

Hello, and welcome to The Zeus Power Podcast, where we interview experts about the battery industry and discuss insights on our diverse selection of battery products. Today, we are joined by Aaron Cunningham, Applications Engineer from ZEUS Battery Products. Aaron, tell us about your role and experience at ZEUS Battery Products.

Aaron Cunningham: My name is Aaron Cunningham and I'm an Applications Engineer at ZEUS Battery Products. I'm on the engineering team here where we work closely with customers and our strategic partners to identify, develop, and source the proper battery solutions for our customers. We work with and are experienced with many different battery chemistries, including lithium ion, lithium iron phosphate, nickel metal hydride, nickel cadmium, SLA, and others.

Why is it so important for engineers and design team members to know about battery storage by each chemistry?

Aaron Cunningham: Different chemistries all have different characteristics, including storage requirements. Storage requirements and temperature are some of the most important characteristics of the battery because this will always affect performance. A poorly stored and maintained battery will never perform, as well as a properly stored and maintained battery. Anyone who purchases a battery or batteries will always want to get the maximum out of what they pay for. And we work hard to provide that. So properly storing and maintaining batteries helps to ensure that the customer is getting the absolute maximum out of their investment. An example of this is, if a lithium polymer battery isn't stored properly for long enough, you may find it swollen or puffy and likely useless.

What is the benefit to integrating charge techniques and intervals into the overall scope of use of the product or device?

Aaron Cunningham: Depending on the chemistry, regular charging is very important for the health of batteries. Leaving a battery or batteries on the shelf unmaintained for months or even years at a time ages the battery. This is another way to reduce performance or even ruin your batteries. Again, depending on storage conditions and initial receipt of the parts lithium ion batteries may be okay with just a little bit of capacity loss if not charged are maintained for about under a year. It's recommended to store the batteries at approximately 60% state of charge. So storing at above or below, that is not ideal.

What outcomes can result if manufacturers or end users do not properly store or charge their batteries?

Aaron Cunningham: The main outcome of not properly storing or maintaining your batteries is permanently reduced health and performance. With lithium polymer, if a

battery is stored or maintained improperly, this can lead to swelling of the battery to a point where it may not fit in its application.

How can ZEUS assist customers to become better aware of this knowledge?

Aaron Cunningham: Our engineering and sales teams are dedicated to training our independent sales representatives and electronic distribution partners to communicate this in the beginning discussions of what is required by the customer for their application. We've had many customers come back with issues related to improper storage of the batteries, and then have to spend time going through the process of troubleshooting what's wrong with the device or battery, communicating with us here at ZEUS, and overall wasting time that could have been saved by understanding the product better.

What's the most important part to battery technology? Is it battery management, for example, heat management or monitoring, or is it storage and energy density?

Aaron Cunningham: Not every battery has a battery management or monitoring system. This is typically only for lithium ion batteries. Energy density is selected based on your needs and application. So for example, we typically provide solutions based on voltage capacity and other requirements that we get directly from our customers. So if the customer's device requires 12 volts, 10 amp hours and a five amp, continuous discharge current, we will design that solution around those parameters.

Is there a storage medium that batteries can outperform consistently? Fossil fuels, hydrogen fuel cells?

Aaron Cunningham: Not necessarily. It all depends on the application.

Is there a limit to energy storage and acquisition in the foreseeable future for batteries?

Aaron Cunningham: As technology advances, there will likely always be improvements to be made for battery technology, at least for the foreseeable future.

Are there any important handling or storage tips that you think are sometimes overlooked?

Aaron Cunningham: Oftentimes customers receive batteries and then directly store them in their warehouse for months at a time. Particularly with lithium ion batteries, they're shipped at around 30% state of charge and must be charged within 45 days to avoid over discharge. If this isn't done, it could leave the batteries useless.

How does ambient temperature affect storage recommendations and battery performance?

Aaron Cunningham: Ambient conditions should be held as close to room temperature as possible, around 25 degrees Celsius and approximately 50% relative humidity. It's okay to store at lower or higher temperatures around plus or minus 20 degrees Celsius for up to six months. But again, anything dramatically higher or lower, over a longer period of time, will damage the battery and ultimately reduce capacity and performance.

Thank you so much, Aaron, for sharing your expertise on battery storage. Aaron's insights are a powerful tool and make ZEUS Battery Products rise above the rest. Please join us next time on The Zeus Power Podcast.