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Additive manufacturing - Definition and interaction of data sets

增材制造 数据集定义与交互

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting. Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents. This document was proposed by the China Machinery Industry Federation. This document is under the jurisdiction of the National Technical Committee on Standardization of Additive Manufacturing (SAC/TC562). This document was drafted by: Northwestern Polytechnical University, Inner Mongolia First Machinery Group Co., Ltd., and China Machinery Productivity Promotion Center Co., Ltd. Company, Xi'an National Research Institute of Additive Manufacturing Co., Ltd., Shandong Huayun 3D Technology Co., Ltd., Nanjing Normal University, Shenzhen Jinshi 3D Machining Co., Ltd. Printing Technology Co., Ltd., Guangdong Academy of Sciences New Materials Institute, Wuxi Inspection and Testing Certification Institute, China Nuclear Power Research and Design Institute, Shanghai Yingpu 3D Printing Technology Co., Ltd., Hunan Huashu High-Tech Co., Ltd., Qingdao University of Technology, and Shenzhen Guanghua Weiye Co., Ltd. Limited Company, Ocean University of China, Shandong Chuangrui Additive Manufacturing Industry Technology Research Institute Co., Ltd., Nanjing Yangou Technology Co., Ltd., Shanghai Liantai Technology Co., Ltd., Shencan Technology (Shenzhen) Co., Ltd. The main drafters of this document are. Lin Xin, Yu Jun, Liu Yong, Xue Lian, Ma Wentao, Mei Jingcheng, Julia, Jiang Zexing, Yan Xingchen, and Mao Yuyi. Wang Yuyang, Zhao Luan, Pan Liangming, Hu Fan, Hou Zhanghao, Chen Rui, Zhang Yin, Zhang Shuzhe, Wu Linglong, Yu Qingxiao, Fan Yihua, Zhao Ning.

This document is intended for additive manufacturing service platforms, defining datasets for data information in the design, process, materials, and equipment stages to facilitate various aspects. The filtering, integration, fusion, sharing, and analysis of dataset

information aim to achieve interoperability between additive manufacturing application services and their datasets, ensuring... The definition, interaction, and integration of information from the "design end" to the "manufacturing end" are accurate, complete, and effective. Additive manufacturing service platforms include existing software, online platforms, and other platforms that provide additive manufacturing services, as well as future platforms. A new form of additive manufacturing service platform has been developed. Additive Manufacturing Dataset Definition and Interaction

1.Scope This document specifies the basic requirements for defining and interacting with additive manufacturing datasets, the connotation and requirements of datasets, and the rules for interaction between datasets. Interaction. This document applies to the design dataset, process dataset, material dataset, and equipment information dataset of the additive manufacturing service platform. Interaction.

4 Basic Requirements

4.1 Basic Requirements for Dataset Definition An additive manufacturing dataset consists of a name, identifier, constraints/conditions, data type, and data field, and must meet the following requirements.

a) The dataset name should not be empty;

b) Dataset names should use the character set specified in GB/T 1988 and should not contain special characters;

c) Dataset identifiers should begin with a specific symbol (such as "`" or "@") or an underscore "_", followed by letters, numbers, etc. A line or a specific symbol;

d) The length of the dataset identifier should be less than the maximum length specified by the computer system of the service platform used;

e) Data sets should define data types, such as integers, floating-point numbers, booleans, strings, and dates;

f) The data field should specify a range of values. See Appendix A for a format example of the additive manufacturing dataset.

4.2 Basic Requirements for Dataset Interaction The additive manufacturing service platform uses design data, process data, material data, and equipment data to form design datasets, respectively. Process datasets, material datasets, and equipment information datasets are stored in a specific database. Through the interaction of these datasets, design and process... Interoperability between processes such as technology and manufacturing. Additive manufacturing dataset interaction must meet the following requirements.

a) The dataset should maintain data consistency with the corresponding system;

b) The integrity of the data information should be maintained when performing necessary format conversions on the dataset;

c) Data set interaction should implement data access control to ensure data security;

d) Data interfaces should be established between datasets to ensure data interaction between systems such as design, process, and manufacturing.

5.1 Designing the Dataset

5.1.1 Design the dataset content The additive manufacturing design dataset contains the following information.

a) Basic design information mainly includes. 1) Unique identifier; 2) Three-dimensional model; 3) Two-dimensional model (if available).

b) Design annotation information mainly includes. 1) Dimensioning; 2) Surface roughness specification; 3) Tolerance marking; 4) Engineering notes.

c) Design attribute information mainly includes. 1) Materials; 2) Quantity; 3) Mass (or weight).

d) Design ownership information mainly includes. 1) Design/Modeling/Drawing; 2) Review; 3) Approval; 4) Copyright ownership.

5.1.2 Design Dataset Requirements Additive manufacturing design datasets should meet the following requirements.

a) To store and manage effectively;

b) Contains the material's unique identifier or nameplate information [see 5.3.1a)1)].

5.2 Process Dataset

5.2.1 Contents of the Process Dataset The additive manufacturing process dataset mainly contains the following information.

a) Process geometry information. 3D model information, layer information, path information, command information, etc., expressed by patch meshes;

b) Process annotation information. Non-geometric data displayed in the model, such as text, symbols, dimensions, etc., should include annotations from the design dataset. information;

c) Process information. Data on the process methods used, such as powder bed melting, directional energy deposition, and material extrusion. Form, etc.;

d) Process parameter information. The process parameters set based on the material type and printing shape shall comply with the provisions of GB/T 42619;

e) Process monitoring information. Data such as real-time recording, feedback and output of the process.

5.2.2 Process Dataset Requirements Additive manufacturing process datasets should meet the following requirements.

a) To store and manage effectively;

b) Contains unique identification information for the design [see 5.1.1a)1)];

c) Contains unique identification or nameplate information for the material [see 5.3.1a)1)];

d) Contains the device's unique identifier or nameplate information [see 5.4.1a)1).

5.3 Materials Dataset

5.3.1 Contents of the Materials Dataset The materials dataset contains the following information.

a) Basic information about the materials mainly includes. 1) A unique identifier or nameplate; 2) Brand name; 3) Manufacturer; 4) Chemical composition; 5) Physical and chemical properties; 6) Mechanical properties (if any).

b) Material morphology information mainly includes. 1) Form (e.g., powder, filament, etc.); 2) Dimensions (if applicable).

c) Material storage information mainly includes. 1) Environmental information; 2) Storage time limit; 3) Packaging.

d) Material property information mainly includes. 1) Color; 2) Number of cycles (if any).

5.3.2 Requirements for Material Datasets Additive manufacturing material datasets should be stored and managed effectively.

5.4 Equipment Information Dataset

5.4.1 Equipment Information Dataset Content The device information dataset contains the following information.

a) Basic equipment information mainly includes. 1) A unique identifier or nameplate; 2) Equipment manufacturers; 3) Model number; 4) Equipment dimensions; 5) Maximum forming size; 6) Process type; 7) Material type; 8) Forming accuracy; 9) Work environment.

b) The equipment motion control system information mainly includes. 1) Positioning accuracy; 2) Repeatability; 3) Maximum travel; 4) Rotational speed; 5) Tilt angle.

c) Equipment energy source information mainly includes. 1) Energy source type; 2) Energy source parameters (such as power, voltage, etc.).

d) Information on the equipment's raw material conveying system mainly includes. 1)