The Thermoforming Process

In the **vacuum assisted thermoforming process** a sheet of plastic material is heated uniformly to the softening point of the material, next the softened sheet is brought in contact with the mold surface. Then vacuum is applied and the trapped air is evacuated by means of very small holes in the mold.

The hot sheet is drawn tight against the mold surface. After the material has cooled back down to a rigid shape the formed part is removed from the mold tool.

The formed sheet is then trimmed by die cutting, hand routing, or CNC routing to produce the required final part shape. The trimmed off scrap is then sent back to be recycled into raw sheet stock to make new parts. Even scrap, old, or unused parts can be recycled, making the plastic thermoforming process an inherently green manufacturing technique.

The thermoforming process requires a critical “forming temperature window” and all of our forming machinery utilizes precision electronic controls for maintaining part to part consistency.

Because all vacuum forming starts from a flat sheet, the wall thickness of the formed part will have a variable wall thickness as the material is deformed to match the forming tool. The material must stretch and give to conform to it’s new shape. The variation in wall thickness is a function of how much the material must be deformed into the new shape. Often times a design can be optimized to produce a better part simply by altering some features or angles. This is where Industrial Forming can offer assistance to our customers in developing new designs. We can often predict how a part will turn out based on our years of experience and suggest changes that may result in a superior part with only minor design changes.

Vacuum forming only requires a single sided mold, and the pressures involved are many times less than injection molding. This allows for tooling prices typically a fraction of the cost of comparable injection mold tooling. Forming molds can be made from a variety of materials. For production parts we primarily use Aluminum tooling which offers an infinite lifespan. For prototyping and development work we offer a range of materials that can be tailored to the project cost and performance requirements.
For thick gauge parts, the thermoforming process is especially well suited for prototyping and part production from short to medium run production levels. During the prototype phase the material thickness and type can be changed without any effect on the mold. Changes to the mold profile are also relatively simple and rapid. Through use of textured materials or pre-decorated sheets, a final finishing step such as painting may not be required. However, painting is an option if a specific or exact color match is required.

For thin gauge parts, such as product packaging, clamshells, trays, and other lightweight parts, vacuum forming is the predominate method of manufacture for these types of parts. The rapid speed of inline forming production (typically a 5 – 15 second cycle time) allows for high volumes to be achieved at very competitive costs. The parts are formed in a continuous sequential operation from heating, to forming, then punching from the plastic material web.

For more information about our vacuum assisted thermoforming process or vacuum thermoforming in general please contact us.