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First edition
2004-07

Enterprise-control system integration –

Part 2: Object model attributes

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ENTERPRISE-CONTROL SYSTEM INTEGRATION –

Part 2: Object model attributes

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International Standard IEC 62264-2 has been prepared by subcommittee 65A: System aspects, of IEC technical committee 65: Industrial-process measurement and control, and ISO SC5, JWG 15, of ISO technical committee 184: Enterprise-control system integration.

It is published as double logo standard.

This standard is based upon ANSI/ISA-95.00.02-2001, Enterprise-Control System Integration, Part 2: Object Model Attributes. It is used with permission of the copyright holder, the Instrumentation, Systems and Automation Society (ISA)¹. ISA encourages the use and application of its industry standards on a global basis.

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This standard was submitted to the National Committees for voting under the Fast Track Procedure as the following documents:

FDIS	Report on voting
65A/408/FDIS	65A/416/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table. In ISO, the standard has been approved by 10 P members out of 11 having cast a vote.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

IEC 62264 consists of the following parts under the general title *Enterprise-control system integration*:

Part 1: Models and terminology

Part 2: Object model attributes

Part 3: Models of manufacturing operations

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

A bilingual version may be issued at a later date.

INTRODUCTION

IEC 62264 is a multi-part standard that defines the interface content between enterprise activities and control activities. This part of IEC 62264 provides the definitions of the attributes of the object models in IEC 62264-1.

IEC 62264 defines object models of exchanged information between enterprise systems and control systems. This part of IEC 62264 adds details to the object models through the definition of attributes, so that implementable interfaces may be constructed. IEC 62264 does not define models of enterprise objects or control objects.

The area of concern of this standard is strongly related to the ISO/TC 184 (Industrial automation systems and integration) scope. Nevertheless the objectives and approaches are completely different and complementary. Relevant TC184 standards or work in progress address the modeling of enterprise and/or the modeling of enterprise objects whereas this standard specifies the content of interfaces between control functions and enterprise functions. The functions may be precisely modeled with TC184 standards. See ISO/IEC 62264-1 Annex A for further details.

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ENTERPRISE-CONTROL SYSTEM INTEGRATION –

Part 2: Object model attributes

1 Scope

This part of IEC 62264, in conjunction with IEC 62264-1, specifies generic interface content between manufacturing control functions and other enterprise functions. The interfaces considered are the interfaces between Levels 3 and 4 of the hierarchical model defined in IEC 62264-1. The goal is to reduce the risk, cost, and errors associated with implementing these interfaces.

Since IEC 62264 covers many domains, and there are many different standards in those domains, the semantics of this Standard are described at a level intended to enable the other standards to be mapped to these semantics. To this end, this Standard defines a set of generic interfaces content elements, together with a mechanism for extending those elements for implementations.

The scope of this part of IEC 62264 is limited to the definition of attributes of the IEC 62264-1 object models.

This part of IEC 62264 does not define attributes to represent the object relationships defined in IEC 62264-1.

2 Normative references

The following referenced documents are indispensable for the application 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.

IEC 62264-1, *Enterprise-Control System Integration – Part 1: Models and terminology*

ISO 10303-1:1994, *Industrial automation systems and integration – Product data representation and exchange – Part 1: Overview and fundamental principles*

ISO 15704:2000, *Industrial automation systems – Requirements for enterprise-reference architectures and methodologies*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in IEC 62264-1 as well as the following apply.

3.1 event

representation of a solicited or unsolicited fact indicating a state change in the enterprise

3.2

product

the desired output or by-product of the processes of an enterprise

NOTE 1 A product may be an intermediate product or end product from a business perspective.

NOTE 2 Also defined in ISO 10303-1 as: 'a substance produced by a natural or artificial process'.

3.3

property

object denoting an implementation specific characteristic of an entity

4 Object model attributes

4.1 General

This clause describes the attributes associated with the objects listed in IEC 62264-1.

Tables 3 to 88 in Clause 4 define the attributes of objects defined in IEC 62264-1, Clause 7. The attributes are an extension to the object information model presented in IEC 62264-1 and are thus a part of the definition of terms. The attributes of this part of IEC 62264 and the object models of IEC 62264-1 define interface content for integration of Level 3 and Level 4 enterprise-control systems. See also IEC 62264-1, Clause 7.4.

In this part of IEC 62264, the word "Class" used as part of an object definition name is to be considered as a category, not as a "Class" in the object-oriented sense.

EXAMPLE "Personnel class" is to be considered a "personnel category", in the sense of distinguishing between the kinds of personnel in the real world.

A minimum set of industry-independent information has been defined, in this part of IEC 62264, as attributes. However, values for all attributes may not be required depending on the actual usage of the models. If additional information, including industry- and application-specific information, is needed, it shall be represented as property objects. This mechanism is the extension capability referenced in Clause 1. This solution increases the usability through the use of standard attributes, and allows flexibility and extensibility through the use of properties. This was done to make the standard as widely applicable as possible.

4.2 Attribute extensibility

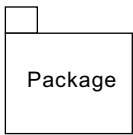
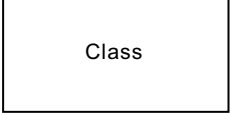
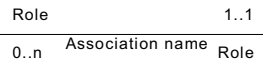
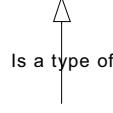
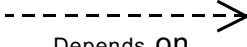
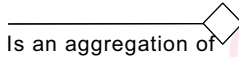
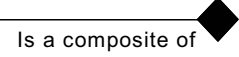
For particular applications, the objects defined in the object models will need to be extended through the addition of attributes to object class definitions. Accordingly, this part of IEC 62264 provides for attributes that are application or industry specific, to be modeled in terms of properties and represented in property classes in the model. For example, the personnel class property would be used to define application or industry specific attributes for personnel classes, and person property would be used to contain instance values for the properties.

4.3 Object model structure

The object models are depicted using the Unified Modelling Language (UML) notational methodology.

Table 1 defines the UML notations used in the object diagrams.

Table 1 – UML notation used

Symbol	Definition
 Package	Defines a package, a collection of object models, state models, use classes, and other UML models. In this document a package is used to specify an external model, such as a production rule model, or a reference to another part of the model.
 Class	Defines a class of objects, each with the same types of attributes. Each object is uniquely identifiable or enumerable. No operations or methods are listed for the classes. Attributes with a “ - ” before their name indicate attributes that are generally optional in any use of the class.
 Role 1..1 0..n Association name Role	An association between elements of a class and elements of another or the same class. Each association is identified. May have the expected number or range of members of the subclass, when ‘n’ indicates an indeterminate number. For example, 0,n means that zero or more members of the subclass may exist.
 Is a type of	Generalization (arrow points to the super class) shows that an element of the class is a specialized type of the super class.
 Depends ON	Dependence is a weak association that shows that a modelling element depends on another modelling element. The item at the tail depends on the item at the head of the relationship.
 Is an aggregation of	Aggregation (made up of) shows that an element of the class is made up of elements of other classes.
 Is a composite of	Composite shows a strong form of aggregation, which requires that a part instance be included in at most one composite at a time and that the composite object has sole responsibility for disposition of its parts.

4.4 Explanation of tables

4.4.1 Tables of attributes

This subclause gives the meaning of the attribute tables. This includes a listing of the object identification, data types, and presentation of the examples in the tables.

4.4.2 Object identification

Many objects in the information model require unique identifications (IDs). These IDs shall be unique within the scope of the exchanged information. This may require translations:

- from the internal ID of the source system to the interface content ID;
- from the interface content ID to the internal ID of the target system.

EXAMPLE A unit may be identified as “X6777” in the interface content, as resource “R100011” in the business system, and as “East Side Reactor” in the control system.

A unique identification set shall be agreed to in order to exchange information.

The object IDs are used only to identify objects within related exchanged information sets. The object ID attributes are not global object IDs or database index attributes.