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**Test conditions for five-axis electrical discharge arc milling
machines - Accuracy testing**

五轴电火花电弧复合铣削机床 精度检验

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part

1. Structure and drafting rules for standardization documents" Drafting. Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the 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 for Standardization of Special Processing Machine Tools (SAC/TC161). This document was drafted by: China University of Petroleum (East China), Suzhou Electro-Mechanical Machine Tool Research Institute Co., Ltd., Beijing Electro-Mechanical Research Institute Ltd., Capital Aerospace Machinery Co., Ltd., Xiamen Songzhu Precision Technology Co., Ltd., Shanghai Jiaotong University, China Aviation Manufacturing Technology Research Institute Institute, Shandong Haomai CNC Machine Tool Co., Ltd., Xiamen Standardization Research Institute, Beijing Institute of Technology, Guangdong Taizheng Precision Machinery Co., Ltd., Nanjing Ningqing CNC Machine Tool Manufacturing Co., Ltd., Shenzhen Lanlan Technology Co., Ltd., Hunan Jinling Machine Tool Technology Group Co., Ltd., Hebei Guan Shi Automation Technology Co., Ltd. and Hangzhou Datian CNC Machine Tool Co., Ltd. The main drafters of this document are. Liu Yonghong, Ji Renjie, Wu Qiang, He Hu, Zhang Kun, Xiao Liqiang, Gu Lin, Fu Junying, Ma Jipeng, Wang Shaowu, Wu Yue, Guo Jianmei, Li Chaojiang, Wu Xinlei, Xia Zhenpo, Cai Jing, Wang Wentao, Lei Limeng, Liu Guodong, and Wang Yuanqing.

With the advancement of science and technology and industrial development, new difficult-to-cut materials and their complex components continue to emerge, and the inadaptability of traditional milling is becoming increasingly prominent. Therefore, modern industry has an urgent need for new and efficient milling technology and machine tools for

difficult-to-cut materials. Machining is a method of using high-voltage, low-energy electric sparks to open energy transmission channels and low-voltage, high-energy arc energy to remove materials. It is not affected by the strength and hardness of the material, has the advantages of high processing efficiency, low cost, energy saving and environmental protection, and has been widely used in aviation and aerospace in recent years. However, EDM arc milling machine tools lack relevant technology. Standards have limited its large-scale application and sustainable development of the industry. This document provides a unified precision requirement and test method for EDM milling machines. The integration of milling technology and standards leads the technological progress of EDM technology and machine tools, and promotes the high-quality development of the difficult-to-cut parts manufacturing industry. The development provides technical and equipment support to solve the "bottleneck" problem of processing parts made of difficult-to-cut materials in high-end equipment, and fills the gap in standards. The document specifies the testing methods and tolerance values for machine tool manufacturing accuracy and working accuracy, and improves the design and manufacturing quality and processing application level of machine tools. It can meet the needs of machine tool R&D and production enterprises, and also provide a standardized basis for the manufacturing acceptance and use of machine tools. To meet the industrial development needs of enterprises. Five-axis arc EDM milling machine Accuracy test

1 Scope

China's national accuracy test conditions for five-axis electrical discharge arc milling machines. Arc milling is a Chinese-developed variant of electrical discharge machining that removes metal an order of magnitude faster than conventional EDM by sustaining an arc rather than a discharge, flushed aggressively with a working fluid. It exists to attack the materials that defeat cutting tools - nickel superalloys, titanium, hardened steels - at rates that make roughing large components practical, and combining it with five-axis motion allows the complex surfaces of blisks, integral impellers and dies to be machined in one setup. Because the tool electrode never touches the work and wears as it goes, the machine's accuracy is what determines the part's, and it must be verified independently. The standard specifies the nomenclature, geometric accuracy, positioning accuracy and working accuracy of the main components with the corresponding tolerances, for machines with linear travel up to 1000 mm.

This document specifies the naming, general rules, geometric accuracy, positioning accuracy, working accuracy of the main components of the five-axis electric spark arc compound milling machine tool. degrees, and the tolerance values corresponding to the above accuracy inspection items. This document is applicable to the accuracy detection of five-axis EDM arc milling machines with linear axis travel up to 1000mm.

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document. For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document.

GB/T 14896.1 Terminology of special processing machine tools Part

3 Terms and definitions

The terms and definitions defined in GB/T 14896.1 and the following apply to this document.

3.1 A special machine tool that uses electric spark arc compound milling method to process workpieces.

4 Nomenclature of main machine tool components

The five-axis EDM arc milling machine tool (hereinafter referred to as the "machine tool") has three CNC linear axes (X, Y, Z) and two CNC rotary axes. Axis (A, B, C in any combination), the machine tool coordinate axis is named in accordance with the provisions of GB/T 19660. This document is based on a machine with three CNC linear axes As an example, a vertical five-axis EDM arc milling machine with two CNC rotary axes (X, Y, Z) and two CNC rotary axes (A, C) is used. There are two types. mobile cradle type and fixed cradle type. The schematic diagram and coordinate system of the mobile cradle type machine tool are shown in Figure 1, and the schematic diagram and coordinate system of the fixed cradle type machine tool are shown in Figure 2. See Figure 2 for the system.