

Press Release

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Micro-Machining Performance Evaluation With New Smaller Machine Tool Analyzer

St. Paul, MN USA, October 6, 2011

For over ten-years, the industry standard Spindle Error Analyzer (SEA) from Lion Precision has been measuring machine-tool spindle thermal growth and error motions in multiple axes; it has now been adapted for micro-machining. The micro-machining system uses smaller versions of the noncontact probes, probe mounts, and masterball targets, along with standard SEA software, to perform ANSI and ISO standard tests of spindle performance. According to Don Martin, president of Lion Precision, “The performance demands for micro-machining are at such a high level that every error source must be measured and addressed for it to realize its full potential. What would have been considered an insignificant error a few years ago, must now be measured and remedied.” Machining problems related to surface finish, feature location, and roundness are all significantly affected by spindle performance and thermal effects. The SEA system measures spindles at operational speeds up to 300,000 RPM with resolutions less than one nanometer. In an article about micromilling, Sandia National Labs reports that “faster spindles with reduced tool runout are the path to achieve efficient mesoscale milling” (Gill & Jokiell, 2004, Next Generation Spindles for Micromilling).

With the recent surge in micro-machining spindle designs that minimize error motions, measuring those error motions will continue to present challenges to designers and end users alike. This micro-machining adaptation of a standard instrument is a major step in helping the micro-machining industry get to the next level.

The SEA system includes high-resolution noncontact capacitive displacement sensors, precision probe mounts, precise masterball targets with less than 100 nm of roundness error, temperature sensors and software to acquire and analyze the measurements. Results are presented in polar or linear plots and values are listed for synchronous and asynchronous errors, TIR and more. Spindle displacement can be plotted against temperature and RPM to show critical relationships between these variables.

For more information on the Micro-Machining version of the Spindle Error Analyzer, visit: www.spindleanalysis.com and click the “Micromachining SEA” button in the left menu, or go directly to: www.lionprecision.com/sea/microsea.html.

In 1958, Lion Precision was the first company to provide capacitive displacement sensors to industry. The company has expanded its product offering to include eddy-current displacement sensors and some application specific sensors for the packaging and PCB industries.

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