



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 17421.10-2021

**Test code for machine tools - Part 10: Determination of the
measuring performance of probing systems of numerically
controlled machine tools**

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Foreword

GB/T 17421 "General Rules for Machine Tool Inspection" is divided into the following 11 parts.

- Part 1.The geometric accuracy of the machine tool under no load or finishing conditions;
- Part 2.Determination of the positioning accuracy and repeat positioning accuracy of the CNC axis;
- Part 3.Determination of thermal effects;
- Part 4.Circle inspection of CNC machine tools;
- Part 5.Determination of noise emission;
- Part 6.Determination of the accuracy of the position of the body and the diagonal line (diagonal displacement inspection);
- Part 7.Geometric accuracy of the axis of rotation;
- Part 8.Vibration (technical report);
- Part 9.Basic equations (technical reports) for the uncertainty estimation of ISO 230 machine tool inspection series standards;
- Part 10.Determination of the measurement performance of the CNC machine tool detection system;
- Part 11.Measuring Instruments for Inspection of Geometric Accuracy of Machine Tools (Technical Report).

This part is part 10 of GB/T 17421.

This section was drafted in accordance with the rules given in GB/T 1.1-2009.

The translation method used in this part is equivalent to the ISO 230-10:2016 General Rules for Inspection of Machine Tools Part 10.Measurement of CNC Machine Tool Detection System

Determination of performance.

The Chinese documents that have consistent correspondence with the normatively cited international documents in this section are as follows.

---GB/T 17421.1-1998 General rules for inspection of machine tools Part 1.Geometric accuracy of machine tools under no load or finishing conditions

(equivISO 230-1:1996)

---GB/T 17421.2-2016 General Rules for Inspection of Machine Tools Part 2.Confirmation of the positioning accuracy and repeatability of the CNC axis

Fixed (ISO 230-2:2006, IDT)

---GB/T 17421.3-2009 General Rules for Inspection of Machine Tools Part 3.Determination of Thermal Effects (ISO 230-3.2001, IDT)

This part was proposed by China Machinery Industry Federation.

This part is under the jurisdiction of the National Standardization Technical Committee for Metal Cutting Machine Tools (SAC/TC22).

Drafting organizations of this section. Shenyang Machine Tool (Group) Co., Ltd., National Machine Tool Quality Supervision and Inspection Center, Shenji Group Kunming Machine Tool

Co., Ltd., Beijing University of Technology.

Introduction

GB/T 17421 (all parts) is a standardized method used to determine the accuracy of machine tools, excluding portable power tools.

This section involves the detection steps of the measurement performance evaluation of the contact detection system (discrete point detection mode) integrated with the CNC machine tool. Detect

The steps are not to distinguish the various causes of errors, but to illustrate the integration of the environment, machine tools, detection systems, and detection software in terms of measurement performance

influences.

The results of these tests cannot reflect the performance of the machine tool in the state of metal cutting. When testing is used for acceptance purposes, in the manufacturer/supplier

With the consent of the supplier, the user makes a choice, and the detection of the performance of the machine tool detection system is more worthy of attention.

The results of these tests also do not reflect the performance of the machine tool when it is used in a coordinate measuring machine (CMM). These properties involve tracking capabilities

For questions, the corresponding assessment is based on GB/T 16857.2 and GB/T 16857.5.

Refer to Appendix A for a description of the symbols used in this section.

Refer to Appendix B for the inspection process of scanning probe measurement performance.

General Rules for Inspection of Machine Tools Part 10.CNC Machine Tools

Measurement of the measurement performance of the detection system

1 Scope

This part of GB/T 17421 specifies the measurability of a contact detection system (discrete point detection mode) assembled with a CNC machine tool.

Test procedures that can be evaluated.

This section does not contain other types of detection systems, such as those used in scanning mode or non-contact detection systems. For coordinate measuring machine

The performance evaluation of the machine tool is also not within the scope of this section. These performances involve the problem of tracking ability and are obviously affected by the geometric accuracy of the machine tool.

The detection of machine tool detection system specified in this section can also be determined in accordance with GB/T 16857.2 and GB/T 16857.5.

The contact detection system of CNC machine tools is used in the processing process as follows.

- Check whether the workpiece is installed correctly before processing;
- Positioning and/or calibration of the workpiece;
- After processing, the workpiece is still being measured on the machine tool;
- Positioning and orientation measurement of machine tool rotation axis;
- Setting and measurement of cutting tools (tool radius, length and offset);
- Determination of tool wear.

Note 1. This section is mainly for machining centers, for other types of machine tools, such as turning and grinding centers, will be involved in later versions of this section.

Note 2. This section does not involve non-contact measurement (for example. optical probe), but it will be involved in later versions of this section.

2 Normative references

The following documents are indispensable for the application of this document. For dated reference documents, only the dated version applies to this article

Pieces. For undated reference documents, the latest version (including all amendments) is applicable to this document.

GB/T 16857.5-2017 Geometric Technical Specification for Products (GPS) Acceptance Test and Re-inspection Test of Coordinate Measuring Machine Part 5

Sub. Coordinate measuring machine (ISO 10360-5:2010, IDT) using single-probe or