ASME B5.57-2012
[Revision of ASME B5.57-1998 (R2006)]

Methods for Performance Evaluation of Computer Numerically Controlled Lathes and Turning Centers

AN AMERICAN NATIONAL STANDARD

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Two Park Avenue • New York, NY • 10016 USA

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The American Society of Mechanical Engineers
Two Park Avenue, New York, NY 10016-5990

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FOREWORD

The primary purpose of this Standard is to provide procedures for the performance evaluation of computer numerically controlled (CNC) lathes and turning centers. These procedures are used to evaluate conformance to specifications, to compare machines, to periodically reverify the suitability of production machines, and to reverify performance of machines after repair or modification. Definitions, environmental requirements, and test methods are specified. This Standard defines the test methods capable of yielding adequate results for most turning centers but is not intended to supplement more complete tests that may be required for particular special applications. This Standard does not address issues of machine safety.

Suggestions for improvement of this Standard are welcome. They should be sent to The American Society of Mechanical Engineers; Attn: Secretary, B5 Standards Committee; Two Park Avenue; New York, NY 10016-5990.

This revision was approved as an American National Standard on November 30, 2012.

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Machine Tools — Components, Elements, Performance, and Equipment

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Secretary, B5 Standards Committee
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Two Park Avenue
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Proposing Revisions. Revisions are made periodically to the Standard to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published periodically. The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

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Attending Committee Meetings. The B5 Standards Committee regularly holds meetings, which are open to the public. Persons wishing to attend any meeting should contact the Secretary of the B5 Standards Committee.

METHODS FOR PERFORMANCE EVALUATION OF COMPUTER NUMERICALLY CONTROLLED LATHES AND TURNING CENTERS

1 SCOPE

This Standard establishes requirements and methods for specifying and testing the performance of CNC lathes and turning centers. In addition to clarifying the performance evaluation of lathes and turning centers, this Standard seeks to facilitate performance comparisons between machines by unifying terminology, general machine classification, and the treatment of environmental effects. The Standard defines testing methods capable of yielding adequate performance results for the majority of turning centers and is not intended to replace more complete tests. It is not the intent of this Standard to place limits on, or to enforce 100%-testing of, any individual machine tool in accordance with this Standard. This shall be the subject of contractual agreement between the Supplier and the User.

The actual specification for turning centers is divided into the following six logical areas:

(a) General Definitions. Definitions provided in this Standard are generally consistent with the usage in other referenced documents related to machine tools and metrology, although some are specific to their use in this Standard.

(b) Machine Environmental Specifications and Responses. Environmental specifications and responses include thermal, electrical, and vibration specifications and tests, as well as requirements on utility air and other externally supplied services.

(c) Machine Accuracy Performance as a Machine Tool. Machine accuracy performance as a machine tool includes positioning accuracy and repeatability for linear and rotary axes, angular error motion of linear axes, spindle axis of rotation analysis, machine thermal tests, critical alignments, and contouring performance using circular tests.

(d) Machine Cutting Performance and Short-Term Reliability. Machine cutting performance and short-term reliability includes tests of spindle idle run losses and maximum metal-removal capability. Additionally, the machine is run for approximately 24 h to determine short-term reliability.

(e) Additional Machine Performance. Additional performance sections are provided for axis of rotation alignment, tail stock alignment, subsystems repeatability, tool-setting performance, CNC performance, and machine performance as a measuring tool.

(f) Machining Test Parts. This Standard provides for the machining of test parts for a particular manufacturing application. These test parts shall be fully specified as part of the original purchasing agreement between the User and the Supplier. Such specification shall include, but not be limited to, material, tooling, machining sequence, and inspection procedure.

This Standard is rather comprehensive, and for smaller, less-expensive machines, a shorter series of tests for conformance to specification is given in Nonmandatory Appendix B.

1.1 Performance Forms (Sample)

A schematic of the machine with axis directions should be provided along with Forms 1 through 8.

1.2 Alternatives

Where specifications use definitions and procedures different than those in this Standard, the alternative items shall be identified and made part of the machine specification. Such procedures should follow the philosophy outlined in the previous paragraphs and be specified in equivalent detail.

This Standard allows parts of the environmental test section to be deferred or bypassed, and only the performance test to be carried out. This alternative is allowable only if it is acceptable to both the User and the Supplier and if deferred according to the procedures outlined in para. 6.1.