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Specifikacija geometrijskih veliį in izdelka - Preskusi za sprejemljivost in ponovno verifikacijo koordinatnih merilnih strojev - 4. del: Koordinatni merilni stroji, uporabljeni kot merilni skenerji

Geometrical Product Specifications (GPS) -- Acceptance and reverification tests for coordinate measuring machines (CMM) -- Part 4: CMMs used in scanning measuring mode

Spécification géométrique des produits (GPS) -- Essais de réception et de vérification périodique des machines à mesurer tridimensionnelles (MMT) -- Partie 4: MMT utilisées en mode de mesure par scanning

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Geometrical Product Specifications (GPS) — Acceptance and reverification tests for coordinate measuring machines (CMM) —

Part 4: CMMs used in scanning measuring mode

Spécification géométrique des produits (GPS) — Essais de réception et de vérification périodique des machines à mesurer tridimensionnelles (MMT)

Partie 4: MMT utilisées en mode de mesure par scanning

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 10360 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 10360-4 was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

ISO 10360 consists of the following parts, under the general title *Geometrical Product Specifications (GPS) — Acceptance and reverification tests for coordinate measuring machines (CMM)*:

— *Part 1: Vocabulary*

— *Part 2: CMMs used for measuring linear dimensions*

— *Part 3: CMMs with the axis of a rotary table as the fourth axis*

— *Part 4: CMMs used in scanning measuring mode*

— *Part 5: CMMs using multiple stylus probing systems*

— *Part 6: Estimation of errors in computing Gaussian associated features*

Annexes A, B and C of this part of ISO 10360 are for information only.

Introduction

This part of ISO 10360 is a geometrical product specification (GPS) standard and is to be regarded as a general GPS standard (see ISO/TR 14638). It influences link 5 of the chains of standards on size, distance, radius, angle, form, orientation, location, run-out and datums.

For more detailed information on the relationship of this part of ISO 10360 to other standards and the GPS matrix model, see annex C.

The acceptance test and reverification test of this part of ISO 10360 are applicable only to a CMM that is capable of being used in a scanning measuring mode and may be used to determine the form of a surface or the parameters of an associated feature.

The tests specified in this part of ISO 10360 are performed in addition to the size measuring test according to ISO 10360-2, which are conducted without the use of scanning, and are designed to assess the performance of a CMM used in a scanning measuring mode. It is normally not useful to isolate the scanning probing errors from other sources of machine error.

Geometrical Product Specifications (GPS) — Acceptance and reverification tests for coordinate measuring machines (CMM) —

Part 4:
CMMs used in scanning measuring mode

1 Scope

This part of ISO 10360 specifies the acceptance test which verifies that the performance of a CMM used in scanning measuring mode is as stated by the manufacturer. It also specifies the reverification test which enables the user to periodically reverify the performance of a CMM used in scanning measuring mode.

The acceptance test and reverification test described in this part of ISO 10360 are applicable only to CMMs capable of performing scannings using any type of contacting probing system(s).

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 10360. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 10360 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 10360-1:—[1)], *Geometrical Product Specifications (GPS) — Acceptance and reverification tests for coordinate measuring machines (CMM) — Part 1: Vocabulary.*

ISO 14253-1:1998, *Geometrical Product Specifications (GPS) — Inspection by measurement of workpieces and measuring equipment — Part 1: Decision rules for proving conformance or non-conformance with specifications.*

International Vocabulary of Basic and General Terms in Metrology (VIM). BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML, 2nd edition, 1993.

3 Terms and definitions

For the purposes of this part of ISO 10360, the terms and definitions given in ISO 10360-1, ISO 14253-1 and VIM apply.

1) To be published.

4 Requirements for metrological characteristics

4.1 Error of indication

The scanning probing error(s), Tij, shall not exceed the maximum permissible scanning probing error(s), MPE_{Tij}, as stated by:

— the manufacturer, in case of acceptance tests;

— the user, in case of reverification tests.

The scanning probing error(s), Tij, and the maximum permissible scanning probing error(s), MPE_{Tij}, are expressed in micrometres.

4.2 Time for scanning test

The time for scanning test, τ, shall not exceed the maximum permissible time for scanning test, MPT_{τ}, as stated by:

— the manufacturer, in case of acceptance tests;

— the user, in case of reverification tests.

The time for scanning test, τ, and the maximum permissible time for scanning test, MPT_{τ}, are expressed in seconds.

4.3 Environmental conditions

Limits to be respected for permissible environmental conditions such as temperature conditions, air humidity and vibration at site of installation that influence the measurements shall be specified by:

— the manufacturer, in case of acceptance tests;

— the user, in case of reverification tests.

In both cases, the user is free to choose the conditions within the specified limits.

4.4 Stylus system

A ball-ended stylus with a nominal tip diameter of 3 mm shall be used for performing the test for CMMs used in scanning measuring mode.

Other limits to be respected for the stylus system configuration, to which the stated values of MPE_{Tij} apply, shall be specified by:

— the manufacturer, in case of acceptance tests;

— the user, in case of reverification tests.

In both cases, the user is free to choose the way in which the components of the stylus system are configured within the specified limits.

The form deviation of the stylus tip will influence the measurement results and shall be considered when proving conformance or non-conformance with specification.

NOTE It is recommended that a stylus orientation is chosen which will ensure all axes of the probe and the CMM are exercised simultaneously when performing the scannings.

4.5 Operating conditions

The CMM shall be operated using the procedures given in the manufacturer's operating manual when conducting the tests given in clause 5. Specific areas in this manual to be adhered to are for example:

a) machine start up/warm up cycles;

b) stylus system configuration;

c) cleaning procedures for stylus tip and reference sphere;

d) probing system qualification.

NOTE The stylus tip and the reference sphere should be cleaned before the probing system qualification so as to leave no residual film which could affect the measuring or test result.

5 Acceptance test and reverification test

5.1 General

The tests described are applicable for:

a) scanning on a predefined path to collect a high density of points (HP);

b) scanning on a predefined path to collect a low density of points (LP);

c) scanning on a non-predefined path to collect a high density of points (HN);

d) scanning on a non-predefined path to collect a low density of points (LN).

NOTE 1 Scanning to collect a high density of points is particularly relevant when information on deviations from perfect form is required. Scanning to collect a low density of points may be relevant to allow the optimization of speed when information on associated feature characteristics is required. In any case the test is not able to define completely CMM performance when it is used for either form measurement or associated feature calculation.

NOTE 2 If the CMM is to be used for a specific form measurement task (e.g. roundness), it is recommended that a standardized test for that measurement task is carried out.

NOTE 3 Surface roughness, surface discontinuities and lubricity of workpiece and stylus influence scanning performance. In this test these influence parameters are controlled producing results that may not reflect those obtained in real workpieces (see annex B).

5.2 Principles

The principle of the assessment method is to establish whether the CMM is capable of measuring within the stated:

— maximum permissible scanning probing error(s), MPE_{Tij}, by determining the range of the values of the radial distance R on a test sphere;

— maximum permissible time for scanning test, MPT_{τ}, by monitoring the elapsed time for the test.

The centre and radius of a test sphere is determined by scanning the test sphere in four target scan planes.

The scanning probing error(s), Tij, is calculated as the range of radii between the measured centre and all of the assessed scan points i.e. the absolute difference between the maximum and minimum measurement results.

In the following:

— acceptance tests are executed according to the manufacturer's specifications and procedures;

— reverification tests are executed according to the user's specifications and the manufacturer's procedures.