

# TECHNI/TIPS

A Publication of the Lubrication Engineers Technical Department

LEADERS IN LUBRICANTS

NUMBER 50

## THE PLASTICS INDUSTRY

The use of plastic is rapidly increasing. The two major classes of plastic materials are **THERMOPLASTIC** and **THERMOSETTING**.

**THERMOPLASTIC** materials undergo only a physical change during processing. They will liquefy under heat and pressure and then solidify on cooling. These are the cellulose derivatives, polyethylene, fluorocarbons, polystyrene, acrylics, nylons and vinyls.

**THERMOSETTING** materials become rigid because of a chemical reaction which takes place under heat and pressure. After the reaction is completed, they will not change form with further heat application. Polyesters, alkyds, ureas, melamines and phenolics are in this group.

Molding processes are probably the most important methods of forming plastics. There are four variations of molding processes and they are: compression, transfer, injection and blow molding.

**COMPRESSION MOLDING** is used mostly for large articles using simple designs and thermosetting plastics. The basic equipment requirement is a hydraulic press large enough to exert sufficient pressure on the plastic. This may be two tons per square inch of plastic surface or even higher.

LE's MONOLEC Industrial Oils, with their exceptional oxidation resistance and ability to keep a system clean, will reduce downtime. Special additives and excellent foam resistance prevent pump wear and reduce "fade" in the system.

LE's MONOLEC or MULTILEC Industrial Oils are the best guarantee of long, continuous service from these machines. LE's MONOLEC Hydraulic Oils or MULTILEC Industrial Oils would be the normal recommendation for the hydraulic system on these presses. LE's 1275 ALMAPLEX Industrial Lubricant, 4622 MONOLEC MULTIPLEX Lubricant or LE's 3752 ALMAGARD Vari-Purpose Lubricant would be the normal recommendation for the hydraulic pump bearings and grease lubricated motor bearings. If the motor bearings are oil lubricated, then LE's 6403 MONOLEC R&O Compressor/Turbine Oil, LE's 300 MONOLEC industrial Lubricant or LE's 6803 MULTILEC industrial Oil would be recommended.

**TRANSFER MOLDING** is almost the same as compression molding as far as equipment and type of plastics are concerned. In compression molding, the dry plastic powder or pellets are charged to the molds. In transfer molding, the charge is plasticized outside and forced into the mold for curing. Transfer molding is commonly used for making more complicated pieces than is compression molding. The lubrication considerations are essentially the same.

**INJECTION MOLDING** forces hot plasticized stock through a nozzle and into closed molds. The molds are cooled and the piece removed. Injection molding is comparable to transfer molding of thermosetting plastics. Most injection machines have two separate units; a clamping unit which supports, opens and closes the molds, and an injection unit which injects liquefied solid plastic into the closed mold.

Injection machines normally have hydraulic systems for supplying power to both the clamping and injection units. LE's MONOLEC Hydraulic Oils or MULTILEC Industrial Oils are unsurpassed under these tough conditions.

Units using rotating screws or spreaders to help plasticize the feed stock have gear trains and motors. Usually they require an SAE 140 oil. LE's 608 ALMASOL Vari-Purpose Gear Lubricant or LE's 9920 SYNOLEC Gear Lubricant will give the best lubrication protection under these severe conditions because of their outstanding EP characteristics, the wear reducing capabilities of the ALMASOL or MONOLEC additives, and their excellent oxidation resistance.

**BLOW MOLDING** is used to produce hollow plastic articles such as toys, bottles, jugs, etc. Blow molding consists of heating and inflating inside a mold by air pressure, and then cooling and ejecting it. Good design and construction of the molds used in blow molding are important. However, they need not be as strong, since the air pressure seldom exceeds 100 psi. Lubrication requirements are similar to the other equipment.

**EXTRUSION** is a continuous process of converting powder, or pellets of thermoplastic material into tubes, filaments, rods, sheets and film. Packaging films and extruded pipe (to replace metal pipe) are largely responsible for the current increase in the use of plastics. Extrusion equipment is less complicated than injection equipment. A heavy heated cylinder, with an internal screw extending the length of the cylinder, feeds dry plastic into the cylinder by the action of the screw. As the plastic emerges from the die it is hot, and cools in water or air. The hot die rotator bearings usually require a high temperature grease such as 1250 ALMASOL High Temperature Lubricant or 1262 ALMASOL High Temperature Lubricant.

The very high pressures needed to force the plastic through the die at any rate of speed are transmitted to the screw thrust bearing and gear train. These must be properly lubricated to minimize wear. LE's 608 ALMASOL Vari-Purpose Gear Lubricant and LE's 9920 SYNOLEC Gear Lubricants are outstanding for this application. Their stability, along with the extra protection of ALMASOL and MONOLEC, LE's exclusive wear-reducing additives, will result in longer gear and bearing life, and consequently increased production.

Oil lubricated motor bearings on the electric motor will require LE's MONOLEC or MULTILEC Industrial Oils. Extruders are usually driven through grease lubricated flexible couplings. Use LE's 1275 ALMAPLEX Industrial Lubricant, 4622 MONOLEC MULTIPLEX Lubricant or LE's 3752 ALMAGARD Vari-Purpose Lubricant, depending upon the operating variables.

**CALENDERING** is used to convert thermoplastics into continuous sheets and to apply plastic coatings to textiles. Calender rolls are normally steam heated to maintain the desired plasticity and are powered by electric motors driven through gear stands. They are equipped with both precision roll bearings and plain sleeve type bronze bearings. There is considerable pressure on these bearings. Often they are water cooled to prevent them from overheating. Older bearings may be lubricated by compression and grease cups, grease pockets or by heavy oil. Modern units usually provide for automatic lubrication of the bearings.

The viscosity of the oil used depends upon the bearing temperature. For temperatures up to 145°F. (63°C.) use SAE 90. Above this use SAE 140. LE'S 607 and 608 ALMASOL Vari-Purpose Gear Lubricant or LE's 9920 SYNOLEC Gear Lubricants are excellent in this application. Their outstanding oxidation resistance and extreme pressure (EP) characteristics, in addition to ALMASOL or MONOLEC, combine to give long life and excellent service. For grease lubricated bearings, use LE's 1275 ALMAPLEX Industrial Lubricant, 4622 MONOLEC MULTIPLEX Lubricant or LE's 3752 ALMAGARD Vari-Purpose Lubricant. If high temperatures are involved, it may be necessary to use a non-melt grease such as LE's 1250 ALMASOL High Temperature Lubricant, LE's 1262 ALMASOL High Temperature Lubricant or LE's 9901 ALMASOL SYNTEMP Lubricant.



***LUBRICATION ENGINEERS, Inc.***<sup>®</sup>

P.O. Box 7128, Fort Worth, TX 76111 | 817-834-6321 | 800-537-7683  
fax 817-834-2341 | <http://www.le-inc.com>