighties, looking at things that had happened in factories, including us Steel in the Pittsburgh area, where someone had been injured and he was investigating the reason behind it among other customers. We have sensors in those same factories helping

those accidents not happen. So in some way, we went through a very non straight path, but in some ways, we ended up where we really naturally should have ended up. So we're about a 200 employee company now. We're still headquartered right here in downtown state College. We solve what we call the machine health problem for some of the biggest, highest profile north american companies, increasingly global companies. Ford, Toyota, Georgia Pacific, International Paper, General Motors, Delantis, Tesla, all these companies and what we do for them, those companies all have a shared problem, which is that they depend on large machinery to conduct the operations. Human beings, and certainly horses don't do work in factories anymore. Those things are done by machines controlled by computers in processes.

The problem that we address is that when those machines aren't treated well or aren't configured well or aren't operated well, they fail prematurely, and the consequences of that are very severe. A huge waste of energy. There's more energy wasted in that than there is with all of the internal combustion engine, the switch of that to electric vehicles. The waste problem of industrial machinery is greater than that. On a global scale. More people get injured in industry than any other category who are industrial workers performing maintenance on basically failing machines. Reactive maintenance, and it's trillions of dollars. The reason we really got into it is because the government studied this. The Department of Energy studied reactive maintenance in industry, and they concluded it's a multi trillion dollar problem. Just in North America, every year lost productivity when machines fail prematurely. So we attack all those problems. For some of the companies that I mentioned, and I mean, the customer success, we track it. We actually have. If you saw it, we have a thermometer up on our window of our office. We've been tracking it that way since 2017. We've saved our customers over $4 billion to date by addressing these machine health issues proactively, and I don't know how many. We've certainly saved people's lives, like, literally saved people's lives, certainly saved thousands and thousands of injuries.

[00:24:04] Ryan Newman: Is it fair to say that one of the greatest tools in the success of essentially making the compelling offer as to why an industrial based business should buy your sensors for their businesses, is that ultimately, whatever they're going to pay for, the actual sensors themselves, they're going to save in multiples of that? In terms of keeping the systems online and keeping the machines healthy?

[00:24:27] Jeremy Frank: Yes, absolutely. Our average multiple is twelve times. Every dollar they pay us, they save twelve.

[00:24:32] Ryan Newman: Incredible. And how have you thought about scale and growth? You talked about having 250 employees at the beginning of the podcast. When you were coming out of Japan, you had two to three employees, you and the two professors. So how did you think about scaling and growing this business from three employees to 250? And if someone's not paying attention to the timeline here, it feels like an overnight success. I'm sure it didn't feel like that to you, though. So can you take us through how you got to that? How you thought about scaling and growing?

[00:24:58] Jeremy Frank: It did, off and on, feel like an overnight success, because it kind of was. However, it's like what they say about yingling, it took, in their case, 100 years to be an overnight success. For our case, it took about 20 years. What happened is we actually grew relatively stable for the first ten years or so getting into the DoD contract, and we did a lot of work for the navy and the army on cool applications, but the work was relatively steady.

Now, we were piecing the bridge together as we were building it, but we were able to do that smoothly enough that it was relatively steady. It wasn't three, by the way. The other two never left Penn State. So I was the only employee for the first several years and we hired a few

interns, but it was probably year five before we had a second full time employee. And we grew from one over that decade, that first decade relatively steadily, up to about a dozen people.

And then we started getting into some other defense contracting. We got some big work around 2008 2009 on a prosthetics technology development program for the US army. And that grew us and grew. It made us both more stable and larger. And so we grew up to about 20 going on 30 people. Again, it was fairly steady over our whole trajectory. We've grown an average of 42% per year all the way along. But there were some bumps. That financial crisis of 2008 was timed with us having. We launched our first commercial product at that time, and so we had a dip, but it was manageable until in 2014, we launched a big partnership with a big Fortune 500 company. We were starting to get into wireless sensors. We'd been developing them for the DoD, for applications on helicopters and submarines, on research contracts, but we were interested in industrial applications for that technology. Didn't realistically think, or at least thought it would be difficult to sell that technology directly to industry, to a company like Toyota, and therefore instead took the path to partner with a large company that was already making lots of other products, industrial products, and then put our sensors in their products and sell it to the market that way. We went all in on that model for three years, and then this is one of our most significant failures as a business. The project fell far short of the expectations in terms of revenue and sales and product success. Far short. Like maybe 5% of what was intended. It was going very slow. And then even as slow as it was going, the corporate leaders at that company decided to take a path different than us. They basically decided to work with the company. We weren't the source of it going slowly. It was really mostly on their side selling it. It wasn't technology. Then they basically cut us out. It was one of the first big setbacks the company had. We had to reduce the headcount of the company by a third in one day.

[00:27:44] Ryan Newman: So what you're really talking about is the idea of direct market sales versus channel sales, right? Because if your sensor is being embedded in another product, the good news is that they have a fully built out salesforce. You basically can get scale by having your embedded product be sold through their channel partners. On the flip side, if you're going direct, you have greater ownership of what your sensor is doing. You can control the growth trajectory greater, but you also have to have all the corresponding infrastructures to support that sale growth as well.

[00:28:09] Jeremy Frank: Exactly. And one thing that I would, that I learned in the process is I think this is probably something that's relevant to other businesses. The indirect path, selling through someone else, sounds attractive for those reasons. However, if you're doing something that's new and disruptive, it's really difficult to be successful that way. I think you, even though it's more difficult, or at least seems more difficult and more expensive, because you have to hire salespeople, you just have to sell it yourself, especially when it's new, when it's disruptive and evangelical. So we learned that lesson the hard way.

[00:28:37] Ryan Newman: So would you say that your sensors, you were literally having to go to, first of all, who do you actually sell to within an organization? What is the, is it a procurement manager, or is it a, the decision.

[00:28:48] Jeremy Frank: Maker is really the maintenance leader or the reliable for a larger company, they have a reliability engineering function.

[00:28:54] Ryan Newman: Was this in some ways like a category defining type of sale exercise where you had to go to them and say, listen, this is a category of sale that you actually need to understand, or did the category already exist and you were just sort of optimizing it?

[00:29:05] Jeremy Frank: A little bit of both, but more the former, I would say. We are certainly

category defining in our space now. We didn't obviously invent vibration sensors, and we didn't invent vibration sensors for measuring and diagnosing machine health. That had been going on since about the sixties. It had become fairly standard practice about 20 years ago, but the technology was very different. It was a person walking around with basically a handheld unit, acquiring data with a handheld sensor. Rather laborious and slow. Picture just a large $20 billion industrial company, medium sized, large industrial company would be spending maybe a couple million dollars a year on that. People walking around taking data, a couple employees per factory.

We caused those companies to 20 x that spend by filling that whole factory up with wireless sensors that dramatically. It's probably 1000 x more information. And you have the ability to do it in the cloud, and you have the ability to have software that's shareable and makes it democratic across the whole organization. And so in that sense, it was a totally different category, even though it was essentially the same basic capability.

[00:30:10] Ryan Newman: And that was my next question. You actually led right to the answer, which is, are you a product company or are you a software company? How would you answer that question? And how has the role of software dramatically changed and led to the growth of your business?

[00:30:24] Jeremy Frank: Yeah, we're really a software company. I personally prefer solutions company, but we're a software company in terms of where the real value is created. And that's even, you know, we make hardware, as you said, but the reality is vibration sensors as an actual sensing device, they have been very mature and unchanging for a couple decades. It is the use of that, the packaging of that sensor in a unit. It's a sensor that's the size and shape of an egg that has electronics in it. It's kind of the price and sophistication more similar to a smartphone than a sensor. It's a. It's a connected device.

The software that lives on that device and that gathers this data seamlessly at scale, all day, every day, across these really complex, just difficult environment factories. That's also software. It's firmware that's built into that whole system, but it's that whole set of software combined with the software that the user actually sees. We build the user interfaces that the customers use to interface with that information. And in that sense, it's the solution we deliver. But it's all done with the software.

[00:31:22] Ryan Newman: So before we turn over to our student guest for his questions, I have one more really important topic to cover with you, and that is building and growing a business here in state college. I mean, we've had a number of podcast guests on up to this point, but you are our first podcast guest that actually has a very substantial business that actually is here, based in state college. Can you talk about the decision to base your company here and what the experience has been like for your employees, to the extent that they're living here locally or how you've thought about that?

[00:31:52] Jeremy Frank: So, first of all, as I mentioned, ever since my visit to Penn State as a senior in high school, I just completely fell in love with Happy Valley. That has never changed. I love it here so much that I just. That's the reason we stayed here. And I really never even thought twice about it. And it's been a wonderful place to grow a business. It's an engineering company, the talent pool that comes through Penn State, especially if you have a business that can benefit from a young, extremely well educated talent pool, which we are. It's a wonderful place to have a business. What it isn't is a big industrial hub. You know, we sell to industrial manufacturing companies.

If you go a little bit outside State college, it's mostly farms. There aren't a lot of big industrial

companies here, and there certainly aren't headquarters of them here. So in that sense, you know, state College is a little bit of an unusual town in that sense. However, it doesn't change the fact that I think that being in state college has been a wonderful thing for us. Wonderful thing. For me personally, I wouldn't change anything about it. But I also really think that the ecosystem here, there ought to be more companies like KCF in state College, and I think there's a lot of people who are working on that at Penn State and in the ecosystem. Having more companies that are successful that are actually operating in state college is, first of all, is inevitable. And second of all, I think it's really already happening to a significant degree.

[00:33:07] Ryan Newman: Trey, so can you describe the entrepreneurial environment that you see here today versus the one you witnessed when you first came to see in college years ago?

[00:33:15] Jeremy Frank: I didn't really have any interface with it until I was in grad school, but I definitely had some interface then. We were starting a company. What we did not do, which companies do now, is take technology from the lab and build a company out of that technology, even though it was related, we really never did that. We started around a kind of a totally different concept, so we didn't have any IP issues at first. However, we subcontracted a lot of work to Penn State in the early days, and we were collaborating on work that we were earning the contracts on that did generate IP. And the environment was, I'll just say it was not nearly as open or encouraging as it is now. The professor that I founded the company with had to go in front of conflicts of interest committees to just explain the fact that he was involved in a startup. Now, fast forward 20 years later, it's definitely much more of an encouraging system. Penn State has embraced the concept of entrepreneurship and very much encourages it, and that's been a strategic initiative of the university. So it's just, it's pretty night and day. It's much better now and then.

[00:34:19] Ryan Newman: How about just culturally talking in classes today? How would you describe the appetite and interest in entrepreneurship when you go and speak to the classes in our present day?

[00:34:27] Jeremy Frank: Similarly, night and day. I mean, when I was in grad school, so I was a mechanical engineering student getting a PhD, it was probably when we decided that we were looking towards starting a company. I wanted to get some education, you know, here I am, I'm in school, I'll take some entrepreneurship classes. It was really difficult to find one. I found one entrepreneurship class, which I took. It was a great experience, but there were no undergraduate programs, there was no minor, there was no clubs. And now there was all those things. There's entrepreneurship minors, there's clubs. When I go talk to an entrepreneurship class, most of the students in there are already pretty seriously thinking about some form of startup, and it's just night, day.

[00:35:03] Ryan Newman: You're the third company we've had on our podcast that has an ongoing partnership with Penn State Athletics. Can you talk about what encouraged you to do that partnership to start and what role it plays within your organization?

[00:35:14] Jeremy Frank: Yeah, so we. Yeah, so if you've been to a Penn State football game recently and you've seen the roar tracker that is powered by KCF technologies, and what it is, is we actually have our vibration sensors installed in the stadium, under the student section, in the rafters, like the steel structure, and they pick up. So it's a little bit like a. Like a noise meter that you see on the big screen. We don't actually display it in real time. That part of it isn't literally connected, but it is taking real data. And so we can see the moments in the game where the structure of the stadium is actually vibrating the most. What it causes it to do is almost the whole stadium operates like a big diaphragm of a microphone. So we picked that up. But the reason we did it, we didn't do this as just a side project for fun. We did it for exposure to students almost

entirely. When we committed to that, it was maybe a little before the pandemic in 2014. We had grown from 2014 to 2019, more than ten x in employees and even more than that in revenue. And the company just grew leaps and bounds over a five year period. So it really was almost like an overnight success. We couldn't find enough people, and we didn't have very good visibility at Penn State. And so that was the reason we did that. And it was extremely successful in that regard.

[00:36:28] Ryan Newman: Great. Well, thank you, Jeremy. I'd now like to turn it over to a current Penn State student, Ankur Verma. Ankur just defended his PhD at Penn State in industrial Engineering last month. He is the founder and CEO of Lightscline, an AI based software that will significantly reduce the amount of data collected by devices such as drones and satellites. Ankur completed both the NSF I Corpse regional short course offer to Penn State and the NSF I Corps national Teams program. He also completed the Happy Valley launch box powered by PNC Bank Idea test Lab. Ankar, I'll now hand the interview over to you.

[00:37:09] Ankur Verma: Thanks, Ryan. So, my first question, Jeremy, as an early stage founder for you, is on business. Development. And so, does your messaging and tactic change for mid market and enterprise customers, and if so, how it does?

[00:37:24] Jeremy Frank: That's a very thoughtful question. And we've learned, like most things we've done, we've learned the hard way.

They definitely do. What I would actually say is even more fundamental than that is we've primarily learned to mostly target mid market companies just because they're much easier to work with and deal with. So the companies that aren't, as you know, a lot of the companies I named before, they're customers of ours, but they're large bureaucracies. They do things very slowly when you're especially small. I think working with small companies, even if they're not brand names, you can have much better outcomes because their organization is more suited to working with your size and scale. From a practical, tactical standpoint, the main thing we do is we just pursue those companies with greater priority. I think the second thing that we do is we just pursue them more organically. You can get a decision maker on the phone just by calling them, whereas if you try to get into a big company with a bigger, powerful brand, that doesn't happen. It's almost impossible.

[00:38:19] Ankur Verma: And then the second question I had was a technical one. So, given the age of AI explosion, right now, each industrial machine, in your case, is a little bit different from the other, adjacent one. And so in this context, how do you see the importance of proprietary data and models as we, like, embed more and more AI in real world industrial applications?

[00:38:40] Jeremy Frank: One thing about our space, and I say this with an open mind, because AI is affecting many things. As I said, AI has been a talking point for many decades, but that doesn't change the fact that something very different is happening now, and it affects many things. However, in our space, the physics of behavior of machines, we're monitoring the behaviors of things like motors and pumps and gearboxes and overhead cranes. The physical behavior of those things as expressed in vibration is very specific and well understood if you have that knowledge. And so applying the knowledge of those models to the analysis is really like the correct starting point.

AI is really just icing on the cake. Beyond that, it wouldn't make sense for AI to try to fundamentally challenge the rules of physics, for example. That's my opinion. Now, it's possible if you get to a point where the AI is so powerful and so widely applicable that it does not so much challenge the laws of physics, but understand them more intelligently than a person can, that would be different.

[00:39:48] Ankur Verma: That's very insightful and leads into my final question as well. So how are you using your years of expertise in informing your AI models? And then how can industrial companies learn from your previous experience with AI as they go forward?

[00:40:03] Jeremy Frank: So the best way that our companies are interfacing with AI as we go forward is twofold. First of all, we absolutely apply machine learning, feature extraction and AI to analyze data for everything that's beyond physics. Anything unusual or new that happens, that's how we apply AI in our product.

In addition to that, we also have generative AI like chatbot built into our software that we've already trained on all of the existing knowledge in our space. So you can ask it questions about our product, about a series of industrial applications, you can ask it questions about vibration analysis or physics, and it will answer those questions very effectively. And it's maybe counterintuitive in the world of AI. The way we're using our expertise in most cases has very little to do with AI. In fact, it even has very little to do with technology. What I would tell you is the biggest problem in industry, and there are so many problems, but the biggest problems are people problems. Industry doesn't have enough workers. Every industry that we serve is short on trained, skilled workers. And the workers who are there, like most people, don't love change. Digital transformation is a scary thing for them. And so it's actually much more of a change management thing, and it's a people thing much more than AI or a technology thing. And so we really just embraced that. So a lot of the actual answer to your question is having people who understand what's happening, who can actually put that in a usable context that the customer can not only understand, but act upon. And there are probably ways that AI and software, I mean, certainly our software does that, and we're always looking for ways to do that better, leveraging AI. But that's the reality.

[00:41:45] Ankur Verma: Yeah, I definitely get the point. Like, having done the NSF I core and the learnings about, like, how do you actually connect with the customer? I think people problems are definitely very important. Thank you.

[00:41:57] Jeremy Frank: Yeah, thank you. Thank you very much and good luck.

[00:42:01] Ryan Newman: That was Jeremy Frank, co founder and CEO of KCF Technologies. This episode was produced and edited by Katie D. Fiore. If you haven't already, be sure to subscribe to dare to disrupt wherever you listen to podcasts and look out for next month's episode. Thanks for listening.