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Transfer Molding Startup Procedure for Phenolic and Melamine-Phenolic 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 tonnage 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 ($2T/in^2$)
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. Typical start up **mold temperatures** are:

   - 330°F - 360°F (165°C - 182°C) for phenolic molding compounds

   - 300°F - 350°F (150°C - 177°C) for melamine-phenolic molding compounds

2. Check the **preheat temperature** of the material being loaded into the transfer pot. It should be: 220°F - 240°F (104°C- 115°C).

   It is to be measured by taking an extruded slug or a preheated preform or slug of bulk or log 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.

3. If you are using a **preplasticizer** to preheat the material, the screw RPM in most cases should be 60 or less. A faster RPM may not allow the material to be picked up as well and the result will be the same as running at a slower RPM. In addition, running at a slower screw speed usually produces a more uniform stock temperature and a more consistent shot weight.

4. When using a **reciprocating screw preplasticizer**, a typical back pressure to start with is 0.3MPa (50 psi).

5. Just prior to charging the transfer pot with material for the first shot, the mold should be **completely waxed**. Carnuba 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 it into every pocket and corner. Remove any excess wax from the mold surface.

6. Please note, in some instances the use of a breathe cycle may be necessary. Its timing and duration will be dependent on the mold, press and molding material.

7. The molding parameters should be adjusted to produce good parts from all cavities, of each shot. Typically, the transfer time should be 3 - 8 seconds and the transfer pressure should be 800 - 1,000 psi (5.5 - 6.9 MPa).

8. After an acceptable molding process is established, it should be capable of continuing without change for many hours.

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