

LINCAD'S RESEARCH & QUALITY MANAGER, GAVIN DURHAM, TALKS ABOUT BATTERY STORAGE



Q. There seems to be a lot of discussion about battery storage at the moment, particularly in Australia. Why is battery storage such a hot topic?

A. The Australians seem to be leading the way in taking their homes off-grid. Because of the sunny climate there, solar installations are taking off. Large scale energy storage systems in the form of batteries allows the solar energy to be stored and distributed at night or during times of peak demand.

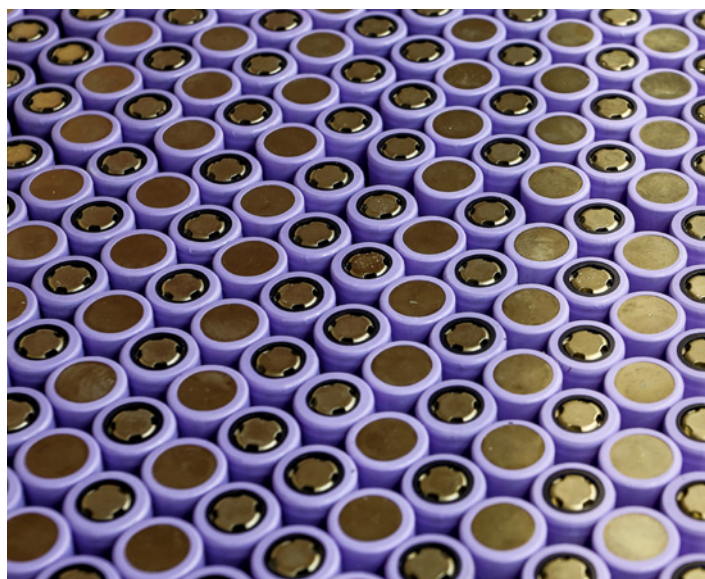
Now the types of battery we're talking about can be very expensive, several thousand pounds. So, it's very important, whether in an energy storage system or stored in a warehouse, to maintain them properly in order to ensure long life. In general, batteries prefer to be stored at relatively low temperatures and the reason for that is because reaction rates slow down at lower temperatures. For every ten degrees drop in temperature, the reaction rate halves. You see, the main problems with storing batteries is that (1) they self-discharge losing capacity (which can be recovered after re-charge) and (2) when stored at higher temperatures they can permanently lose capacity which is not recoverable by re-charging.

Depending on the chemistry, most batteries like to be stored at a temperature of about 5 to 15 degrees centigrade. If you go to much lower temperatures, say, -10 or -20, like a freezer, you run into issues of condensation. As you bring the battery out of the very cold conditions and it starts to warm up, condensation forms on the battery which can be very damaging to it.

Q. What about the state of charge when you're storing batteries?

A. With primary batteries, you obviously have no choice; they have to be stored in a fully charged state. But rechargeable batteries, depending on their chemistry, like to be stored in different states of charge. Lead acid batteries, for example, need to be stored fully charged. Storing them in a discharged state causes a process called sulphation and other problems that affect the capacity. But with nickel cadmium batteries, it doesn't really matter what state of charge they're stored at; they tend to store pretty well whether they're fully charged or fully discharged.

Lithium-ion batteries, on the other hand, should be stored in a 40 to 50% state of charge. If you store



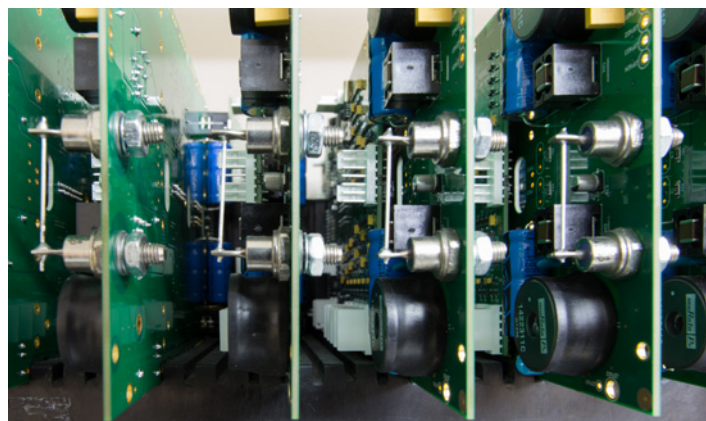
them at 100%, they tend to lose capacity, especially if stored at higher temperatures. But if they're stored at a very low state of charge then there's a risk of them dropping below 2 volts and once that happens, there can be issues regarding their serviceability.

Q. All of this must make it difficult for organisations which have a lot of batteries to store, the MOD for example?

A. Well, there's certainly a lot of important information you need to understand when it comes to storage. Customers may not have this information, so they have to come back to battery experts for guidance. That's how it is; it's quite complicated. If it was straightforward, if the same rules applied to all chemistries, then it would be easy. But unfortunately, that's not the case.

Q. How long can you store batteries for?

A. The shelf life of a battery is the length of time that the manufacturer will guarantee you can store the battery for. In the last few years there has been a massive increase in shelf lives reported. There are some lithium batteries that now have a shelf life of 20 years. So, you can put them into storage and they'll still be OK after 20 years. The shelf lives of alkaline manganese batteries were 5 years not so long ago but 10-year shelf lives are now becoming the norm for this chemistry. Through improved technology and improved battery design, batteries can now be stored for longer periods of time.



Q. Lincad manufactures batteries for a number of different markets - the military, oil and gas, medical. Does that have any bearing on how the batteries need to be stored?

A. No, it has nothing to do with the sector. It's all down to the chemistry of the cells. Having said that, in some sectors, customers may need to store batteries in environments which are not ideal. As I said before, temperature is very important. If the batteries are being stored in a very hot climate, it would obviously be best to keep them in an air-conditioned storage unit.

Q. Finally, does Lincad offer its customers any kind of battery storage service?

A. We do offer battery storage and maintenance service for some customers. We provide battery handling notes for most of the batteries that we design and manufacture, these give the recommended storage conditions, so the customer can maximise its shelf life. ●

