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# BAMBERGER POLYMERS TECH TIPS

## Polypropylene

### Shrink Considerations

Shrinkage is an inherent property of a material. As polymers cool, their density increases as the polymer transitions from the melt to the solid state, resulting in shrinkage.

- Amorphous materials exhibit lower shrinkage than semi-crystalline materials

The rate of shrinkage can be affected by the following factors:

- Processing conditions
  - mold temperature and pack pressure Gate
- size and design
- Part and mold design
- Additives
  - Nucleators are used to produce clarified and dimensionally-stable parts.
  - Fillers

## Additional Factors

Shrinkage is a time-dependent function. In injection molding, most shrinkage occurs in the mold while the part is cooling. However, additional post-molding shrinkage usually continues for ~ 48 hours (or longer). Exposure of molded parts to high temperature and/or humidity can also cause additional part shrinkage.

A  $\pm 2\%$  shrinkage range for PP is reasonable depending on wall thickness. The greater the wall thickness, the greater the shrink value. Additionally, if there are thick-and-thin sections a gradual transition is desired.

Controlling part shrinkage is critically important particularly in tight tolerance plastic parts. Material selection is a critical factor in the process. For parts requiring close tolerances, a prototype mold should be considered so the actual shrinkage measurements can be obtained.

