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Standard terminology for additive manufacturing — Coordinate systems and test methodologies



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Preface

This Standard was prepared by the Standards Australia Committee MB-028, Additive Manufacturing.

The objective of this document is to specify the terms, definitions of terms, descriptions of terms, nomenclature, and acronyms associated with coordinate systems and testing methodologies for additive manufacturing (AM) technologies in an effort to standardize terminology used by AM users, producers, researchers, educators, press/media, and others, particularly when reporting results from testing of parts made on AM systems. Terms included cover definitions for machines/systems and their coordinate systems plus the location and orientation of parts. It is intended, where possible, to be compliant with ISO 841 and to clarify the specific adaptation of those principles to additive manufacturing.

NOTE Non-cartesian systems are not covered by this Standard.

This document is identical with, and has been reproduced from, ISO/ASTM 52921:2020, *Standard terminology for additive manufacturing — Coordinate systems and test methodologies*.

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

Australian or Australian/New Zealand Standards that are identical or options of international normative references may be used interchangeably. Refer to the online catalogue for information on specific Standards.

The terms “normative” and “informative” are used in Standards to define the application of the appendices or annexes to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

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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. 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. Neither ISO nor ASTM International shall 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. 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.

ISO/ASTM 52921 was prepared by ASTM International (as ASTM F2921) and was adopted, under a special “fast-track procedure”, by Technical Committee ISO/TC 261, *Additive manufacturing*, in parallel with its approval by the ISO member bodies. This has been done under a Partner Standards Development Organization (PSDO) Cooperation Agreement between ISO/TC 261, *Additive manufacturing*, and ASTM International Committee F42, *Additive Manufacturing Technologies*. ASTM F2921 was developed by ASTM Subcommittee F42.01, *Test Methods*.

This first edition of ISO/ASTM 52921 cancels and replaces ASTM F2921-11^{e3}.

Standard Terminology for Additive Manufacturing—Coordinate Systems and Test Methodologies¹

This standard is issued under the fixed designation ISO/ASTM 52921; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision.

1. Scope

1.1 This terminology includes terms, definitions of terms, descriptions of terms, nomenclature, and acronyms associated with coordinate systems and testing methodologies for additive manufacturing (AM) technologies in an effort to standardize terminology used by AM users, producers, researchers, educators, press/media, and others, particularly when reporting results from testing of parts made on AM systems. Terms included cover definitions for machines/systems and their coordinate systems plus the location and orientation of parts. It is intended, where possible, to be compliant with ISO 841 and to clarify the specific adaptation of those principles to additive manufacturing.

NOTE 1—The applicability of this standard to cladding has to be evaluated. Discussions are under progress.

NOTE 2—Non-cartesian systems are not covered by this standard.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

D638 Test Method for Tensile Properties of Plastics
E8/E8M Test Methods for Tension Testing of Metallic Materials

¹ This terminology is under the jurisdiction of ASTM Committee F42 on Additive Manufacturing Technologies and is the direct responsibility of Subcommittee F42.01 on Test Methods, and it falls under the jurisdiction of ISO/TC 261.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

F2792 Terminology for Additive Manufacturing Technologies³

2.2 ISO Standard:³

ISO 841 Industrial Automation Systems and Integration—Numerical Control of Machines—Coordinate System and Motion Nomenclature

ISO 527 (all parts), Plastics—Determination of tensile properties

ISO 6892-1 Metallic materials—Tensile testing—Part 1: Method of test at room temperature

3. Significance and Use

3.1 Although many additive manufacturing systems are based heavily upon the principles of Computer Numerical Control (CNC), the coordinate systems and nomenclature specific to CNC are not sufficient to be applicable across the full spectrum of additive manufacturing equipment. This terminology expands upon the principles of ISO 841 and applies them specifically to additive manufacturing. Although this terminology is intended to complement ISO 841, if there should arise any conflict, this terminology shall have priority for additive manufacturing applications. For any issues not covered in this terminology, the principles in ISO 841 may be applied.

3.2 Furthermore, this terminology does not prescribe the use of any specific existing testing methodologies or standards that practitioners of AM may wish to employ for testing purposes; however, it is expected that practitioners will employ appropriate existing methodologies and standards to test parts made by AM.

4. Terminology

4.1 *Definitions*—Definitions shall be in accordance with Terminology **F2792** and the following:

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.