INTERNATIONAL STANDARD

ISO 230-7

Second edition
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Test code for machine tools —

Part 7: Geometric accuracy of axes of rotation

Code d'essai des machines-outils —

Partie 7: Exactitude géométrique des axes de rotation

Reference number
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Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 39, *Machine tools*, Subcommittee SC 2, *Test conditions for metal cutting machine tools.*

This second edition cancels and replaces the first edition (ISO 230–7:2006), which has been technically revised.

ISO 230 consists of the following parts, under the general title *Test code for machine tools*:

— *Part 1: Geometric accuracy of machines operating under no-load or quasi-static conditions*

— *Part 2: Determination of accuracy and repeatability of positioning of numerically controlled axes*

— *Part 3: Determination of thermal effects*

— *Part 4: Circular tests for numerically controlled machine tools*

— *Part 5: Determination of the noise emission*

— *Part 6: Determination of positioning accuracy on body and face diagonals (Diagonal displacement tests)*

— *Part 7: Geometric accuracy of axes of rotation*

— *Part 8: Vibrations* [Technical Report]

— *Part 9: Estimation of measurement uncertainty for machine tool tests according to series ISO 230, basic equations* [Technical Report]

— *Part 10: Determination of the measuring performance of probing systems of numerically controlled machine tools*

— *Part 11: Measuring instruments suitable for machine tool geometry tests* [Technical Report]

Introduction

This International Standard has been revised based on the comments received from industry and academia related to the applications of axis of rotation error motions to rotary tables, and other milling and drilling operations where more than one sensitive direction can be of critical importance. In this revision, the terms and definitions were updated and the special cases, where 1st order harmonic of radial error motion differs in different directions, were addressed. They are also reordered based on a modified structure for better clarifying the general concepts and their applications. The cases where there are multiple sensitive directions as well as the consequence of axis of rotation error motion in radial location of parts (2D sensitive direction) are described.

Test code for machine tools —

Part 7:
Geometric accuracy of axes of rotation

1 Scope

This part of ISO 230 is aimed at standardizing methods of specification and test of the geometric accuracy of axes of rotation used in machine tools. Spindle units, rotary heads, and rotary and swivelling tables of machine tools constitute axes of rotation, all having unintended motions in space as a result of multiple sources of errors.

This part of ISO 230 covers the following properties of rotary axes:

— axis of rotation error motion;

— speed-induced axis shifts.

The other important properties of rotary axes, such as thermally induced axis shifts and environmental temperature variation-induced axis shifts, are dealt with in ISO 230-3.

This part of ISO 230 does not cover the following properties of spindles:

— angular positioning accuracy (see ISO 230-1 and ISO 230-2);

— run-out of surfaces and components (see ISO 230-1);

— tool holder interface specifications;

— inertial vibration measurements (see ISO/TR 230-8);

— noise measurements (see ISO 230-5);

— rotational speed range and accuracy (see ISO 10791-6 and ISO 13041-6);

— balancing measurements or methods (see ISO 1940-1 and ISO 6103);

— idle run loss (power loss);

— thermal effects (see ISO 230-3).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 230-1:2012, *Test code for machine tools — Part 1: Geometric accuracy of machines operating under no-load or quasi-static conditions*