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

GB/T 24635.3-2025

Replacing GB/T 24635.3-2009

**Geometrical product specifications (GPS) - Coordinate measuring machines
(CMM): Technique for determining the uncertainty of measurement - Part 3: Use
of calibrated workpieces or measurement standards**

(English Translation)

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting.

This document is GB/T 24635 "Technical Specification for Product Geometry (GPS) - Techniques for Determining Measurement Uncertainty with Coordinate Measuring

Machines (CMM)" Part 3: GB/T 24635 has published the following parts.

- Part 1: Overview and metrological characteristics;
- Part 3: Application of calibrated workpieces or measurement standards;
- Part 4: Application of simulation techniques to evaluate measurement uncertainty for specific tasks.

This document replaces GB/T 24635.3-2009 "Product Geometry Specification (GPS) Coordinate Measuring Machine (CMM) Determination of Measurement Inaccuracies" Compared with GB/T 24635.3-2009, except for structural adjustment and editing, in addition to the functional changes, the main technical changes are as follows.

---Added ub, uwp, uwt (see Chapter 4).

---In the method of dealing with systematic errors, the standard uncertainty related to the systematic errors is introduced; according to the GUM recommendation, the measured value Corrections should be made according to the magnitude of the systematic effect. If this is not feasible, the measurement results can be combined with the measured value, systematic error and measurement the uncertainties are listed separately in the calibration certificate (see 7.3).

This document is modified to adopt ISO 15530-3:2011 "Product geometry specification (GPS) Coordinate measuring machine (CMM) to determine measurement uncertainty" Measurement techniques - Part 3: Use of calibrated workpieces or measurement standards.

The technical differences between this document and ISO 15530-3:2011 and their reasons are as follows.

- Changed the scope (see Chapter 1) to make the standard applicable to coordinate measurement systems, consistent with the development of coordinate measurement;
- ISO 10360-1 was replaced by the normative reference GB/T 16857.1 to adapt to my country's technical conditions (see Chapter 3), and the addition of Operability.

The following editorial changes were made to this document.

- The informative reference GB/T 24634 replaced ISO 14978 to adapt to my country's technical conditions (see 5.1), and increased operability Sexuality;
- ISO 8015 was replaced by the informative GB/T 4249 to adapt to my country's technical conditions (see B.1), and operability was increased.

Sexuality;

- The informative reference GB/T 18779.1 replaces ISO 14253-1 to adapt to my country's technical conditions (see B.1), and adds Operability;

--- Replaced ISO 14638 with the informative reference GB/T 20308 to adapt to my country's technical conditions (see B.1), and increased operability Acting nature.

Introduction

When using a coordinate measuring machine (CMM) to perform pass/fail testing on a workpiece, the task-specific test should be considered according to GB/T 18779.1.

Despite the importance of knowing the measurement uncertainty, only a few procedures have been developed so far to provide the measurement uncertainty for a specific task.

Certainty.

For simple measuring equipment, according to the "Guide to the Expression of Uncertainty in Measurement" (JJF1059.1), the uncertainty components can be expressed as However, for coordinate measuring machines, due to the complexity of the measurement process, conventional uncertainty assessment methods are not suitable for Most measurement tasks are difficult.

The purpose of this document is to provide an experimental method to simplify the evaluation of the measurement uncertainty of a coordinate measuring machine.

The method is similar to the actual measurement, using the calibrated workpiece or measurement standard instead of the actual workpiece for measurement.

The standardization of uncertainty assessment procedures provides for mutual recognition of calibration and other measurement results worldwide.

Serve.

This document applies to non-substitution measurements using the indications of a coordinate measuring machine as the measurement results of workpieces and measurement standards. It can also be used to substitute Alternative measurement, i.e. using a measurement standard to correct the errors of the coordinate measuring machine. The latter usually reduces the measurement uncertainty and is often used in modern Field calibration or gauge calibration.

This document provides one of the methods for evaluating uncertainty. Other methods are introduced in other parts of GB/T 24635.

The experimental method is simple to implement and provides an achievable statement of measurement uncertainty.

The limitations of these methods are. availability of effectively defined workpiece geometry, stability, economic rationality, and the ability to accurately define the geometry of the workpiece with sufficiently small uncertainties.

Calibration under certain requirements.

GB/T 24635 is proposed to consist of 4 parts.

--- Part 1: Overview and metrological characteristics. Aims to specify the metrological characteristics of coordinate measuring machines (CMMs), uncertainties for specific tasks the source and the relationship between GB/T 16857 series standards and GB/T 24635 series standards are given.

--- Part 2: Assessment of measurement uncertainty for specific tasks using a single uncalibrated workpiece through multiple measurement strategies.

Procedure for evaluating measurement uncertainty of contact coordinate measuring machines.

--- Part 3: Application of calibrated workpieces or measurement standards. Aims to specify the use of coordinate measuring machines and calibrated workpieces or measurement standards Evaluation of the measurement uncertainty of the measured values obtained.

--- Part 4: Application of simulation techniques to evaluate measurement uncertainty for specific tasks.

The uncertainty evaluation software (UES) based on the simulation technology is used for coordinate measurement.

Requirements for manufacturers and users when measuring with measuring machines.

Product Geometric Specification (GPS) Coordinate Measuring Machine (CMM) Techniques for Determining Measurement Uncertainty Part 3: Use of calibrated workpieces or measurement standards

1 Scope

This document specifies a procedure for evaluating the uncertainty of measurement results obtained using a coordinate measuring machine and calibrated workpieces or measurement standards.

A simplified experimental method for evaluating the measurement uncertainty of coordinate measuring machines is proposed. This method (surrogate measurement) uses a method that is consistent with the actual measurement.

In this way, a calibrated workpiece with a size and shape similar to the actual workpiece is used to replace the unknown workpiece to be measured.

It also covers CMM non-substitution measurement methods, requirements for uncertainty assessment procedures, required measuring equipment, and measurement uncertainty.

Regular retesting and intermediate inspection.

The measurement uncertainty assessment method specified in this document can be applied to other coordinate measurement systems.