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**NATIONAL STANDARD OF THE
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**Laser directed energy deposition machines - General technical
specification**

激光定向能量沉积机床 通用技术规范

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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 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 sponsored by the National Technical Committee on Standardization of Special Processing Machine Tools (SAC/TC161) and the National Technical Committee on Standardization of Additive Manufacturing (SAC/TC562) Common focus. This document was drafted by: Nanjing Zhongke Yuchen Laser Technology Co., Ltd., Xi'an National Institute of Additive Manufacturing Co., Ltd., Suzhou Dianjia Industrial Machine Tool Research Institute Co., Ltd., Nanjing Huirui Optoelectronics Technology Co., Ltd., Wuhan Huagong Laser Engineering Co., Ltd., Suzhou Tianhong Laser Co., Ltd., Jiangsu Mingya Technology Co., Ltd., Jinan Senfeng Laser Technology Co., Ltd., Huazhi Excellent Productivity Promotion (Beijing) Co., Ltd., Wuxi Inspection, Testing and Certification Research Institute, China Machinery Research Institute of Standards and Technology (Beijing) Co., Ltd., Kunshan Baojin Laser Tailor Welding Co., Ltd. Co., Ltd., Guangdong Hongshi Laser Technology Co., Ltd., Shenzhen Aibet Electronic Technology Co., Ltd., Suzhou University, Xi'an Jiaotong University, Nanjing Chenguang Group Co., Ltd., Beijing Satellite Manufacturing Factory Co., Ltd., Shenyang University of Technology. The main drafters of this document. Hua Chen, Lu Xin, Xue Fei, Wang Ying, Qi Huan, Ye Bing, Jin Chaolong, Liu Yisheng, Li Fengxi, Li Xiaofei, Lu Xinfeng, Xue Lian, Li Guoxin, Liu Yang, Wang Haiying, Shi Tuo, Wang Lei, Hu Weiye, Qi Junfeng, Liu Weijun. General technical specifications for laser directed energy deposition machine tools

1 Scope

China's national general technical specification for laser directed energy deposition machines. Directed energy deposition differs from powder bed fusion in that the material is delivered to the melt pool as it is created, through a nozzle that blows powder or feeds wire into a laser spot, with the head moving over the workpiece. That difference determines what the process is for. It builds much faster and much larger than a powder bed, it can deposit onto an existing component rather than only building from a plate, and it can change material during the build. Those properties make it the repair technology of choice for high value parts - turbine blades, dies, shafts - and the way to add features to a forging rather than machining them from solid. Its resolution and surface finish are far worse than a powder bed's, so parts are usually finish machined, and the specification has to describe a machine tool as much as a printer.

This document stipulates the composition and environmental requirements, safety protection requirements, technical requirements, detection methods and signs of laser directional energy deposition machine tools, Packaging, transportation and storage. This document is applicable to the design and manufacturing of additive manufacturing machine tools using metal powder as raw material and using laser directional energy deposition process.

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 191 Packaging, storage and transportation pictorial mark

GB 2894 Safety signs and guidelines for their use

GB/T 5226.1 Mechanical and electrical safety mechanical and electrical equipment Part

3 Terms and definitions

The terms and definitions defined in GB/T 14896.7 and GB/T 35351 apply to this document.

4 Machine tool composition and environmental requirements

4.1 Machine tool composition The components of laser directional energy deposition machine tools (hereinafter referred to as "machine tools") generally include. mechanical

motion system, atmosphere control system, laser system system, powder feeding system, and signal monitoring system. The main functions of each component are shown in Table 1.

7 Additive manufacturing machine tools

GB/T 17421.1 General principles for inspection of machine tools Part

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