

Injection Molding

Contributed by Administrator
Sunday, 30 September 2007

The basic concept of injection molding revolves around the ability of a thermoplastic material to be softened by heat and to harden when cooled. In most operations, granular material (the plastic resin) is fed into one end of the cylinder (usually through a feeding device known as a hopper), heated and softened (plasticized or plasticated), forced out the other end of the cylinder, while it is still in the form of a melt, through a nozzle into a relatively cool mold held closed under pressure. Here, the melt cools and hardens until fully set-up. The mold is then opened, the piece ejected, and the sequence repeated.

Thus, the significant elements of an injection molding machine become: 1) the way in which the melt is plasticized (softened) and forced into the mold (called the injection unit); 2) the system for opening the mold and closing it under pressure (called the clamping unit); 3) the type of mold used; 4) the machine controls.

Methods of melting and injecting the plastic differ from one machine to another and are constantly being improved.

Conventional machines use a cylinder and piston to do both jobs.

This method simplifies machine construction but makes control of injection temperatures and pressures an inherently difficult problem. Other machines use a plasticating extruder to melt the plastic and piston to inject it while some have been designed to use a screw for both jobs. Nowadays, sixty percent of the machines use a reciprocating screw, 35% a plunger (concentrated in the smaller machine sizes), and 5% a screw pot.

Many of the problems connected with injection molding arises because the densities of polymers change so markedly with temperature and pressure. At high temperatures, the density of a polymer is considerably lower than at room temperature, provided the pressure is the same. Therefore, if molds were filled at atmospheric pressure, "shrinkage" would make the molding deviate from the shape of the mold.

To compensate for this poor effect, molds are filled at high pressures.

The pressure compresses the polymer and allows more materials to flow into the mold. Shrinkage is reduced and better quality moldings are produced.