

## Review of "Precision Spindle Metrology"

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The demand for advancement of the accuracy and productivity in production systems continues to increase. At the heart of these production demands are high-speed machine tools and multi-tasking machine tools; at the heart of these machine tools are their spindles. These spindles continue to increase in variety, maximum speed, and number of spindles per machine; therefore, standardization and accurate and efficient tests of spindle performance have been demanded by the pursuit of productivity. Especially needful are tests at full operating speed rather than simple static measurements.

With these points as background, the ISO standard on “ Geometric accuracy of axes of rotation (ISO230-7)” was released in 2006 as the universal performance test method for machine tool spindles to help comply with these ever increasing demands.

Given these current demands, the publication of *Precision Spindle Metrology* is very significant. This book will be very helpful to the study of the necessary concepts and techniques in the measurement and analysis of spindle performance. Because the contents of the book are detailed and practical, it will help establish a complete system for the metrology of precision spindles. The book addresses all of the important considerations for spindle metrology:

- The spindle error motion is systematically classified based on the mode of error motion, behavior in the frequency domain, and the sensitive direction for machining accuracy. The required measurement and analysis techniques for accurate assessment of spindle performance are clearly explained.
- All elements required for establishing a metrology system for precision spindles are described in detail:
  - Fundamental knowledge of the required instruments: Artifact, sensor, fixture, and data acquisition system
  - Environmental effects to be considered for reliable results from performance tests
  - Fundamental knowledge of data acquisition and processing the acquired data
  - Filtering techniques in data acquisition and analysis
  - Methods for separation of the artifact error from the acquired data and

their features

- Case studies of metrology systems for spindles of typical machine tools and bearings (a major element of machine tools) are described with measurement data.
- Ample bibliography is attached at the end of chapter to study more in detail.

This book gives deep understanding of the metrology of precision spindles. Marsh describes the concepts, methods, and their meaning for measurement and analysis of spindle performance in detail with abundant figures and actual values as examples. Moreover, detailed description is given to critical factors worthy of our attention in the measurement process and how we should analyze the acquired data. This makes the book very practical.

This book will be helpful for engineers and researchers in the precision machine industry as well as students trying for the first time to carry out performance tests of the rotational element with high accuracy such as machine tool spindles. In addition, this book will also help the readers very much who want to carry out spindle performance tests according to ISO230-7.