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Meritve, krmiljenje in avtomatizacija v industrijskih procesih - Digitalni tovarniški okvir - 1.del: Splošna načela

Industrial-process measurement, control and automation - Digital factory framework - Part 1: General principles

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IEC TC 65 : INDUSTRIAL-PROCESS MEASUREMENT, CONTROL AND AUTOMATION	
SECRETARIAT:	SECRETARY:
France	Mr Rudy BELLIARDI
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD:
SC 3D,SC 65E,SyC SM	☐
	Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

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TITLE:

Industrial-process measurement, control and automation - Digital factory framework - Part 1: General principles

PROPOSED STABILITY DATE: 2024

NOTE FROM TC/SC OFFICERS:

CONTENTS

1 # INTERNATIONAL ELECTROTECHNICAL COMMISSION

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3

4 ## INDUSTRIAL-PROCESS MEASUREMENT, CONTROL
5 ## AND AUTOMATION – DIGITAL FACTORY FRAMEWORK –

6

7 ## Part 1: General principles

8

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41 International Standard IEC 62832-1 has been prepared by IEC technical committee 65:
42 Industrial-process measurement, control and automation.

43 This first edition cancels and replaces the first edition of IEC TS 62832-1 published in 2016.
44 This edition constitutes a technical revision.

45 This edition includes the following significant technical changes with respect to the previous
46 Technical Specification:

47 • correction of terms and definition of additional terms (clause 3);

48 • correction of description of header;

49 • moved UML diagram to IEC 62832-2.

50   The text of this International Standard is based on the following documents:

FDIS	Report on voting
65/XX/FDIS	65/XX/RVD

51

52   Full information on the voting for the approval of this International Standard can be found in the
53   report on voting indicated in the above table.

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

55   A list of all parts in the IEC 62832 series, published under the general title, *Industrial-process*
56   *measurement, control and automation – Digital factory framework* can be found on the IEC
57   website.

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

61   •   reconfirmed,

62   •   withdrawn,

63   •   replaced by a revised edition, or

64   •   amended.

65

66   The National Committees are requested to note that for this publication the stability date
67   is 2024

68   THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED
69   AT THE PUBLICATION STAGE.

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that it contains colours which are considered to be useful for the correct understanding
of its contents. Users should therefore print this document using a colour printer.

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INTRODUCTION

0.1 Market demand and situation

High performance, flexible dynamic processes, and agile machines and production systems are essential to meet the demands for quality, delivery and cost of the products. This results in an increased complexity of the plant life cycle. In addition, all existing information of a product or a production system is described and modified through the whole life cycle of a product or production system, for example during the planning, development process, and operation. This situation spurs the enterprise to exchange product and production system data in electronic form.

However, each enterprise and each department inside the enterprise describes their products and production systems according to their own data management schemes, often using different terms, structures, and media.

EXAMPLE   Examples for data management schemes are paper-based, databases, disks, e-catalogues, cloud.

Therefore, no seamless information exchange can be found between all the actors involved in the life cycles of both products and production systems.

Efficient exchange of data between and within enterprises can only be performed if syntax (format) and semantics (meaning) of the information has been defined in a unanimous and shared manner.

0.2 History of standardization in this area

Earlier work started with the initial objective to replace paper data sheets with an electronic description of electronic components used in products, and to use it in software tools for electronic wiring and assembly (for example, when designing electronic boards).

Additionally, concepts were developed for profiling of devices used in production systems, in order to describe parameters and behavioural aspects to facilitate integration and reduce engineering costs, providing guides for standards developers.

NOTE 1   See Device Profile Guideline (IEC TR 62390).

IEC 61987-10 made an important step toward this objective by defining fundamentals that aim at describing devices used in production systems by creating lists of properties (LOPs). The properties themselves are compiled into blocks that describe given features of a device. Further parts of IEC 61987 and other related standards (e.g. IEC 62683) define reference LOPs for electronic/electric components and materials used in electro-technical equipment and systems, such as equipment for measuring flows, pressures, temperatures, levels and densities.

NOTE 2   Although the title of IEC 62683 is "Low-voltage switchgear and controlgear – Product data and properties for information exchange", the intent of IEC 62832 is to use the information exchange for interoperability in describing devices that are used in production systems.

IEC 61360-1, IEC 61360-2 and ISO 13584-42 specify the principles to be used for defining characterization classes of parts and their properties. As a result, a database was developed, also named IEC Common Data Dictionary (IEC CDD), which contains the reference collection of classes and associated properties. ISO 22745 specifies open technical dictionaries (OTDs) and their application to master data. ISO/IEC Guide 77 provides recommendations for the description of products and their properties for the creation of these classes, catalogues and reference dictionaries.

NOTE 3   ISO/IEC Guide 77 uses the term "product". It is taken to include devices, processes, systems, installations, etc.

117 ISO 15704 specifies requirements of enterprise reference architectures and methodologies for
118 supporting the applications in terms of the interoperability, the integration, and the architectures
119 of the applications throughout the life cycle and supply chain aspects of the systems.

120 A number of efforts have addressed the development of business and manufacturing enterprise
121 models to aid in understanding of different aspects of the enterprise to realize improvements in
122 enterprise operations. Additionally, models for enterprise and control systems have been
123 developed to support the production operations, but gaps remain in development of models to
124 bridge from the manufacturing system design environments to the manufacturing operation
125 environments, in terms of sharing information of the process, equipment, and devices.

126 NOTE 4 IEC 62264 defines models of functions in the manufacturing and control domains and information
127 exchanged with the enterprise domain.

128 **0.3 Purpose and benefits of IEC 62832**

129 While the standards mentioned above provide a method for describing properties of a given
130 device, IEC 62832 extends this method by defining a reference model for the representation of
131 production systems, which include the devices.

132 In order to manage a production system effectively throughout its life cycle, it is very important
133 to have its digital representation and to maintain the contents appropriately in response to its
134 evolution in its life cycle. Activities related to the production system will access, update, and
135 use the contents of digital representation in order to support the whole life cycle of the
136 production system. This digital representation provides a consistent information interchange
137 between all processes and partners involved and makes related information understandable,
138 reusable and changeable through the entire production system life cycle.

139 Dictionaries and models can help to establish such digital representation by providing
140 descriptions of elements, such as equipment and devices, of the production system. However,
141 additional information is needed in order to achieve the intended digital representation of
142 production systems, such as descriptions of relationship between the elements.

143 IEC 62832 provides a framework used for establishing and maintaining the digital
144 representations of production systems, including the elements, relationships between these
145 elements and the exchange of information about these elements.

146 The framework aims at reducing the interoperability barriers for exchange of information for the
147 various activities related to production systems. The main advantages of this method are that
148 all information related to a production system is described in a standardized manner, and it can
149 be used and modified through its entire life cycle. The method defined in IEC 62832 is kept as
150 generic as possible in order to enable its use in several industrial sectors.

151 NOTE Enterprise modelling concepts are described in standards referenced in the Bibliography (for example
152 ISO 15704, ISO 11354-1).

153 **0.4 Contents of the IEC 62832 series**

154 The IEC 62832 series consists of multiple parts which provide:

155 • general introduction to the model and principles of the Digital Factory framework (DF
156 framework);

157 • detailed data model for all the model elements of the DF framework;

158 • description of how the DF Framework is used to manage the life cycle of a production
159 system;

160 • description of how data is migrated into the DF framework.

161

162 **INDUSTRIAL-PROCESS MEASUREMENT, CONTROL**
163 **AND AUTOMATION – DIGITAL FACTORY FRAMEWORK –**
164
165 **Part 1: General principles**
166
167
168

169 ## 1 Scope

170 This part of IEC 62832, which is an International Standard, defines the general principles of the
171 Digital Factory framework (DF framework), which is a set of model elements (DF reference
172 model) and rules for modelling production systems.

173 This DF framework defines:

174 • a model of production system assets;

175 • a model of relationships between different production system assets;

176 • the flow of information about production system assets.

177 The DF framework does not cover representation of building construction, input resources (such
178 as raw production material, assembly parts), consumables, work pieces in process, nor end
179 products.

180 It applies to the three types of production processes (continuous control, batch control or
181 discrete control) in any industrial sector (for example aeronautic industries, automotive,
182 chemicals, wood).

183 NOTE This document does not provide an application scenario for descriptions based on ISO 15926, because
184 ISO 15926 uses a different methodology for describing production systems.

185 The representation of a production system according to this document is managed throughout
186 all phases of the production system life cycle (for example design, construction, operation or
187 maintenance). The requirements and specification of software tools supporting the DF
188 framework are out of scope of this document.

189 ## 2 Normative references

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

194 IEC 62832 (all parts), *Industrial-process measurement, control and automation – Digital factory*
195 *framework*

196 ISO/IEC 6523 (all parts), *Information technology – Structure for the identification of*
197 *organizations and organization parts*

198 ISO/IEC 11179-6, *Information technology – Metadata registries (MDR) – Part 6: Registration*

199 ISO TS 29002-5:2009, *Industrial automation systems and integration – Exchange of*
200 *characteristic data – Part 5: Identification scheme*