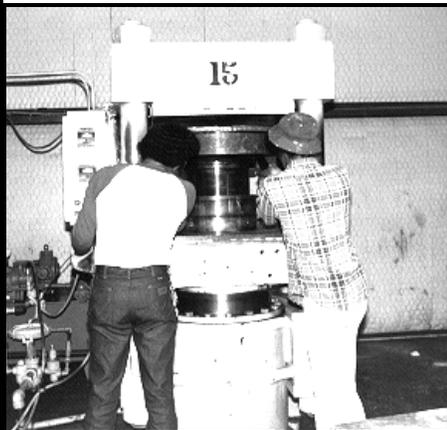
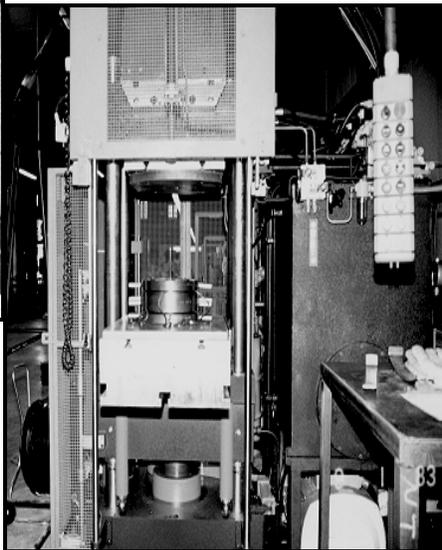


Chapter IV.
Molding Techniques



TRANSFER



INJECTION



COMPRESSION

MOLDING TECHNIQUES

Throughout the years many basic methods for transforming the rubber mixture into a usable shape as a vulcanized rubber compound have been used. In the instance of oil field products, great care should be taken in the choosing of proper molding procedures. These will vary from the very simple flash type molds to the newer more sophisticated injection types.

To begin a discussion of molding, it must be understood that rubber compounds due to their thermoflowing characteristic will, with heat and under pressure, flow into the shape of the mold cavity. The mold closes and the material is held in place under pressure until vulcanization takes place and the rubber becomes thermosetting. The mold is opened and the finished product is taken from the mold. In most instances, some anti-stick lubricant is necessary to readily remove the finished product from the mold.

The type product to be molded, the type molding equipment (presses), the characteristics of the rubber compound and the specific capabilities of each processing plant must be considered in the proper choice of molds. Not every product or every compound lends itself to just any mold design. Especially with oil field rubber products, the rubber design engineer should be particularly careful with his choice.

The first and most basic mold is commonly called a flash type. Specifically, this design consists of the mold cavity cut into the bottom plate of the mold and a flat cover plate. There is no positive compression and the rubber material during cure is allowed to continue to flash out between the parting line at the top of the bottom plate and bottom of the top plate. In this type mold, the rubber preform is cut to near the shape of the cavity with an excess of weight and closing the mold causes the cavity to fill.

A product from the flash type mold would not possess high density, could have a poor surface at the mold parting line and would have a grain formation in the direction of movement of the rubber through the processing and preform equipment.

The next type mold is similar to the first except it would cause positive compression on the rubber compound due to the top plate entering into and locating in the bottom plate. This mold would be loaded similarly to the basic flash type and would give an improved product due to higher unit pressure on the rubber. There would be less chance of poor surface at the parting line, but the grain formation would still be present.

In both of the first two instances, the preform would be placed in the mold at room temperature and

would have to pick up sensible heat until vulcanization is completed. There are many rules of thumb as to how long this process takes, but molding oil field products requires definite values for these times and these must be established.

The third type mold design is the positive compression plunger type. In this mold the design is such that positive entry and location of the top and bottom plate is accompanied with a plunger or center pin attached to the top plate.

The rubber preform in this instance is put into the bottom of the mold and is displaced into the mold cavity by the action of the plunger applying pressure to the preform. The rubber must still pick up some sensible heat from the mold before the speed of flow will increase, but it does pick up additional frictional heat by the action of the mold plunger.

This type molding improves the product over the first two types by increasing the speed by which the rubber fills the cavity and reaches vulcanizing temperature and also removes to some extent any grain orientation that may be present.

The next step to improving molding is accomplished by combining a positive compression mold with an external plunger-pot system. This is commonly called transfer molding. This method is exactly what its name implies. The rubber preform is inserted in a machined cylindrical cavity called a pot and is forced through sprue holes into the closed mold cavity by pressure from the plunger moving into the pot, thus the rubber is transferred from one cavity to another.

The pot and plunger are machined to precise fit dimensions to allow maximum pressure build up without leakage from the pot. The pot is fitted to the top of the main mold cavity and the rubber flows through gates and then sprues into the part cavity.

Transfer molding is an excellent means of producing parts for the oil field. Some reasons that make for this are the increased molding pressure causing a high density product, less cure time due to heat build up in the transfer process and removal of all signs of grain orientation.

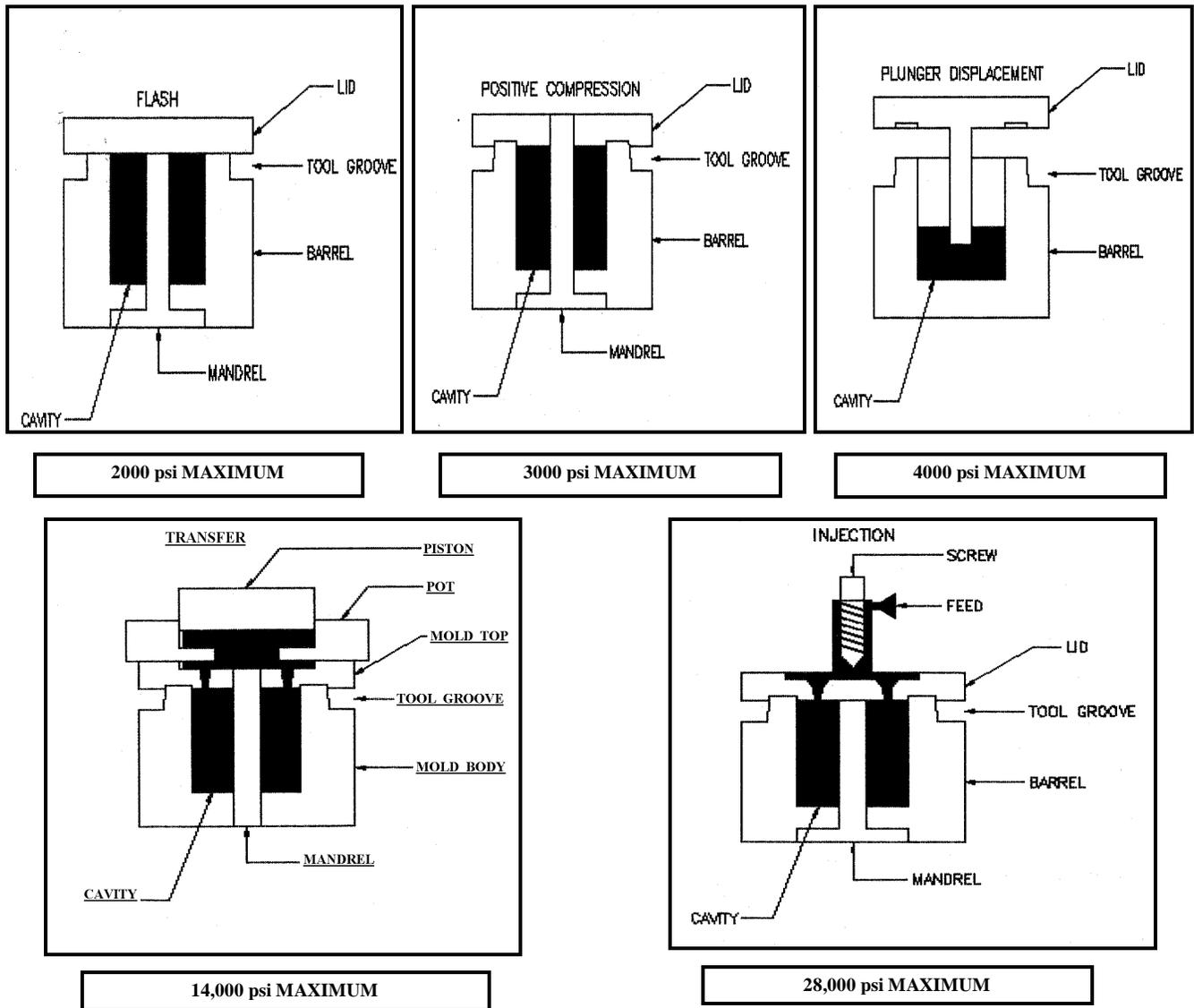
Most parts for oil field use, especially down hole use, should be transfer molded. This will give a better product for resistance to temperature, oil and gas deterioration.

The final and newest method of molding is basically an updated and systemized transfer molding

process. This method is called injection molding. It varies from transfer molding in the fact that the rubber compound is injected by a screw or plunger in measured amounts under extremely high pressure through a nozzle into a positive compression mold that is clamped shut.

Injection molding is very attractive because the speed of production is greatly increased and the quality of product is definitely improved. One disadvantage arises from the exotic nature of many oil field compounds that cannot be processed at the rate of the injection method. To compound the problem further, many oil field products are too large in per piece volume to be run on injection presses.

The molding avenue is clearly open as noted above and shown below. Many variations of those mentioned here are available and they will vary from plant to plant. The proper choice must be made to match a high quality product with high product performance. One must not sell this choice short.



What Is Hustle?

Hustle is doing something that everyone is absolutely certain can't be done.

Hustle is getting the order because you got there first, or stayed with it after everyone else gave up.

Hustle is shoe leather and elbow grease and sweat and missing lunch.

Hustle is getting prospects to say "yes" after they've said "no" twenty times.

Hustle is doing more unto a customer than the other guy is doing unto him.

Hustle is believing in yourself and the business you're in.

Hustle is the sheer joy of winning.

Hustle is being the sorest loser in town.

Hustle is hating to take a vacation because you might miss a piece of the action.

Hustle is heaven if you're a hustler.

Hustle is hell if you're not.