

Custom Enclosures: Getting Exactly What you Want in a Protective Instrumentation Enclosure

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In the past, OEMs, product designers and engineers basically had two choices when it came to designing sensitive internal components that required an enclosure, design them to fit into a standard, off-the-shelf box, or expend considerable time, money and effort to have one or more mill, machining or metal shop modify an enclosure or custom build one from the ground up.

Fortunately, today's forward-thinking enclosure manufacturers are beginning to think outside of those off-the-shelf boxes and are bringing many product customization options and services in-house. By offering the flexibility to change everything from the height, depth or width of a pre-engineered enclosure case, manufacturers are giving their customers the freedom to design their products and applications without being forced into a standard enclosure footprint.

Some manufacturers are even offering detailed customization services like hole punching, machining and the application of self-clinching inserts, along with finishing touches like silk screening and graphic overlays. As a result, it's more affordable and more convenient than ever for an OEM or designer to acquire a case that's perfectly configured to a specific product or application design—and 100-percent ready to install.

Replacing 'One Size Fits All' With 'One-Stop Shopping'

So how, exactly, can a manufacturer modify a case? The answer is, anyway you can imagine. Most enclosure manufacturers already offer a sizable selection of quality standard cases in various materials, sizes, configurations and styles, such as desktop, handheld and rackmount units. Sometimes, one of these stock solutions will be just what an OEM needs. But more often than not, a standard case doesn't quite fit the bill.

Modifications allow better support for product and design engineers' requirements and specifications, down to the very last detail. And they allow customers to get everything they need—all from one single source.

The Customization Process: from AutoCAD to Zinc Chromate

In certain instances, starting with a standard enclosure and modifying it to fit a customer's design will work,

other times, it's best to design the ideal enclosure solution first. Based on the specifications identified, you can then look for a pre-engineered, standard case, which can be modified to fit the product. Or, if necessary, you can create a completely customized solution from scratch.

To facilitate this first step in the process, some manufacturers are beginning to either provide or offer their customers access to technology-based design and drawing services.

Design and Drawing Services

Design and drawing services are typically powered by industry-leading engineering tools and technology, such as AutoCAD. AutoCAD is an engineering software application that manufacturers can use to quickly and easily draw detailed dimensional illustrations of all the components of an enclosure. The drawings specify everything from height, width, depth, hole sizes, hold position, hole configuration, finish and more. AutoCAD drawings, or their equivalent, let you know exactly what type of case you need to house your specific application—and they let the manufacturer know just how to assemble the enclosure components for the perfect fit.



Using design software, custom enclosures can be easily build and prototyped in a number of configurations

From there, the customization process can include anything and everything from creating special case sizes to special services such as hole punching, finishing, shielding and graphic overlays. Some of the in-house customization services your enclosure manufacturer may be able to provide include:

Special Sizes

Some manufacturers engineer flexibility into enclosure components in order to accommodate special sizing when

a standard size won't fit the end user's requirements. You may be able to request that the height, width and/or depth of your enclosure be modified to meet your exact specifications. If you are using an extruded case, extrusions can sometimes be cut to specific depths to better accommodate your product design.

Self-Clinching Inserts

Inserts such as studs, stand-offs, blind studs, captive nuts, Spring Latches, rivets and right angle standoffs are available in a variety of sizes and can often be added to a case in order to mount electronics or hardware.



Punching and Holes

You may want a hole punched into your enclosure in order to mount internal components or allow for venting. Some manufacturers offer a variety of punches and holes in different sizes, configurations and shapes, ranging from square, to round, to trapezoid. The punches are ideal for customizing enclosures made of extruded aluminum, aluminum sheet or steel sheet.



Custom punched holes in enclosure panels

Machining

A machining process can be used for holes, vents, corner radius, cutouts, counter boring and other customized processes to extruded aluminum enclosures. Unlike punching, the machining process does not require the material to be flat. The machining process can also be used to mill enclosure components, such as handles, out of aluminum bar stock. Most machining is performed before metal finishing in order to ensure a uniform finish coating.



Machining bar stock aluminum can produce custom handles and such as the one above

Finishing

Often, enclosures are finished with an undercoat and topcoat to provide a durable and attractive finish that protects your product and helps it function at its best. The final use for the product often dictates the best type of finish to use—as each finish offers different properties and advantages. Your enclosure manufacturer may be able to provide you with a variety of finishing options, such as:

- **Alodine:** Ideal on aluminum for paint adherence, inhibiting oxidation, and conductivity, alodine finishes come in yellow or clear.

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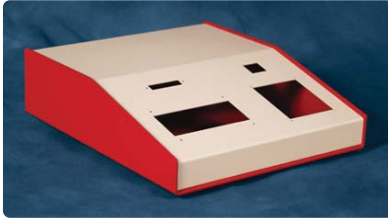
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• **Anodize:** Anodize finishes are used on aluminum and available in clear, black and other colors and are primarily used for their cosmetic appearance, hardness and oxidizing-inhibiting properties.

• **Zinc Chromate:** The primary functions of this type of finish include conductivity and rust-inhibiting. Zinc chromate is commonly available in yellow or clear and used on steel.

• **Paints:** Powder and water-based paints can add eye appeal to your product and allow you to utilize a specific color scheme. PMS and RAL colors can be matched, and specific textures can be achieved with this type of finish.



Paints and powder coating add aesthetics and functionality to custom enclosure designs

Vinyl-Clad Aluminum: Vinyl-clad aluminum and steel provide a very tough yet attractive finish and are ideal for enclosures that require punching. The finish features a lightly textured surface and is available in a variety of different colors.

Shielding

Shielding protects products by limiting interference into or out of an enclosure. It's particularly important for products that include highly sensitive components inside the enclosure or for enclosures that will be placed near other sensitive equipment or components. The shielding process uses overlapping seams and multiple fasteners to minimize gaps and spaces between enclosure components while ensuring effective conductivity among components. To meet special requirements, Copper-Beryllium and Metal-impregnated gasketing, Copper-Nickel paint and/or additional fastening hardware can also be used.

Masking

For plated or painted enclosure components, a masking process creates a raw contact surface, which is essential for improving the effectiveness of the shielding process. Masking can also help achieve a specific appearance for your enclosure.

Graphics and Silk-Screening

You can really make a product your own with the application of your company or product name, a logo, or other artwork on your enclosure. Some manufacturers provide graphic overlay and single or multi-color silk screening capabilities to professionally apply your graphics or artwork and put the final touches on your case.

Case Closed: OEM's Can Enjoy Design Flexibility Along with Value-Added Service

Based on all the customization options that are becoming more readily available from enclosure manufacturers, it's easy to see how any OEM—or even a single inventor working out of his basement—can take advantage of cases designed to better meet the specific requirements of any type of product or application.

But the benefits of in-house customization solutions don't end with lifting the constraints on electrical component and product design. Manufacturers who provide these services at their shops are also bringing considerable value to their customers of all sizes in terms of customer service, time and costs saved.

Today, we're seeing shrinking order sizes. OEMs and product designers are more pressed than ever for in-house resources. Customers are demanding faster and faster delivery times. When an OEM is able to deal with an enclosure-manufacturing

expert who already understands the necessity for unique solutions, low-volume or one-off orders and fast turn-around times, time and money is saved compared to placing and tracking orders with multiple vendors who may not understand or be able to accommodate needs.

With in-house enclosure customization solutions, OEMs and product designers in every industry win on every level. And the manufacturer is rewarded with some pretty satisfied customers.

Kenneth R. Tumbison is president of Buckeye Shapeform. For more than 100 years, Buckeye has been committed to providing quality products to OEM compa-

nies of all sizes around the world. Founded in 1902 as the Buckeye Stamping Company, the organization now includes Buckeye Enclosures, Buckeye Novelty Cans, Buckeye Knobs, and Buckeye Deep Drawn Technology. Buckeye Enclosures offers a complete line of off-the-shelf instrumentation enclosures as well as services for modifying standard enclosures and creating completely customized solutions in either metal or plastic material. For additional information, contact Buckeye Shapeform at 877-728-0776 or info@buckeyeshapeform.com or visit www.buckeyeshapeform.com.

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