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Additive manufacturing — General principles — Fundamentals and vocabulary

Fabrication additive — Principes généraux — Fondamentaux et vocabulaire

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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).

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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 of ISO/ASTM 52900 replaces the first edition (ISO/ASTM 52900:2015), which has been technically revised. The main changes compared to the previous edition are as follows:

— new and modified terms and definitions;

— abbreviations added for seven process categories;

— new annex for the specification of AM processes based on process categories and determining characteristics (Annex A).

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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Introduction

Additive manufacturing (AM) is the general term for those technologies that successively join material to create physical objects as specified by 3D model data. These technologies are presently used for various applications in engineering industry as well as other areas of society, such as medicine, education, architecture, cartography, toys and entertainment.

During the development of additive manufacturing technology, there have been numerous different terms and definitions in use, often with reference to specific application areas and trademarks. This is often ambiguous and confusing, which hampers communication and wider application of this technology.

It is the intention of this document to provide a basic understanding of the fundamental principles for additive manufacturing processes, and based on this, to give clear definitions for terms and nomenclature associated with additive manufacturing technology. The objective of this standardization of terminology for additive manufacturing is to facilitate communication between people involved in this field of technology on a worldwide basis.

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Additive manufacturing — General principles — Fundamentals and vocabulary

1 Scope

This document establishes and defines terms used in additive manufacturing (AM) technology, which applies the additive shaping principle and thereby builds physical three-dimensional (3D) geometries by successive addition of material.

The terms have been classified into specific fields of application.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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/

3.1 General terms

3.1.1
3D printer, noun
machine used for *3D printing* (3.3.1)

3.1.2
additive manufacturing, noun
AM
process of joining materials to make *parts* (3.9.1) from 3D model data, usually *layer* (3.3.7) upon layer, as opposed to subtractive manufacturing and formative manufacturing methodologies

Note 1 to entry: Historical terms include: additive fabrication, additive processes, additive techniques, additive layer manufacturing, layer manufacturing, solid freeform fabrication and freeform fabrication.

Note 2 to entry: The meaning of "additive-", "subtractive-" and "formative-" manufacturing methodologies is further discussed in Annex B.

3.1.3
additive system, noun
additive manufacturing system
additive manufacturing equipment
machine and auxiliary equipment used for *additive manufacturing* (3.1.2)

3.1.4
AM machine, noun
section of the *additive manufacturing system* (3.1.3) including hardware, machine control software, required set-up software and peripheral accessories necessary to complete a *build cycle* (3.3.8) for producing *parts* (3.9.1)

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3.1.5
AM machine user, noun
operator of or entity using an *AM machine* (3.1.4)

3.1.6
AM system user, noun
additive system user
operator of or entity using an entire *additive manufacturing system* (3.1.3) or any component of an *additive system* (3.1.3)

3.1.7
front, noun
<of a machine; unless otherwise designated by the machine builder> side of the machine that the operator faces to access the user interface, or primary viewing window, or both

3.1.8
material supplier, noun
provider of material/*feedstock* (3.6.6) to be processed in an *additive manufacturing system* (3.1.3)

3.1.9
multi-step process, noun
type of *additive manufacturing* (3.1.2) process in which *parts* (3.9.1) are fabricated in two or more operations where the first typically provides the basic geometric shape and the following consolidates the part to the fundamental properties of the intended material

Note 1 to entry: Fundamental properties of the intended product material are typically metallic properties for intended metallic products, ceramic properties for intended ceramic products, polymer properties for intended polymer (plastic) products and composite material properties for products intended to be made of a composite material.

Note 2 to entry: Removal of the support structure and cleaning can many times be necessary; however, in this context, this operation is not considered as a separate process step.

Note 3 to entry: The principle of *single-step* (3.1.10) and multi-step processes is further discussed in Annex B.

3.1.10
single-step process, noun
type of *additive manufacturing* (3.1.2) process in which *parts* (3.9.1) are fabricated in a single operation where the basic geometric shape and basic material properties of the intended product are achieved simultaneously

Note 1 to entry: Removal of the support structure and cleaning can many times be necessary; however, in this context, this operation is not considered as a separate process step.

Note 2 to entry: The principle of single-step and *multi-step processes* (3.1.9) is further discussed in Annex B.

3.2 Process categories

3.2.1
binder jetting, noun
BJT
additive manufacturing (3.1.2) process in which a liquid bonding agent is selectively deposited to join powder materials

Note 1 to entry: Identification of different binder jetting processes shall be consistent with the method described in Annex A.

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