Transfer Molding Startup Procedure for Granular Polyester Molding Compounds

Prior to setting a mold into a press, it is necessary to determine first 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 keep the mold closed while the material is being pushed into mold 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 ($2T/in^2$) - 6,000 psi ($3T/in^2$).

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

This can be calculated from the following formula:

Clamp tonnage required = $r^2 * \pi * T/in^2$

$6"^2 * 3.1416 * 2(T/in^2)$ = 226 tons of clamp pressure

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. It is desirable to have as little temperature variance (typically within 10F) across the mold surface as possible.
2. Typical **mold temperatures** are: 310ºF - 350ºF (154ºC - 182ºC).
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. Check the **preheat temperature** of the material being loaded into the transfer pot / transfer cylinder. It should be 200ºF - 210ºF (93ºC - 99ºC). It is to be measured by taking an extruded slug or a preheated preform and probing it 2 or 3 times using the needle probe of a calibrated pyrometer. The preheat temperature should always be rechecked after any changes are made to the process.
8. If you are using a **reciprocating screw preplasticizer** to preheat the material, it is suggested to use a slower RPM such as 30-40 RPMs to start with. Using a slower RPM typically yields more consistent shot to shot preheated slugs, while faster RPMs over 50 have shown to yield inconsistent shot to shot preheated slugs.
9. When using a **reciprocating screw preplasticizer**, a typical backpressure to start with is 50 psi (0.3MPa).
10. Just prior to charging the transfer pot with material for the first shot, the mold should be **completely waxed**. Carnauba wax works well for this purpose. To wax a mold, 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 the wax into every pocket and corner. Remove any excess wax from the mold surface and begin to mold parts before the wax has a chance to burn on the tool surface.

11. 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.

12. The molding parameters should be adjusted to produce good parts from all cavities, each shot. Typical the transfer times are 3 - 6 seconds, with typical transfer pressures in the 800 - 1,000 psi (5.5 - 6.9 MPa) range.

13. After an acceptable molding process is established, it should be capable of continuing without change for many hours. All process parameters should be documented for future startups.