



BSI Standards Publication

Automation systems and integration — Digital twin framework for manufacturing

Part 1: Overview and general principles

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National foreword

This British Standard is the UK implementation of ISO 23247-1:2021.

The UK participation in its preparation was entrusted to Technical Committee AMT/4, Industrial data and manufacturing interfaces.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Automation systems and integration — Digital twin framework for manufacturing —

Part 1: Overview and general principles

*Systèmes d'automatisation industrielle et intégration — Cadre
technique de jumeau numérique dans un contexte de fabrication —*

Partie 1: Vue d'ensemble et principes généraux



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Contents

Page

Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms, definitions and abbreviated terms	1
3.1 General terms	1
3.2 Terms related to digital twin for manufacturing	2
3.3 Abbreviated terms	3
4 Overview of digital twin for manufacturing	4
4.1 Concept of the digital twin for manufacturing	4
4.2 Applications of the digital twin for manufacturing	5
4.2.1 Real-time control	5
4.2.2 Off-line analytics	5
4.2.3 Predictive maintenance	5
4.2.4 Health check	5
4.2.5 Engineering design	5
4.2.6 Production control	5
4.2.7 Video surveillance	5
4.3 Benefits of the digital twin for manufacturing	5
4.3.1 In-loop planning and validation	5
4.3.2 Production scheduling assurance	5
4.3.3 Enhanced understanding of manufacturing elements	6
4.3.4 Dynamic risk management	6
4.3.5 Part/assembly traceability	6
4.3.6 Process traceability	6
4.4 Observable manufacturing elements	6
4.4.1 Personnel	6
4.4.2 Equipment	6
4.4.3 Material	6
4.4.4 Process	7
4.4.5 Facility	7
4.4.6 Environment	7
4.4.7 Product	7
4.4.8 Supporting document	7
5 General principles of the digital twin framework for manufacturing	7
5.1 Overview	7
5.2 Limitations and boundaries of the digital twin framework for manufacturing	8
5.3 Requirements of the digital twin for manufacturing	8
5.3.1 Accuracy	8
5.3.2 Communication	8
5.3.3 Data acquisition	8
5.3.4 Data analysis	9
5.3.5 Data integrity	9
5.3.6 Extensibility	9
5.3.7 Granularity	9
5.3.8 Identification	9
5.3.9 Management	9
5.3.10 Product life-cycle	9
5.3.11 Security	9
5.3.12 Simulation	9
5.3.13 Synchronization	9
5.3.14 Viewpoint	9

This is a preview of "BS ISO 23247-1:2021". [Click here to purchase the full version from the ANSI store.](#)

5.3.15	Hierarchical modelling of digital twin for manufacturing	9
5.4	High level outline for framework implementations	10
Annex A (informative) Digital twins and the product life-cycle		11
Bibliography		13

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 184, *Automation systems and integration*, Subcommittee SC 4, *Industrial data*.

A list of all parts in the ISO 23247 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The ISO 23247 series defines a framework to support the creation of digital twins of observable manufacturing elements including personnel, equipment, materials, manufacturing processes, facilities, environment, products, and supporting documents.

A digital twin assists with detecting anomalies in manufacturing processes to achieve functional objectives such as real-time control, predictive maintenance, in-process adaptation, Big Data analytics, and machine learning. A digital twin monitors its observable manufacturing element by constantly updating relevant operational and environmental data. The visibility into process and execution enabled by a digital twin enhances manufacturing operation and business cooperation.

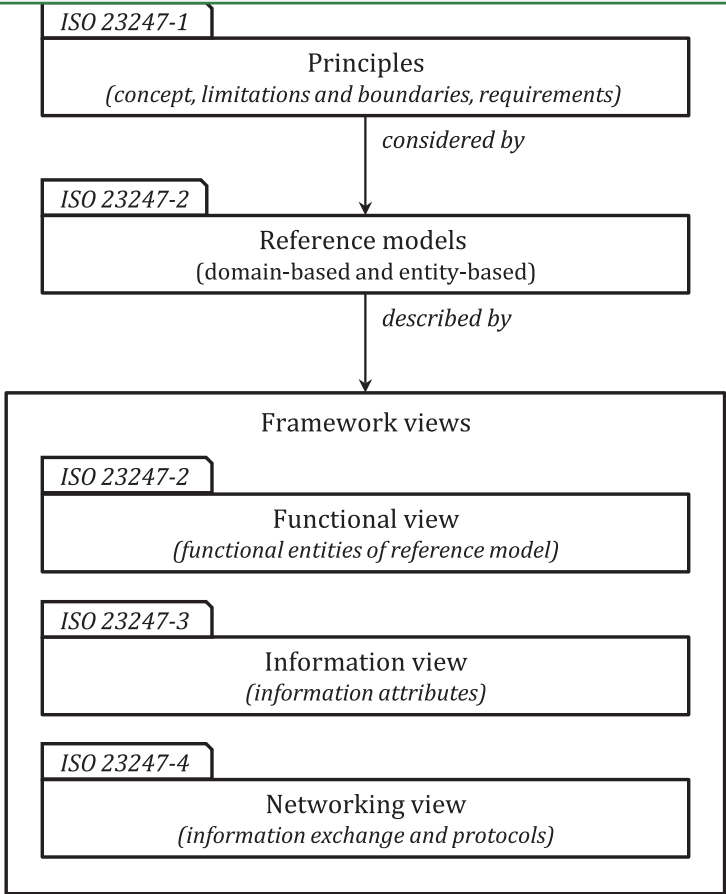
The type of manufacturing supported by an implementation of the ISO 23247 framework depends on the standards and technologies available to model the observable manufacturing elements. Different manufacturing domains can use different data standards. As a framework, this document does not prescribe specific data formats and communication protocols.

The scopes of the four parts of this series are defined below:

- ISO 23247-1: General principles and requirements for developing digital twins in manufacturing;
- ISO 23247-2: Reference architecture with functional views;
- ISO 23247-3: List of basic information attributes for the observable manufacturing elements;
- ISO 23247-4: Technical requirements for information exchange between entities within the reference architecture.

[Figure 1](#) shows how the four parts of the series are related.

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**Figure 1 —
ISO 23247 series structure**

ISO 23247-4:2021, Annexes A to E, provide use cases that demonstrate the digital twin framework for manufacturing. The use cases are in the discrete manufacturing domain and the digital twins are modelled using the ISO 10303 series. In other domains, different standards and technologies can be used. For example, in the oil and gas industry, digital twins may be modelled using the ISO 15926 series, and for building and construction, digital twins may be modelled using the ISO 16739 series.

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Automation systems and integration — Digital twin framework for manufacturing —

Part 1: Overview and general principles

1 Scope

This document provides an overview and general principles of a digital twin framework for manufacturing including:

- terms and definitions;
- requirements of the digital twin framework for manufacturing.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1 General terms

3.1.1 control

purposeful action on or in a process to meet specified objectives

[SOURCE: IEC 60050:2013, 351-42-19, modified — The Notes to entry have been removed.]

3.1.2 element

basic system part that has the characteristics of state, behaviour, and identification

[SOURCE: ISO 14258:1998, 2.2.4]

3.1.3 enterprise

one or more organizations sharing a definite mission, goals, and objectives which provides an output such as a product or service

[SOURCE: IEC 62264-1:2013]