BS ISO 10791-7:2014

BSI Standards Publication

Test conditions for machining centres

Part 7: Accuracy of finished test pieces

bsi.

...making excellence a habit.™

This British Standard is the UK implementation of ISO 10791-7:2014. It supersedes BS ISO 10791-7:1998 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MTE/1/2, Machine tools - Accuracy.

A list of organizations represented on this committee can be obtained on request to its secretary.

ISBN 978 0 580 69279 6

ICS 25.040.10

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 December 2014.

Amendments issued since publication

Date	Text affected

INTERNATIONAL ISO

Second edition
2014-12-01

Test conditions for machining centres —

Part 7: Accuracy of finished test pieces

Conditions d'essai pour centres d'usinage —

Partie 7: Exactitude des pièces d'essai usinées

Reference number
ISO 10791-7:2014(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

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, which has been technically revised.

ISO 10791 consists of the following parts, under the general title *Test conditions for machining centres*:

— *Part 1: Geometric tests for machines with horizontal spindle and with accessory heads (horizontal Z-axis)*

— *Part 2: Geometric tests for machines with vertical spindle or universal heads with vertical primary rotary axis (vertical Z-axis)*

— *Part 3: Geometric tests for machines with integral indexable or continuous universal heads (vertical Z-axis)*

— *Part 4: Accuracy and repeatability of positioning of linear and rotary axes*

— *Part 5: Accuracy and repeatability of positioning of work-holding pallets*

— *Part 6: Accuracy of speeds and interpolations*

— *Part 7: Accuracy of finished test pieces*

— *Part 8: Evaluation of contouring performance in the three coordinate planes*

— *Part 9: Evaluation of the operating times of tool change and pallet change*

— *Part 10: Evaluation of thermal distortions*

Introduction

A machining centre is a numerically controlled machine tool capable of performing multiple machining operations, including milling, boring, drilling, and tapping, as well as automatic tool changing from a magazine or similar storage unit in accordance with a machining programme. Most machining centres have facilities for automatically changing the direction in which the workpieces are presented to the tool.

The purpose of ISO 10791 (all parts) is to supply information as wide and comprehensive as possible on tests and checks which can be carried out for comparison, acceptance, maintenance, or any other purpose.

This International Standard specifies, by reference to the relevant parts of ISO 230, several families of tests for machining centres with horizontal or vertical spindle or with universal heads of different types, standing alone, or integrated in flexible manufacturing systems. This International Standard also establishes the tolerances or maximum acceptable values for the test results corresponding to general purpose and normal accuracy machining centres.

This International Standard is also applicable, totally, or partially, to numerically controlled milling and boring machines, when their configuration, components, and movements are compatible with the tests described herein.

INTERNATIONAL STANDARD ISO 10791-7:2014(E)

Test conditions for machining centres —

Part 7:
Accuracy of finished test pieces

1 Scope

This part of ISO 10791 specifies standard test pieces with reference to ISO 230-1, cutting tests under finishing conditions. It also specifies the characteristics and dimensions of the test pieces themselves. This part of ISO 10791 is intended to supply minimum requirements for assessing the cutting accuracy of the machine. This part of ISO 10791 takes into consideration 3- to 5-axis machining centres.

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*

3 Preliminary remarks

3.1 Measuring units

In this part of ISO 10791, all linear dimensions and deviations are expressed in millimetres. All angular dimensions are expressed in degrees. Angular deviations are, in principle, expressed in ratios (e.g. 0,00x/1 000), but in some cases, microradians or arcseconds can be used for clarification purposes. The following expression should be used for conversion of angular deviations or tolerances:

$$0{,}010/1\,000 = 10\ \mu\text{grad} \approx 2''$$

3.2 Reference to ISO 230-1

To apply this part of ISO 10791, reference shall be made to ISO 230-1, especially for the installation of the machine before testing, warming up of the machine, description of measuring methods, and evaluation and presentation of the results.

3.3 Testing sequence

The sequence in which the tests are presented in this part of ISO 10791 in no way defines the practical order of testing. In order to make the mounting of fixtures and machining easier, tests can be performed in any order.

3.4 Tests to be performed

When testing a machine, it is not always necessary or possible to carry out all the tests described in this part of ISO 10791. When the tests are required for acceptance purposes, it is up to the user to choose, in agreement with the manufacturer/supplier, those tests relating to the components and/or the properties of the machine which are of interest. These tests are to be clearly stated when ordering a