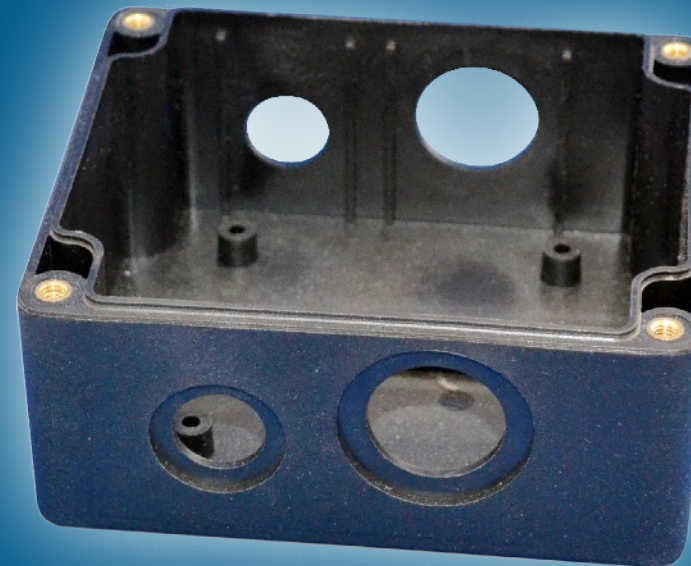


Enclosure Modifications eBook

*Getting the enclosure you
need faster, for less money*



How to Modify Your Enclosures in Five Days [Play Video](#)

*Enclosures
Right Now,
Right Price.*



Inside: **Play the THINK FAST QUIZ!**

As time-to-market pressures increase, only the swift succeed. Bud can make simple modifications to enclosures up to 3x faster than other suppliers. Do you think fast? Take the Quiz and see how fast you think.

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Tips that speed and simplify enclosure modifications

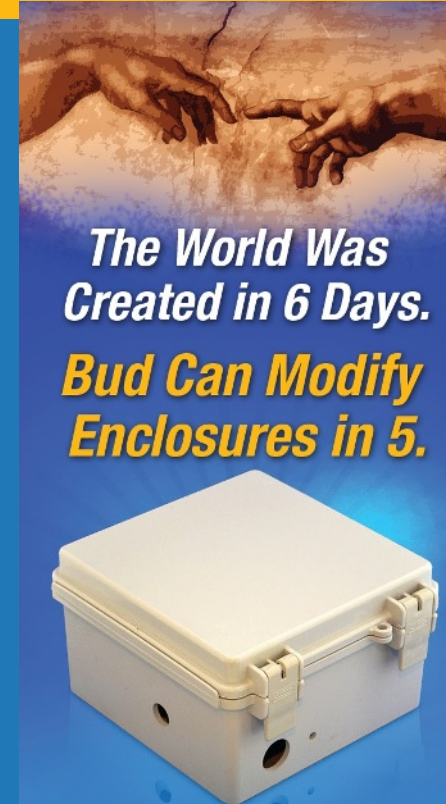
Modifying Enclosures

Following a few simple tips helps designers get their products to market on budget with the exact enclosure their design requires. What distinguishes a simple metal or plastic box from a functional electronic enclosure? Most often, it's the modifications necessary to allow access to the interior, stabilize and protect its contents, and present the appropriate appearance. Enclosures typically need a minimum of one cutout for a power cable and often many other modifications, which can include holes, cutouts, tappings, gaskets, pre-assembly, and finishing. With a little planning and coordination with the right supplier, product designers can get their creations to market faster with exactly the enclosure their design requires.



THINK FAST QUIZ #1

In Star Trek, how fast is impulse power?



*The World Was Created in 6 Days.
Bud Can Modify Enclosures in 5.*

Your next creation shouldn't have to wait.

Bud can make simple modifications to most enclosures in only five days, at no extra cost.

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Tips that speed and simplify enclosure modifications

Speed and Simplify Enclosure Modifications

For many design engineers, specifying enclosure modifications is the final step in the design cycle, with time-to-market pressure leading many to demand 1 to 2 weeks delivery rather than the 4 to 6 weeks common in the past.

Although enclosure suppliers can typically turn around modifications in up to 6 weeks, the most efficient ones can complete simple modifications in as few as five days with no charge for expediting. Identify your enclosure modification needs as you create your product design. If you figure out your enclosure requirements early, you'll often be able to take advantage of a stock enclosure, which will cost substantially less and require far less lead time than a custom one.

For example, with extra planning time, you have the flexibility to reposition the mounting screws on the PCB to line up with a stock enclosure's mounting bosses, or you might select taller keys to accommodate a standard box's depth.

Enclosure suppliers can easily mill out a mounting boss or card guide that's in the way or add tapped inserts to increase the stand-off to allow mounting the PCB closer to the front of the enclosure.

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Selection

Find a supplier with a wide selection of sizes in the enclosure style you prefer. Standard sizes are almost always less costly than custom ones. If you select the right enclosure, some modifications may not be necessary.

For example, a polycarbonate enclosure with a clear lid eliminates the need for cutouts for LEDs and displays. On the other hand, sheet metal boxes are formed by bending metal, so the additional cost for a custom dimension may be within your budget, while a custom plastic enclosure entails significant molding charges and long lead times.

Look for suppliers who have invested in tooling, can produce modifications rapidly, and are equipped to accept customer CAD files.



IP67 Enclosure for Less.

Waterproof protection of electronics for about 10% less than competing enclosures.

See specs.



THINK FAST QUIZ #2

DARPA's goal for the experimental Falcon HTV-2 hypersonic test vehicle is to reach any spot on the globe how quickly?

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Selection *(continued)*

Make sure you know where the cutouts need to be and what tolerances are acceptable. Some components, such as a switch, may be connected to the PCB with a flexible cable, in which case the exact position of the cutout is not critical.

However, with a component like a data port that's mounted on the PCB, the cutout must be positioned precisely in relation to the PCB mounting bosses. Tolerances depend on the precision of the equipment used, so ask the supplier of your components to verify the product's tolerances so that the enclosure supplier provides a turn-key modification for you.

Remember that two holes can be within tolerance and still not fit your design. If one hole is offset slightly to the left and the other is offset slightly to the right, the combined distance may be significant. Inform your supplier which cut has the most critical tolerance so the other cuts can be made in relation to it.

Other considerations you should keep in mind to streamline your modification order are:

- **Mounting.** Are internal or external mounting provisions required? Your supplier may be able to add tapped holes or preassemble mounting brackets.
- **Grounding.** Will certain areas or enclosure components need to be masked for continuity? Are ground points or studs needed? Suppliers can address these needs for you.
- **Draft angles.** Cast boxes typically have a 1 to 2 degree taper, which enables the casting to be removed from the mold. This angle may affect mounted components, and should be taken into consideration when making modifications.
- **Wall thickness.** Some components have minimum wall thickness that they can mount to or maximum wall thicknesses that they can mount through.

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Services

Take advantage of services that you would otherwise have to perform in house. Most enclosure suppliers offer pre-assembly of enclosure components, including cable glands and mounting brackets. Most will also apply decals and custom labels for easy shipment to your customers.

The same is true of racks and cabinets. Rather than assembling custom components in house, it can save production time to order them pre-assembled. Locations of access panels, custom shelves, fans, vents, lock hasps, power strips, casters and levelers must be carefully specified. If a component needs special EMI protection, then the supplier can mount a die-cast aluminum box on the rack.

Consider how a custom color could help differentiate your product in the marketplace, which could give you an edge in markets where competing products all appear similar. Many suppliers offer enclosures with a powder-coat finish.



THINK FAST QUIZ #3

What is the fastest supercomputer in the world, whose processing speed clocks in at 33.86 petaflops?



High-End Cabinet Rack, Low Cost.

All the features of a high-end 19-inch rack, without the extra cost.

VIDEO DEMO

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Tips that speed and simplify enclosure modifications

Services *(continued)*

Carefully weigh the pros and cons of making enclosure modifications in house. The break-even quantity for saving money by having the manufacturer perform the modifications is around 50500 pieces depending on the manufacturer, but it also varies based on the type of modification you need and the capabilities you have in house. If all you need is a drill press, it's probably doable in house, but if you also have to pull a worker off the shipping dock to run it, make sure to factor in the cost of not shipping for a few hours or the cost of overtime. Other modifications, such as silk-screening or painting, require equipment you probably don't own.

Many OEMs who consider handling modifications in house don't know they shouldn't use the same drill bit for metal, plastic, and fiberglass, and they're unaware of the torque speed required to cut a polycarbonate box without cracking it. Therefore, if they absolutely must do modifications in house, they should plan for a certain amount of scrap. On some projects, the cost of modifications at the supplier will be just a fraction of the cost of scrapping an enclosure.

Here's what's involved in working with an enclosure supplier to handle the modification process. First, download or request a DXF or STEP file, which may be available on the manufacturer's website. Then import the file into your CAD software and indicate where the modifications should be located. The supplier will work from your file. The vendor will then use its expertise to verify your design and ensure that it will perform as anticipated.

Having the enclosure manufacturer make the modifications is usually the most economical decision. Order in the largest quantity that makes sense to minimize cost. On an automated milling machine, the run time is only 30 to 60 seconds per enclosure; setting up the machine takes the majority of time. Robotic equipment can modify multiple box sides with only one setup. Although job shops may be more cost competitive on shorter runs with just one setup, OEMs will incur extra freight costs and shipping time, and must deal with multiple suppliers.

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Don't wait

Enclosures are part of the design and should not be left as an afterthought. Once product designers discover the ways that their suppliers can modify a stock enclosure, they have the freedom to focus on more critical parts of their jobs, reduce costs, and get products to market faster.

Lower your costs while finding the perfect enclosure: 5 tips.

1. Evaluate your enclosure requirements during your design, with an eye toward stock enclosures. [Bud's Product Selector Tool](#) can make your search easy.
2. Choose a supplier with a broad range of product offerings of the type you'll need.
3. Carefully determine the modifications you'll need and how your design will impact their implementation.
4. Take maximum advantage of services offered by enclosure manufacturers.
5. Evaluate the real cost of making modifications in-house, particularly scrap costs.



THINK FAST QUIZ #4

Bud can make simple modifications to most in-stock enclosures in only 5 days. How long does it take most Bud competitors?

Contact Us &
Find Out More:

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Bud Blog

Request a Catalog

Right Now, Right Price

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