

August 2022

BAMBERGER POLYMERS TECH TIPS

Screw Design

In order to select the correct screw design for a particular resin (or resins), a basic understanding of screw design variables and their effect on processing is essential.

There are five distinct variables that may be utilized in the design of a metering screw that have an effect on how a solid resin becomes a melt.

- Length / Diameter (L/D)
- Profile
- Channel Depth
- Compression ratio
- Helix Angle

In addition to these variables, there are barrier and mixing screw designs which can also significantly affect processing results.

Screw design factors

- L/D is the ratio of the flighted length of the screw to its outside diameter. The ratio calculation is calculated by dividing the flighted length of the screw by its nominal diameter.
- Profile of a standard metering screw is made up of three zones: the feed zone, the transition zone, and the melting or metering zone.
- Channel depth in the meter zone of the screw is determined by the resin to be processed. The feed and transition zone channel depths are dependent upon the selected compression ratio and screw profile.
- Compression Ratio of the feed zone channel depth to the meter zone channel depth, referred to as “compression ratio”, typically ranges from 1.5:1 to 4.5:1 for most thermoplastic materials. Most injection screws classified as general purpose have a compression ratio of 2.5:1 to 3.0:1.
- Helix angle is the angle of a screw flight relative to a plane perpendicular to the screw plane. Although the helix angle is not commonly altered from the standard square pitch, such a change can have a significant impact on processing.

