

# **The Use of Carbon Fiber Composites In Sliding Contacts**

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## **Abstract**

Historically, the sliding contact within a potentiometer position sensor has been made from metal and was compatible with the metal wire wound elements originally in use. As the technology developed the wire wound element was replaced with a carbon based resistive ink track. This change provided major technical and economic advantages but introduced incompatibility between the contact and track. Initially when life requirements were in the range of one million or less cycles and the currents through the contact were higher, this incompatibility was tolerated. As life requirements increased to the present levels, in hundreds of millions of cycles; and currents reduced to the dry circuit range, it became more difficult to penetrate various barriers and transmit a clean noise free signal. The interface between the two dissimilar materials has produced a delicate balance into which the wear and increases in contact resistance have an adverse effect on the performance of the unit.

A natural progression was to find a contact material more compatible with the carbon based resistive ink tracks. Previous work has indicated the feasibility of the use of carbon fiber as a replacement for the metal in the contact, but has not provided the structure that will satisfy the mechanical, electrical, and environmental requirements of the product. Further development has produced a carbon fiber composite material to satisfy these requirements.

This paper will present the test program used for the evaluation of this new material, showing the results, conclusions, and design considerations in the utilization of this product.