

Protecting your valuable, medical products is of the utmost importance, but it often comes with a hefty price tag and unforeseen challenges. But did you know that rigid extruded tubes (ExT) can offer an affordable, customizable, durable, reusable, and sterilizable packaging option for your medical product?

Why Extruded Tubes May Be The Best Medical Device Packaging Option

By Mike McElhaney, Caplugs

Extruded tubing (ExT) offers a rigid plastic package to protect valuable medical products from being damaged during transport and storage. In addition to protecting products, ExT packaging gives medical companies the added benefit of being reusable. This can save money in packaging costs over the long term while also being sustainable or “green.” A further benefit can be found in ExT’s sterilizable nature. Both the ExT packaging and the product it is protecting can be sterilized simultaneously, aiding in process efficiency.

The ExT Process And How It’s Used For Packaging

It’s important to note that our extrusion process is for rigid plastics that are appropriate for medical packaging and not for other medical applications, such as drain lines or blood/fluid delivery, as nothing made at Caplugs is intended for in-body applications.

To create ExT packaging, plastic pellets are melted and pushed through an extruder. At Caplugs, we can extrude plastic into a variety of shapes: round, square, rectangle, and oval. These different shapes play an important role in adding value to packaging (more on this in a moment). Once the hot plastic is extruded, it is then pushed through a sizing tool within a cooling tank that allows the plastic tube’s opening to be sized while it is cooled. Our cooling tanks are filled with cold UV-treated water to kill any potential microbial contaminants and pass cytotoxicity testing. The ExT is then cut to the appropriate length according to client specifications.

Different extruded shapes are important because of the value added through convenience, safety, and quality assurance they provide in usage, shipping, and storage.

Round Tubes – These are the ubiquitous, all-encompassing standard for ExT packaging, as round tubes can be used for nearly any packaging application.

Oval tubes – A standard round tube has the potential to tip and roll off a surface. Oval tubes eliminate that possibility. Further, oval tubes allow the packaging of different shapes of products within one container. For instance, an oval-shaped ExT package could house a bone drill bit and a flat surgical instrument in the same unit.

Square and rectangular tubes – The primary benefits of square- and rectangle-shaped ExTs are their ability to be packaged upright in boxes and their ability to neatly and efficiently fit within that box. Square and rectangular ExTs also have inherent anti-rolling properties.

In addition to these shapes, others can be developed for clients so long as the shape is symmetrical, such as a hexagon or octagon. And while ExT packaging can be cut to nearly any length, the diameter of its opening must fall within the one-eighth of an inch to 4 inches range. Regarding the thickness of tube walls, Caplugs has two standard thicknesses, but thickness is also customizable for customer-specific applications.

We are primarily a cap and plug solution provider, so we have many off-the-shelf options to enclose ExT packaging. However, the enclosures are also highly customizable. For instance, we offer closed-

end round and square tubes in which one end is welded closed with a plug. This option will soon be available for oval-shaped ExT packaging.

How Caplugs And ExT Address Medical Product Packaging Issues

Most often, customers approach us with a product they've developed but don't have a reliable way for it to be packaged for shipping and storage. In order to develop a solution for the client, we need to know the end use of the product and how many of the packaging application will need to be made. This process helps determine if the client will need an off-the-shelf solution or a customized one. From there, quotes are drawn up and presented; as you may expect, customized solutions take longer to quote and are generally more costly than stock solutions. In the case of customized solutions, the next step is to complete a design review of both the tools to create the part and the design of the part itself to work out any design kinks or flaws. Then, the part is made and samples sent to the client. This process is repeated until a final sample is approved for production. The most important aspect of this is transparent, open communication between parties to ensure everyone is on the same page and no option is left undiscovered.

Medical companies often come to us for help packaging their products because in the process of designing and creating a medical product, packaging is forgotten about. Many product developers are so consumed with developing the product, ensuring it works and passes stringent medical regulatory requirements, that packaging becomes an oversight. This puts a lot of strain on the medical product developer's timeline for release. Further, that timeline strain can lead to budget strains as developing a packaging solution in a condensed timeline can be costly.

Fortunately, ExT is an ideal solution for these problems. We are at a point in developing and creating ExT packaging that we have enough tools, dies, and resources in-house to make an ExT prototype quickly. The only development needed to be done in-house would be to create the sizing tool and cutter bushing. This allows us to excel in condensed timelines and develop samples for testing in just a few weeks. Further, our internal tool room allows us to develop and make any necessary tool to create our client's products on-site, eliminating the possibility for shipping delays and third-party errors.

While ExT is an economical solution for medical product packaging, the real value of it is found in the long term. The rigid plastic walls of the tubes are the best line of defense to prevent damage to products that can lead to costly repairs or replacement. Further, cost savings can be found within the ExT packaging itself. For instance, even just slightly reducing the length of a tube or its wall thickness will reduce the amount of materials required to make it. When that material reduction is spread throughout the entire manufacturing run, dramatic savings can be found.

Of course, medical products arriving at their final destination in pristine condition is the ultimate goal, and ExT packaging is a great choice to achieve this. As previously mentioned, ExT tubes are rigid, which protects their contents from damage during shipping and storage. The tubes, and their caps and plugs, can also be sterilized, providing a sturdy, contaminant-free storage environment.

ExT packaging also addresses warehousing and freight issues. In addition to their anti-rolling qualities, square- and rectangle-shaped ExT packages are extremely efficient at filling secondary packaging boxes. Square- and rectangle-shaped tubes fit edge-to-edge within a box, eliminating negative space and maximizing the shipping volume or capacity. Some ExT tubes are also able to nest within each other, which also maximizes the box's shipping volume or capacity.

Using ExT packaging can also save warehouse space. In addition to maximizing box space, the reusable nature of ExT allows medical companies to keep a fewer number of products on hand. Users can reuse the tubes until their life expectancy is exhausted.

In addition to saving warehouse space, ExT packaging can help prevent products from warping, bending, and falling victim to other climate-control issues. Ultimately, there is a trade-off in investing in quality ExT packaging and the potential for damaged products. Ultimately, the investment in sturdy, sterile, reusable packaging is significantly less costly than repairing or replacing medical tools.

What Else Can An ExT Packaging Company Provide?

In addition to the durable, sterilizable, and highly customizable packaging ExT can provide, the company should also be able to add value to your company in other ways. First, your contracted partner for ExT should be able to offer both off-the-shelf and customizable options for tubing as well as the closed end (caps and/or plugs) for them. After all, a tube can't be a package without enclosing it.

Your contracted ExT partner should also have value-added secondary operations capabilities, such as printing on the tube. This can include everything from a logo and product usage instructions to graduated measuring lines and nearly any customizable image. The ExT provider should also be able to add value to the packaging itself. For instance, as ExT packaging can house fragile medical equipment, your provider should be able to offer additional options to enhance protection. This is often done with dampeners: a soft material, often foam, inserted into the tube to absorb vibrations and impacts to further protect the product.

Finally, your ExT provider should be able to provide customizable secondary packaging, such as boxes with precise fittings to hold tubes in place during shipping, in addition to its other value-added services.

But even if ExT isn't the right fit to package your medical product, the right contracted packaging partner will be able to find the right packaging solution. This can include injection molded or vinyl solutions. Even if the solution to a packaging need isn't completely obvious, the right packaging partner will be able to develop and build the solution within reason. This could include something like making an extrusion, then finding or creating a secondary operation to finish it, such as a welded or domed end/enclosure.

Protecting your valuable medical product needs to be the number one priority of your contracted solution provider. That provider should have a proven track record of success, accompanied by the highest of quality standards to meet and exceed client expectations. Finally, your contracted packaging partner should be willing to work closely with customers to deliver the product that best fits their needs. And if issues should arise in the packaging creation process, your packaging partner needs to take steps above and beyond what was agreed upon to ensure expectations are met.