

### **Predicting Polyolefin Foamability Using Melt Rheology**

Every polyolefin has a unique and definitive "fingerprint" of its melt flow. Many different polyolefinic foams and effectively nonfoamable polyolefinic resins are successfully studied by ASTM D-4440, "Standard Test Method for Plastics: Dynamic Mechanical Properties Melt Rheology" techniques. Test set up parameters increase the test method sensitivity to chain branching of the polymeric molecule. Optimizing test set-up procedures, measures the material melt viscosity, also known as complex viscosity. Viscoelastic properties of storage and loss modulus are also measured. The functional relationship between the loss tangent ( $\tan\delta$ ), which is defined as the damping of the material from the loss modulus divided by the storage modulus, and the complex viscosity characterizes each different material.

Comparison of the loss tangent vs. complex viscosity relationship functionality for foams and nonfoamable resins has identified a "processibility window" for the polyolefinic foaming process. Applying ASTM D-4440 techniques to determine whether the functional relationship between the loss tangent and complex viscosity passes through the processibility window for polyolefinic resins, from new or recycled sources or even resin blends can thus be employed to predict their foamability and thereby avoid costly process upsets or needless process trials.

#### **Applications**

- Melt Flow Rheology
- Comparative Analysis
- Benchmark current resin material
- Qualify off-spec or wide-spec resins
- Reduce the number of manufacturing trials
- Blending resins and materials for end product use
- Repurpose recycled resin for other applications
- Foamability Affects of Rheology modifiers and additives
- Deformulation