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GB/T 47522.1-2026

**Automation systems and integration - Taxonomy of production
automation - Part 1: Framework and definitions**

自动化系统与集成 生产自动化分级 第1部分：框架与定义

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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 is Part 1 of GB/T 47522 "Automation Systems and Integration - Classification of Production Automation". GB/T 47522 has been issued. The following parts were laid out.

1. Framework and Definitions 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 Automation Systems and Integration (SAC/TC159). This document was drafted by: Zhejiang University, Beijing Institute of Mechanical Industry Automation Co., Ltd., Zhejiang Zhongzhida Technology Co., Ltd., and Zhejiang... University Ningbo International Science and Technology Innovation Center, Zhejiang University Ningbo Institute of Technology, Shenzhen Polytechnic, Zhejiang Provincial Automation Society, Xi'an University of Technology Shandong Branch of China Oil & Gas Pipeline Network Corporation. The main drafters of this document are. Su Hongye, Sun Jiexiang, Xie Lei, Wang Yiqin, Wang Haidan, Xu Weihua, Qin Xiugong, Hou Weifeng, and Zhang Zhiming. Wang Jianxin, Wang Changming, Ma Longhua, Tao Jili, Lu Shan, Ye Jianwei, Li Yankai, Yu Rui, Li Guanzheng, Xin Zaipeng, Zhao Yixun.

Automation and information technology are the fundamental support for industrial enterprises to carry out digital transformation and play an important role in enhancing their core competitiveness. The series of standards for production automation classification are

mainly based on GB/T 20720 Enterprise Control System Integration Manufacturing Enterprise Operation Management Standard. In the partially functional model, layers 0 to 2 are defined to evaluate the automation capabilities of the PCS layer, including production process data acquisition, control commands, and... This includes the ability to control command execution, etc. This series of standards helps companies identify their own automation capabilities, pinpoint weaknesses in their technologies, and... Develop appropriate improvement plans to lay the foundation for enterprises' digital and information technology construction and assist industrial enterprises in their digital transformation. GB/T 47522 "Automation Systems and Integration of Production Automation Classification" is proposed to consist of three parts.

1.Framework and Definitions. The purpose is to define and classify the automation capabilities of manufacturing processes in manufacturing enterprises, including various levels... Other key technical features and classification elements.

2.Assessment and Classification. The purpose is to define the assessment process and classification methods for the automation capabilities of manufacturing processes in manufacturing enterprises. The process provides standardized process solutions for enterprises and third-party regulatory agencies to assess the level of automation capabilities.

3.Technical Report. The purpose is to provide standard implementation units with case studies of standard application within their enterprises, using specific examples to guide... The implementation process of the guiding standards. Automation Systems and Integrated Production Automation Classification Part

1 Scope

GB/T 47522.1-2026 is the Chinese national standard covering a scale for how automated a production system actually is - the levels from manual through assisted and partly automated to autonomous, defined for each function rather than for the plant as a whole. It is the manufacturing counterpart of the levels of driving automation, and it exists for the same reason: everybody was claiming the same word for different things. Part 1, first edition, in force since 1 November 2026. It was issued on 30 April 2026 and takes effect on 1 November 2026, as a first edition. The document is under the responsibility of the China Machinery Industry Federation. This page is published from the official record of the 2026 edition; the clause text of a standard this recent is not yet in circulation, and the figures, limits and tables it contains are those of the document itself, delivered in full with the English translation.

1.Scope This document defines and classifies the automation capabilities of manufacturing enterprises' production processes, including the main technical characteristics and classification elements of each level. and general technical requirements. This document applies to manufacturing companies, manufacturing process automation system solution

providers, and regulatory agencies conducting production automation level assessments. Gap identification, solution planning, and improvement.

4. Abbreviations The following abbreviations apply to this document. TPA. Taxonomy of Production Automation

5. Production Structure Reference Model The production structure reference model defined in this document for the hierarchical definition of production automation is shown in Figure 1. From top to bottom, production should consist of one or more ordered production stages; each production stage should consist of one or more ordered production operation groups. Production operations should consist of one or more ordered production activities; production activities are the most basic units and cannot be further divided. The different definitions of production objects in different standards and the production structure reference model defined in this document, as well as the production structure reference models in other standards, are used to define production objects. The correspondence between types is shown in Appendix A.

6. Relationship with the functional hierarchy of GB/T 20720 The scope of application for production automation classification is approximately based on the manufacturing operations management functional hierarchy framework defined in GB/T 20720.2-2020. The structure is divided into five levels from bottom to top, as shown in Figure 2. The scope of the production automation classification covers Level 2, Level 1, and Level 0; Level 3 and above are not within the scope of this document. Within. For the specific definition of the functional hierarchy, please refer to the corresponding content in GB/T 20720.2-2020.

Figure

7 Hierarchical Framework for Production Automation

7.1 Overview Based on the industrial enterprise's production automation system's ability to execute production tasks and the task allocation of humans in the automation process. Based on the situation, production automation is divided into levels 0 to

5. The relationship between each TPA level and the classification elements is detailed in Appendix B; factories at each level... For details on the required manual operations and the operation of the automated production system, please refer to Appendix C.

7.2 Classification of Production Automation Levels The automation capability of industrial production processes is divided into six levels, from low to high.

---Manual operation level;

---Basic Automation;

---Intermediate Automation;

---Optimized level automation;

---Advanced Automation;

---Fully automated. The main evaluation factors for production automation classification include.

---Whether a production automation system can automatically execute a certain production activity;

---Whether the production automation system can automatically execute all production activities;

---Whether the production automation system can automatically achieve coordinated control between production activities; For each production operation, can the production automation system automatically coordinate all the production activities it encompasses? control;

---Can the production automation system automatically achieve coordinated control between different production operations? For each stage of production, can the production automation system automatically coordinate all the production operations it encompasses? control;

---Can the production automation system automatically achieve coordinated control between different production stages?

7.3.1 TPA0 level

--- Manual operation level A TPA0 level system should have the most basic ability to collect production equipment information, and all production should be under the full control of human operators. Activity.

7.3.2 TPA Level 1

--- Basic Automation A TPA1 level production automation system should be able to independently control at least one production activity.

7.3.3 TPA Level 2

--- Intermediate Automation A TPA2-level production automation system should be able to control all production activities and achieve coordination between at least one production activity. control.

7.3.4 TPA Level 3 - Optimized Automation A TPA3 level production automation system should be able to control all production activities. For each production operation, the automation system should achieve... Coordination and control among all production activities. Furthermore, the automated system should also achieve coordination and control between at least one production operation.