Battery + *Storage* Podcast — Battery Chemistry's AI Era

Host: Bill Derasmo
Guest: Brandon Smith
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Bill Derasmo (00:03):

Welcome back to the Troutman Pepper Locke *Battery and Storage* podcast. I am your host, Bill Derasmo, as we return for another season of this podcast, which by the way, was recently awarded a Listener's Choice award from Million Podcasts. So, I want to give a hearty thank you to our audience for that honor. This will be, believe it or not, the eighth year that we've been doing this and this will be our 53rd episode, if you can believe it. During that time, grid scale storage has moved from being a niche application with a lot of questions to a very mainstream application and considered by many to be a key part of meeting the needs of the bulk power system as we move into an era of load growth driven by many factors, but most recently by the proliferation of data centers and AI. And we think that's particularly relevant to today's program. So with that, I will welcome onto today's program Brandon Smith, the Vice President of Global Sales and Product Management at ZincFive Inc. Welcome to the program.

Brandon Smith (01:03):

Yeah, thank you. Happy to be here.

Bill Derasmo (01:05):

All right, well, Brandon, you've been with ZincFive for about three and a half years or so. You have an extensive resume before coming to ZincFive. Why don't I let you introduce yourself, your background and maybe give us a little bit of background on ZincFive.

Brandon Smith (01:22):

Yeah, perfect. So, my name is Brandon. I'm in charge of Global Sales and Product Development for ZincFive. My background starts in engineering. I was an engineer for a very brief period of time, but I've always kind of loved energy and the technical aspects of that. I got started in oil and gas and when that cycled one heavy time in 2015, 2016, I decided to try and find a new home. So, I joined battery and UPS technology when data centers were in a closet or a very small building that nobody knew about, right, in a few metropolitan cities. And I've been fortunate to kind of grow with this industry and watch places like Ashburn, Virginia triple, quadruple in scale and every time I go back see three, four, five, 10 new gigawatt scale campuses going up. So, it's been a wild ride and I've had a lot of fun. My expertise is really in the advanced battery domain. So, I've been with lithium battery companies, battery monitoring companies, VRLA batteries, so both of kind of the legacy chemistries I would say. And then I joined ZincFive about three and a half years ago now because I felt like it was a purpose-built chemistry for the UPS side of data centers.

(02:39)

And I've spent the last couple years doing just that. We've been really focused on bringing safe, high power technology to UPS and backup. And then with kind of this proliferation of AI that's bringing new electrochemical benefits to the table that we're also solving with our chemistry as well. So, that's kind of a high level on my background.

Bill Derasmo (03:01):

Well, I appreciate that. And by the way, before we dive into it, when you mentioned a place like Ashburn, Virginia, I don't live in Ashburn, but I live in Fairfax County a little further south. But man, when you drive out to Dulles Airport to catch a flight, depending on which route you go, man, it is like, I don't know, this post-apocalyptic landscape with these giant faceless buildings that go on and on. It's amazing the size and scope of these data centers. But yeah, as everyone talks about, they use an enormous amount of energy. And so, it's going to take probably a variety of solutions to keep meeting that need. And that's where I think ZincFive in part comes in. But there's other things that ZincFive does. Why don't we start with the nickel-zinc battery chemistry? Because for the people who listen to this program and geek out on this thing, a lot of times we start with battery chemistry and how you differentiate yourself in the market. So, why don't we start there?

Brandon Smith (03:59):

Yeah, we can do that. So nickel-zinc was originally discovered by Thomas Edison. So it's been around a very long time. The commercialization of it has been closely linked to battery separator design and technology development over the last 10 years, primarily driven by lithium ion. So, some of the technology that lithium ion batteries have used to be commercialized, we've been able to leverage to bring nickel-zinc to a point where it's now ready to be commercialized. And we've been working on this chemistry since 2003. We've had a couple different names throughout the years, some mergers as well, but ultimately we have over 80 patents on the chemistry, on the process, and we have kind of two sides of the house. So, we make the chemistry and the battery formats, which we can talk about a bit more, and then we also make the solutions. So, we have a power electronics group and we bring the entire battery solution to the market as opposed to just one particular battery that someone then integrates into a complete solution. And so, the chemistry is nickel and zinc, of course, but it's very similar to nickel metal hydride and some of the other nickel-based technologies in the market, except we've swapped in zinc, zinc oxide, which is very light and also gives our battery very high power capability. And so what we focus on is high power, short duration.

(05:23):

Okay, so for the rest of the battery nerds out there like myself, we think of battery energy storage systems and lithium, those are all primarily energy focused systems. And our product, though it has similar energy density to lithium, it's economical value is in the power output. We can do things like 12 to 20 C, 20 times the current rating of the battery in terms of power output. So, if you look at a data center, you look at AI, you look at start stop or engine start, those are all very high power, very short duration problems that we have solutions for. And that's where we focus.

Bill Derasmo (06:01):

Well, that's really helpful because that gets to the heart of it. Because on this program we try to figure out, okay, where do you guys fit in? And you hit it then right at the start, it's high power, short duration. Because we've had others on the program talked about long duration solutions and there's a place for all of it, right? It's all needed. But it's interesting then to have you and your company focused on the short duration, high power. So, I guess if you have a situation where you've got to start up a piece of industrial equipment or if you've got, I'm guessing a data center that goes down, maybe that's where you guys can come in.

Brandon Smith (06:39):

Right. Yeah, so our core market right now is with our BC series, which is a battery cabinet with 38 monoblock batteries. So, those are prismatic cells in a monoblock case, 38 of them in series for a 580 volt DC cabinet. And that cabinet goes in parallel with many of them attached to an uninterruptible power supply. And that UPS is designed to bridge the gap between utility and a long duration product like a diesel generator, right? So the customer, the data center, they may size our battery system for five minutes, seven minutes, but really it's only going to run for about 30 to 50 seconds until that generator starts up. So, that's why our core focus has been data center. That's very high power, that's megawatt, 1.5, 2 megawatt UPS for one to three minutes of battery runtime. That's been that primary driver for us.

Bill Derasmo (07:38):

That's really interesting to hear. Let me back up to how the battery is constructed. What do you use as the separator?

Brandon Smith (07:45):

So, the traditional separator design like with a lithium battery, so nothing unique there. And we have two formats. We have a monoblock that's actually an LM3 case, which is a European automotive case for those who know their battery cases well. And then we put prismatic plates in that monoblock and we use a liquid water-based electrolyte. So it's a base, not an acid. So, that's the difference between us and like a VRLA battery. And that's our monoblock design. And we have two of those. We have an 80 amp-hour and a 90 amp hour. Just different plates, different capacities in the 90 and the 80. And then we also have a cylindrical cell which we call our sub C. It's a C cell but smaller. And that's a wound jelly roll. Same chemical, nickel and zinc, but a different format for different power electronics and battery solutions. Also within data center and some other markets.

Bill Derasmo (08:41):

Well, that must be a heck of an electrolyte if you can power up that much. And so, tell me about, I think we like the battery chemistry stuff. So, tell me about the electrolyte and why that's so effective.

Brandon Smith (08:53):

Yeah, the electrolyte is very, very conductive. And I'd be lying if I knew exactly why the chemical properties of the electrolyte allow that. And I'd actually go so far as saying one of the things we've been very successful at over the last 15 years plus is keeping our chemistry a secret, the actual recipe, right? You'll notice there are a couple nickel-zinc battery companies in the world. Very few. Most of them are following in our footsteps, I would say. And we wrote the book on the chemistry and we've protected that with everything we have. Because in today's world, if you build a new novel chemistry, certainly in certain regions of the world, someone is bound to take the recipe, replicate it and build it at scale much faster than say a US company might be able to. No, but I joke about that, but our electrolyte is very, very robust. It's very conductive, but it's also liquid-based. So, that's what gives us our safety properties as well. Nickel and zinc are not flammable neither is the electrolyte.

Bill Derasmo (09:58):

And that was the next thing I was going to turn to that I think you and your company tout as an advantage is you don't have the thermal runaway problem and that has been a problem from time to time with respect to lithium ion.

Brandon Smith (10:11):

Yeah, exactly. And even to some degree lead acid, mentor of mine used to call it thermal walkaway. So, let acid batteries can still have the thermal runaway process. It's just very, very slow. You can let it go for hours and hours before it becomes an issue. Whereas lithium ions thermal runaway characteristics are quite dramatic. It's very volatile, depending on the exact chemical variant. They can be very volatile and then the off gas is obviously very flammable. So, that's where you kind of can turn a bad day into a bad week. For us, the battery is not capable of going into thermal runaway, not at the cell level, not at the battery level, not at any level. And if you put our battery in a fire, it's purely going to melt. The chemicals in it, the electrolyte, they're just not flammable. And the case itself is is flame resistant as well. So, traditional kind of VRLA style case with some flame resistant properties. So, it's not going to start a fire and it won't contribute to a fire either, which those safety properties go a long way with these customers.

Bill Derasmo (11:13):

Well, definitely. And with communities becoming more educated on what's happening in the energy space, you see some community opposition, maybe surprisingly, but it's popping up in certain places and part of it is the fire risk. A lot of questions about it. I think ultimately the problems will be solved, but for you guys it's not a problem at all. So, that differentiates you in the marketplace. So why don't we talk about the market a little bit? We've talked some about what your battery can do, what your products can do. But why don't you speak to a little bit about how you see ZincFive playing in the data center space?

Brandon Smith (11:52):

Yeah, absolutely. So we've been in the data center space about five years now, really focused on the battery cabinet solution for UPSs. And that was always the traditional backup role I kind of spoke about earlier, where we're bridging the gap between a generator and utility outage. As data centers have kind of changed, AI is becoming a big focus. There are some new applications within data centers, mainly to manage the AI workloads where high power battery chemistries have an advantage and certainly safe battery chemistries have an advantage as well because these batteries are getting closer and closer to the IT rack. And in some cases, hyperscaler builds, they do put the batteries in the IT racks already today. They use lithium ion. Nickel zinc is a good alternative for them, especially when they're building at scale to where, as you mentioned, the communities, but mainly the fire departments and the authorities having jurisdiction have some issues with large quantities of lithium batteries in one building without certain precautions, building requirements, et cetera.

Brandon Smith (13:02):

So, that's kind of where we fit in. And our focus again has been on the UPS side, but as the AI infrastructure is changed, it's creating these electrical pulses. As the GPUs work in parallel, parallel processing, they create large power surges and then large power drops, all within a one second time interval. And that's causing a lot of stress on infrastructure and causing a lot of stress on generators and other long duration storage devices that don't take peak ramping up within a one second interval to a new peak very well. And so we're slotting into that application as those get built out as a as a chemistry that can deploy a very high amount of power very quickly and then charge very quickly on that downswing.

Bill Derasmo (13:50):

So when you become aware of a data center installation, how do you partner? So, do you partner with the utility or the data center developer or how do you enter into that space?

Brandon Smith (14:04):

Yeah, that's a great question. The data center space is interesting. It requires quite a bit of partnering. As a novel chemistry and a new technology, I would say newer right over the last five to 10 years, we have to go talk to end user data center customers ourselves. We have to go explain our chemistry, explain our benefits, educate the market on what we do and and how we do it. But we don't sell those products directly to the data center. They then go out to their network, whether it's the general contractor whether it's the UPS provider itself, whether it's a different integrator that buys all the UPS and batteries and puts them in a container and sells the container. There's always another channel that actually sells the battery systems to that end user. So, we partner with a lot of people. We partner with great companies like Vertiv and ABB and Schneider and others to deliver systems to to joint customers. And then we partner with electrical integrators in the marketplace. We've worked with all of them that are out there. So, it depends on the the path for the customer.

Bill Derasmo (15:12):

Yeah. All right. I was trying to think through that in my head. You've got a great product, you've got the value proposition of making sure the uninterrupted power supply issue is essentially solved quickly. It's almost akin to like on the bulk system when we talk about black start capability.

Brandon Smith (15:31):

Yeah, exactly.

Bill Derasmo (15:32):

So, and it's an interesting parallel, but I was trying to figure out how you guys get your foot in the door. But it sounds like through a variety of channels. And then basically as the project is coming together you have to get the parties to agree that your product is going to be one of the features of this installation and included in it. And then I guess you have to coordinate with if it's ABB or Schneider, whoever that it gets integrated into the design and ultimate installation.

Brandon Smith (15:59):

Yeah, exactly. And I think that channel is also changing slightly. The energy storage companies, Fluence and EPC and guys like that who are putting four-hour lithium BESS systems all over, but certainly they've turned their attention to data center. No, that's another channel for us kind of opening up because a lot of those guys are using lithium chemistries. They have that long duration taken care of. That's covered. But this new requirement for these AI workloads really requires a high power, high cycling chemistry. And the lithium batteries can do it if you oversize them dramatically. But the nickel zinc solution doesn't need to be oversized to support these AI workloads. So, there's a new avenue kind of opening where hopefully we can start working with those integrators and that market segment to have nickel zinc batteries closer to that utility, as you mentioned earlier, and partnering on the medium voltage side of the application as well as deploying batteries in the IT rack and maybe at the UPS. And we can have nickel zinc solutions providing black start or UPS backup or AI workload mitigation at all these kind of points in the value chain.

Bill Derasmo (17:17):

Well, for the uninitiated out there, by the way, black start is one of the ancillary services that FERC, sets out where it basically is the capability to essentially restart the grid. If there's a catastrophic failure, so in other words, you've got a big power plant that there's a catastrophic outage on the bulk power system, plant goes down, then you have some capability to bring that system back up. And so, anyway, that was the analogy that I was drawing and I think you've got it with ZincFive's ability to get a piece of equipment started up quickly, starting from a cold start. So, it's an important part of the picture. I would think that the data center community would really be interested in this. We work a lot with the utilities that are trying to serve these things or the generator community. But I mean, at least me personally, I don't work with the data centers at all really. So, everything I've heard is that they're interested in this continuous power that it

can't ever go down. We need 24/7, 365. So, I would think that the data center developers out there, they would be quite interested in this product. And, I mean, it seems like it's one of the prerequisites. So, I don't know, have you had any direct talks with that community, the Amazons and the CoreWeaves and these different companies?

Brandon Smith (18:44):

Yeah, of course. I mean, we, we've been in this data center market for a few years now and we've got about one to one and a half gigawatts deployed in Europe and the US. So yeah, we've worked with a handful of the major colocation companies out there in the market. And then the Amazons, the Facebooks or Metas, they build with that in-rack battery solution. So, they typically put their batteries in that IT server rack. And we're working in that direction. We're talking to some of those customers and markets to figure out all the requirements and and put a solution together for that. So yeah, we're heavily involved in the marketplace. There's always more to do. Lithium has a, a really strong foothold in the data center market. It came at a time where the market needed it. It needed a better solution than lead. It had a ton of benefits. I just always think that lithium is a great technology. It's just the UPS aspect is not where it fits best. I think the high power technology fits better there and then lithium fits better in that more energy-focused application. And I see a world or a data center where you have five to six different chemistries or or energy storage devices sprinkled throughout, right, to build the most efficient AI factory that you possibly can.

Bill Derasmo (20:01):

Oh yeah, no, and if you've listened, I'm sure you have, the program going back years, we've talked about the use cases. The great thing about battery energy storage is you can always customize, you can build a bespoke solution for whatever you try to solve. But it's interesting to hear you say that at any one site you could have five or six different types of batteries deployed to meet the various needs. And coming at it from like a utility perspective, one of the first projects I ever worked on in Indiana, it ended up, the best use case for it was for primary frequency response. And it could respond to a frequency excursion within a nanosecond, whereas conventional resources can do it too, but it takes longer. And so, the analogy is the car starts backing down, sliding down the driveway and it doesn't have the brake on. You could either arrest that right away and stop it and then it's back to normal or the longer it goes down that hill, the momentum starts to build and it becomes more and more difficult to arrest that deviation. But that's just one example that I'm familiar with.

(21:08):

But yeah, we talk a lot about how the battery energy storage systems can be customized, can be designed to address all these different problems. You guys have found one that is, everything that I understand is critically important to the developers of these data centers. So, it sounds like you've got your place in the ecosystem. But beyond that, why don't you talk about some of the other things that you're developing and working on? Because I was playing around with your website. I know there's other products out there, so.

Brandon Smith (21:39):

Yeah, absolutely. So, one of our other products, we work through a partner, and the company's called SEMS, S-E-M-S. And they make an engine start product called the Super Torque 8Z. And for all the diesel generators out there in the market, data center and otherwise they typically have big, heavy lead acid batteries hooked up to them for engine starting. And what SEMS was able to do is take two of our monoblock batteries and build a solution that can start a megawatt generator more times in less footprint and for longer life than traditional VRLA. So, that's just another example of a high power, short duration market that we were able to kind of show our benefits for and be successful in. And that's going to continue. So, you mentioned black start, but a lot of these data centers are struggling to get utility connection and or they're already designing a data center meant to work completely off-grid.

(22:40):

And so they have gas turbines or hydrogen fuel cells or all these different kind of bring your own power products. And each of them typically have an application for a high power short duration battery to support. Whether that's starting the turbine or whether that's bridging the gap from a turbine shutdown to going on utility, where they use the utility as that redundant feed, where you only really need 30 seconds, 10 seconds, right, of coverage. The utility is either there or it's not. So, there's kind of all these different applications popping up and for us, we have a battery, we have the power electronics and we have a cabinet. And so we have these Lego pieces, if you will, and we have a sub C. So, we have a couple Lego pieces. And so it's really about customers and partners coming to us and saying, this is what it needs to look like, and we can take these Lego pieces and build the solution for them. So, maybe it's a 800-volt DC battery cabinet. Okay, perfect. That's easy. Or maybe it's a 48-volt in-rack battery backup unit for the hyperscalers. Okay. Different Lego pieces, right, building these these solutions. So, that's really our focus.

Bill Derasmo (23:47):

Yeah, I mean, I was looking at your Z5 1390. It's almost like a little portable power pack, it looked like..... I mean, at least it looks that way, right? I know it's.... Yeah. I just thought it was really cool. I did a little bit of a deep dive on that part of the energy world, the portable power pack market, and it's an interesting space. I don't know what's going to become of that, but I don't know if you guys would ever foray into that more broadly.

Brandon Smith (24:14):

Oh, that's a good question. Yeah, the ZF90 is our monoblock, so that's our base battery. It looks kind of like a VRLA engine start product. It has a kind of similar feel. Again, it's in a European automotive case called an LN3. But that's our battery. And so, we would use those batteries in different series and parallel configurations for different applications. But on the portable side, that has always felt like an energy market. But maybe there are some high power applications there that we need to explore. One of the interesting ones we came across and really just haven't had the time to focus on is emergency door open systems. So, emergency exits have little nickel metal hydride packs, I believe, in those door frames. Well, that's a high power, short duration application, right? You need to be able to swing that door open one time a year or twice

a year at a very high power. So, if you look around, you find kind of these niches, if you will, where our chemistry is a really solid fit.

Bill Derasmo (25:14):

You never think about these little things, but you're right. Emergency door opener, that's a great application.

Brandon Smith (25:19):

Yeah.

Bill Derasmo (25:20):

Very, very cool. Well, listen, it was great to have you on the program today. I think you had a good opportunity to tell ZincFive's story and we really appreciate it. Why don't I give you an opportunity here to have the last word and maybe tell customers, potential customers, where they can go to learn more about your company.

Brandon Smith (25:41):

Yeah, absolutely. Well, first of all, thanks for having me. I think this is a great platform and your audience is fantastic and your podcast is great as well. I think battery technology, it needs platforms like this. We need more vocalization. Batteries used to be kind of a commodity, batteries, batteries. And now they're an enabling technology. They are kind of a gateway to a lot of the success big industries like AI and data centers and utility and everything need. So, we need more of this. And then it's good for the data center to have good PR as well. Coming from oil and gas, I know what it feels like when your industry is doing the right thing for the world, but the media is is not understanding. And data centers are kind of towing that line right now. So, it's important to get it out there that these are vital pieces of equipment for the future of our civilization, including AI.

(26:33):

They're very important and we do it responsibly and sustainably as well. And from the ZincFive perspective, yeah, come find us anywhere. We're at trade shows all the time, www.zincfive.com. We have lots of information on our batteries, lots of different information on those use cases. And then our full-scale solutions for data center are outlined in there as well. Reach out to us anytime and we're happy to discuss.

Bill Derasmo (27:00):

Well, I thought I was going to be done, but then you mentioned, I forgot part of your past was the oil and gas industry, which by the way, I'm always fascinated by.

Brandon Smith (27:07):

Yeah.

Bill Derasmo (27:07):

I have to ask you, are you watching the show Landman at all?

Brandon Smith (27:11):

I have watched it, yes. I used an analogy the other day I said, a Landman is like is to oil and gas as Yellowstone is to ranching. Right? It's close.

Bill Derasmo (27:23):

It's Taylor Sheridan, so yeah.

Brandon Smith (27:25):

That's right.

Bill Derasmo (27:26):

I know, it's a very entertaining show. And yeah, there's a lot of colorful characters and I've just.... I've had a lot of laughs just following it, but it's been fun to watch. Well, all right, on that high note, why don't we leave it there, but thanks again for being on the program. We really appreciate it.

Brandon Smith (27:41):

Appreciate it. Thank you so much.