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

GB/T 45616.3-2026

**Automation systems and integration - Digital twin framework
for manufacturing - Part 3: Digital representation of
manufacturing elements**

自动化系统与集成 面向制造的数字孪生框架 第3部分：制造要素的数字表示
(English Translation)

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A.1 Overview

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 3 of GB/T 45616 "Automation Systems and Integration. A Digital Twin Framework for Manufacturing".

The following sections have been released.

---Part 1: Overview and General Principles;

---Part 2: Reference Architecture;

---Part 3: Numerical Representation of Manufacturing Elements;

---Part 4: Information Exchange.

This document is equivalent to ISO 23247-3:2021 "Automation systems and integration - Digital twin framework for manufacturing - Part 3: Manufacturing".

Digital representation of creative elements.

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).

Introduction

GB/T 45616 (all parts) defines a framework to support the creation of observable digital twins of manufacturing elements, including personnel, equipment, etc.

Preparations, materials, processes, facilities, environment, products, and supporting documentation.

Digital twins can help detect anomalies in processes, enabling real-time control, predictive maintenance, in-process adjustments, and big data analytics.

And functional goals such as machine learning. Digital twins monitor observable manufacturing elements by continuously updating relevant operational and environmental data.

Digital twins enable visibility into processes and execution, thereby enhancing manufacturing operations and business collaboration.

The manufacturing types supported by implementing the GB/T 45616 (all parts) framework depend on the standard available for producing observable manufacturing elements.

Standards and technologies. Different manufacturing sectors may use different data standards. As a framework, this document does not specify specific data formats.

and communication protocols.

GB/T 45616 "Automation Systems and Integration. A Digital Twin Framework for Manufacturing" is proposed to consist of four parts.

---Part 1: Overview and General Principles. The aim is to clarify the general principles and requirements for developing digital twins in the process.

---Part 2: Reference Architecture. The purpose is to provide a reference architecture with a functional view.

---Part 3: Numerical Representation of Manufacturing Factors. The purpose is to standardize the basic informational attributes of observable manufacturing factors.

---Part 4: Information Exchange, which aims to standardize the technical requirements for information exchange between entities in the reference architecture.

Figure 1 is a relationship diagram of GB/T 45616 (all parts).

Figure 1. Structure of GB/T 45616 series

Appendix A to Appendix E of GB/T 45616.4-2025 provide use cases illustrating the framework of a manufacturing-oriented digital twin system.

The use cases are primarily located in the discrete manufacturing field, and the digital twin is modeled using ISO 10303 (all parts). In other fields, it is possible to use...

Same standards and technologies. For example, in the oil and gas sector, digital twins can be modeled using ISO 15926 (all parts), while in building construction...

For industry-specific digital twins, modeling is done using ISO 16739 (all parts).

Automation Systems and Integration Digital Twin Framework for Manufacturing Part 3: Digital Representation of Manufacturing Elements

1 Scope

This document provides a list of basic informational attributes for observable manufacturing elements (OME).

---Example of information attributes;

Appendix A provides the criteria for defining these information attributes.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included.

For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies.

This document.

ISO 23247-1 Automation systems and integration - Framework for manufacturing-oriented digital twin systems - Part 1: Overview and general principles Note. GB/T 45616.1-2026 Automation Systems and Integration - Framework for Manufacturing-Oriented Digital Twin Systems - Part 1: Overview and General Principles (ISO 23247-1:2021, IDT)

3 Terms and Definitions

The terms and definitions defined in ISO 23247-1, as well as the following terms and definitions, apply to this document.

The URLs for the terminology databases maintained by ISO and IEC for standardization work are as follows.

Information attribute Information about observable manufacturing elements.

dynamic

Information attributes that change during the manufacturing process (3.1).

static

Information attributes that remain unchanged during the manufacturing process (3.1).

Mandatory

must be included in any description of OME (3.1).