

## 029 Art of Engineering Tyler Courtney Transcript

### Denise:

Welcome to the Art of Engineering. Today we're taking a different look at a subject that those of us who are joining me today are familiar with, and that is how [Custom Powder Systems](#) and [ChargePoint](#) fit into the additive powdered metal battery manufacturing space. And I'd like to start by introducing the three people who have joined me today. Austin Hill is the subject matter expert for Custom Powder Systems for all of the powdered metal additive battery projects that we do at Custom Powder Systems. Scott Heffern is our longtime technical expert who has helped us determine that a lot of what we're doing in this space we've been doing for a long time in other industries. And Tyler Courtney, welcome. Tyler, is the subject matter expert for powder containment for the ChargePoint Technology Company, and I'll let them take it from here. Austin, will you tell us about how Custom Powder System fits into this industry? A little description of the industries themselves, and then we'll pass it to Tyler.

### Austin:

Yeah. thanks for having us on. We you know, we as Custom Powder Systems, we've got a long standing, you know, knowledge base with things like pharmaceutical and food handling when it comes to, you know, stainless steel fabrication, equipment, fabrication. And as we went along and these new industries have popped up in the, in the battery space and additive manufacturing we realized that a lot of those you know, things that we'd learned over the years tra translate really well into these new areas and you know, the key components there being the containment and you know, explosion proof equipment things like that for these powders that are really difficult to otherwise handle unless you have some sort of knowledge base there to be able to to rely on. So we've spent a lot of time kind of going back and revisiting the old projects that we've done in these other spaces and pulled the bits and pieces from each one that that kind of culminated to, to make a really good you know, whether it be an IBCA blender or you know, transferring equipment that relates over to the additive and battery world.

So, when it comes to the additive side, we work really well and alongside a lot of the companies producing the metal powders the aluminums, titaniums and other alloys that when they get into the state for additive manufacturing become a, a real fire hazard, and we have to, you know, handle them in a much different way than a traditional, you know, larger metal powder. And then when we get into the battery side, it's, it's very similar approach that we're looking at. You know, not so much an explosion risk, but that when

they mix these chemicals together, there can be a lot of off-gassing and, you know, things that you wouldn't want to be in the room with if, if it were to just be exposed to an open air, you know, environment. So both of those scenarios have really come from probably the pharmaceutical background of just making sure that we're keeping everything contained in an inert and oxygen free environment where we can't have those reactions.

**Scott:**

Yeah. And this is Scott. I equate it to pharmaceutical from the standpoint that it all comes down to product purity. The, the additive and, and battery markets need that same level of product purity for different reasons, but it's, it's the, the containment isolation and inerting that come with, with our, our traditional products that we've used in many different industries really come back to 95% of what we learned through the pharmaceutical world in a regulated industry, which also applies to most of these. It's, it's it still astounds me to this day how many similarities there are between the markets.

**Denise:**

So, Scott, will you just briefly tell us what, what pieces of equipment that CPS Custom Powder Systems has traditionally made that fit into this space?

**Scott:**

Yeah, and, and, and that is that is really part of the astounding thing with our, our entire product line, with both both companies ICS and CPS, CPS me being the powder handling part of the company, and then ICS being the containment isolation. That with if you look at our, our product line from start to finish on CPS, we've got IBCs, containers those are present in both of these, these markets. First and foremost, there's our transfer systems for docking this container to different processing or, or to different containers. Very very present and, and, and right up Tyler's and Charge Points specialties. We have the, the blending systems bl it, it's a little more diverse with the, at least to the additive that some of our blenders are repurposed to variation devices, basically rolling the material.

It goes through the lifting placing with our column lifts for all different type of purposes. The containers tend to be smaller, but the weights are higher because of the product densities. And the the, the one area, the one product that doesn't cross over as much is our, is our IBC wash stations, because in most of the additive and battery that water is, water is our full and we go into the ICS side. Our isolators containment isolators there's an extension of that with our isolators become inerting chambers in, in a lot of cases,

but still product period purity and containment. Our in our even our downflow booths for, for the first stages of open transferring apply to this. And the one other product that that's probably not as applicable is, is our lyophilizer carts. It's real special to, to the septic market.

**Denise:**

Thank you, Scott. Tyler, will you tell us how ChargePoint fits into all of this for a system?

**Tyler:**

Yeah, absolutely. First Denise and the Custom Powders team, I'd like to say thank you for allowing myself to come onto this podcast and represent ChargePoint longtime listener, first time attendee, let's call it. So, ChargePoint has a very, very rich history in transferring powders. That is what we do, that is our primary focus. Chargepoint manufactures what we refer to as a split butterfly valve system. What this valve enables our end users to do is to contained safe transfer as a contained safe transfer of their powders. Now, when we use the word containment, oftentimes in different industries, we're thinking about operator health and safety, which is a big role in the battery industry. But as Scott and Austin both alluded to, the battery industry in most cases is off, is also looking at trying to maintain their own product and keep the environment out, keep the atmosphere away, things like moisture, ingress, oxidation.

These are big concerns in the battery industry that we have seen firsthand. The ChargePoint valve system is capable of moving this powder from one step of the process to the next step of the process, keeping it completely contained. I think one of the biggest advantages to a new end user looking at ChargePoint equipment is definitely our scalability. We have current battery applications in the United States right now that are working in a range from anywhere from 50 grams all the way up to hundreds of kilos moving this material at a time, whether it's charging into their formulation, mixing vessels, or it's harvesting the raw material or pre weighing this raw material as it arrives on site, the ChargePoint system has a lot of options to help these guys move this material safely inert. Interestingly enough, when these engineers reach out very early on and we start talking about the process, they're aware of the concerns around the material itself and, and the the environmental impacts of the material, but they don't really realize the benefit of the containment from the operator health and safety side.

We start to touch on that, and it just opens up a whole new door of opportunity. And the buy-in is immense ChargePoint as a company, we're quite nimble when we get a request like this. What we've also found is that this particular industry battery specifically, they are really keen on testing the equipment firsthand. They want us to get our valves on site. They want to put a similar type powder through the valve, and they wanna see it firsthand. And in every instance that we've done that with one of these potential new end users they have become a long time customer of ours. So we've had a lot of success in this sector for sure.

**Austin:**

Throughout the course of a lot of these projects that we've worked on. You know, subjects like NFPA and SIL and various UL ratings have come up, and, and we've had to become kind of pseudo experts on the various you know, subsets of those regulations to, to be able to help guide the customer in making sure that we're building equipment that's, you know, adequately safe. Yeah.

**Scott:**

And Austin, those codes we see keep changing and seem to be more frequently. We were aware and, and was helped to guide a customer that little did they know that class two, division two group E does not exist anymore, that automatically defaults to a class two div one group E...A much higher level because NFPA has recategorized that and for the layman's term that's 30% of the price of the equipment.

**Denise:**

So just for the, the real novices in the audience, what does NFPA stand for?

**Tyler:**

The National Fire Protection Agency.

**Austin:**

Yeah, that's it.

Tyler:

Did I get that right?

**Austin:**

I believe it's agency. I don't ever remember what the A is, but National Fire Protection something,

**Tyler:**

Association! It's association is not agency, it's the National Fire Protection Association. Do not mess that up ever again. <Laugh>.

**Austin:**

So, yeah, and, and through all that, we've also had to become, you know quite aware or, you know, things are changing quickly with all of that. And so we've had to, you know, kind of keep our head on a swivel and make sure that we're not missing new regulations that are coming out. You know, NFPA six 60 is supposed to be coming out next year, and it's gonna change even again, a lot of these things.

**Tyler:**

When your customers reach out to you with requirements on their process, how familiar are they with the NFPA guidelines and recommendations? Or are you guys really kind of taking a consultancy role to some degree to suggest, Hey, we're gonna have to do it this way based on the NFPA? The NFPA guidelines?

**Austin:**

It's dependent on the customer. Sometimes we get guys who are in here teaching us stuff about it. And other times it's customers who had no idea that, you know, what they're doing even qualifies for you know, NFPA practices. So. It's a bit of a mixed bag. We've had some really, really good customers who have actually helped kind of guide us and, and be more familiar and more aware of what's going on. And then in other cases, we've been the ones kind of driving that conversation to get them to either bring in a consultant or you know, somebody who has the, the knowledge base to really tell 'em what their, their facility is gonna require.

**Tyler:**

If you took that experience of the the customer coming in and kind of teaching you guys some things about NFPA, and I'll admit, I'm the first one to admit, I've got a lot to learn when it comes to the NFPA. If we were able to just take that and extrapolate upon that and start to have more of these open discussions and forums of learning sessions back and forth between the industry and the equipment suppliers, I just feel like that'd be so beneficial for everyone involved.

**Austin:**

Yeah, for sure. And I've, I've seen a little bit of it starting to come through in various seminars and trade shows and events that, you know, those, those bodies have always kind of been involved in them, I think, but they're starting to get a lot more vocal and,

and having, you know, longer sessions and really big technical breakdowns. And then that kind of has helped to open the door to having those conversations on a more, you know, individual level.

**Scott:**

Yeah. There, there's a very close dialogue between, I mean, not just necessarily us, but our clients and their suppliers because the, we, we need to guide our clients to give us decisions and rulings how they're going to address certain things in NFPA because they're ultimately responsible for the decisions at that facility. And it's there's a big cross section of, of different approaches and how they handle things and, and how they not necessarily interpret the code, but where it applies to the code and how, you know, what, what they're going to do 10 years from now in that facility. They have to pre predict that and bring it back to us that we can, we help guide 'em on what features and what, what safety controls we do in our equipment. It's very, very that's, that's one area that, that I, I keep going to parallels between our pharmaceutical history with this and where we get into the additive and, and battery markets. The NFPA explosion proof isn't nearly as present in those those older markets with pharmaceutical as it is. It's a forefront issue with most of our products or projects in the, the additive and battery.

**Denise:**

Well, and Tyler, thank you for mentioning the safety aspect because as I've read about what happens in these industries, there are too many instances of fires and safety accidents that have happened around these materials that are used both for the additive and the battery industry. So part of our initial effort with this podcast is to help educate people about what products are out there that we can help solve, not just the safety aspect, but getting people out of personal protective equipment as they're making these products.

**Tyler:**

Yeah, that's a, it's a, it's a fantastic point, and sometimes it's over missed initially. Eventually, when we get the opportunity to discuss a project with one of these end users, it does come up and it does turn into a huge selling point for the project. Just to give you an example, the typical battery applications that ChargePoint has worked on, and I'm speaking from my own personal experience, we typically will end up highlighting these projects as what we would refer to as OEB four or OEB five projects to try to draw a comparison to the pharma world. This would be looking at really potent drugs, drugs that are used in the preparation of medication for cancer treatment as an example, or hormone drugs. These are drugs that we really don't want exposed to the operator whatsoever. ChargePoint's approach is to look at a lot of these battery applications in that same light.

We go full belts and braces. One thing that the battery industry that we have seen really latch onto with the ChargePoint split butterfly valve is our mechanical interlock systems. The valve system itself is protecting the operators through its use in, its, in its most fundamental way, meaning simple things like when the valve is attached to your equipment, it simply won't open until you have followed the proper steps to ensure a contained transfer. It's small things like that that I think maybe we take for granted because we're so used to working with that equipment that I've found that this industry specifically is really open to that. And they love the idea when they see it and they're like, holy cow, not only is this thing robust, but you mean to tell me it can't be messed up by a brand new operator? And the answer's no. It, it, it, it either works or it does not. And it's a, it's a safety mechanical interlock. And so the, the entire product line of ChargePoint really, you know, is based on safety. And then from there, we've learned of a lot of different ways that it also benefits the process, which, you know, to Scott and Austin's point, the inert transfers, the the, the keeping the moisture out of the process, you know, ChargePoint can definitely lend a hand in all of those.

**Denise:**

So, Scott and Austin, where do the ChargePoint pieces fit into a system that we would put together?

**Scott:**

I can take the, the, the first part of this with, with a specific example. We have taken a project that was for Potter Metals that was going to be a class two division one explosion proof application. And through analysis, the ChargePoint valve introduction for a charge position, because it has mechanical interlock removes the potential for the product for ever being in the room and takes that to a non explosion proof area. It's, it's the savings were, you know, close to close to seven digits.

**Austin:**

Yeah, I mean, just kind of how we've you know, presented it to customers recently in, in being able to not only contain and, and provide a cleaner transfer and like you mentioned, you know, potentially be able to remove a bunch of extremely expensive parts and components by, by not having to have it as a, a, you know, classified piece of equipment anymore. It's offered in those instances a lot more flexibility for their systems as well, and being able to you know, have multiple different containers dock to the same, transfer with the same means and give them a lot simpler solution to their, you know, problem.

**Tyler:**

Austin and Scott, when you guys first bring up the ChargePoint valve to your customers on this type of application, are they familiar with the technology or is this something that you're bringing up to them kind of cold Turkey and, and, and really having to kind of explain to them, so this is what this is and we think that this might actually fit and benefit you both from a safety standpoint and financially?

**Austin:**

I would say it's, it's half and half. You know, it's, but never has anybody in these industries been familiar, like truly familiar with the product. They've maybe heard of it or understand the concept of it, but they don't really realize how it applies to what they're doing.

**Tyler:**

Right. Yeah. Do you find that that's the same situation when you're discussing Custom Powder Systems or Integrated Containment Solutions equipment as well?

**Austin:**

Yes. Yeah. 'cause You know, again, kind of as we've, we've mentioned before in this you know, they, they're figuring out what their systems look like. You know, there's a lot of scaling going on right now. You had mentioned, you know, the difference between 50 grams and you know, kilos at a time, hundred kilos. You know they are in a lot of cases working in very small batches right now. And so something that we're really trying to push for, show them that we can help them with is how to properly scale their production and go from those you know, in, in one case you know, 50 liters or a hundred liter containers all the way up to a thousand or even maybe larger. You know, sometimes we're limited in size just due to the weight of these materials.

**Tyler:**

When you're looking at scaling that magnitude like that, what do you think the biggest consideration is for these guys?

**Austin:**

So I think in, in a lot of cases, it's gonna be the end production that they're trying to achieve. You know, talking to a couple of customers who are doing you know, aerospace 3D printing, if they're printing a large part that part can only come from a single batch of powder. And so if their part is bigger than the batch of powder that they can receive, they can't print that part because they can't mix the batches. So being able to go from a 50 liter batch to, you know, potentially maybe a 600 liter batch, that really



changes the conversation as to what kind of parts and what size of parts they can print for these really high, high, you know, purity applications.

**Tyler:**

Yeah.

**Scott:**

Yeah. And we're, I think, a big growth area in discovery for, for our clients, there is gonna be coming down to the transporting of much larger volumes of material that right now most of our clients are shipping these in, you know, small hundred liter or less drum packs of, of different, different types that will limit the, you know, it basically limits it to that batch size, even though it maybe came from a bigger batch that that if they get larger containers, our equipment is being used to integrate multiple smaller batches as they scale up in a, in a blending system to, to make it uniform throughout this, this large volume of material. So when we get to a point with clients 3D printing much larger parts that, that we can be shipping in larger volumes in, in IBCs or other, other other transportable devices like that.

**Tyler:**

Yeah, yeah. From ChargePoint perspective, we haven't had a lot. We've had some, but not a lot of discussions at these really large scales that we're kind of thinking about. We, it's interesting from an R & D standpoint, there is so much super interesting stuff happening in the battery industry right now from I, I don't even want to try to say the terms because I'm, I'm not, I'm not an absolute expert in battery. I'm an expert in powder transfer, but what I can tell you is that the industry from an R & D standpoint is very much interested in containment, and I oftentimes wish I had more time with the customers where I could ask, you know, what is this going to look like when we scale this thing up? If they crack the code, let's say, on the battery, that will be used in everything moving forward, because all of these companies have a different means and a different way.

**Tyler:**

We've got solid state versus lithium ion versus you name it, it's out there. And I just wonder what this thing's gonna look like as it scales up ChargePoint oftentimes on these processes, we find ourselves, like I said, in the formulation, charging, actually charging the mixing vessels. And boy, if those things go, you know, full scale, I'd be interested to see what that looks like. I know from ChargePoint perspective on a containment on the containment side as we scale up from, you know, 50 grams or a

couple kilos to the scale that we're kind of envisioning, there is a lot of considerations that we have to take into play.

**Denise:**

So I have on my list of things to ask about, is cross contamination also a player in, in these types of systems?

**Scott:**

Oh, yeah. That's, that's huge for 'em. As, as much I keep referring back to pharmaceutical and nutraceutical, but it's as important to them if, if not the other clients, you know, I've, I've had our clients say in the, the additive area area that when their if, if their products fail, planes drop out of the sky with pharmaceutical, you know, lives are threatened if it's, there's contamination, right? It's, it's, it's just as important.

**Tyler:**

Absolutely. It is. It, it's, it's so important. I think one of the ways that ChargePoint has been able to come in and, and talk with these folks about cross-contamination and really help them understand why are we even looking at a split butterfly valve? How would that help with cross-contamination? And we draw this back to the idea that, well, we're able to contain this product so much so between process step A and process step B, our containment level, we're talking, you know, less than a grain of dust floating in the air. If we're able to contain to that level, then the idea that there would be any sort of cross-contamination is almost non-existent. And it's interesting, the cross-contamination concern is always present on the front end. And once we start to establish what the ChargePoint split valve system is capable of, the concern is almost like the, the box has been ticked very early in the process. It's like, yep, okay, as long as we have a ChargePoint valve on the bottom of a Custom Powders bin as an example, we know that there won't be cross-contamination between bin A and bin B because it's been contained.

**Scott:**

Exactly.

**Denise:**

So let's expand on that just a little bit. Tell me the difference between using batch versus vacuum transfer. And I may not be asking that question correctly.

**Austin:**

Yeah. I can probably weigh in a little bit, but Scott, it'd be your authority on it probably. But you know, it really, when we're talking about the purity standpoint you know, doing a batch production like we do with our IBCs it allows for all of, you know, your material at a, in a certain batch to be contained within a single vessel. So whether you're blending or storing or transporting that material there's no chance of of there being a cross-contamination event. You know, up until we transfer out of that bin, which is again, where the ChargePoint valve would come into play and that we eliminate that that issue of, of contamination versus, you know, vacuum transfer or some other means of, of, you know, kind of a continuous transfer. You have issues where those systems are really difficult to clean. And so there's always the risk when you're changing from one material or one batch to the next, that there's residual material still in those systems. You know, when we do a batch or a batch in an IBC, that vessel is taken offline and cleaned somewhere else outside of the process. So we're removing the contamination issue by taking that piece of equipment out of the equation when it's time to clean.

**Scott:**

Yeah. And another consideration there is generally with, with a vacuum transfer system most cases you're looking at much larger scale volumes of product than what, what our, our clients are doing in either battery or additive. And and, and in that case that that it, it's would be a dedicated, ideally be a dedicated transfer system or process system for one product to get around all the potential cross contamination points with with pneumatic transfer. The in, in both of these cases, most of the products we get involved with are oxygen sensitive or even, you know powerfluoric where the, where oxygen as it full that with, with, you know, batch, batch handling with with, you know, an IBC system, you have much limited exposure points to the atmosphere than you would with a pneumatic transfer system where you've got feets and yards and meters of, of, of piping and, and leak points.

But there, there, there definitely is a place for 'em, and it usually comes down to to scale of, of the product. The another step away from it that I haven't seen this market go into, just because of the volumes is continuous manufacturing that is, is caught on a a little bit still being struggle with in pharmaceutical, in my opinion where the, the, you run into the same type of issues that pharma struggles with is the, the, the lot traceability because now you don't have defined volumes of materials segregated from each other. It's you, you're using timestamps and where the product was in the system at the time, which is, which is a for pharma, it's regulatory issue for, for battery and additive. It's, it's probably a little more of just product product tracking in uniformity.

**Denise:**

Thank you. I'd like to direct our audience to two different websites. The one for custom powder is [custom-powder.com](http://custom-powder.com) and ChargePoint is [thechargepoint.com](http://thechargepoint.com) where you can see the types of equipment we've been talking about and, and at ChargePoint in particular, that valve. But just for a bit of history, this whole batch blending came about in the forties when fertilizer was being commercially developed to feed the world. And the whole batch blending system was developed at the Tennessee Valley Authority years ago, probably in the forties. And it's amazing to me that all this same equipment that you can see on both those websites is primarily being used in the same way in all these different industries. Well, I would like to thank Scott Heffern, Austin Hill and Tyler Courtney for joining me on the Art of Engineering podcast because this truly gets to the art of engineering.