Industriautomation – Mjukvaror för produktionsstyrning,
egenskaper för systemintegration –
Del 6: Gränssnittstjänster och protokoll för matchande
profiler baserade på strukturer med flera kapacitetsklasser
(ISO 16100-6:2018, IDT)

Industrial automation systems and integration – Manufacturing
software capability profiling for interoperability –
Part 6: Interface services and protocols for matching
profiles based on multiple capability class structures
(ISO 16100-6:2018, IDT)
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Denna standard är framtagen av kommittén för Information och automation i produktlivscykeln, SIS/TK 280.

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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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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.

This second edition cancels and replaces the first edition (ISO 16100-6:2011), of which it constitutes a minor revision. The changes compared to the previous edition are as follows:

— in 5.2 b) 5) and b) 6), changed “a requirement capability profile or a requirement capability profile” to “an MSU capability profile or a requirement capability profile”;
— in 6.2.2.2.2, changed “createTemplate service” in the second sentence to “createProfile service”;
— in Figure 8, NOTE 2, changed “unique template identifiers” to “unique profile identifiers”;
— in 6.2.5, changed “returnTestingResult services” to “returnTestResult services”;
— in 7.3.5, changed “The deleteTemplate service deletes an existing template” to “The deleteProfile service deletes an existing profile”;
— in 7.4.1.2, changed “generates a template” to “generates a CCS”;
— in 7.4.5, changed “deletes an existing template” to “deletes an existing CCS”;
— in Annex A, changed “the class capability model” to “the capability class model”;
— in Annex G, added double quotation marks for object names;

A list of all parts in the ISO 16100 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 motivation for ISO 16100 stems from the industrial and economic environment, in particular:

— a growing base of vendor-specific solutions;
— user difficulties in applying standards;
— need to move to modular sets of system integration tools;
— recognition that application software and the expertise to apply that software are assets of the enterprise.

ISO 16100 is an International Standard for the computer-interpretable and human-readable representation of a capability profile. Its goal is to provide a method to represent the capability of manufacturing application software relative to its role throughout the life cycle of a manufacturing application, independent of a particular system architecture or implementation platform. This can lead to reduced production and information management costs to users and vendors/suppliers of manufacturing applications.

Certain diagrams in this document are constructed following UML conventions. Because not all concepts embodied in these diagrams are explained in the text, some familiarity with UML on the part of the reader is assumed.
Industrial automation systems and integration —
Manufacturing software capability profiling for interoperability —

Part 6:
Interface services and protocols for matching profiles
based on multiple capability class structures

WARNING — This document provides a specification intended to be implemented in software.
Incompatibilities may result in machine-to-machine communication in the case of software
developed on the basis of translations of this document into languages other than the official
ISO languages. Accordingly, any implementations should be developed only on the basis of the
texts in the official ISO languages.

1 Scope

This document defines the detailed interface services and protocols used in a matching method based
on multiple capability class structures. This document also defines a CPTI (Capability Profile Template
Interface) Service Group, an Extended CPI (Capability Profile Interface) Service Group and an Extended
Matcher Interface Service Group, which is extensions of the Type 1, Type 2 and Type 3 services,
respectively, specified in ISO 16100-3:2005,5.4.

This document also defines the CCSI (Capability Class Structure Interface) Service Group, an additional
service group used to create, register, access and modify a capability class structure for the reference

This document also specifies detailed contents of the specific part of a capability profile template

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 16100-1:2009, Industrial automation systems and integration — Manufacturing software capability
profiling for interoperability — Part 1: Framework

ISO 16100-2:2003, Industrial automation systems and integration — Manufacturing software capability
profiling for interoperability — Part 2: Profiling methodology

ISO 16100-3:2005, Industrial automation systems and integration — Manufacturing software capability
profiling for interoperability — Part 3: Interface services, protocols and capability templates

ISO 16100-4:2006, Industrial automation systems and integration — Manufacturing software capability
profiling for interoperability — Part 4: Conformance test methods, criteria and reports

ISO 16100-5:2009, Industrial automation systems and integration — Manufacturing software capability
profiling for interoperability — Part 5: Methodology for profile matching using multiple capability
class structures
3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16100-1, ISO 16100-2, ISO 16100-3, ISO 16100-4, ISO 16100-5 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

3.1 capability class

<software unit capability class> element within the capability profiling method that represents software unit functionality and behaviour with regard to the software unit's role in a manufacturing activity

Note 1 to entry: The role of an MSU changes when used in different manufacturing activities; however, the MSU's corresponding capability class is positioned uniquely in an inheritance structure, but it can assume different positions in an aggregation structure.

Note 2 to entry: In this document, a capability class template is identical to a capability profile template (see ISO 16100-2:2003, 6.3 for requirements for capability templates).

Note 3 to entry: In general, a capability class maps to an activity. The capability class is distinct within a capability inheritance structure and can form a capability aggregation structure with other capability classes.

[source: ISO 16100-2:2003, 3.3, modified — The domain in angle brackets has been added; Note 1, 2 and 3 to entry have been added; the wording "software units role" has been changed to "software unit's role".]

3.2 capability class structure

hierarchy of capability classes

Note 1 to entry: This structure is intended for modeling capability aggregation hierarchies in the target domains of ISO 16100-1:2009, Figure 2.

3.3 capability class structure template

XML schema representing a capability class structure

[source: ISO 16100-5:2009, 3.2, modified — The full form for "XML" has been deleted; the wording "a hierarchy of capability classes" has been changed to "a capability class structure".]

3.4 capability profile template

schema for a manufacturing software capability profile

3.5 extended service interface

set of service access points defined in this document that handle manufacturing domain data, manufacturing domain models, capability class structures, capability profiles and capability profile templates

Note 1 to entry: "Extended" refers to both the services specified in this document and the "basic" services specified in ISO 16100-3.
3.6 
**manufacturing domain data**
information, represented by a UML class, about manufacturing resources, manufacturing activities, or items exchanged among manufacturing resources within a particular manufacturing domain

[SOURCE: ISO 16100-5:2009, 3.3, modified — The wording “unified modeling language (UML) class representing information” has been changed to “information, represented by a UML class”.]

3.7 
**manufacturing domain data template**
XML schema representing a manufacturing domain data

[SOURCE: ISO 16100-5:2009, 3.4, modified — The full form for “XML” has been deleted.]

3.8 
**manufacturing domain model**
particular view of a manufacturing domain, consisting of manufacturing domain data and relationships among them, corresponding to the domain’s applications


3.9 
**parts library**
<manufacturing> collection of part descriptions or catalogue

Note 1 to entry: The term "parts library" also refers to a dictionary such as a PLIB dictionary in ISO 13584 or OTD in ISO 22745.

4  **Symbols and abbreviated terms**

BSU  Basic Semantic Unit
CCS  Capability Class Structure
CCSI  Capability Class Structure Interface
CPI  Capability Profile Interface
CPTI  Capability Profile Template Interface
CSI  Conformance Statement for the Implementation
ESI  Extended Service Interface
ESP  Extended Service Provider
ICD  International Code Designator
MDD  Manufacturing Domain Data
MDM  Manufacturing Domain Model
MSU  Manufacturing Software Unit
OTD  Open Technical Dictionary
PLIB  Parts Library (as specified in ISO 13584)
UML  Unified Modeling Language
5 Service provider interface services

5.1 Service sets

Figure 1 shows all the services and their relations to Extended Service Providers and Basic Service Providers to handle capability profiles, capability profile templates, CCSs, MDMs, MDDs and MDD objects. Basic Service Providers handle CPI group Type 1 services. Extended Service Providers handle CPTI, CPI and CCSI services. In addition, Extended Service Providers support extended matcher services and other service interfaces to handle MDMs and MDDs.

NOTE 1 This figure is not in accordance with UML conventions. The line between the Data Store Mechanism and the Repository represents the rules for adding, removing and changing contents of the Repository. The line between the Data Store Mechanism and the Extended Service Provider represents a mapping of the extended services to the Data Store services. The mapping is typically implementation-specific and therefore not part of the scope of this document.

NOTE 2 The boldfaced elements in this figure are specifically addressed in this document.

NOTE 3 The contents in the Repository are stored as XML files.

NOTE 4 The ESI access point is represented elsewhere in this document by the object ServiceAccessPoint.

NOTE 5 The Type 1 CPI service group, which is briefly described in ISO 16100-3:2005, 5.4, includes Type 1 matcher service.

NOTE 6 The Type 2 CPI service group, which is briefly described in ISO 16100-3:2005, 5.4, does not include Type 2 matcher services, which are part of the Extended Matcher Group.

NOTE 7 The Type 3 CPI service group is briefly described in ISO 16100-3:2005, 5.4.

Figure 1 — Extended Service Provider Service sets

All services have the following characteristics:

a) when a service is conducted, there is one service provider and one service user, and no other third party is involved;

b) the service user initiates all service invocations, which are distinct from the lower communications layer service invocations;

c) a service user invocation is always accompanied by a response from the service provider;