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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 20317-2023

Replacing GB/T 20317-2006

**Fused extrusion and deposition modeling machines - Testing of
the accuracy**

熔融挤出沉积成形机床 精度检验

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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: This document replaces GB/T 20317-2006 "Accuracy Inspection of Fused Deposition Rapid Prototyping Machine Tools" and GB/T 20318-2006 "Fused Deposition Rapid Prototyping Machine Tool Accuracy Test" Deposition rapid prototyping machine tool parameters", compared with GB/T 20317-2006 and GB/T 20318-2006, except for structural adjustment and editing In addition to the modifications, the main technical changes are as follows:

---Added a chapter "Structure and Parameters"; deleted the details of X, Y, Z axis stroke, table width, table length, and nozzle diameter of nozzle Parameter value, the relative size requirements of the forming platform size and the motion axis stroke are added (see Chapter 4, GB/T 20318-2006 Table 1);

---Added general requirements such as "machine tool leveling", "diagrams", "software compensation" and "machining accuracy inspection" (see 5:3, 5:7, 5:8, 5:11);

---Changed the X and Y coordinate directions of the X-axis motion straightness check (see G1 item of 6:1, 5:1 of GB/T 20317-2006 G1 item);

---Changed the inspection steps in geometric accuracy inspection and positioning accuracy inspection (see Chapter 6 and Chapter 7, GB/T 20317-2006 of Chapters 5 and 6);

---Changed the structure of the chapter "Machining Accuracy Inspection" and deleted Appendix A; added test piece processing conditions and detection methods, changed Results statistical analysis methods and confidence indicators (see Chapter 8, Chapter 7 and Appendix A of GB/T 20317-2006): Please note that some content in this document may be subject to patents: The publisher of this document assumes no responsibility for identifying patents: This document is proposed by China Machinery Industry Federation:

This document is under the jurisdiction of the National Technical Committee for Standardization of Special Processing Machine Tools (SAC/TC161): This document was drafted by: Wuyi Stinarui 3D Technology Co., Ltd., Jiangsu Mingya Technology Co., Ltd., Wuxi Inspection, Testing and Certification Research Institute, Westan (Xiamen) Industrial Co., Ltd., Shenzhen Collaborative Innovation High-tech Development Co., Ltd., and Xi'an National Research Institute of Additive Manufacturing have Co., Ltd., Suzhou Electrical Machining Machine Tool Research Institute Co., Ltd., Tsinghua University, Xuzhou Mingshun Baicheng Technology Co., Ltd., China Machinery Research Institute Standard Technology Research Institute (Beijing) Co., Ltd., China National Heavy Duty Truck Group Jinan Power Co., Ltd., Xuzhou Weijia New Material Technology Co., Ltd., Suzhou JiuJun Intelligent Equipment Equipment Co., Ltd: The main drafters of this document: Zhang Xiaojun, Liu Yisheng, Zhu Yingchen, Zhang Pingyuan, Yao Caihong, Hou Ying, Wang Ying, Lin Feng, Shan Yingying, Xue Lian, Zhang Dianping, Han Minfeng, Wu Rencai: The previous versions of this document and the documents it replaces are as follows:

---GB/T 20317, first released in:2006;

---GB/T 20318, first released in:2006;

---This is the first revision:

GB/T 20317-2006 "Accuracy Inspection of Fused Deposition Rapid Prototyping Machine Tools" and GB/T 20318-2006 "Fused Deposition Rapid Prototyping Machine Tools" "Shape Machine Tool Parameters" is my country's earliest national standard for machine tool accuracy inspection in the additive manufacturing industry: After more than ten years of technological development, Melt The precision inspection and parameters of fused deposition rapid prototyping machine tools have gradually become clearer with the promotion of product applications and the improvement of technology maturity: and specifications: This document combines the current design, production, use and other needs of melt extrusion deposition forming machine tools, in terms of machine tool structure, parameters, accuracy, etc: In terms of aspects, the:2006 version of the standards has been integrated and revised: Melt extrusion deposition forming machine tool accuracy inspection

1 Scope

GB/T 20317-2023 is the Chinese accuracy test for fused extrusion and deposition modelling machines, the machine tool standard for FDM additive manufacturing. It treats a 3D printer as what it structurally is, a three-axis machine tool, and tests it the way a machine tool is tested: the geometric accuracy, the straightness of each axis motion, squareness and the flatness of the forming platform, the positioning and repeatability of each axis, and then the machining accuracy, the dimensional and form accuracy of a defined test part built under defined conditions. This edition adds a clause on structure and parameters with relative requirements on platform size and axis travel in place of the fixed

dimensions of the old text, and adds general requirements for machine levelling, diagrams, software compensation and machining accuracy inspection. The 2023 edition replaces GB/T 20317-2006 and GB/T 20318-2006, both superseded, and takes effect on 1 July 2024.

This document specifies the structure and parameters, general principles, geometric accuracy inspection, positioning accuracy inspection and machining precision of melt extrusion deposition forming machine tools: degree inspection: This document also gives tolerance values corresponding to the above inspections: This document is suitable for inspection of the accuracy of melt extrusion deposition forming machine tools:

2 Normative reference documents

The contents of the following documents constitute essential provisions of this document through normative references in the text: Among them, the dated quotations For undated referenced documents, only the version corresponding to that date applies to this document; for undated referenced documents, the latest version (including all amendments) applies to this document: GB/T 14896:

7 Special processing machine tool terminology Part 7: Additive manufacturing machine tools

GB/T 17421:1-2023 General principles for inspection of machine tools Part 1: Geometric accuracy of machine tools under no-load or quasi-static conditions GB/T 17421:

2 General principles for machine tool inspection Part 2: Determination of positioning accuracy and repeatability accuracy of CNC axes

GB/T 19764-2005 Selection guide for priority numbers and priority number integer series

3 Terms and definitions

The terms and definitions defined in GB/T 14896:7 apply to this document:

4 Structure and parameters

1 The structure of the melt extrusion deposition forming machine tool (hereinafter referred to as the "machine tool") is shown in Figure 1: 4:

2 When designing the travel in the X-axis, Y-axis and Z-axis directions, it is preferred to use the R'10 number system in GB/T 19764-2005 (the common ratio is 1:25): 4:

3 The length (or diameter) of each side of the forming platform should not be less than 20mm of the corresponding X-axis and Y-axis travel: 4:

4 When designing the nozzle diameter, the R'20 number system in GB/T 19764-2005 (common ratio is 1:12) is preferred: