

Learning Objectives: Plastic Materials

1. Recognize the manner in which various polymers are polymerized and how chemistry affects the structure and properties of the polymers, including processability and physical performance.
2. Identify various methods used to study and report data on polymer rheology and relate them to the terms used to describe it, such as shear rate, shear stress, and viscosity.
3. Recognize common commercial polymers as either semi-crystalline or amorphous while being able to identify common characteristic differences between the two classifications and analyze how the structural differences impact rheology, processing, and physical properties of a molded part.
4. Understand stress and strain relationships/graphs and the impact on the polymer properties. Recognize the practical aspects of viscoelastic behavior and other long-term time-temperature performance characteristics of a polymer, such as creep and stress relaxation in the solid state.
5. Identify the critical aspect of molecular weight and molecular weight distribution; their influence on both processing and end-use performance; identify practical methods for measuring molecular weight and how to interpret the results of these tests.
6. Identify the key uses of additives in modifying polymer properties and describe their impact on such items as shrinkage and warpage and while preventing other certain mechanisms that may compromise end-use polymer performance.
7. Interpret traditional material data sheets by analyzing the information and relating it to how the physical tests are performed.
8. Analyze and breakdown the various potential root causes of plastic part warpage due to variations in shrinkage, both volumetric and orientation induced.