BS ISO 15531-1:2004

BSI Standards Publication

Industrial automation systems and integration — Industrial manufacturing management data

Part 1: General overview

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National foreword

This British Standard is the UK implementation of ISO 15531-1:2004.

The UK participation in its preparation was entrusted to Technical Committee AMT/4, Industrial data and manufacturing interfaces.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Part 1:
General overview

Systèmes d'automatisation industrielle et intégration — Données de gestion de fabrication industrielle —

Partie 1: Aperçu général

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 15531-1 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC 4, *Industrial data*.

A complete list of parts of ISO 15531 is available from the Internet:

http://www.tc184-sc4.org/titles/Mandate_titles.rtf

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Introduction

The information generated about the manufacturing process of an industrial product is very important for the life cycle of this product, notably in a context of sustainable development. Manufacturing may be defined as the transformation of raw material or semi-finished components leading to goods production. Manufacturing management is the function of directing or regulating the flows of goods through the entire production cycle from requisitioning of raw materials to the delivery of the finished product, including the impact on resources management.

A manufacturing management system manages the flow of materials and products through the whole production chain, from suppliers, through manufacturers, assemblers, to distributors and sometimes customers.

The relations among those partners may be identified and structured in an electronic form with a view to facilitate electronic exchanges. Then, information handled during these exchanges have to be identified, modelled and represented in such a way that they may be shared by a maximum of partners through the usage of standards for product and manufacturing data modelling.

The production planning functions within the supplier plants are assumed to have strong relationships with the master production scheduling people of the main plant, who share with them information on the likely pattern of the future demands to allow suppliers to plan in turn their production. On a day-to-day basis, the operational planning system of the main plant sends orders to the suppliers to ensure the availability of components, subassemblies and others such as resources needed to its manufacturing and assembly process.

From this approach, three main categories of data related to manufacturing management may be distinguished as follows:

— information related to the external exchanges, e.g., between main plant and suppliers;

— information related to the management of the resources used during the manufacturing processes;

— information related to the management of the manufacturing flows.

NOTE This information is usually provided within the main plant, and exchanged among the different machine tools, or production cells.

ISO 15531 is an International Standard for the computer-interpretable representation and exchange of industrial manufacturing management data. The objective is to provide a neutral mechanism capable of describing industrial manufacturing management data throughout the production process within the same industrial company and with its external environment, independent from any particular system. The nature of this description makes it suitable not only for neutral file exchange, but also as a basis for implementing and sharing manufacturing management databases and archiving.

The standard is focused on discrete manufacturing, but not limited to it. Then any modification or extensions to industrial that do not belong to discrete part manufacturing have always been under consideration when they did not imply any contradiction or inconsistency with the initial objective of the standard.

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ISO 15531 addresses the three types of data described above. It does not standardise the model of the manufacturing process. The aim of ISO 15531 is to provide standardised data models for those three types of manufacturing management data. The purpose of that standard development is to facilitate the integration between the numerous industrial applications by means of common, standardised software that are able to represent these three sets of data.

This International Standard is organised as a series of parts, each published separately. The parts of ISO 15531 fall into the following series: production data for external exchange, manufacturing resources usage management data, manufacturing flow management data.

This part of ISO 15531 provides a general overview. It specifies the functions of the various series of parts of ISO 15531 and the relationships among them. It also specifies the relations between ISO 15531 and other related standards in its Annex B.

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Industrial automation systems and integration — Industrial manufacturing management data — Part 1: General overview

1 Scope

ISO 15531 specifies the characteristics for a representation of manufacturing management information over the entire industrial process. It provides the necessary mechanisms and definitions to enable manufacturing management data to be shared and exchanged within the factory, with other plants or companies.

The standard is mainly focused on discrete manufacturing but not limited to it. It may also apply to any industrial processes that do not imply any contradiction or inconsistency with the basic principle of the standard.

The following are within the scope of ISO 15531:

— the representation of information needed to manage production and resources;

— the exchange and sharing of production information and resources information including storing, transferring, accessing and archiving.

EXAMPLE Information on resources and system capability and capacity, monitoring, maintenance, constraints and control information.

NOTE Maintenance constraints and relevant maintenance management data are taken into account from the point of view of their impact on the flow control.

The following are outside the scope of ISO 15531:

— architecture and methodologies for the modelling of an enterprise in its whole as well as the related tools;

— representation and exchange of product information;

— representation and exchange of computer-interpretable parts library information;

— representation of exchange of cutting tool data;

— technical maintenance information.

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EXAMPLE Technical information that is included in devices repair, operation and maintenance manuals.
More specifically this part of ISO 15531 gives an overview of this International Standard and of the main principles used. It specifies the characteristics of the various series of parts in ISO 15531 and the relationships among them.

The following are specifically within the scope of this part of ISO 15531:

— general overview of the standard and of the main principles used;

— structure of the standard and relationships between the three series of parts which the standard is made of;

— definitions of terms used throughout this International Standard.

The scope of this part includes provisions of explanations addressing the following item that are issued in Annex B:

— how this standard fits with ISO 10303, with ISO 13584, and with other related standardisation works;

— the role and usage of manufacturing systems data exchange and how this standard may be used in conjunction with other standards to contribute to the integration of manufacturing applications.

The scope of each of the other parts of ISO 15531 is defined within the relevant part of each series.

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.

— ISO/IEC 2382-24:1995, *Information technology - Vocabulary - Part 24: Computer-integrated manufacturing*

— ISO/IEC 8824-1:1998, *Information technology - Abstract Syntax Notation One (ASN.1) - Part 1: Specification of basic notation*

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

— ISO 10303-11:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 11: Description methods: The EXPRESS language reference manual*

— ISO 10303-49:1998, *Industrial automation systems and integration - Product data representation and exchange - Part 49: Integrated generic resources: Process structures and properties*

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— ISO 13584-1:2001, *Industrial automation systems and integration - Parts library - Part 1: Overview and fundamental principles.*

— ISO 13584-42:1998, *Industrial automation systems and integration - Parts library - Part 42: Description methodology: Methodology for structuring part families*

— ISO 14258:1998, *Industrial automation systems - Concepts and rules for enterprise models*

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

— ISO 15926-1: — [1], *Industrial automation systems and integration - Integration of life-cycle data for process plants including oil and gas production facilities - Part 1: Overview and fundamental principles*

— ISO/TS 16668:2000, *Basic Semantics Register (BSR)*

— ISO/IEC 62264-1:2003, *Enterprise-control system integration - Part 1: Models and terminology*

3 Terms, definitions and abbreviations

3.1 Terms defined in ISO 10303-1

This part of ISO 15531 makes use of the following terms defined in ISO 10303-1:

— data;

— data exchange;

— information;

— product;

— product data.

[1] To be published.

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3.2 Terms defined in ISO 10303-11

This part of ISO 15531 makes use of the following terms defined in ISO 10303-11:

— entity.

3.3 Terms defined in ISO/IEC 2382-24

This part of ISO 15531 makes use of the following terms defined in ISO/IEC 2382-24:

— manufacturing resources planning (MRP II);

— material requirement planning (MRP).

3.4 Terms defined in ISO 13584-42

This part of ISO 15531 makes use of the following terms defined on ISO 13584-42:

— basic semantic unit (BSU).

3.5 Terms defined in ISO 14258

This part of ISO 15531 makes use of the following terms defined in ISO 14258:

— enterprise;

— enterprise model.

3.6 Other terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.6.1
basic semantic register
basic register of semantics units.

NOTE Definition adapted from ISO/TS 16668:2000.

3.6.2
building block; construct
textual or graphical artefact designed to represent in a structured way the various information about common properties of a collection of objects or enterprise entities.

EXAMPLE Artefact designed for resources, activities, product, event or any phenomena representation.

NOTE Definition adapted from CEN/CENELEC ENV 40003 [1] and CEN/CENELEC ENV 12204 [2]. Building block and construct have the same meaning. Those European standards use the term construct without qualifier.

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3.6.3
capability
quality of being able to perform a given activity.

NOTE The capability is defined by a group of characteristics that describes functional aspects of manufacturing resources or system.

3.6.4
capacity
capability of a system, subsystem or resource to perform its expected function from a quantitative point of view.

EXAMPLE The capacity of a system or a resource to produce a given quantity of output in a particular time period.

NOTE For a given system or resource the distinction between capacity available and capacity requested may be useful.

3.6.5
capacity planning
process of determining the required capacities for expected production.

3.6.6
cost control
application of procedures to monitor expenditures and performance against progress of projects and manufacturing operations with projected completion to measure variance from authorised budget and allow effective to be taken to achieve minimal cost.

NOTE That includes the act of gathering and checking cost information elements. The term may also apply to the function or services. Definition adapted from APICS dictionary [5].

3.6.7
continuous process
production process that lends itself to an endless flow of non discrete product or component.

NOTE This is the opposite of discrete part manufacturing as the material flow is continuous during the production process.

3.6.8
device
any identified physical equipment, system or subsystem that does not belong to software, data set or human resource class.

NOTE A device may nevertheless include software.

3.6.9
discrete manufacturing
production of discrete items.

EXAMPLE Cars, appliances or computer.

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