Additive manufacturing — General principles — Terminology

Fabrication additive — Principes généraux — Terminologie
# Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreword</td>
<td>iv</td>
</tr>
<tr>
<td>Introduction</td>
<td>v</td>
</tr>
<tr>
<td><strong>1 Scope</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>2 Terms and definitions</strong></td>
<td></td>
</tr>
<tr>
<td>2.1 General terms</td>
<td>1</td>
</tr>
<tr>
<td>2.2 Process categories</td>
<td>2</td>
</tr>
<tr>
<td>2.3 Processing: General</td>
<td>3</td>
</tr>
<tr>
<td>2.4 Processing: Data</td>
<td>6</td>
</tr>
<tr>
<td>2.5 Processing: Material</td>
<td>8</td>
</tr>
<tr>
<td>2.6 Applications</td>
<td>9</td>
</tr>
<tr>
<td>2.7 Properties</td>
<td>10</td>
</tr>
<tr>
<td><strong>Annex A (informative) Basic principles</strong></td>
<td>12</td>
</tr>
<tr>
<td><strong>Annex B (informative) Alphabetical index</strong></td>
<td>17</td>
</tr>
<tr>
<td><strong>Bibliography</strong></td>
<td>19</td>
</tr>
</tbody>
</table>
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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO’s adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is 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.

This first edition of ISO/ASTM 52900 cancels and replaces ASTM F2792.
Introduction

Additive manufacturing is the general term for those technologies that based on a geometrical representation creates physical objects by successive addition of material. 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 International Standard 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 world-wide basis.

This International Standard has been developed by ISO/TC 261 and ASTM F42 in close cooperation 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.
Additive manufacturing — General principles — Terminology

1 Scope

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

The terms have been classified into specific fields of application.

New terms emerging from the future work within ISO/TC 261 and ASTM F42 will be included in upcoming amendments and overviews of this International Standard.

2 Terms and definitions

2.1 General terms

2.1.1
3D printer, noun
machine used for 3D printing (2.3.1).

2.1.2
additive manufacturing, noun
AM process of joining materials to make parts (2.6.1) from 3D model data, usually layer (2.3.10) upon layer, as opposed to subtractive manufacturing and formative manufacturing methodologies

Note 1 to entry: Historical terms: 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 are further discussed in Annex A.

2.1.3
additive system, noun
additive manufacturing system
additive manufacturing equipment
machine and auxiliary equipment used for additive manufacturing (2.1.2)

2.1.4
AM machine, noun
section of the additive manufacturing system (2.1.3) including hardware, machine control software, required set-up software and peripheral accessories necessary to complete a build cycle (2.3.3) for producing parts (2.6.1)

2.1.5
AM machine user, noun
operator of or entity using an AM machine (2.1.4)

2.1.6
AM system user, noun
additive system user
operator of or entity using an entire additive manufacturing system (2.1.3) or any component of an additive system
2.1.7  
**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

2.1.8  
**material supplier**, noun  
provider of material/feedstock (2.5.2) to be processed in additive manufacturing system (2.1.3)

2.1.9  
**multi-step process**, noun  
type of additive manufacturing (2.1.2) process in which parts (2.6.1) 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 (metallic, ceramic, polymer or composite)

Note 1 to entry: Removal of the support structure and cleaning may be necessary, however in this context not considered as a separate process step.

Note 2 to entry: The principle of single-step (2.1.10) and multi-step processes are further discussed in Annex A.

2.1.10  
**single-step process**, noun  
type of additive manufacturing (2.1.2) process in which parts (2.6.1) 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 may be necessary, however in this context not considered as a separate process step.

Note 2 to entry: The principle of single-step and multi-step processes (2.1.9) are further discussed in Annex A.

2.2  
**Process categories**

2.2.1  
**binder jetting**, noun  
additive manufacturing (2.1.2) process in which a liquid bonding agent is selectively deposited to join powder materials

2.2.2  
**directed energy deposition**, noun  
additive manufacturing (2.1.2) process in which focused thermal energy is used to fuse materials by melting as they are being deposited

Note 1 to entry: “Focused thermal energy” means that an energy source (e.g. laser, electron beam, or plasma arc) is focused to melt the materials being deposited.

2.2.3  
**material extrusion**, noun  
additive manufacturing (2.1.2) process in which material is selectively dispensed through a nozzle or orifice

2.2.4  
**material jetting**, noun  
additive manufacturing (2.1.2) process in which droplets of build material are selectively deposited

Note 1 to entry: Example materials include photopolymer and wax.

2.2.5  
**powder bed fusion**, noun  
additive manufacturing (2.1.2) process in which thermal energy selectively fuses regions of a powder bed (2.5.8)