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Additive manufacturing — Test artefacts — Geometric capability assessment of additive manufacturing systems



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Preface

This Standard was prepared by the Standards Australia Committee MB-028, Additive Manufacturing to supersede AS ISO/ASTM 52902:2021, *Additive manufacturing — Test artifacts — Geometric capability assessment of additive manufacturing systems.*

The objective of this document is to cover the general description of benchmarking test piece geometries, i.e. artefacts, along with quantitative and qualitative measurements to be taken on the benchmarking test piece(s) to assess the performance of additive manufacturing (AM) systems.

This performance assessment can serve the following two purposes:

(a) AM system capability evaluation.

(b) AM system calibration.

This document is identical with, and has been reproduced from ISO/ASTM 52902:2023, *Additive manufacturing — Test artefacts — Geometric capability assessment of additive manufacturing systems*.

As this document has been reproduced from an international document, a full point substitutes for a comma when referring to a decimal marker.

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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.

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).

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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 ISO/TC 261, *Additive manufacturing*, in cooperation with ASTM Committee F42, *Additive Manufacturing Technologies*, on the basis of a partnership agreement between ISO and ASTM International with the aim to create a common set of ISO/ASTM standards on *Additive manufacturing*, and in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 438, *Additive manufacturing,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO/ASTM 52902:2019), which has been technically revised.

The main changes are as follows:

— addition of a test artefact for testing the performance of the Z-axis in an AM system.

— changed dimensions in text and in drawing (see Figure 3) of medium circular artefact such that the description in the text matches the dimensions in the downloadable STEP file; Figure 3 was also re-drawn to better depict the circular artefact geometry.

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.

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NOTES

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Additive manufacturing — Test artefacts — Geometric capability assessment of additive manufacturing systems

Section 1 Scope

This document covers the general description of benchmarking test piece geometries, i.e. artefacts, along with quantitative and qualitative measurements to be taken on the benchmarking test piece(s) to assess the performance of additive manufacturing (AM) systems.

This performance assessment can serve the following two purposes:

— AM system capability evaluation;

— AM system calibration.

The benchmarking test piece(s) is (are) primarily used to quantitatively assess the geometric performance of an AM system. This document describes a suite of test geometries, each designed to investigate one or more specific performance metrics and several example configurations of these geometries into test build(s). It prescribes quantities and qualities of the test geometries to be measured but does not dictate specific measurement methods. Various user applications can require various grades of performance. This document discusses examples of feature configurations, as well as measurement uncertainty requirements, to demonstrate low- and high-grade examination and performance. This document does not discuss a specific procedure or machine settings for manufacturing a test piece.

Section 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/ASTM 52900, *Additive manufacturing — General principles — Fundamentals and vocabulary*

ASME B46.1, *Surface Texture (Surface Roughness, Waviness and Lay)*

Section 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/ASTM 52900 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

Section 4 Significance and use

4.1 General

Measurements and observations described in this document are used to assess the performance of an AM system with a given system set-up and process parameters, in combination with a specific feedstock material.

The primary characterization of the AM system obtained by applying this document is via geometric accuracy, surface finish, and minimum feature sizes of the benchmarking test piece(s).

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