International Standard

ISO 16400-5

First edition
2026-08

Automation systems and integration — Equipment behaviour catalogues for virtual production systems —

Part 5: Interfaces of an equipment behaviour catalogue with production systems engineering and manufacturing operations

Systèmes d'automatisation et intégration — Catalogues de comportement des équipements pour les systèmes de production virtuelle —

Partie 5: Interfaces d'un catalogue de comportement des équipements avec l'ingénierie des systèmes de production et les opérations de fabrication

Reference number
ISO 16400-5:2026(en)

© ISO 2026



COPYRIGHT PROTECTED DOCUMENT

© ISO 2026

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ... **iv**

Introduction ... **v**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

4 Abbreviated terms ... **3**

5 The equipment behaviour catalogue in context of production systems engineering and manufacturing operations ... **4**

6 Interfaces for integration of equipment behaviour catalogue ... **6**

6.1 Introduction ... 6
6.2 Mathematical model ... 7
6.3 Calculation formula ... 9
6.4 Program ... 10
6.5 State data ... 11
6.6 External interaction ... 12
6.7 State ... 14
6.8 Equipment behaviour catalogue template ... 15

Annex A (informative) **Description of the logical packages** ... **17**

Annex B (informative) **Decomposition of Equipment behaviour catalogue elements** ... **26**

Bibliography ... **27**

© ISO 2026 – All rights reserved

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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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 5, *Interoperability, integration, and architectures for enterprise systems and automation applications.*

A list of all parts in the ISO 16400 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.

© ISO 2026 – All rights reserved

Introduction

The ISO 16400 series introduces a concept of an equipment behaviour catalogue (EBC), addresses the requirements of an EBC and proposes requirements and recommendations to generate an executable model representing the dynamic behaviour of a nominal or physical instance of an equipment. Such an executable model plays a vital role when configuring virtual production systems used for simulation and verification of a future process as well as monitoring of a current process. Therefore, EBCs will constitute an important part of the evolution of smart manufacturing.

An EBC enables an efficient and standardized way for a provider of equipment to communicate its dynamic behaviour.

In this document, interfaces of an EBC with production systems engineering and manufacturing operations are defined. This document addresses the usability of the information contained within the EBC, and the enrichment and updating of this information using bi-directional interfaces. The interfaces and elements of the EBC are analysed and related to the main information objects of production companies, using a semantic information model introduced in Annex A. The information model encompasses the production lifecycle, which contains production systems engineering and manufacturing operations. This document embeds the EBC in application context in manufacturing.

© ISO 2026 – All rights reserved

Automation systems and integration — Equipment behaviour catalogues for virtual production systems —

Part 5: Interfaces of an equipment behaviour catalogue with production systems engineering and manufacturing operations

1 Scope

This document specifies the interfaces of an equipment behaviour catalogue (EBC) with production systems engineering and manufacturing operations, facilitating their bi-directional integration by providing technical and contextual information.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 16400-1, *Automation systems and integration — Equipment behaviour catalogues for virtual production system — Part 1: Overview*

ISO 16400-2, *Automation systems and integration — Equipment behaviour catalogues for virtual production systems — Part 2: Formal description of a catalogue template*

ISO 16400-3, *Automation systems and integration — Equipment behaviour catalogues for virtual production system — Part 3: Requirements and recommendations for construction of an equipment instance model*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16400-1, ISO 16400-2, ISO 16400-3 and the following apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
product structure
structure providing a functional classification of all items, parts, components, sub-assemblies and assemblies of a product

[SOURCE: ISO 18828-2:2016, 3.1.9, modified — Note 1 to entry has been deleted.]

© ISO 2026 – All rights reserved

3.2
consumption
act of using resources to satisfy current or future needs and wants

Note 1 to entry: A resource according to IEC 62264-1:2003 is an enterprise entity that provides some or all of the capabilities required by the execution of an enterprise activity and/or business process (e.g. a collection of personnel, *equipment* (3.5), and/or material)

3.3
customer order
order from an in-house customer or a customer external to the company

[SOURCE: DIN EN 14943:2006]

3.4
production planning
process describing the phase between product design and production with the primary application domain in the planning of production systems

3.5
equipment
physical *assets* (3.7) of an enterprise involved in manufacturing

Note 1 to entry: Equipment may be a listing of sites, areas, production units, production lines, work cells, process cells or units.

Note 2 to entry: Equipment may be made up of other equipment. For example, a production line may be made up of work cells.

3.6
cost
monetary value of resources consumed to perform activities

[SOURCE: ISO 14051:2011, 3.1]

3.7
asset
physical or logical object owned by or under the custodial duties of an organization, having either a perceived or actual value to the organization

[SOURCE: IEC 62443-1:2009, 3.2.6]

3.8
production systems engineering
engineering of production systems, following the *reference planning process* (3.9) defined in ISO 18828-2

Note 1 to entry: The ISO 18828 series addresses standardized procedures for production systems engineering. Focusing the *production planning* (3.4), it provides a framework which approaches aspects such as production processes, information flows, key performance indicators (KPIs) and manufacturing changes.

3.9
reference planning process
process from the initial product definition to delivery of the last work plan in series planning

Note 1 to entry: The reference planning process does not include production control.

Note 2 to entry: The initial product definition usually corresponds to the end of the concept phase.

[SOURCE: ISO 18828-2:2016, 3.1.10]

© ISO 2026 – All rights reserved

3.10
manufacturing operations
execution of manufacturing processes as well as supporting activities

Note 1 to entry: The term of manufacturing operations relates to the IEC 62264 series, that provides standards for the manufacturing operations management (MOM). The MOM includes activities within Level 3 of a manufacturing facility that coordinate, direct, manage and track the personnel, *equipment* (3.5) and materials in manufacturing. IEC 62264-3 details MOM in terms of four categories (production operations management, maintenance operations management, quality operations management and inventory operations management) and provides references for other enterprise activities affecting manufacturing operations.

3.11
information model
formal model of information

Note 1 to entry: In ISO 10303, an information model is based on the object-relationship modelling technique that organizes the product data as represented in different system aspects.

Note 2 to entry: In ISO 10303, information models are developed using EXPRESS or SysML.

[SOURCE: ISO 10303-2:2024, 3.1.228, modified — Note 1 to entry revised, Example removed.]

3.12
information object
well-defined piece of information, definition, or specification which requires a name in order to identify its use in communication

[SOURCE: ISO 10159:2011, 3.1.1]

3.13
smart manufacturing
manufacturing that improves its performance aspects with integrated and intelligent use of processes and resources in cyber, physical and human spheres to create and deliver products and services, which also collaborates with other domains within enterprises' value chains

Note 1 to entry: Performance aspects include agility, efficiency, safety, security, sustainability or any other performance indicators identified by the enterprise.

Note 2 to entry: In addition to manufacturing, other enterprise domains can include engineering, logistics, marketing, procurement, sales or any other domains identified by the enterprise.

[SOURCE: ISO/TR 22100-4:2018, 3.16]

3.14
EBC element
element of an EBC according to the structure of EBC templates

Note 1 to entry: The formal structure of EBC templates is standardized in ISO 16400-2.

4 Abbreviated terms

AutomationML	Automation Markup Language
CAD	computer aided design
CNC	computer numerical control
EBC	equipment behaviour catalogue
EBOM	engineering bill of materials
ID	identifier

© ISO 2026 – All rights reserved