First edition
2008-04-01

Industrial automation systems and integration — Product data representation and exchange —

Part 223: Application protocol: Exchange of design and manufacturing product information for cast parts

Systèmes d'automatisation industrielle — Représentation et échange de données de produits —

Partie 223: Échange de dessin et d'information sur la conception et la fabrication de pièces de fonderie

Reference number
ISO 10303-223:2008(E)

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

COPYRIGHT PROTECTED DOCUMENT

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Figures

Tables

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 10303-223 was prepared by Technical Committee ISO/TC184, *Industrial automation systems and integration*, Subcommittee SC 4, *Industrial data*.

ISO 10303 is organized as a series of parts, each published separately. The structure of ISO 10303 is described in ISO 10303-1.

Each part of ISO 10303 is a member of one of the following series: description methods, implementation methods, conformance testing methodology and framework, integrated generic resources, integrated application resources, application protocols, abstract test suites, application interpreted constructs, and application modules. This part of ISO 10303 is a member of the application protocol series.

A complete list of parts of ISO 10303 is available from the Internet:
<http://www.tc184-sc4.org/titles/>

Introduction

ISO 10303 is an International Standard for the computer-interpretable representation of product information and for the exchange of product data. The objective is to provide a neutral mechanism capable of describing products throughout their life cycle. This mechanism is suitable not only for neutral file exchange, but also as a basis for implementing and sharing product databases, and as a basis for archiving.

This part of ISO 10303 is a member of the application protocol series. This part of ISO 10303 specifies an application protocol (AP) for the use of product data within a defined context that satisfies an industrial need to exchange product design, simulation, and manufacturing data for producing cast parts. In addition this part of ISO 10303 also provides for the exchange of product design and manufacturing data for value added operations to the cast parts.

This part of ISO 10303 defines the context, scope, and information requirements for the exchange of design, simulation, manufacturing features, and product information for cast parts and specifies the integrated resources necessary to satisfy these requirements. This part of ISO 10303 defines data sharing for the exchange of product specification between a customer and a metalcaster in response to a request for quote (RFQ) to supply cast parts. This part of ISO 10303 can be used to represent the product design modifications necessary for tooling design to produce the cast parts. This part of ISO 10303 provides data sharing and exchange of the original and modified product design between the metalcaster, the customer, the tool shop, and can provide data as direct input the simulation software. Recently many metalcasters use simulation software to evaluate a design and analyze a gating system to reduce the failure rate of the cast part. There is a need to reduce cost, labour time and errors in inputting the part design. This part of ISO 10303 provides a common neutral data form for this data exchange between metalcaster, customer, tool shop and simulation software. Should a customer request delivery of a machined casting to design specifications these value-added operations are supported by the machining features in this part of ISO 10303. The original part design specification from the customer and the modified part design from the metalcaster define the manufacturing features of the casting that are to be machined by a machine shop. This part of ISO 10303 interfaces directly with ISO 10303-224 and ISO 10303-219 and supports the data exchange between customer, metalcaster, and machine shop to deliver machined and inspected casting to customer specification. This part of ISO 10303 can also be used to represent the necessary process data for quality control purposes in support of the Production Part Approval Process (PPAP). Should the metalcaster require a more complete Process Plan capability, this part of ISO 10303 provides an interface to ISO 10303-240, the Process Plan for machined parts. As a member of a suite of application protocols developed to aid in the manufacture of piece parts for mechanical operations, this part of ISO 10303 has been harmonized to be integrated into that suite.

Application protocols provide the basis for developing implementations of ISO 10303 and abstract test suites for the conformance testing of AP implementations.

Clause 1 defines the scope of this part of ISO 10303 and summarizes the functionality and data covered within it. Clause 3 lists the words defined in this part of ISO 10303 and gives pointers to words defined elsewhere. An application activity model that is the basis for the definition of the scope is provided in Annex F. The information requirements of the application are specified in Clause 4 using terminology appropriate to the application. A graphical representation of the information requirements, referred to as the application reference model, is given in Annex G.

Resource constructs are interpreted to meet the information requirements. This interpretation produces the application interpreted model (AIM). This interpretation, given in 5.1, shows the correspondence between the information requirements and the AIM. The short listing of the AIM specifies the interface to the integrated resources and is given in 5.2. Note that the definitions and EXPRESS provided in the integrated resources for constructs used in the AIM can include select list items and subtypes which are not imported into the AIM. The expanded listing given in Annex A contains the complete EXPRESS for the AIM without annotation while the short names of entities is given in Annex B. Information on where to get computer interpretable EXPRESS is given in Annex I. A graphical representation of the AIM is given in Annex H. Additional requirements for specific implementation methods are given in Annex C.

Figure 2 contains the data planning model that provides a high level description of the requirements for this part of ISO 10303. This planning model was created from the in-scope data from the activities of the application activity model (AAM) and grouped into logical units of functionality. This planning model is used as a guide in developing the application reference model (ARM).

In the manufacturing product life cycle area of interest, there have been several application protocols that have been developed.

NOTE Figure 1 illustrates the application protocols that are of interest to manufacturing, and the relationship of these application protocols to each other.

As manufacturing application protocols are being developed, there has been a clear architectural plan for development of new emerging manufacturing standards. The teams developing this set of applicaton protocols are making a concentrated effort to make sure these standards are harmonized and have a matching architecture.

The starting point for harmonization is ISO 10303-203. This part of ISO 10303 first developed Boundary Representation (B-Rep) geometry. This B-Rep geometry resulted in the development of Application Integrated Construct (AIC) for Advanced Brep – ISO 10303-514. This geometry is used throughout the manufacturing application protocols.

The next point of harmonization is ISO 10303-224. This part of ISO 10303 first developed machining features (ISO 10303-522), geometric tolerances (ISO 10303-519), dimensional tolerances, definitions for implicit shape definitions, and property definitions for materials, process, part, and surface finish.

Since the development of ISO 10303-224, several application protocols have been developed to use constructs defined by ISO 10303-224. There has been complete harmonization of constructs with all of the other manufacturing application protocols.

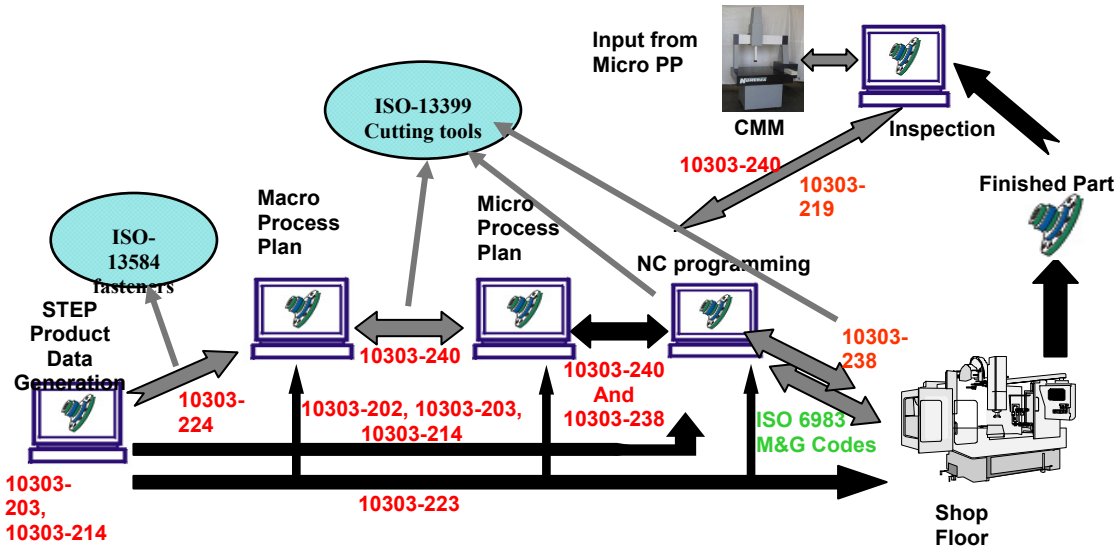

Figure 1 — ISO 10303 manufacturing suite of standards

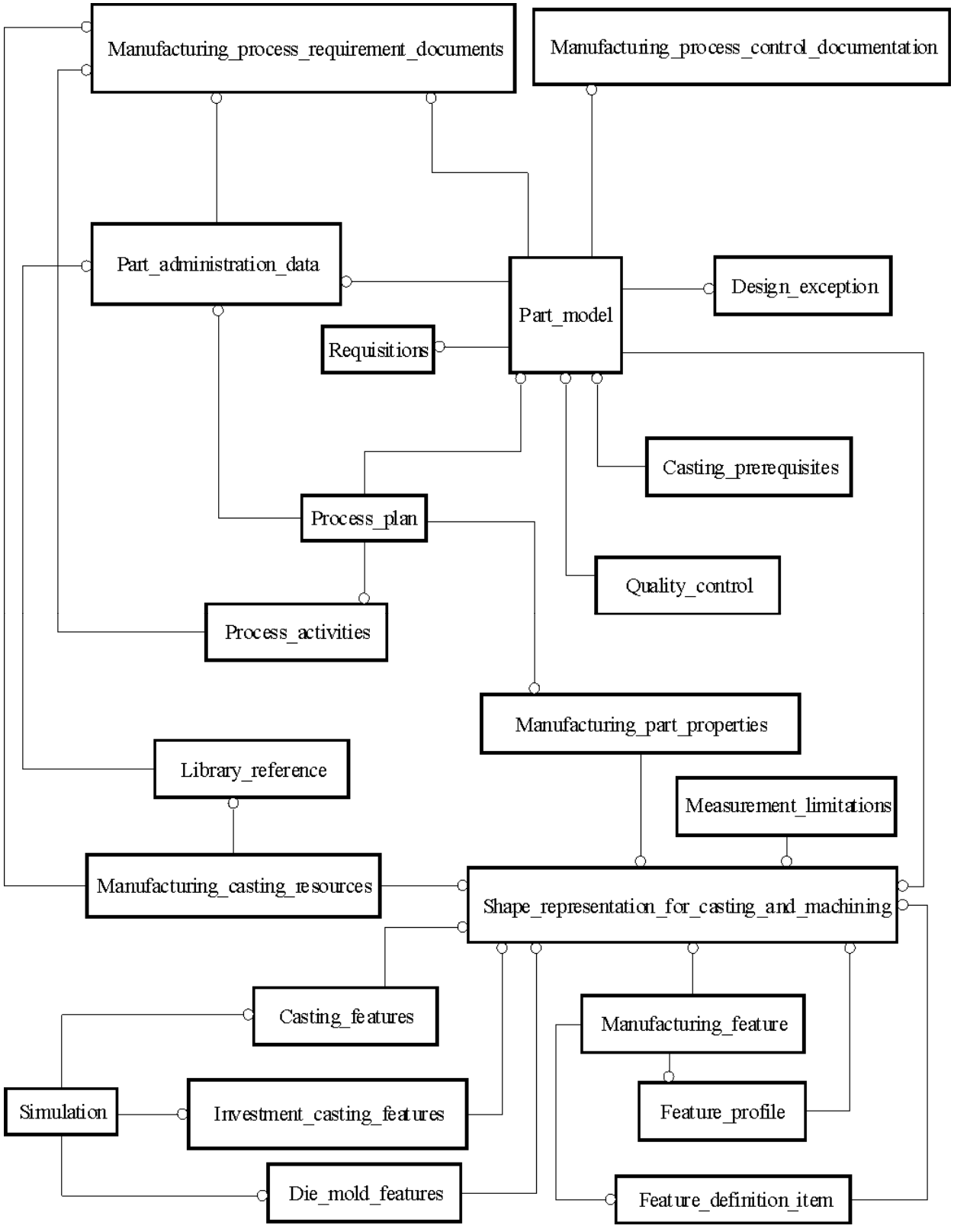

Figure 2 — Data planning model