



## **Application of Modulus Profiling to Understand Aging in Rubber and Plastic Components**

### *Abstract*

A series of controlled aging experiments laboratory and service were conducted on a variety of rubber and plastic components. After laboratory and service aging conditions, we studied the modulus changes using the modulus profiling technique pioneered by K Gillen. The location and extent of aging was determined. The modulus changes in both the exterior and interior regions were quantified, thereby quantifying the location and extent of aging within the component. In earlier work, modulus profiling was applied to tire aging. Now, this technique is extended to other products, both rubber and plastic components. A variety of components were studied, including hose, v-belt, wiper blade, o-ring, rubber band, tread surface, cable jacket, and polycarbonate. A rationale is presented in consideration of the concomitant changes in modulus due to effects of oxidation and mechanical energy. The technique has improved our understanding of aging in a wide variety of products.

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