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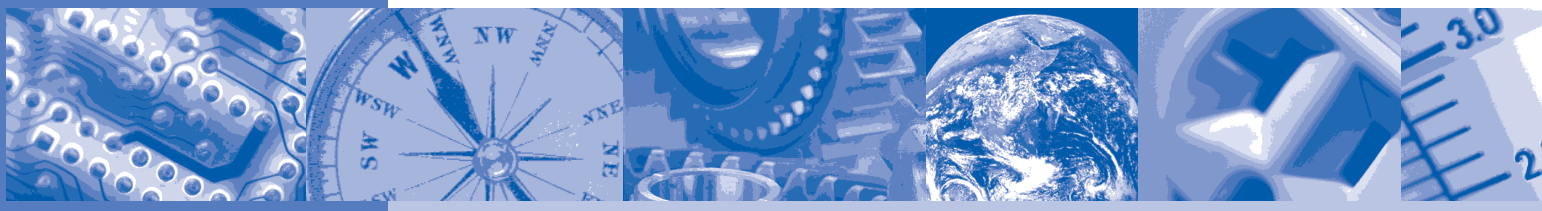

Enterprise-Control System Integration Part 1: Models and Terminology

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Enterprise-Control System Integration
Part 1: Models and Terminology

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This standard is dedicated to the memory of Dr. Guido Carlo-Stella, in recognition of and gratitude for his leadership in earlier work that made this standard possible.

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FOREWORD

This standard is Part 1 of a multi-part set of standards that defines the interfaces between enterprise activities and control activities.

The scope of this Part 1 standard is limited to describing the relevant functions in the enterprise and the control domain and which objects are normally exchanged between these domains. Subsequent parts will address how these objects can be exchanged in a robust, secure, and cost-effective manner preserving the integrity of the complete system. In this standard, the terms “enterprise,” “controls,” “process control,” and “manufacturing” are used in their most general sense and are held to be applicable to a broad sector of industries.

This Part 1 standard is structured to follow IEC (International Electrotechnical Commission) guidelines. Therefore, the first three clauses present the *scope* of the standard, *normative references*, and *definitions*, in that order.

Clause 4 is informative. The intent is to describe the context of the models in clause 5 and clause 6. It defines the criteria used to determine the scope of the manufacturing control system domain. Clause 4, being informative, does not contain the formal definitions of the models and terminology. It describes the context to understand the normative clauses.

Clause 5 is normative. The intent is to describe hierarchy models of the activities involved in manufacturing control enterprises. It defines in general terms the activities that are associated with manufacturing control and the activities that occur at the business logistics level. It also defines an equipment hierarchy model of equipment associated with manufacturing control. Clause 5, being normative, contains formal definitions of the models and terminology.

Clause 6 is normative. The intent is to describe a general model of the functions within an enterprise, which are concerned with the integration of business and control. It defines, in detail, an abstract model of control functions and, in less detail, the business functions that interface to control. The purpose is to establish a common terminology for functions involved in information exchange. Clause 6, being normative, contains formal definitions of the models and terminology.

Clause 7 is normative. The intent is to define in detail the objects that make up the information streams defined in clause 6. The purpose is to establish a common terminology for the elements of information exchanged. Clause 7, being normative, contains formal definitions of the models and terminology. The attributes and properties are not formally defined in this clause of the standard.

Annex A is informative. It presents a bibliography of informative references and a list of the abbreviations used in the document.

Annex B is informative. The intent is to define the business reasons for the information exchange between business and control functions. The purpose is to establish a common terminology for the reason for information exchange.

Annex C is informative. It discusses the rational for multiple models.

Annex D is informative. It contains selected elements from the Purdue Reference Model that can be used to place the functions described in clauses 5 and 6 in context with the entire model.

Annex E is informative. It correlates the Purdue Reference Model to the MESA International model.

This Part 1 standard is intended for those who are:

a) involved in designing, building, or operating manufacturing facilities;

b) responsible for specifying interfaces between manufacturing and process control systems and other systems of the business enterprise; or

c) involved in designing, creating, marketing, and integrating automation products used to interface manufacturing operations and business systems.

Future parts of this standard may address models of level 3 functions, definitions of level 2-3 interfaces, and data structures for information exchange including the attributes and properties of the data model in clause 7.

INTRODUCTION

This Part 1 standard provides standard models and terminology for defining the interfaces between an enterprise's business systems and its manufacturing control systems. The models and terminology defined in this standard:

a) emphasize good integration practices of control systems with enterprise systems during the entire life cycle of the systems;

b) can be used to improve existing integration capabilities of manufacturing control systems with enterprise systems; and

c) can be applied regardless of the degree of automation.

Specifically, this standard provides a standard terminology and a consistent set of concepts and models for integrating control systems with enterprise systems that will improve communications between all parties involved. Some of the benefits produced will:

a) reduce users' times to reach full production levels for new products;

b) enable vendors to supply appropriate tools for implementing integration of control systems to enterprise systems;

c) enable users to better identify their needs;

d) reduce the costs of automating manufacturing processes;

e) optimize supply chains; and

f) reduce life-cycle engineering efforts.

It is not the intent of this standard to:

a) suggest that there is only one way of implementing integration of control systems to enterprise systems;

b) force users to abandon their current methods of handling integration; or

c) restrict development in the area of integration of control systems to enterprise systems.

This Part 1 standard defines the interface content between manufacturing control functions and other enterprise functions, based upon the Purdue Reference Model for CIM (hierarchical form) as published by ISA.

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1 Scope

This Part 1 standard defines the 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 by this standard. The goal is to reduce the risk, cost, and errors associated with implementing these interfaces.

The standard may be used to reduce the effort associated with implementing new product offerings. The goal is to have enterprise systems and control systems that inter-operate and easily integrate.

The scope of Part 1 is limited to:

a) a definition of the scope of the manufacturing operations and control domain;

b) a definition of the organization of physical assets of an enterprise involved in manufacturing;

c) a definition of the functions associated with the interface between control functions and enterprise functions; and

d) a definition of the information that is shared between control functions and enterprise functions.

2 Normative references

The following normative documents contain provisions that, through reference in this text, constitute provisions of this Part 1 standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this Part 1 standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Member organizations of the IEC and ISO (International Standards Organization) maintain registers of currently valid normative documents.

a) IEC 61512-1:1997, Batch Control – Part 1: Models and Terminology

b) ANSI/ISA-88.01-1995, Batch Control – Part 1: Models and Terminology

3 Definitions

For the purposes of this Part 1 standard, the following definitions apply.

3.1 Area:
a physical, geographical or logical grouping determined by the site. It may contain process cells, production units, and production lines.

3.2 Available capability:
the portion of the production capability that can be attained but is not committed to current or future production.

3.3 Bill of lading:
a contract or receipt for goods that a carrier agrees to transport from one place to another and to deliver to a designated person or that it assigns for compensation upon the conditions stated therein.