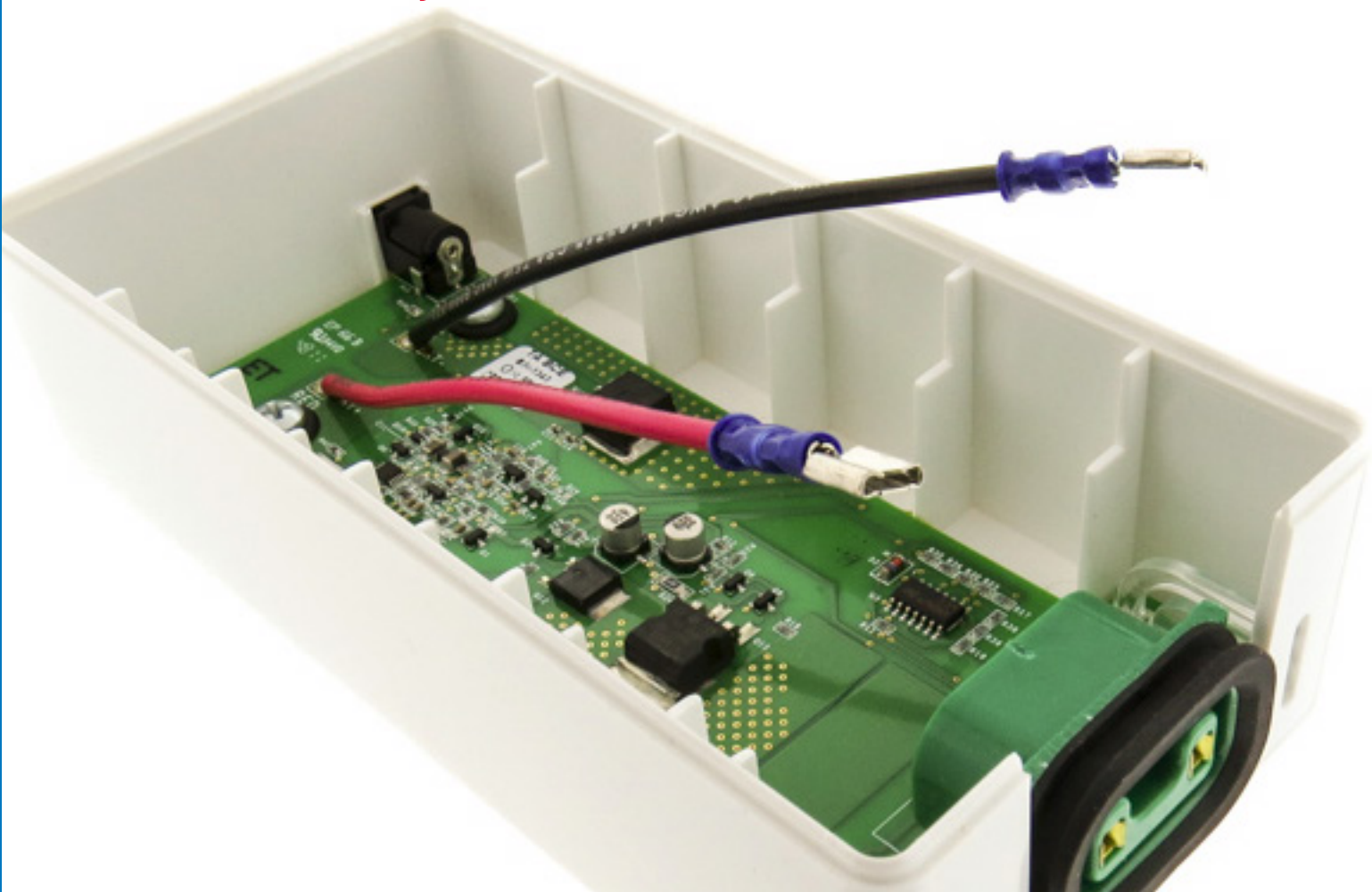


Custom Battery Pack Enclosure Design Factors

5 Considerations When Choosing an Enclosure for Your Custom Battery Pack



Introduction

When it comes to designing an enclosure for your battery pack, most designers are not familiar with battery regulatory requirements which can lead to complications. Understanding the design and management elements can help avoid production process complications.

With any enclosure, the most important aspect is that it must be able to support the battery itself. It must also pass rigorous tests - especially when associated with transportation safety certifications.

The application and environment the battery pack will be used in are can have a major impact on cost, lead time, and expected performance.

In this Ebook, we will review some considerations and challenges you may face when designing an enclosure for a custom battery pack.

Consideration

#1

Shrink Wrap or Vacuum Formed Plastic

Shrink wrap or vacuum formed plastic is the simplest and least expensive packaging for small battery packs.

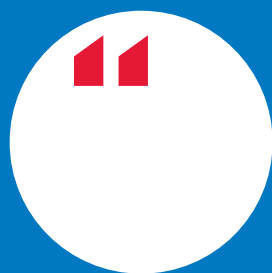
This type of solutions is only possible if the battery is intended to be completely enclosed by the finished product. In other words, shrink wrapped batteries needs to be installed into the end product or final assemblies' enclosure.

If your battery pack is going to be installed in an additional enclosure, a shrink wrap option is usually the best solution. This will help reduce unnecessary tooling costs that are associated with injected molded plastic enclosures.

Safety circuits and other added value electronics can be utilized in such a design if required and can be fully sealed inside the shrink wrap.



Custom battery pack with lithium cells and onboard safety circuit before shrink wrapped.



SHRINK WRAPPING IS A LOWER COST SOLUTION IF YOUR BATTERY PACK WILL BE INSTALLED IN FINAL ASSEMBLY ENCLOSURE.

Consideration

#2

Injection Molded Plastic

The most commonly used enclosure for battery packs are made from injection molded plastics. For these enclosed pack designs, two or more plastic parts are molded and then assembled with the pack and any accompanied circuitry.

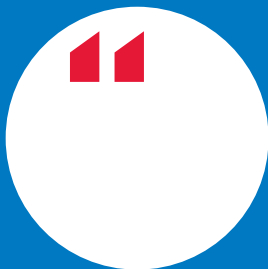
Injection molded enclosures can be sealed using glue, mechanical fasteners (screws) or ultrasonic welding.

The product cost can be reduced by using insert moldings in which the interconnection strips and the terminals are molded into the plastic parts to eliminate both materials and assembly costs.

In some cases, like a hand held power tool for example, the pack can form part of the outer case of the end product and usually requires a mechanical latch to hold the battery in place.



Custom Designed Battery Pack Enclosure Made From Injection Molded Plastic.



AN INJECTION MOLDED PLASTIC ENCLOSURE CAN BE DESIGNED AS AN AESTHETIC PART OF THE END PRODUCT, SIMILAR TO A PORTABLE POWER TOOL.

Consideration

#3

The Grade of Plastic

The complete customization of a battery pack plastic enclosures is available right down to the plastic grade itself.

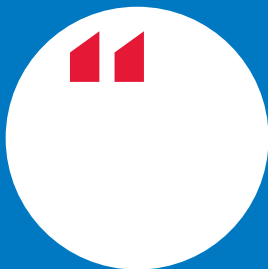
It is important to understand what type of environment the application will be primarily used in and whether it will be used in extreme or mild conditions. The plastic grade will have to be selected to accommodate the appropriate environment.

ABS plastic for an example is less expensive however it becomes very brittle when exposed to certain cold temperatures. There are a lot of plastic grades available and in some cases it is possible to create a Hybrid grade.

The focus on determining the best plastic grade for any your application starts with the environmental conditions but drop tests and of course transportation certification requirements should be kept in consideration.



Custom injection molded plastic enclosures used in a portable medical application.



**DETERMINING THE BEST PLASTIC GRADE
FOR ANY APPLICATION STARTS WITH
THE ENVIRONMENTAL CONDITIONS AND
CERTIFICATION REQUIREMENTS.**

Consideration

#4

Custom Enclosure Branding

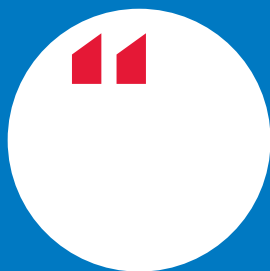
Your company brand is extremely important. In certain applications that require a drop-in replacement battery pack, branding can be incorporated.

This process is not as complex, but knowing you have the ability to add your company's branding or logo to the battery enclosure is good to know, especially for your Marketing team.

Product branding can be achieved by means of labels, digital printing, or etching specific to the application requirements. Custom branding can also be added to the tooling mold, but may add additional costs depending on the complexity of the artwork.



Custom battery pack with recessed notch in plastic enclosure for branded label.



YOUR COMPANY BRANDING IS EXTREMELY IMPORTANT AND CAN BE INCORPORATED INTO YOUR FINAL PRODUCT.

Consideration

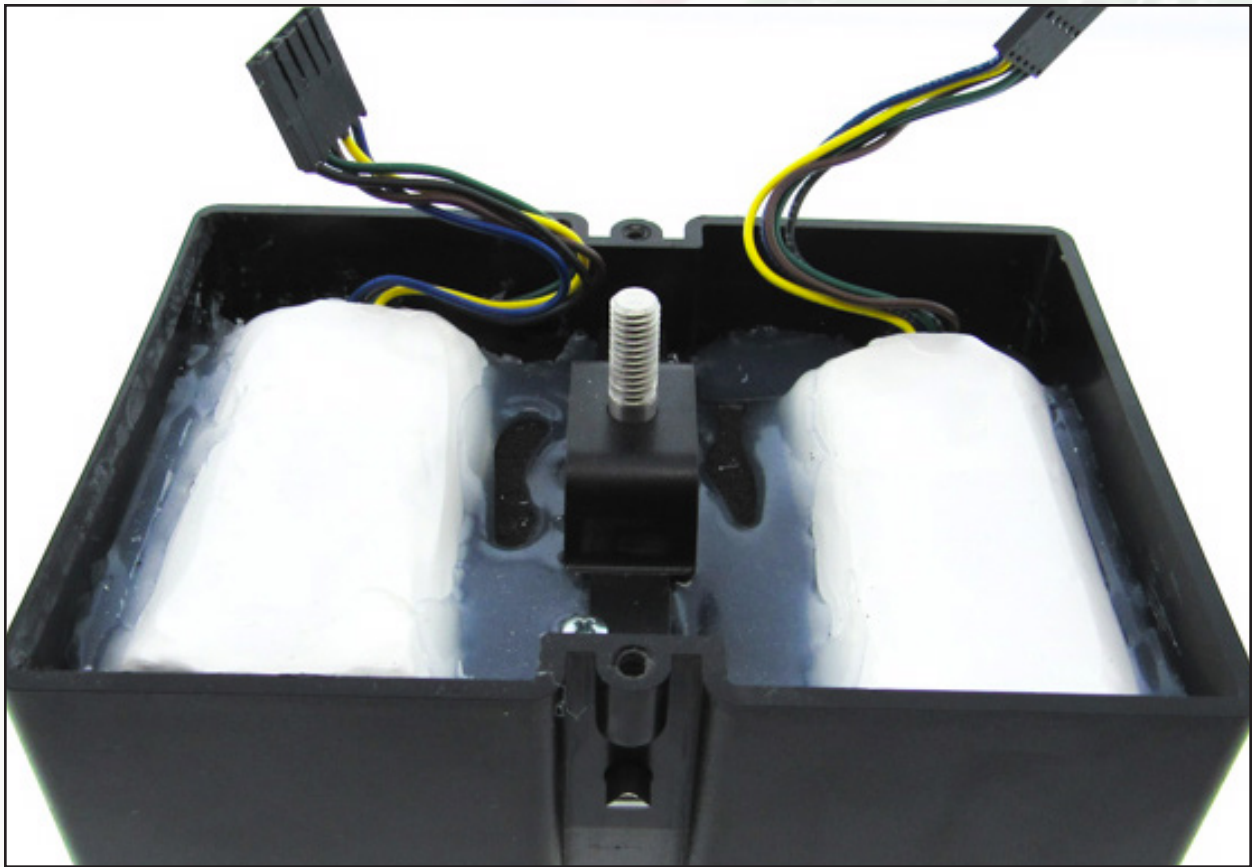
#5

Securing Internal Components

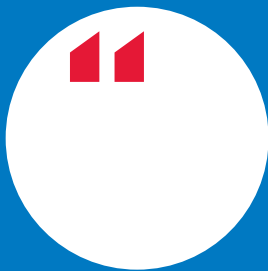
Depending on the environment your battery pack will operate in can be a major factor when securing all the internal components of the pack. Concerns with internal components shifting during use need to be considered to ensure parts stay in place.

The actual product and how it will be used, handled, and stored determines how the enclosure will be created.

Once there is an understanding on the actual product details, the enclosure can be designed internally. Procedures for securing internal parts include RTVs, designing ribs, combination of glues, and in most cases foam spacing - all of which help hold parts in place and minimize any shifting.



Battery pack with cells and internal components shrink wrapped and glued inside injection molded enclosure.



ONCE THERE IS AN UNDERSTANDING ON THE ACTUAL PRODUCT DETAILS, THE ENCLOSURE CAN BE DESIGNED INTERNALLY.

Summary

No custom battery pack is considered equal. An enclosure used for one designed can very rarely be used in multiple applications.

Before starting on your enclosure design, it is important that you understand the process of how your manufacturer will manage and design your project's battery pack's plastic enclosure. This will help determine what type of enclosure is needed and ensure it will function correctly and pass and certification requirements needed.

From a manufacturing standpoint, knowing the elements of the overall design will greatly benefits the customer. Having this knowledge prior to the completion of the design allows the customer to make the best decision possible in regards to what best suites the application and its intended performance.

About The Author

Anton Beck **Battery Product Manager**

Anton came to Epec with over 25 years of electronics manufacturing experience. His background includes all manufacturing processes from design to fabrication. Anton is consistently focused on developing our Battery Design and Manufacturing infrastructure, to continually improve our value added supply chain organization.

Anton's responsibilities include overseeing our design team, product/prototype development, tooling and test processes, regulatory/approval management and sub-component supply chain to ensure Epec's world class standards to our customers are maintained.

Anton oversees hundreds of custom battery pack design projects which include everything from primary and secondary chemistries to include, alkaline, NiMH, NiCd, primary lithium, and the latest lithium-ion or lithium-polymer batteries. He has extensive experience with medical devices, UL/CE, UN DOT, and military power electronics applications.





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