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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 18400.10-2021

Test conditions for machining centres - Part 10: Evaluation of thermal distortions

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Foreword

GB/T 18400 "Machining Center Inspection Conditions" is divided into the following 10 parts.

---Part 1.Geometric accuracy inspection of horizontal and machine tools with additional spindle head (horizontal Z axis);

---Part 2.Vertical or universal spindle head machine tool geometric accuracy inspection with vertical main rotary axis (vertical Z axis);

---Part 3.The geometric accuracy inspection of the integral universal spindle head machine tool with the horizontal main rotary axis (vertical Z axis);

---Part 4.Inspection of positioning accuracy and repeat positioning accuracy of linear and rotary axes;

---Part 5.Inspection of the positioning accuracy and repeated positioning accuracy of the workpiece holding pallet;

---Part 6.Feed rate, speed and interpolation accuracy inspection;

---Part 7.Precision inspection of finishing test pieces;

---Part 8.Evaluation of contour characteristics on three coordinate planes;

---Part 9.Evaluation of operating time for tool exchange and pallet exchange;

--- Part 10.Evaluation of thermal deformation.

This part is Part 10 of GB/T 18400.

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

The translation method used in this section is equivalent to ISO 10791-10.2007 "Machining Center Inspection Conditions Part 10.Evaluation of Thermal Deformation".

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

---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).

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Introduction

The machining center is a CNC machine tool that can perform a variety of processing, including milling, boring, drilling and tapping, and according to the processing program

Set, realize automatic tool exchange from tool magazine or similar storage unit. Most machining centers are equipped with multi-directional motion control devices, which can

The piece is sent to the tool processing position.

The purpose of GB/T 18400 is to provide extensive and comprehensive testing and inspection for product comparison, acceptance, maintenance or other purposes as much as possible

information.

GB/T 18400 specifies some similar inspection requirements by referring to the relevant parts of ISO 230 General Rules for Inspection of Machine Tools, which are applicable to independent

Or a machining center with a horizontal or vertical spindle integrated in a flexible machining system, or a machining center with different types of universal heads.

GB/T 18400 also specifies the detection tolerance corresponding to the general-purpose general-precision machining center, or the maximum allowable value of the detection result.

For CNC milling machines and CNC boring machines whose structural arrangement, components and movements meet the inspection conditions described in this section, all of this section can also be used.

Or part of the request.

Machining center inspection conditions

Part 10.Evaluation of Thermal Deformation

1 Scope

This part of GB/T 18400 refers to ISO 230-3 and specifies the thermal deformation of the machining center machine tool structure and positioning system within the length range

Testing and evaluation.

This part is applicable to machining center machine tools with linear axis stroke up to.2000mm.

This section specifies three detection methods, namely.

---Environmental temperature change error (ETVE) inspection;

---The thermal deformation inspection caused by the rotation of the spindle;

---The thermal deformation inspection caused by the linear axis movement.

It should be noted that no specific tolerance values are given for the inspection described in 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.

ISO 230-3.2007 General Rules for Inspection of Machine Tools Part 3.Determination of Thermal Effects (Testcodeformachinetools-Part 3.

Determinationofthermaleffects)

3.1 Unit of measurement

The unit of all linear dimensions and deviations in this section is millimeters (mm); the unit of angular dimensions is degrees (°), and angular deviations are usually ratios

Means, but in some cases, for clarity, it can be expressed in microradians (μrad) or arc seconds ("). The equivalent relationship of the expression is as follows.

0.010/1000=10x10-6=10μrad~2in

The temperature unit is degrees Celsius (°C).

3.2 Reference standards

The application of this part should refer to the provisions in ISO 230-3, especially the installation, measurement method description and testing before machine tool inspection

Representation of results.

3.3 Inspection tools

The testing instruments and tools recommended in this section are listed as examples only. Can use the same indicator and have the same or higher measurement

Accuracy of other instruments.

3.4 Inspection sequence

The inspections in this section can be carried out individually or in any combination. Before each inspection, the machine tool should be kept at the same temperature as the ambient temperature.