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**BSI Standards Publication**

## **Test conditions for machining centres**

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Part 7: Accuracy of finished test pieces

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## National foreword

This British Standard is the UK implementation of ISO 10791-7:2020. It supersedes BS ISO 10791-7:2014, which is withdrawn.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.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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

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## 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*



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## 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](http://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](http://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 of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 39, *Machine Tools*, Subcommittee SC 2, *Test conditions for metal cutting machine tools*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

This third edition cancels and replaces the second edition (ISO 10791-7:2014), which has been technically revised.

The main changes compared to the previous edition are as follows:

- new [Clause 3](#) has been added;
- new [Annex A](#) has been added.

A list of all parts of this ISO series can be found on the ISO website.

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## 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 the ISO 10791 series is to supply information as widely and comprehensively as possible on tests and checks which can be carried out for comparison, acceptance, maintenance, or any other purpose.

The International Organization for Standardization (ISO) draw[s] attention to the fact that it is claimed that compliance with this document may involve the use of a patent.

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# Test conditions for machining centres —

## Part 7: Accuracy of finished test pieces

### 1 Scope

This document 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 document also establishes the tolerances or maximum acceptable values for the test results corresponding to general purpose and normal accuracy machining centres.

This document 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.

This document 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 document is intended to supply minimum requirements for assessing the cutting accuracy of the machining centres with 3 to 5 simultaneous machining axes. [Annex A](#) introduces a freeform test piece for five-axis machining centres. This machining test is applied to machining centres using five-axis flank milling of freeform surfaces.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. 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, *Test code for machine tools — Part 1: Geometric accuracy of machines operating under no-load or quasi-static conditions*

### 3 Terms and definitions

For the purposes of this document, the terms given in ISO 230-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

#### 3.1 ruled surface

surface containing a family of straight lines

Note 1 to entry: A ruled surface is shown in [Figure 1](#), where each isoparametric line (parameter  $u$  constant) is a straight line, called a rule. The parametric equation for the ruled surface in [Figure 1](#) is given in [Formula \(1\)](#):

$$S(u,v) = (1-v) \times C_0(u) + v \times C_1(u) [u \in (0,1), v \in (0,1)] \quad (1)$$