



# RTM - Closed Mold Process

Resin transfer molding (RTM) is a closed mold manufacturing process. Finished parts are made by introducing polyester, vinyl ester, epoxy or polyurethane resins into closed molds containing fiberglass, carbon or other reinforcements. RTM does not require metal molds or high-pressure mold closing systems. When using low temperature curing resins, molds required for high-performance resin systems. It is ideal for part volumes from 500 to 10,000 parts per year.

Closed molding employs two molds - a male and matching female half. One mold or both can be gelcoated to produce a glossy surface finish if desired. Reinforcing materials are applied to one mold half and then the mold halves are closed together.

Next, the mold is injected with catalyzed resin until all the space has been filled. Parts made from the closed mold process tend to be of higher quality since the amount of resin used is controlled by the engineered space left when the mold halves are combined. Closed molding yields parts that have consistent weight and thickness from part to part.

## Advantages of RTM

A growing number of companies are moving to closed mold processes because it offers many significant benefits:

- Less wasted material
- Faster gel and cure times
- Uniform part size and thickness
- Consistent material usage
- Finished surface on both sides
- Reduced VOC emissions – less environmental impact
- Higher fiber content which results in lighter weight parts



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There are many types of RTM including:

- Traditional RTM - Utilizes very rigid top and bottom mold halves. Mixed resin is injected under pressure requiring very sturdy molds and high clamping forces. These molds last the longest since they are usually made from metal but they are also the most expensive form of molds.
- Lite RTM - Bottom mold is rigid and top mold is flexible. A vacuum is typically used to draw the mixed material into the mold and the system feeds the vacuum draw with mixed material.
- Vacuum Infusion Process (VIP) - The bottom mold is semi rigid and the top half is a thin plastic film designed to be used and then discarded. No injection pressure. The system is not connected to the mold. In this case, the system fills a bucket or drum with catalyzed resin. The mold has a vacuum applied to and a supply line that runs from the mold into the bucket/drum of mixed material. The vacuum source draws the material from the container into the mold.