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Geometrical product specifications (GPS) — Acceptance and reverification tests for coordinate measuring systems (CMS) —

Part 13: Optical 3D CMS

Spécification géométrique des produits (GPS) — Essais de réception et de vérification périodique des systèmes à mesurer tridimensionnels (SMT) —

Partie 13: SMT optique 3D

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Contents

Page

Foreword

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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).

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).

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.

This document was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 290, *Dimensional and geometrical product specification and verification,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

A list of all parts in the ISO 10360 series can be found on the ISO website.

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.

Introduction

This document is a geometrical product specification (GPS) standard and is to be regarded as a general GPS standard (see ISO 14638). It influences chain link F of the chain of standards on size, distance, form, orientation, location and run-out in the general GPS matrix (see Annex H).

The ISO GPS matrix model given in ISO 14638 gives an overview of the ISO GPS system, of which this document is a part. The fundamental rules of ISO GPS given in ISO 8015 apply to this document and the default decision rules given in ISO 14253-1 apply to specifications made in accordance with this document, unless otherwise indicated.

This document has two technical objectives:

1) to test the error of indication when measuring a calibrated test length across the global measuring volume of the CMS;

2) to test the errors of indication within a locally intended measuring volume.

These two objectives correspond to:

a) the test performed for a probing system and a moving carrier of the probing system in combination as described in ISO 10360-2, ISO 10360-7, ISO 10360-8, ISO 10360-10, ISO 10360-11[1)] and ISO 10360-12;

b) the test performed dominantly for the probing system as described in ISO 10360-5, ISO 10360-7, ISO 10360-8, ISO 10360-9, ISO 10360-10, ISO 10360-11 and ISO 10360-12.

The benefits of these tests are that the measured result has a direct traceability to the unit of length, the metre, and that it gives information on how the coordinate measuring machine (CMM) or the coordinate measuring system (CMS) performs in similar length measurements.

An optical 3D CMS as specified by this document is a contactless area measuring sensor delivering 3D data in several individual single views by an optical measuring principle and transforming it into a common coordinate system. Typical optical measuring principles are pattern projection, fringe projection and projecting-and-sweeping a scanned line, or similar, delivering single views without assistance of external information related to position and orientation of the objects to be scanned relative to the CMS. Typical registration principles are based on a best fitting of commonly captured position information across at least two different single views by using either or both reference features attached or surface features of the objects to be scanned.

This document is not intended to apply to other types of CMSs, for example:

— tactile CMMs (Cartesian metrological moving carrier), see ISO 10360-2;

— imaging CMMs (Cartesian metrological moving carrier), see ISO 10360-7;

— CMMs equipped with optical distance sensors (Cartesian metrological moving carrier), see ISO 10360-8;

— laser trackers, see ISO 10360-10;

— X-ray CTs, see ISO 10360-11;

— articulated arm CMMs, see ISO 10360-12;

— measuring instruments intended to measure surface characteristics, see the ISO 25178 series;

— optical microscopes;

— hand-held laser-line type scanners.

1) Under preparation. Stage at the time of publication: ISO/DIS 10360-11:2021.

Parties can apply this document to the above or other types of CMSs by mutual agreement.

This document specifies:

— performance requirements that can be assigned by the manufacturer or the user of the CMS;

— the manner of execution of the acceptance and reverification tests to demonstrate the stated requirements;

— rules for verifying conformance;

— applications for which the acceptance and reverification tests can be used.

NOTE 1 Annex E describes possible limitations with regard to less cooperative surface characteristics, such as colour, glossiness and roughness, and provides a suggested test that can give CMS users an idea of how representative the maximum permissible error would be when measuring their specific industrial part.

NOTE 2 The optical 3D CMS can be moved and positioned by a manually or automated moving unit. The position, orientation or both can be used as additional information for the registration.

NOTE 3 The acceptance and reverification tests are designed to mimic real but simple measurements occurring in practice, subject to the rated operating conditions and the testing procedures. The user is advised to consider the influence of additional or omitted conditions, procedural steps or both when applying the test results according to this document to predict the performance of an actual CMS.

For more detailed information of the relation of this document to other standards and the GPS matrix model, see Annex H.