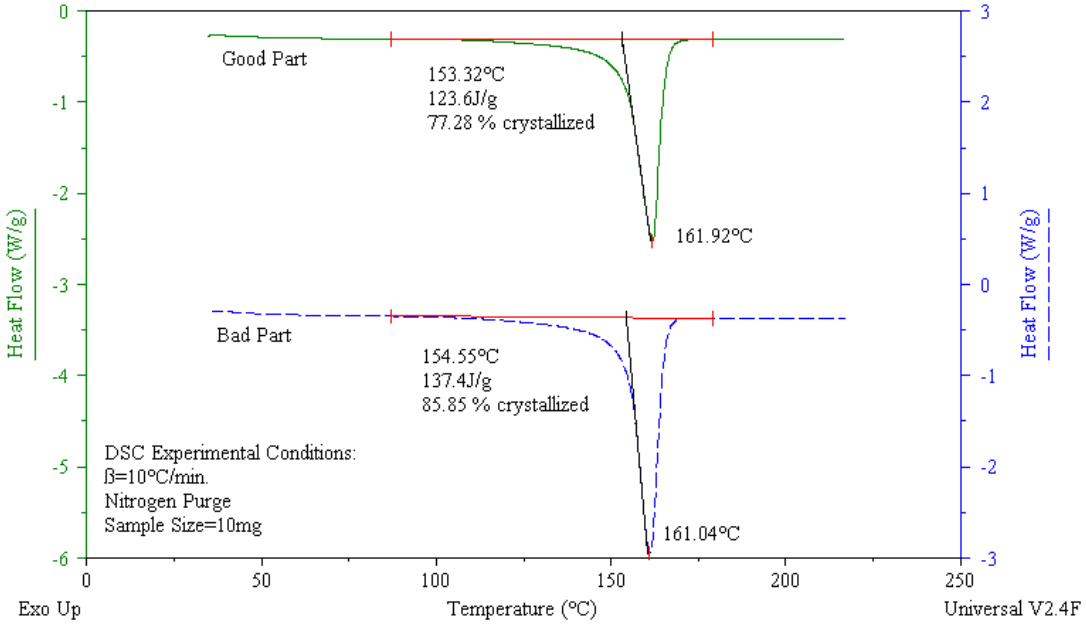
THERMAL SOLUTIONS

Determination of Crystallinity of a Common Automotive Thermoplastic



DSC measures the temperatures and heat flows associated with transitions in materials as a function of temperature or time in a controlled atmosphere. This technique provides quantitative and qualitative information about physical and chemical changes that involve endothermic or exothermic processes, or changes in heat capacity.

Determination of the crystallinity of automotive parts by DSC can be a useful tool in helping to predict premature failure in the field. The above plot shows two DSC heating experiments on a "good" and "bad" automotive part made at different molding temperatures. It was suspected that the "bad" part was failing due to higher initial crystallinity compared to the "good" part. DSC experiments were run to determine the crystallinity of both the "good" and "bad" parts and to try and correlate this to the molding temperature. Previous experiments determined that the heat of fusion for 100% crystalline material is 160J/g. Using the data from the above plots, the initial crystallinity of the "bad" part is 85.85% compared to 77.28% for the "good" part. The higher crystallinity of the "bad" part was contributing to less impact resistance and the tendency to fail prematurely compared to the lower crystallinity "good" part. This example clearly shows how DSC can be used to predict product performance in the field.