

**Design of a Thermal Interface Material Cycling Reliability Test Program for Semiconductor Test
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Requirements for semiconductor test and burn-in applications are very challenging for thermal interface materials (TIMs), including mechanical durability and temperature as well as thermal performance goals. A mechanical reliability test program has been developed and implemented for specialized TIMs developed specifically to meet those very challenging requirements for semiconductor test. Cycling with multiple contacts -- up to thousands of cycles with a single TIM -- is a long-sought development goal for the semiconductor test industry. These unusual industry requirements affect total cost, throughput, and yield for semiconductor test and achieving repeated, demonstrated high cycle counts is critical to cost reduction.

This presentation will describe an industry survey of requirements, development of a mechanical reliability test for evaluating durability, and test results for a family of specialized TIMs. The overall goal is to achieve 1,000 cycles in an automated system replicating the actual requirements found in high-volume semiconductor test; in addition to physical requirements, test data an evaluation for thermal resistance, thickness change, and visual analysis will be presented. All testing has been completed with an industry-standard, automated ASTM D5470-17 test stand that is commercially available.