

## 13 Variations of the Injection-Molding Process

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In its beginnings the injection-molding process was reserved for thermoplastic materials. Recently it has been shown that apart from thermoplastics also thermoset materials, elastomers and fiber-reinforced as well as thermoplastic materials charged with blowing agents can be injection molded.

The difference between injection-compression molding and the normal injection-molding process is that the mold halves are not completely closed during injection. Final closing only occurs when the mold is almost filled.

With this method one achieves a reduction of the resistance the injected melt has to overcome. The injection piston force can be reduced, thereby improving the flow path-wall thickness ratio. The injection-compression mold is designed with flash faces so that it is already closed when injection takes place.

Molds for processing of thermosets differ from molds for thermoplastic materials in that the former require powerful heating. It has been calculated that approximately 50 to 60 W heating capacity per kg of mold volume is required. The tapered sprue should be 6mm in diameter, likewise the main runners. The secondary runners should be kept as short as possible.

When constructing molds for the processing of elastomers, special attention must be paid to the design of the sprue and runners. These must be large dimensioned so that the material flowing in the mold does not become prematurely cured. Special care must be taken that all flow paths are constructed as streamlined as possible to prevent partial precuring.

The processing of foamed thermoplastics has increased during the past few years. Parts are produced by the blowing-agent-charged expanding plastic melt injected at extremely high velocity and pressure. The molds require low clamping forces only and they can therefore be made of nonferrous alloys, in contrast to standard molds.

Nor is surface polish required, as the surface is rough and disturbed due to the processing technology. Cavity venting is important so that the expanding melt can reach all parts of the mold.