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Ersatz für
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Siehe jedoch Beginn der
Gültigkeit

**Integration von Unternehmensführungs- und Leitsystemen –
Teil 2: Attribute des Objektmodells (IEC 62264-2:2004);
Englische Fassung EN 62264-2:2008**

Enterprise-control system integration –
Part 2: Object model attributes (IEC 62264-2:2004);
English version EN 62264-2:2008

Intégration des systèmes entreprise-contrôle –
Partie 2: Attributs pour les modèles d'objets (CEI 62264-2:2004);
Version anglais EN 62264-2:2008

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Beginn der Gültigkeit

Die von CENELEC am 2007-12-01 angenommene EN 62264-2 gilt als DIN-Norm ab 2008-07-01.

Nationales Vorwort

Vorausgegangener Norm-Entwurf: E DIN IEC 62264-2:2003-09.

Für diese Norm ist das nationale Arbeitsgremium K 931 „Systemaspekte“ der DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE (www.dke.de) zuständig.

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Änderungen

Gegenüber DIN EN 62264-2:2008-05 wurden folgende Korrekturen vorgenommen:

- a) Bildbeschriftungen sind geändert worden.

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DIN EN 62264-2: 2008-05

Integration von Unternehmensführungs- und Leitsystemen –
Teil 2: Attribute des Objektmodells
(IEC 62264-2:2004)

Enterprise-control system integration –
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(IEC 62264-2:2004)

Intégration des systèmes entreprise-contrôle –
Partie 2: Attributs pour les modèles d'objets
(CEI 62264-2:2004)

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Vorwort

Der Text der Internationalen Norm IEC 62264-2:2004, ausgearbeitet von dem SC 65A „System aspects“ des IEC/TC 65 „Industrial-process measurement, control and automation“ und dem ISO/TC 184/SC 5/JWG 15 „Enterprise-control system integration“, wurde dem Einstufigen Annahmeverfahren unterworfen und von CENELEC am 2007-12-01 ohne irgendeine Abänderung als EN 62264-2 angenommen.

Nachstehende Daten wurden festgelegt:

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Der Anhang ZA wurde von CENELEC hinzugefügt.

Anerkennungsnotiz

Der Text der Internationalen Norm IEC 62264-2:2004 wurde von CENELEC ohne irgendeine Abänderung als Europäische Norm angenommen.

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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 TC 184 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 TC 184 standards. See ISO/IEC 62264-1 Annex A for further details.

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 purposes 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, 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

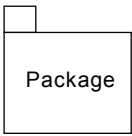
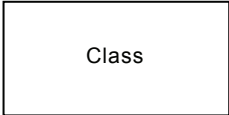
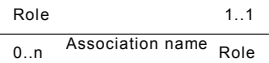
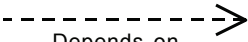
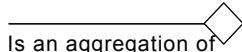
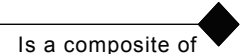
For particular applications, the objects defined in the object models will need to be extended through the addition of attributes to object class definitions. Accordingly, this part of IEC 62264 provides for attributes that are application or industry specific, to be modeled in terms of properties and 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.

Generally, objects that are elements of aggregations, and are not referenced elsewhere in the model, do not require unique IDs.

4.4.3 Data types

The attributes presented are abstract representations, without any specific data type specified. A specific implementation will show how the information is represented.

Example 1 An attribute may be represented as a string in one implementation and as a numeric value in another implementation.

Example 2 A date/time value may be represented in ISO standard format in one implementation and in Julian calendar format in another.

Example 3 A relationship may be represented by two fields (type and key) in database tables or by a specific tag in XML.

4.4.4 Presentation of examples

Examples are included with each attribute given. Where multiple examples are used, there are multiple rows in the right hand column. See Table 2 below for how the example rows and columns are used.

Table 2 – Example table

Attribute name	Description	Examples
Name of first attribute	Description of first attribute	Example #1 for first attribute
		Example #2 for first attribute
		Example #3 for first attribute
Name of second attribute	Description of second attribute	Example #1 for second attribute
		Example #2 for second attribute
		Example #3 for second attribute
Name of third attribute	Description of third attribute	Example #1 for third attribute
		Example #2 for third attribute
		Example #3 for third attribute

When an example value is a set of values, or a member of a set of values, the set of values is given within a set of braces, {}.

The examples are purely fictional. They are provided to further describe attributes in the model. No attempt was made to make the examples complete or representative of any manufacturing enterprise.

4.4.5 Data relationships

The models used to document a reference to a resource, in another package, using the class or instance, with additional optional specification using properties, are not fully illustrated in the IEC 62264-1 object model figures. This relationship does not conform to the Unified Modeling Language (UML) modeling methodology, but was done to keep the diagrams simpler. Figure 1 illustrates how it is currently presented, on the left side, and how it could be more accurately modeled in UML on the right side. UML was used in this standard as a visualization method and not meant to describe implementations. The simplified relationship diagram method is used for the following objects and their relationship to another package:

Personnel capability
Material capability
Equipment segment capability
Personnel segment specification
Material segment specification
Equipment specification
Personnel requirement
Material produced requirement
Consumable expected
Equipment actual
Material consumed actual

Equipment capability
Personnel segment capability
Material segment capability
Equipment segment specification
Personnel specification
Material specification
Equipment requirement
Material consumed requirement
Personnel actual
Material produced actual
Consumable actual

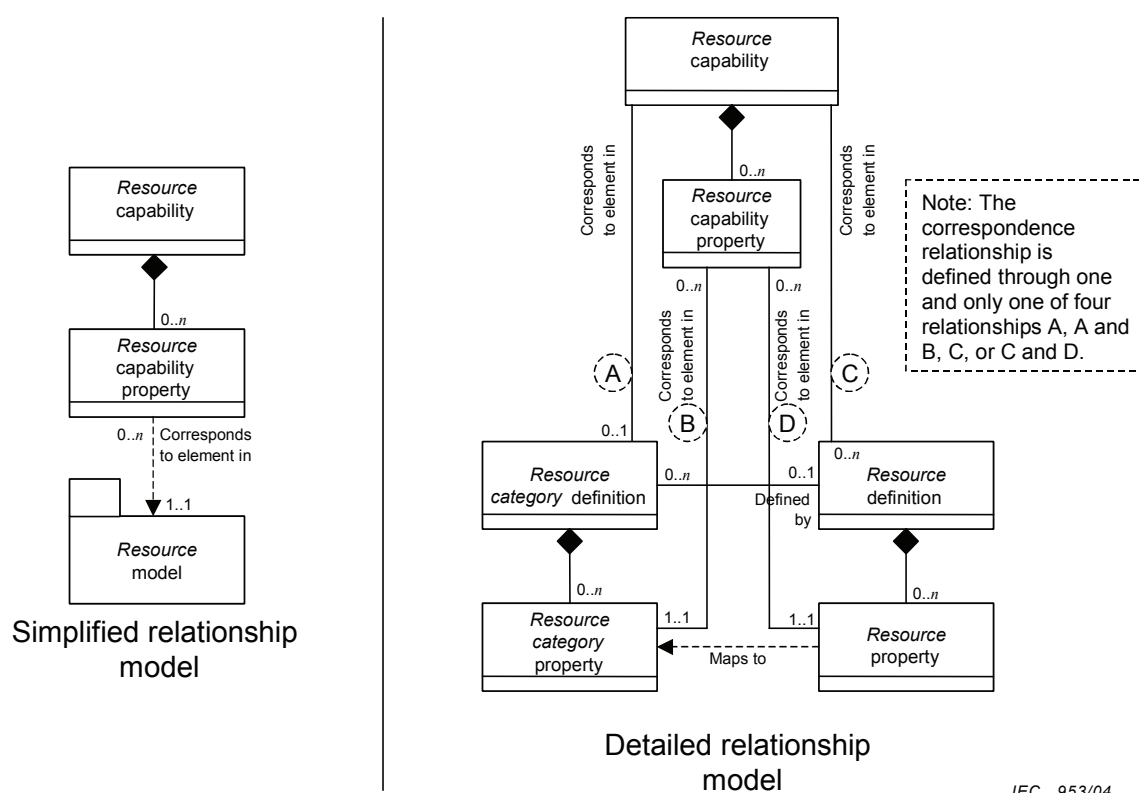


Figure 1 – Detailed relationship models

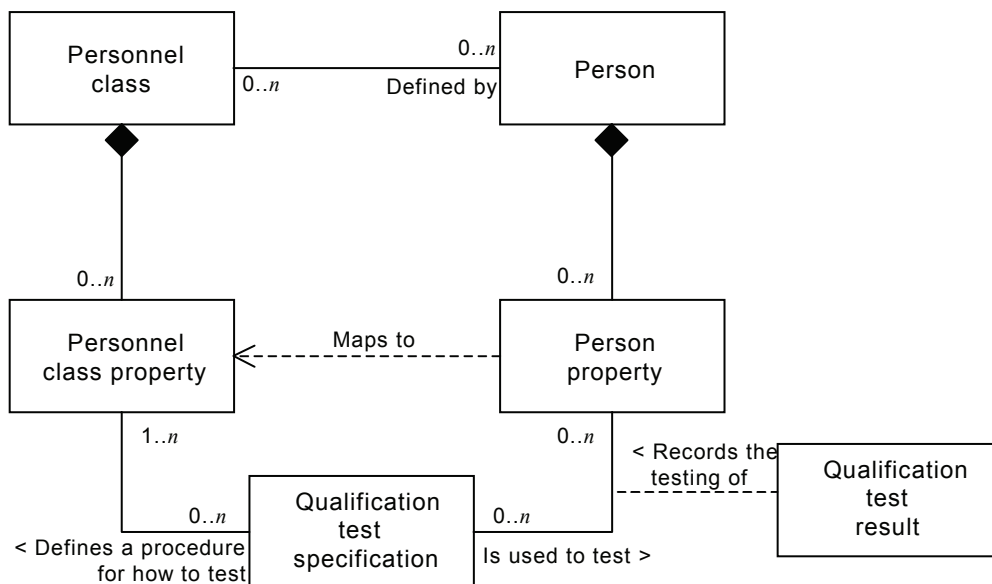
The correspondence relationship is determined through one and only one of four possible relationships: to the *resource category definition*; to the *resource category definition* and *resource category property*; to the *resource definition*; or to the *resource definition* and *resource property*.

In the model above, the term *resource category* indicates: personnel class, equipment class, material class, and material definitions. The term *resource* indicates: person, equipment, material lot, and material subplot. The term *resource capability* indicates the use in the capability model, the process segment capability model, the process segment model, the product definition model, the production schedule model, and the production performance model.

4.5 Personnel

4.5.1 Personnel model

The personnel model contains the information about specific personnel, classes of personnel, and qualifications of personnel. Figure 2 is a modified copy of Figure 14 in Part 1. This corresponds to a resource model for personnel, as given in ISO 15704.



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Figure 2 – Personnel model

4.5.2 Personnel class

Table 3 lists the attributes of *personnel class*.

Table 3 – Attributes of personnel class

Attribute name	Description	Example
ID	A unique identification of a specific <i>personnel class</i> . These are not necessarily job titles, but identify classes that are referenced in other parts of the model.	Widget assembly operator
Description	Additional information and description about the <i>personnel class</i> .	"General information about widget assembly operators."

4.5.3 Personnel class property

Table 4 lists the attributes of *personnel class property*.

Table 4 – Attributes of personnel class property

Attribute name	Description	Examples
ID	An identification of the specific property, unique under the scope of the parent <i>personnel class</i> object. For example, the property “ <i>has class 1 safety training</i> ” (with values of <i>yes</i> or <i>no</i>) may be defined under several different <i>personnel class</i> definitions, such as <i>fork lift operator</i> and <i>pipe fitter</i> classes, but has a different meaning for each class.	Class 1 certified
		Night shift available
		Monthly exposure hours maximum
Description	Additional information and description about the <i>personnel class property</i> .	“Indicates the certification level of the operator.”
		“Indicates if operator is available for night shift.”
		“Indicates the maximum monthly exposure hours that can be used.”
Value	The value, set of values, or range of the property. This presents a range of possible numeric values, a list of possible values, or it may be empty if any value is valid.	{True, False}
		{True, False}
		[0..20]
Value unit of measure	The unit of measure of the associated property values, if applicable.	Boolean
		Boolean
		h

4.5.4 Person

A person is a representation of a specifically identified individual. A person may be a member of zero or more personnel classes. Table 5 lists the attributes of *person*.

Table 5 – Attributes of person

Attribute name	Description	Examples
ID	A unique identification of a specific person, within the scope of the information exchanged (<i>production capability</i> , <i>production schedule</i> , <i>production performance</i> , etc.). The ID shall be used in other parts of the model when the <i>person</i> needs to be identified, such as the <i>production capability</i> for this person, or a <i>production response</i> identifying the person.	999-123-4567
		Jane W Smith – #2
		Employee 23
Description	Additional information about the resource.	“Person information”
		“Person information”
		“Person information”
Name	The name of the individual. This is meant as an additional identification of the resource, but only as information and not as a unique value.	Joe Smith III
		Jane
		Bubba

4.5.5 Person property

Table 6 lists the attributes of *person property*.

Table 6 – Attributes of person property

Attribute name	Description	Examples
ID	An identification of the specific property.	Class 1 certified
		Exposure hours available
		Pager number
Description	Additional information about the <i>person property</i> .	"Indicates if the person is class 1 certified widget assembly operator"
		"Indicates number of exposure hours available this month"
		"Pager number"
Value	The value, set of values, or range of the property. The value(s) is assumed to be within the range or set of defined values for the related <i>personnel class property</i> .	True
		4
		800-555-1212
Value unit of measure	The unit of measure of the associated property value, if applicable.	Boolean
		h
		Phone number

4.5.6 Qualification test specification

Table 7 lists the attributes of *qualification test specification*.

Table 7 – Attributes of qualification test specification

Attribute name	Description	Example
Name	An identification of a test for certifying one or more values for one or more <i>person properties</i> . For example, this may be the name of a document that describes or defines the qualification test.	Class 1 widget assembly certification test
Description	Additional information and description about the <i>qualification test specification</i> .	"Identifies the test for class 1 widget assembly certification – returns a true or false value for the <i>class 1 widget assembly certification property</i> "
Version	An identification of the version of the qualification test specification. In cases where there are multiple versions of a qualification test specification, then the version attribute shall contain the additional identification information to differentiate each version.	V23

4.5.7 Qualification test result

Table 8 lists the attributes of *qualification test result*.

Table 8 – Attributes of qualification test result

Attribute name	Description	Example
ID	A unique instance identification that records the results from the execution of a test identified in a <i>qualification test specification</i> for a specific <i>person</i> . (For example, this may just be a number assigned by the testing authority.)	T5568700827
Description	Additional information and description about the <i>qualification test results</i> .	"Results from Joe's widget assembly qualification test for October 1999."
Date	The date and time of the qualification test.	1999-10-25 13:30
Result	The result of the qualification test. For example: pass, fail	Pass
Result unit of measure	The unit of measure of the associated test result, if applicable.	{Pass, fail}
Expiration	The date of the expiration of the qualification.	2000-10-25 13:30

4.6 Equipment

4.6.1 Equipment model

The equipment model contains the information about specific equipment, the classes of equipment, equipment capability tests, and maintenance information associated with equipment. This corresponds to a resource model for equipment, as defined in ISO 15704:2000.

Figure 3 is a modified copy of Figure 15 in Part 1.

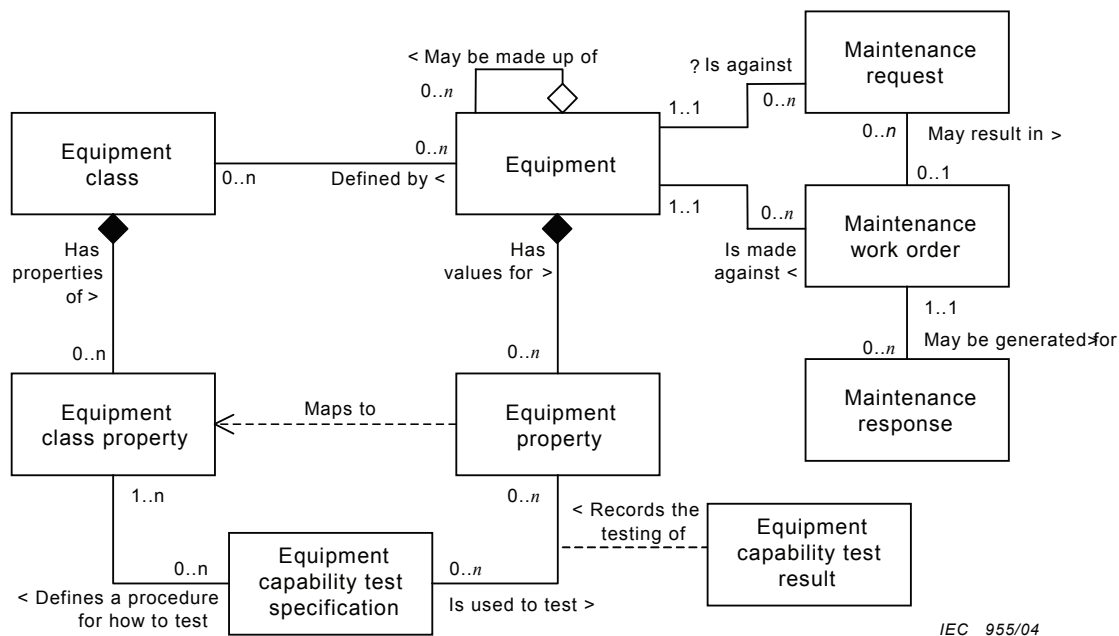


Figure 3 – Equipment model

4.6.2 Equipment class

Table 9 lists the attributes of *equipment class*.

Table 9 – Attributes of equipment class

Attribute name	Description	Example
ID	A unique identification of a specific <i>equipment class</i> , within the scope of the information exchanged (<i>production capability</i> , <i>production schedule</i> , <i>production performance</i> , etc.). The ID shall be used in other parts of the model when the <i>equipment class</i> needs to be identified, such as the <i>production capability</i> for this equipment class, or a <i>production response</i> identifying the equipment class used.	WJ6672892
Description	Additional information about the <i>equipment class</i> .	"Jigs used to assemble widgets."

4.6.3 Equipment class property

Table 10 lists the attributes of *equipment class property*.

Table 10 – Attributes of equipment class property

Attribute name	Description	Examples
ID	An identification of the specific property.	Run rate
		Template size
Description	Additional information about the <i>equipment class property</i> .	"Range of run rate for the widget machines."
		"Range of template sizes for widget machines."
Value	The value, set of values, or range of the property.	{1..100}
		{10,20,30,40,100,200,300}
Value unit of measure	The unit of measure of the associated property value, if applicable.	Widgets/h
		cm

4.6.4 Equipment

Table 11 lists the attributes of *equipment*.

Table 11 – Attributes of equipment

Attribute name	Description	Example
ID	A unique identification of a specific piece of equipment, within the scope of the information exchanged (<i>production capability</i> , <i>production schedule</i> , <i>production performance</i> , etc.). The equipment ID shall be used in other parts of the model when the equipment needs to be identified, such as the <i>production capability</i> for a piece of equipment, or a <i>production response</i> identifying the equipment used.	Jig 347
Description	Additional information about the equipment.	"This is the east side, north building, widget jig."

4.6.5 Equipment property

Table 12 lists the attributes of *equipment property*.

Table 12 – Attributes of equipment property

Attribute name	Description	Examples
ID	An identification of the specific property.	Equipment name
		Run rate
		Template size
Description	Additional information about the <i>equipment property</i> .	"Local name for the widget machine."
		"Widget making average run rate"
		"Widget jig template size."
Value	The value, set of values, or range of the property. The value(s) is assumed to be within the range or set of defined values for the related <i>equipment property</i> .	Big Bertha
		59
		300
Value unit of measure	The unit of measure of the associated property value, if applicable.	[not applicable]
		Widgets/h
		cm

4.6.6 Equipment capability test specification

Table 13 lists the attributes of *equipment capability test specification*.

Table 13 – Attributes of equipment capability test specification

Attribute name	Description	Example
Name	An identification of a test for certifying one or more values for one or more <i>equipment properties</i> . For example, this may be the name of a document that describes or defines the capability test.	WAJTT-101
Description	Additional information about the <i>equipment capability test specification</i> .	"Widget assembly jig throughput test – returns the run rate for a specific machine"
Version	An identification of the version of the capability test specification. In cases where there are multiple versions of an equipment capability test specification, then the version attribute shall contain the additional identification information to differentiate each version.	1.0

4.6.7 Equipment capability test result

Table 14 lists the attributes of *equipment capability test result*.

Table 14 – Attributes of equipment capability test result

Attribute name	Description	Example
ID	A unique instance identification that records the results from the execution of a test identified in a <i>capability test specification</i> for a specific piece of <i>equipment</i> . (For example, this may just be a number assigned by the testing authority.)	FQ101/01-10-2000
Description	Additional information about the <i>equipment capability test result</i> .	"Results from run rate test for JIG 237 for October 1999."
Date	The date and time of the capability test.	1999-10-25 13:30
Result	The result of the capability test.	48
Result unit of measure	The unit of measure of the associated test result, if applicable.	Widgets/h
Expiration	The date of the expiration of the capability.	2000-10-25 13:30

4.6.8 Maintenance request

Table 15 lists the attributes of *maintenance request*.

Table 15 – Attributes of maintenance request

Attribute name	Description	Example
ID	A unique identifier of a specific <i>maintenance request</i> .	MR-1001029928
Problem	A description of the maintenance issue.	"Limit Switch, XS101, failed ON. PLC X24 input forced to OFF."
Requested completion date	Date and time the request is expected to be completed.	2000-03-30 10:00 EST
Requested priority	The initially defined priority of the <i>maintenance request</i> .	High
Requestor	An identification of the person, system, or equipment making the <i>maintenance request</i> .	ID# 236663
Status	The status of <i>maintenance request</i> . For example: submitted, denied, closed, in work, in review.	Submitted
Reviewer	An identification of the person, system, or equipment reviewing the <i>maintenance request</i> .	ID# 236664
Submission date	Date and time of maintenance request submission.	2000-03-28 10:33 EST

4.6.9 Maintenance work order

Table 16 lists the attributes of *maintenance work order*.

Table 16 – Attributes of maintenance work order

Attribute name	Description	Example
ID	A unique identifier of a specific <i>maintenance work order</i> .	WO-1001029928
Planned start	The planned start date and time for the <i>maintenance work order</i> .	2000-03-29 16:00 EST
Planned finish	The planned finish date and time for the <i>maintenance work order</i> .	2000-03-29 18:30 EST
Responsible person	Person or function responsible for work order, or assigned to work.	Second shift maintenance crew
Resources	List of resources needed to perform the work.	{Duct tape, safety glasses, breathing air}
Status	Current status of the work order, for example "in work", "not started", and "assigned".	Assigned

4.6.10 Maintenance response

Table 17 lists the attributes of *maintenance response*.

Table 17 – Attributes of maintenance response

Attribute name	Description	Examples
ID	A unique identifier of a response to a specific <i>maintenance work order</i> .	MR-1001029928-01
		MR-1001029928-02
		MR-1001029928-03
Cause	The diagnosis of the fault or problem, or reason for <i>maintenance work order</i> .	Wet floor
		Bad duct tape
		Preventive maintenance
Correction	The action taken to perform the work.	"Wet floor sign placed on wet area"
		"Duct tape replaced"
		"Filters replaced"
Actual start time	The actual start date and time for the work order.	2000-03-29 16:00 EST
		2000-03-29 16:00 EST
		2000-03-29 16:00 EST
Actual finish time	The actual finish date and time for the work order. Empty if this is a status update response or work is incomplete.	2000-03-31 18:30 EST
		2000-03-31 18:30 EST
Status	Status of the work order as of the current update period.	"In process"
		"Suspended"
		"Completed"
Status time	Time and date stamp for the <i>maintenance response</i> .	2000-03-30 18:30 EST
		2000-03-30 18:30 EST
		2000-03-30 18:30 EST
Responsible person	Person or function responsible for response.	Second shift maintenance crew
		999-12-3456
		Bill

Material

4.6.11 Material model

The material model defines the actual materials, material definitions, and information about classes of material definitions. Material information includes the inventory of raw, finished, and intermediate materials. The current material information is contained in the material lot and material subplot information. Material classes are defined to organize materials. This corresponds to a resource model for material, as defined in ISO 10303.

Figure 4 is a copy of Figure 16 in IEC 62264-1. An additional association is shown between a QA test specification and a material class property.

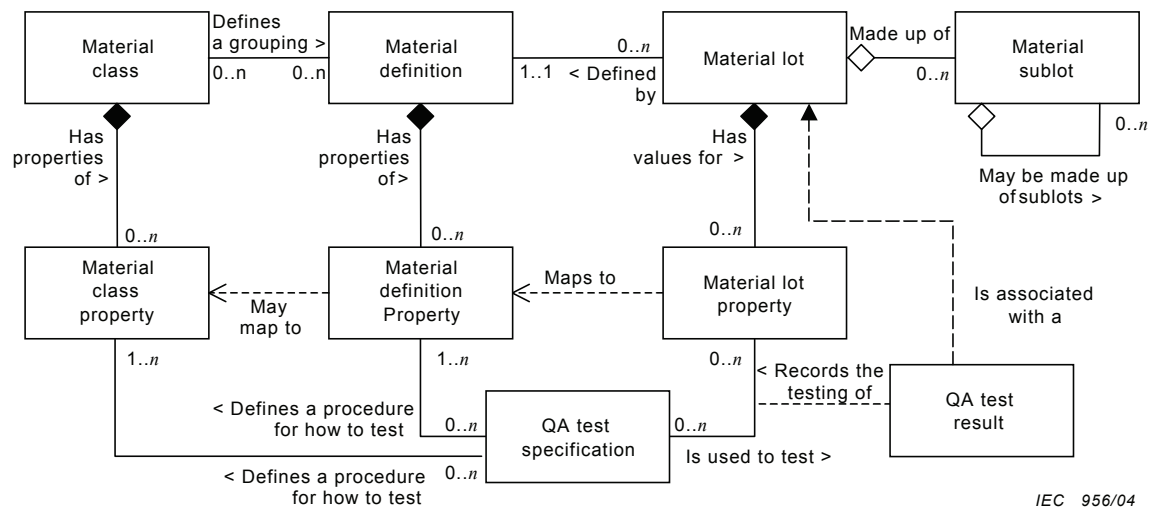


Figure 4 – Material model

4.6.12 Material class

Table 18 lists the attributes of *material class*.

Table 18 – Attributes of material class

Attribute name	Description	Example
ID	A unique identification of a specific <i>material class</i> , within the scope of the information exchanged (<i>production capability</i> , <i>production schedule</i> , <i>production performance</i> , etc.). The ID shall be used in other parts of the model when the <i>material class</i> needs to be identified, such as the <i>production capability</i> for this <i>material class</i> , or a <i>production response</i> identifying the <i>material class</i> used.	Polymer sheet stock 1001A
Description	Additional information about the <i>material class</i> .	"Solid polymer resin"

4.6.13 Material class property

Table 19 lists the attributes of *material class property*.

Table 19 – Attributes of material class property

Attribute name	Description	Example
ID	An identification of a specific <i>material class property</i> .	Polyethylene sheets
Description	Additional information about the <i>material class property</i> .	"Sheet thickness"
Value	The value, set of values, or range of the property.	{5, 10, 25}
Value unit of measure	The unit of measure of the associated property value, if applicable.	mm

4.6.14 Material definition

Table 20 lists the attributes of *material definition*.

Table 20 – Attributes of material definition

Attribute name	Description	Example
ID	A unique identification of a specific <i>material definition</i> , within the scope of the information exchanged (<i>production capability</i> , <i>production schedule</i> , <i>production performance</i> , etc.). The ID shall be used in other parts of the model when the <i>material definition</i> needs to be identified, such as the <i>production capability</i> for this <i>material definition</i> , or a <i>production response</i> identifying the <i>material definition</i> used.	Sheet stock 1443a
Description	Additional information about the <i>material definition</i> .	General purpose sheet stock

4.6.15 Material definition property

Table 21 lists the attributes of *material definition property*.

Table 21 – Attributes of material definition property

Attribute name	Description	Example
ID	An identification of the specific <i>material definition property</i> .	1443a5mm
Description	Additional information about the <i>material definition property</i> .	5 mm sheet
Value	The value, set of values, or range of the property.	5
Value unit of measure	The unit of measure of the associated property value, if applicable.	mm

4.6.16 Material lot

Table 22 lists the attributes of *material lot*.

Table 22 – Attributes of material lot

Attribute name	Description	Example
ID	A unique identification of a specific <i>material lot</i> , within the scope of the information exchanged (<i>production capability</i> , <i>production schedule</i> , <i>production performance</i> , etc.). The ID shall be used in other parts of the model when the <i>material lot</i> needs to be identified, such as the <i>production capability</i> for this <i>material lot</i> , or a <i>production response</i> identifying the <i>material lot</i> used.	L66738-99
Description	Additional information about the material lot.	PlastiFab 10/31 shipment
Status	Status of the <i>material lot</i> . For example, released, approved, blocked, in process, in quality check.	In process

4.6.17 Material lot property

Table 23 lists the attributes of *material lot property*.

Table 23 – Attributes of material lot property

Attribute name	Description	Examples
ID	An identification of the specific <i>material lot property</i> .	Average sheet thickness
		Density
Description	Additional information about the <i>material lot property</i> .	Measured thickness
		Measured density
Value	The value, set of values, or range of the property.	5,002
		34,5
Value unit of measure	The unit of measure of the associated property value, if applicable.	mm
		g/cm ³

4.6.18 Material subplot

Table 24 lists the attributes of *material subplot*.

Table 24 – Attributes of material subplot

Attribute name	Description	Examples
ID	A unique identification of a specific <i>material subplot</i> , within the scope of the information exchanged (<i>production capability</i> , <i>production schedule</i> , <i>production performance</i> , etc.). The ID shall be used in other parts of the model when the <i>material subplot</i> needs to be identified, such as the <i>production capability</i> for this <i>material subplot</i> , or a <i>production response</i> identifying the <i>material subplot</i> used.	1999-10-27-a67-B6653
Description	Additional information about the <i>material subplot</i> .	Pallet 2 of 6
Status	Status of the current <i>material subplot</i> . For example, released, approved, blocked, in process, in quality check.	Released
Storage Location	An identification of the storage location of the <i>material subplot</i> .	"Warehouse 1 Rack 12 Slot 4"
Quantity	The quantity of the <i>material subplot</i> .	40
Quantity Unit of Measure	The unit of measure of the associated quantity, if applicable.	Sheets

4.6.19 QA test specification

Table 25 lists the attributes of *QA test specification*.

Table 25 – Attributes of QA test specification

Attribute name	Description	Example
Name	An identification of a test for certifying one or more values for one or more <i>equipment properties</i> . For example, this may be the name of a document that describes or lists the capability test.	STMT-101
Description	Additional information about the <i>QA Test Specification</i> .	"Sheet thickness measurement test – returns the average sheet thickness based on a sample plan and technique for a specific lot"
Version	An identification of the version of the <i>QA test specification</i> . In cases where there are multiple versions of a QA test specification, then the version attribute shall contain the additional identification information to differentiate each version.	1.0

4.6.20 QA test result

Table 26 lists the attributes of *QA test result*.

Table 26 – Attributes of QA test result

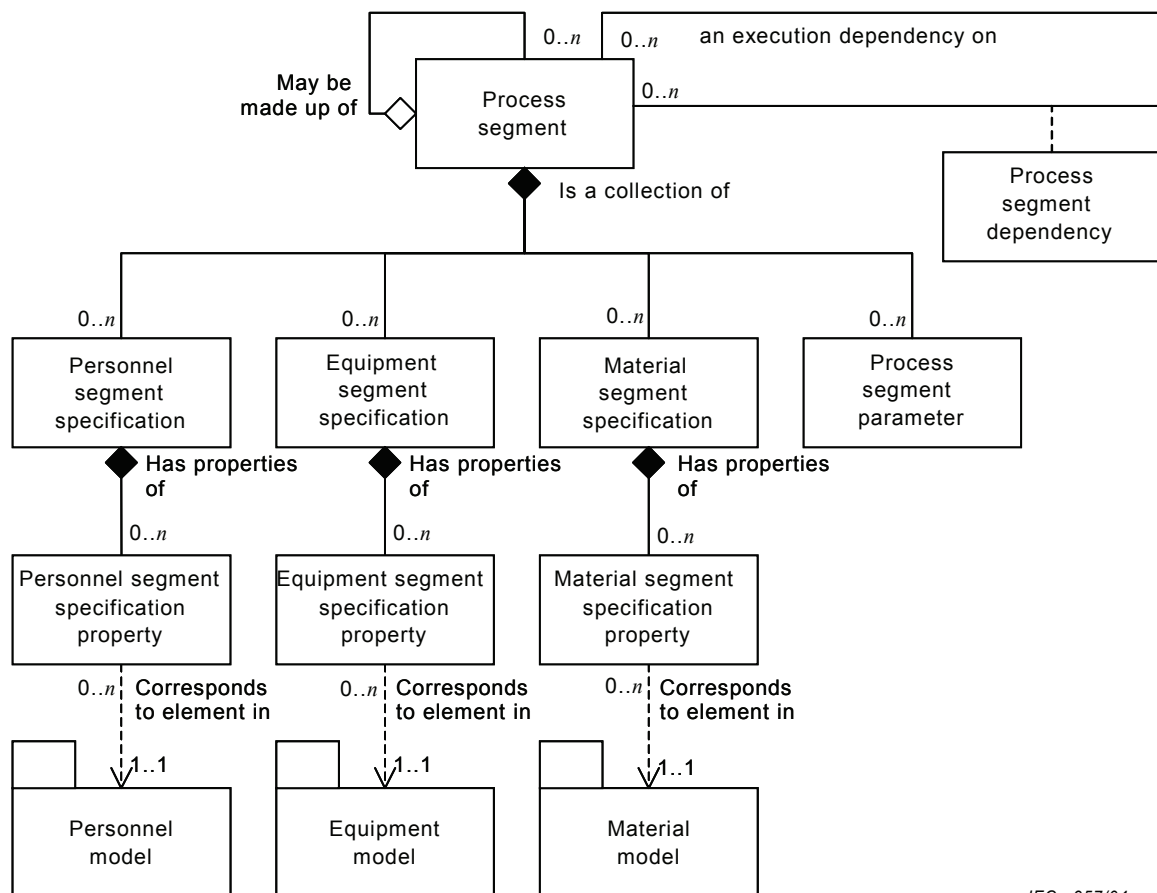
Attribute name	Description	Example
ID	A unique instance identification that records the results from the execution of a test identified in a <i>QA test specification</i> for a lot or subplot. (For example, this may just be a number assigned by the testing authority.)	THK101/01-10-2000
Description	Additional information about the <i>QA Test Result</i> .	"Results from thickness test for PlastiFab lot on 1999-10-25"
Date	The date of the QA test.	1999-10-25 11:30
Result	The value or list of values returned from the performance of the QA test. For example: Pass, Fail, 95, Red, Green.	Pass
Result unit of measure	The unit of measure of the associated test result, if applicable.	{Pass, Fail}
Expiration	The date of the expiration of the test results.	2000-10-25 13:30

4.7 Process segment

4.7.1 Process segment model

A process segment is a logical grouping of personnel resources, equipment resources, and material required to carry out a production step. A process segment defines the needed classes of personnel, equipment, and material, and/or it may define specific resources, such as specific equipment needed. A process segment may define the quantity of the resource needed.

Figure 5 is a copy of Figure 17 in IEC 62264-1, with a clarification of the relationship to the personnel, equipment, and material models, and with an additional object to contain the *process segment dependency*.



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Figure 5 – Process segment model

4.7.2 Process segment

Table 27 lists the attributes of *process segment*.

Table 27 – Attributes of process segment

Attribute name	Description	Examples
ID	A unique identification of a <i>process segment</i> , within the scope of the information exchanged (<i>production capability</i> , <i>production schedule</i> , <i>production performance</i> etc.) The ID shall be used in other parts of the model when the <i>process segment</i> needs to be identified, such as the <i>production capability</i> for this segment, or a <i>production response</i> identifying the segment.	Frame milling
		Top assembly
		Polish and paint
Description	Additional information about the <i>process segment</i> .	"Frame milling operation, separately costed operation"
		"Top assembly operation, separately costed operation"
		"Polish and paint operation"
Location	An identification of the associated element of the equipment hierarchy model. Optionally lists the scope of the process segment definition, such as the site or area it is defined for.	South shore production line
		East wing manufacturing line #2
		East wing manufacturing line #3
Element Type	A definition of the type of the associated element of the equipment hierarchy model.	Site
		Production line
		Production line
Duration	Duration of process segment, if known.	25
		2
		0,85
Duration unit of measure	The units of measure of the duration, if specified.	min
		h
		Days

4.7.3 Personnel segment specification

Table 28 lists the attributes of *personnel segment specification*.

Table 28 – Attributes of personnel segment specification

Attribute name	Description	Example
Personnel class	Identifies the associated <i>personnel class</i> or set of <i>personnel classes</i> of the specification for a specific <i>process segment</i> .	Milling machine operator
Person	Identifies the associated <i>person</i> or set of <i>persons</i> of the specification for a specific <i>process segment</i> .	{999-55-1212, 999-55-1234, 999-55-4567}
Description	Contains additional information and descriptions of the <i>personnel segment specification</i> definition.	"Lists the time for journeyman milling machine operators for each widget frame milling process segment."
Quantity	Specifies the personnel resource required for the parent <i>process segment</i> , if applicable.	1,3
Quantity unit of measure	The unit of measure of the associated quantity, if applicable.	h/piece

4.7.4 Personnel segment specification property

Table 29 lists the attributes of *personnel segment specification property*.

Table 29 – Attributes of personnel segment specification property

Attribute name	Description	Example
Property Name	An identification of a property of the associated <i>personnel segment specification</i> .	Height
Description	Contains additional information and descriptions of the <i>personnel segment specification property</i> definition.	"Lists the required minimum height of a milling machine operator."
Value	The value, set of values, or range of the property.	150
Value unit of measure	The unit of measure of the associated property value, if applicable.	cm
Quantity	Specifies the personnel resource required for the parent <i>process segment</i> , if applicable.	1,3
Quantity unit of measure	The unit of measure of the associated quantity, if applicable.	h/piece

4.7.5 Equipment segment specification

Table 30 lists the attributes of *equipment segment specification*.

Table 30 – Attributes of equipment segment specification

Attribute name	Description	Example
Equipment class	Identifies the associated <i>equipment class</i> or set of <i>equipment classes</i> of the capability for a specific <i>process segment</i> .	Milling machine
Equipment	Identifies the associated <i>equipment</i> or set of <i>equipment</i> of the capability for a specific <i>process segment</i> .	{Mill 15, Mill 16, Mill 19}
Description	Contains additional information and descriptions of the <i>equipment segment specification</i> definition.	"Equipment needed for widget milling process segment"
Quantity	Specifies the amount of resources required for the parent <i>process segment</i> , if applicable.	1,3
Quantity unit of measure	The unit of measure of the associated quantity, if applicable.	Machine h/piece