Transfer Molding

To improve the compression molding process and mold parts with geometries that compression molding is unable to produce, a second method of processing thermoset molding materials was developed - Transfer Molding. The mold consists of a chamber called a **transfer cylinder (also known as a transfer pot or shooting cylinder).** It is separated from but connected to the cavities by way of **runners** and **gates**. There are two methods of transfer molding: top transfer and bottom transfer.

In **"Top Transfer Molding",** the mold is closed and fully clamped; then the shot of material placed into the transfer cylinder. In **"Bottom Transfer Molding",** the mold is fully open, and the shot of material is placed into the transfer cylinder. The material is usually in the form of **preheated preforms** (compacted pills). In the case of BMC products, the material will be loaded into the transfer pot as a log. The transfer cylinder has a fitted end to it called the transfer punch. It is designed with close tolerance to the wall section of the transfer cylinder and has two wiper rings to aid in flash removal during its upwards and downwards travels. It pushes the material out of the transfer pot through the runners and gates and into the cavities. The transfer punch is held under pressure, and the mold is kept closed long enough to **cure** the parts. Typical pressure on the transfer cylinder is about 800 - 1,000 psi (5.5 - 6.9 MPa) and the transfer time is typically 3 - 8 seconds. Pressure typically remains on the molded parts until the transfer cylinder retracts. The **length of cure** is primarily determined by the thickest cross-section in the part, the temperature of the material loaded into the transfer pot and the temperature of the mold.

Mold Temperature - Electric cartridge heaters, steam or hot oil can be used to heat transfer molds.

Typical temperature ranges are:

- 330°F - 360°F (165°C - 182°C) for PLENCO phenolic molding compounds
- 300°F - 350°F (150°C - 177°C) for PLENCO melamine-phenolic molding compounds
- 310°F - 350°F (154°C - 177°C) for PLENCO granular polyester molding compounds
- 290°F - 340°F (143°C - 171°C) for PLENCO BMC polyester molding compounds

What are the advantages of Transfer Molding?

- Parts with geometries that compression molding is unable to produce are now producible.
- Loading the material for the entire shot into one location is less time consuming than loading preforms into each individual cavity.
- Longer and smaller diameter core pins may be used because they can be supported on both ends.
- With the mold being closed before any material reaches the cavity, metal inserts can be molded into the parts without flashing them.
- Across parting line dimensions are more easily held to tight tolerances.
- Parting line flash can be held to a minimal thickness if the mold is designed properly and well maintained.
- Parts have higher physical strengths than injection molding.

What are disadvantages of Transfer Molding?

- The pushing of material through a runner and a gate orients the material, which may result in non-uniform shrinkage.
- Because the material flows from one location to fill the part, knit lines opposite the gate and at each core pin are likely to occur.
- The overall scrap rate for transfer molded parts may be higher than compression molded parts because of the cull and runner system.

- Higher clamp tonnage is typically needed over compression molding due to the transfer cylinder may open the mold slightly while pushing the material into the runner system resulting in heavy flashing of the parting line. Thus, a higher tonnage press may be required.