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Standard Terminology for Additive Manufacturing Technologies^{1,2}

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1. Scope

1.1 This terminology includes terms, definitions of terms, descriptions of terms, nomenclature, and acronyms associated with additive-manufacturing (AM) technologies in an effort to standardize terminology used by AM users, producers, researchers, educators, press/media and others.

NOTE 1—The subcommittee responsible for this standard will review definitions on a three-year basis to determine if the definition is still accurate as stated. Revisions will be made when determined to be necessary.

2. Referenced Documents

2.1 ISO Standard:³

ISO 10303 -1:1994 Industrial automation systems and integration -- Product data representation and exchange -- Part 1: Overview and fundamental principles

3. Significance and Use

3.1 The definitions of the terms presented in this standard were created by this subcommittee. This standard does not purport to address safety concerns associated with the use of AM technologies. 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 of additive manufacturing.

4. Additive Manufacturing Process Categories

4.1 The following terms provide a structure for grouping current and future AM machine technologies. These terms are useful for educational and standards-development purposes and are intended to clarify which machine types share process-

ing similarities. For many years, the additive manufacturing industry lacked categories for grouping AM technologies, which made it challenging educationally and when communicating information in both technical and non-technical settings. These process categories enable one to discuss a category of machines, rather than needing to explain an extensive list of commercial variations of a process methodology.

binder jetting, *n*—an additive manufacturing process in which a liquid bonding agent is selectively deposited to join powder materials.

directed energy deposition, *n*—an additive manufacturing process in which focused thermal energy is used to fuse materials by melting as they are being deposited.

DISCUSSION—"Focused thermal energy" means that an energy source (e.g., laser, electron beam, or plasma arc) is focused to melt the materials being deposited.

material extrusion, *n*—an additive manufacturing process in which material is selectively dispensed through a nozzle or orifice.

material jetting, *n*—an additive manufacturing process in which droplets of build material are selectively deposited.

DISCUSSION—Example materials include photopolymer and wax.

powder bed fusion, *n*—an additive manufacturing process in which thermal energy selectively fuses regions of a powder bed.

sheet lamination, *n*—an additive manufacturing process in which sheets of material are bonded to form an object.

vat photopolymerization, *n*—an additive manufacturing process in which liquid photopolymer in a vat is selectively cured by light-activated polymerization.

5. Terminology

5.1 Definitions:

3D printer, *n*—a machine used for 3D printing.

3D printing, *n*—the fabrication of objects through the deposition of a material using a print head, nozzle, or another printer technology.

DISCUSSION—Term often used synonymously with additive manufacturing; in particular associated with machines that are low end in price and/or overall capability.

¹ This terminology is under the jurisdiction of Committee F42 on Additive Manufacturing Technologies and is the direct responsibility of Subcommittee F42.91 on Terminology.

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² Through a mutual agreement with ASTM International (ASTM), the Society of Manufacturing Engineers (SME) contributed the technical expertise of its RTAM Community members to ASTM to be used as the technical foundation for this ASTM standard. SME and its membership continue to play an active role in providing technical guidance to the ASTM standards development process.

³ Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, Case postale 56, CH-1211, Geneva 20, Switzerland, http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=20579