Converting to Plastic in the Manufacturing Industry: The Method of Conversion and its Benefits

By: Rotonics Manufacturing Inc., Chelsi Scruggs

The rotational molding industry brings about a viable alternative when manufacturing products. Improvement in product performance and instituting technological cost reductions makes rotational molding the process of choice. Rotational molding permits the production of seamless hollow parts in complex or intricate shapes, in any size or application. There are virtually no limits to the design flexibility of rotational molding. In rotational molding, plastic material in liquid or powder form is placed into a mold cavity, and brought up to molding temperature in an oven while being continuously rotated so that the plastic material is evenly distributed throughout the mold, creating a uniform wall thickness. The mold is then cooled until the part can maintain its shape, completing the process. The plastic materials used in molding, also called resins, include polyethylene, polypropylene, polycarbonate, nylon, and vinyl. With the correct resin selection, rotationally molded parts are capable of economically replacing fiberglass, metal, or wood materials.

In essence, conversion takes a product made from one kind of material and rotationally molds it using polyethylene, ultimately improving its quality. The principle behind conversion is to take advantage of the versatility rotational molding offers in its methods, and use it to improve products from a broad spectrum of industries. Conversion is the practice that can most utilize each benefit that rotationally molded products offer.

For instance, material is a great consideration in the design of any product. Before rotational molding, metal and wood were the material of choice when making certain products because of their durability, cost efficiency, and versatility within the manufacturing industry. However, as technology evolved, so did the materials used, and now what was previously made from metal or wood can now be converted into a more durable polyethylene alternative. When exposed to extreme weather and temperatures, wood and metal tend to deteriorate. Polyethylene withstands harsh conditions, and is resistant to cracking and corrosion.

Conversion to plastic has been expanding for a long time because of its capacity to eliminate problems that are inherently linked to manufacturing with other materials. For example, the use of wood in a broad array of industries has sufficiently decreased since a ban in 2002 of soft wood shipping and packing materials

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was issued by approximately ninety countries. This mandate arose from a need to reduce the infestation that occurred in wooden packing materials that allowed bugs to travel along with the products during transport to different countries. Conversion offered an alternative to wood packing materials as polyethylene shipping and packing pallets are lightweight and non porous, eliminating the problem of infestation for those companies operating in an international market.

Like wood, metal also has a major, unavoidable flaw known as rust, which has been eliminated through the mode of conversion. The Rotonics Nevr-Rust products are taking the place of things like traditionally metal truck tool boxes. Service Kits and Tool-Tainers, products used in a broad range of industries including pest control, construction, plumbing, and even in household workshops and garages, are produced in Polyethylene as a replacement for metal boxes and obsolete Fiber Board Carrying cases. The polyethylene construction of these service kits and Tool-Tainers (a.k.a. tool boxes) allow for a permanent no mar finish that does not rust with time, dent with impact, or corrode with exposure to chemicals or water. Through conversion, a more durable product can be created that does not only improve in quality, but sometimes comes to replace outdated products with new technology that combats elements that have been proven problems when dealing with other materials (like rust always being an issue with metal components).

Not only do rotationally molded parts have a better structural quality all around, but the strength of parts is improved in specific areas, particularly corners. This is especially important when the parts function to protect against and absorb impact. For instance, a company, developed four similar hydraulic ground test and support, purifier combination systems to meet varying Air Force Requirements. The General Manager describes that “to meet varying deployment requirements, they developed separate test stands that are powered by either diesel engines or electrical motors. This new equipment will be the first computer controlled test stand and has been long awaited in the field.” The Company and Rotonics Manufacturing Inc. collaborated on a housing design for the Hydraulic Test Stand. The housing design was conceived with strength in mind, as a sturdy shell was needed to protect the computerized Test Stand.

Therefore, the housing had to be able to absorb external impact that might otherwise harm the machine it houses. The high density polyethylene used in the construction of the test stand’s housing does just that with walls of a uniform thickness to protect all areas it covers, as well as thickened corners to offer extra support to the walls of the Test Stand’s housing. The polyethylene housing not only exemplifies the structural benefits of rotationally molded products, but also demonstrates another benefit of conversion: molded in color. When

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rotationally molding the plastic housing for the Test Stand, an olive color was added into the resin so that the color is contained throughout the polyethylene. This is an improvement of metal housing popular in a lot of manufacturing industries because the polyethylene does not have to be painted (and re-painted when the color chips or cracks). Though color might not seem like an issue in mainstream manufacturing industries, color is often associated with the identity of an industry (ex. blue for the recycling industry). Conversion to polyethylene makes molded in color an available option so that companies can choose a color without concern for how long it will look nice before its aesthetic appeal deteriorates.

However, it is important to note that despite the strength converted products have to offer, they can still be lightweight, offering handling benefits in addition to functioning as a solid product. Rotonics produces septic tanks that must be installed underground and still be accessible for inspection. In order to make this possible, RMI's septic tanks come with optional 9" stackable risers, providing access for inspection. The tanks also have rotationally molded handholds for convenient lifting. The lightweight of rotationally molded septic tanks is a valuable asset, as it makes it easier to install, but does not sacrifice the durability a septic tank is expected to have.

In fact, by rotationally molding the tank, it can be made in a seamless one piece construction process, strengthening the structure of the tank by reducing the number of weaker seam areas that have the potential to leak due to frequent pumping applications. The septic tank is even produced with a ribbed design that allows it to hold large soil loads. But the outside of the septic tank is not the only thing that benefits from rotational molding. The traditional fiberglass partitions are now produced as polyethylene baffles. The baffle functions to compartmentalize the septic tank so that each section can efficiently break down bacteria. Because the high density polyethylene used to make the baffle is a heavier weight than fiberglass, it made the tank itself more structurally sound to withstand heavy soil loads and frequent pump applications, yet it did not compromise the lightweight valued in the polyethylene design of the septic tank.

Structural strength is a benefit of conversion that generates other advantages for the consumer and manufacturer. Economically, polyethylene has become a preferred material because of the increase cost of steel in manufacturing industries. This increase is caused by a multitude of factors, but chiefly because most of the steel used in U.S. manufacturing is imported, driving costs up. To offset the cost of steel, manufacturers and businesses must inflate their costs and surcharges to compensate for the price of steel. Yet, it is not just the cost of steel that is expensive, but the energy concentrated process of refining steel itself that is costly.

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Converting to plastic products, the Original Equipment Manufacturer (OEM) benefits from the rotational molding process as well, as it generally costs less for tooling and initial start-up than other plastic processes. Rotational molding is ideal for the OEM because it can run family molds, meaning rotational molding machines can produce more than one product at once, instead of having to produce a single product because of a machine's limited capabilities. For instance, in a rotational molding factory, the machines have several arms that can handle different parts at different times, making an array of products at once, something limited in other plastic manufacturing processes. Different shapes, sizes, and designs can simultaneously be produced. This is important to the efficiency of manufacturing businesses, who are responsible to their clients for timely delivery. Frequently, the OEM will be required to ship small quantities on Just In Time (deliveries), in which companies order only what they will utilize in a short amount of time so that they do not have to inventory large quantities of product. If timely production cannot be accomplished, not only does the OEM fail, but the production line of the consumer company breaks down; that is why the ability to produce many parts at once and in small quantities is so important.

The consumer benefits from polyethylene as well because by owning a product with the durability of polyethylene, the owner does not have to replace the products as often because of wear and tear, saving them money and time. Also, when a product is converted using rotational molding, a machine known as the CNC automatic router can produce a product for them that is accurate and precise. The router works through the programming of measurements and dimensions into the machine's computer, making all molding that takes place automatic, and therefore, more accurate because the machine is doing the measuring.

Sometimes, conversion merely offers an alternative to other materials. A leading manufacturer of air curtain products and technologies worldwide, teamed up with Rotonics Manufacturing Inc. to create a polyethylene housing for the air door, or according to their Vice President, a "competitive differential advantage for itself." Prior to this decision to renovate their product, they had proven metal housing designs. However, by converting the metal housing into a plastic one, they were able to create more options for their customer, another benefit to having the alternative of converted products.

Besides choice, conversion offers an alternative material to the traditionally applied metal and wood material for the adaptation of a part for a specific industry. The Rotobase has revolutionized the laundry and linen industry, creating a part that combats one of their industry's biggest obstacles: moisture. When laundry

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carts had wooden and metal bases, all the moisture characteristic of the laundry industry caused corrosion, rust, and rot on the bases of linen and laundry carts. This created a myriad of problems ranging from the constant costly repair of rusted and rotted bases, to the diminished ability of the carts themselves, which could not haul extremely large loads with weak bases, increasing labor and affecting the timely execution of tasks. To solve the problem, Rotonics Manufacturing Inc. converted the part to polyethylene, and the concerns held with metal and wooden bases became a distant memory. Conversion allowed for the improvement of a product in a specific industry where certain factors begged for an alternative in the construction of one of their main tools. Now, the polyethylene base has become an industry standard because of its contribution to the improvement of the laundry cart.

Lastly, aside from the benefits afforded to the manufacturer, consumer, and industry, the environment also benefits from the use of polyethylene. Obviously, the burning of wood produces air pollutants that have become undesirable in our o-zone conscious world. Polyethylene however can be melted down and recycled with minimum loss in physical properties, as well as little consequence to the environment with regards to the emission of pollutants.

Conversion offers several benefits in the changing of products to plastic: structural strength, molded in color, functionality, and alternatives for the consumer. However, what Conversion most represents a merge of traditional values with progressive methods of manufacturing. Manufacturers still value the production of sturdy products just as much as they did when they used metal, wood, and fiberglass applications, which is why there is a movement towards finding ways to improve a broad array of industries through the single method of Conversion.

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