

Transfer Molding Startup Procedure for BMC Polyester Molding Compounds

Prior to setting a mold into a press, it is necessary to first determine that the mold will fit in between the tie bars of the intended press. Once this is determined and before installation begins, the minimum clamp tonnage for the mold must be calculated. A couple reasons for the need to determine proper clamp tonnage are:

- Insufficient clamping force may lead to parts having unacceptable dimensions such as being too thick because the press may not have sufficient clamp force to force the material throughout the cavity(s)
- Potential mold damage from installing a mold that is too small for a press.
Example: A mold that requires only 75T of clamp force is installed into a 400T press with non-adjustable clamp force may be damaged from too high of clamp pressure.

To determine the correct tonnage, multiply the projected area of the part at the parting line by 4,000-6,000 psi (27.6 - 41.4 MPa.).

Example: A part having a 12" diameter requires a minimum clamp pressure of 226T (2T/in²)

This can be calculated from the following formula:

$$\begin{aligned} \text{Clamp tonnage required} &= r^2 \cdot \pi \cdot T/\text{in}^2 \\ 6''^2 \cdot 3.1416 \cdot 2(T/\text{in}^2) &= 226 \text{ tons of clamp pressure} \end{aligned}$$

Once a mold has been matched with a press and is installed in that press, a standard procedure should be followed to begin molding parts. Following a written procedure each time a mold is installed makes it easier for the press operators by helping to minimize the omission of any procedural steps. After the mold is set the following startup procedure can be implemented.

1. Turn on the heat and frequently check the temperature of the molding surfaces with a calibrated pyrometer and surface probe. Typically start with a mold temperature of 290°F - 330°F (143°C - 166°C). It is desirable to have as little temperature variance (typically within 10F) across the mold surface as possible.
2. Typical **mold temperatures** are:
 - 290°F - 330°F (143°C - 166°C) for BMC materials.
3. Obtain the molding process information if this job has been molded before.
4. If this job has not been run previously, review process information from similar molds.
5. Obtain blank process set up sheets to record press settings and information.
6. Setup / enter press settings **BEFORE** waxing the mold.
7. Just prior to charging the transfer pot with material for the first shot, the mold should be **coated with mold release**. There are several mold releases that have worked well for BMC processing which may include but are not limited to:
 - Carnauba wax
 - Bees Wax
 - Zinc Stearate powder or spray
 - To wax a mold with either Carnauba or Bees wax, melt the wax on the molding surface and with the aid of a small natural bristle paintbrush, spread it over the entire molding surface, getting it into every pocket and corner. Remove any excess wax from the mold surface.
8. Before transferring the material for the first shot, the amount of vacuum being pulled in the mold should be checked to ensure it is at least 21in. Hg. You can then determine the amount of transfer delay time needed to allow the system to achieve the full vacuum.
9. The molding parameters should be adjusted to produce good parts from all cavities, of each shot. Typically, the transfer time should be 3 - 6 seconds and the transfer pressure should be 400 - 800psi (2.75 - 5.5 MPa).
10. After an acceptable molding process is established, it should be capable of continuing without change for many hours.