

MINIATURE SPRING PERFORMANCE TESTER

US Pat. No.: 9,651,464

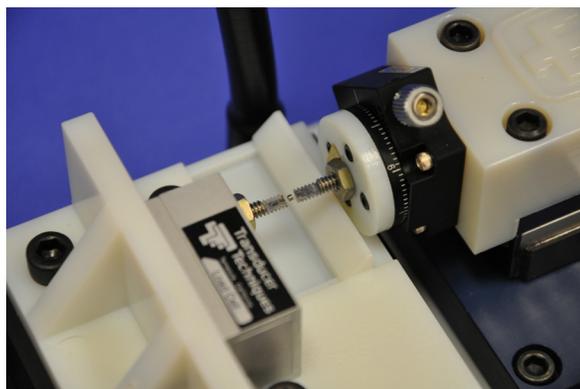
Technology Readiness Level: 8/9

Deliverable qualified through test & demonstration

Many systems require miniature coil-wound springs, such as firing devices, medical, and precision instruments. In order to qualify miniature springs, manufacturers of these systems rely on commercially available testers that are designed for large-scale springs (>0.5 in. diameter). Current state-of-the-art devices lack sufficient force resolution or cyclic test capabilities for miniature springs. Sandia developed a testing platform specifically designed for miniature springs with improved accuracy and precision along with the ability to evaluate spring reliability over its lifetime.

Sandia's Miniature Spring Performance Tester consists of a testing device, control system, and operating system that automates spring testing, data collection and analysis. A voice coil actuator is used to cycle the test spring through extension or compression force. The system includes a linear encoder with a 1 μ m resolution to act as a feedback loop that enables the system to make automatic adjustments—reducing operator time. Sandia's tester allows interchangeable use of force cells ranging from 10g through 1kg. Data obtained during testing is recorded using a bus-powered data acquisition device capable of 16 bit resolution, 250,000 samples/second, and a ± 10 voltage range. This data can be used to determine the cyclic degradation of the springs over a lifetime.

Sandia's device is the only testing platform that provides enough precision to accurately evaluate performance of miniature springs.



Sandia's Miniature Spring Performance Tester System (top);
Closeup of testing stage and load cells (bottom)

TECHNICAL BENEFITS

- Designed specifically for characterization of miniature springs
- Improved precision and accuracy
- Evaluates static or fatigue characteristics
- Evaluates degradation of a spring over a lifetime
- Automates testing process

INDUSTRIES & APPLICATIONS

- Manufacturers of any device that incorporates miniature springs
- Medical devices
- Firearms
- Aerospace components
- Compact electronic controls