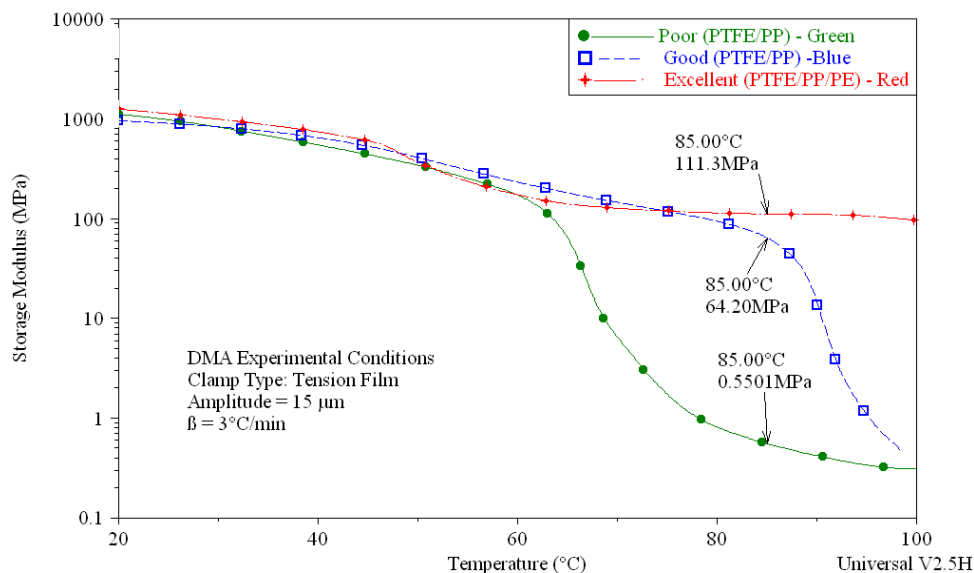


THERMAL SOLUTIONS

Characterization of Packaging Film Performance by DMA Storage Modulus Analysis



DMA measures the modulus (stiffness) and damping (energy dissipation) properties of materials as they are deformed under a periodic stress. These measurements provide quantitative and qualitative information about the performance of materials. DMA is particularly useful for evaluating polymeric materials which exhibit time, frequency, and temperature effects on mechanical properties because of their viscoelastic nature.

Thermoforming is a process used to mold polymer films into a variety of shapes for packaging of many consumer products. In this process, the film is pulled into a heated mold to form the desired shape. The thermoformed film must retain its shape in order to keep the product in the package. Dynamic mechanical measurements can be used to predict the thermoforming characteristics of the polymer film.

on three coextruded polymer films done at the forming temperature (in this case 85°C). This data allows one to predict if the film will have sufficient elasticity to hold its shape and remain a stable product. The storage modulus is a direct measurement of energy stored, or elasticity, in a material. The higher the storage modulus the more memory or elasticity the sample has. If the film does not have enough elasticity, as shown by a low storage modulus (green curve in the above plot), the elasticity may be too low at the forming temperature and the final formed product will not retain the desired shape.

For additional details, see Thermal Solutions TS-47 and TS-49.