Case Study: Electronics

Leading Printed Circuit Board Manufacturer Turns to ADMET for Innovative Testing System

Challenge

ADMET was contacted by one of the world's leading manufacturers of flexible printed circuit boards to help with a new testing application. These boards are used to connect electrical components in various electronics such as mobile phones, laptop computers, and medical devices. The flexibility and thinness of these circuit boards have enabled cell phone manufacturers to design ever more compact and powerful mobile phones. Mobile phones, especially those that are of the flip variety, pose a challenge in the design of flexible circuit boards that can be repeatedly bent and maneuvered into narrow spaces yet remain very durable. New materials and laminates had to be developed that could pass stringent durability testing. At the same time, new testing equipment was needed to validate all of the new designs.

Solution

The first step was to determine an appropriate test method. It was determined that the circuit boards needed to be fatigue tested in both the tensile and flexural directions. Designs of new products change so quickly that a very fast method of testing materials was needed. One test that was deemed appropriate was to stretch the materials going into the circuit board to 100% of starting length 30 times per minute. A normal universal testing machine can be configured to reach those speeds but it is not realistic for a system that needs to test into the millions of cycles. Therefore, ADMET recommended a low force, voice coil actuated fatigue system from the ADMET eXpert 1900 series controlled with MTESTQuattro testing and fatigue software. The recommended system had 100mm of crosshead displacement, maximum cycling speeds in excess of the requirement, and control software that could fatigue the sample with a sawtooth or sinusoidal wave profile.

Results

The materials going into the circuit board were not allowed to fail or allow the force at maximum strain to drop below an acceptable force threshold within 200,000 cycles. Using ADMET's MTESTQuattro software, ADMET engineers programmed and saved a test method with a sinusoidal wave profile that cycled the sample to 100% strain 30 cycles per minute. The system was set to record every 1000 cycles and stopped automatically when the sample failed. At this point the number of cycles completed successfully was noted. The customer can look at the force vs. time graph to determine peak forces across all cycles to make sure none of them dropped below a minimum force reading. The system has already helped in the material selection process. It will continue to serve the quality control department as well as be used for further R&D purposes.

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