
**Industrial automation systems
and integration — JT file format
specification for 3D visualization**

*Systèmes d'automatisation industrielle et intégration — Spécification
de format de fichier JT pour visualisation 3D*



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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).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 184, *Automation systems and integration*, Subcommittee SC 4, *Industrial data*.

This second edition cancels and replaces the first edition (ISO 14306:2012), which has been technically revised.

The main changes compared to the previous edition are as follows:

- addition of a STEP B-Rep Segment based on the ISO 10303 STEP suite of standards;
- addition of a new geometry chapter listing all geometry segments in the annexes;
- updates of the documentation from the ProSTEP iViP industrialization guidelines;
- addition of a conformance clause;
- addition of a mapping table JT ISO to STEP;
- deprecation of the JT Brep segment;
- deprecation of the PMI data segment which is superseded by the meta data segment.

Introduction

The ISO 14306 format is an industry focused, high-performance, lightweight, flexible file format for capturing and repurposing 3D product definition data for visualization to enable collaboration and validation throughout the extended enterprise. The ISO 14306 format is streamable and contains compression for compact and efficient representation.

Some of the highlights of the ISO 14306 format include:

- built-in support for assemblies, sub-assemblies and part constructs;
- a flexible partitioning scheme, supporting single or multiple files;
- b-rep solid shape representations to provide precision to the light-weight viewing processes;
- product manufacturing information in support of paperless manufacturing initiatives;
- precise and imprecise wireframe shape representations;
- discrete purpose-built levels of detail;
- triangle sets, polygon sets, point sets, line sets and implicit primitive sets (such as cylinder, cone and sphere);
- a full array of visual attributes such as for materials, textures, lights;
- hierarchical bounding box and bounding spheres;
- data compression that allows producers of JT files to fine tune the trade-off between compression ratio and fidelity of the data.

Beyond the data contents description of the ISO 14306 format, the overall physical structure/organization of the format is also designed to support operations such as:

- offline optimizations of the data contents, i.e. file granularity and flexibility optimized to meet the needs of enterprise data translation solutions;
- asynchronous streaming of content, i.e. viewing optimizations such as view frustum and occlusion culling and fixed-framerate display modes;
- layers, and layer filters.

NOTE This document is based on the JT Open version 9.5 specification, which defines a scene graph with geometry specific node and attribute support, extended to support ISO 10303.

The International Organization for Standardization (ISO) draws attention to the fact that it is claimed that compliance with this document may involve the use of patents USA 20110199382, 8019788.

ISO takes no position concerning the evidence, validity and scope of this patent right.

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Industrial automation systems and integration — JT file format specification for 3D visualization

1 Scope

This document defines the syntax and semantics of a file format for the 3D visualization and interrogation of lightweight geometry and product manufacturing information derived from CAD systems, using visualization software tools that do not need the full capability of a CAD system.

This document has been adopted as a 3D visualization capability in addition to the ISO 10303 series.

The ISO 10303 series are the ISO standards adopted for the engineering data exchange, sharing and long term archiving of product definition information throughout the product lifecycle.

In this document 3D visualization is defined as the visual presentation on a screen or another media of graphical and textual 3 dimensional representations of a set of data representing an object, information or results of a computational process in order to enable decision process by a human looking at the data visualized in a medium.

The file format supports the following information:

- facet information (triangles), stored with geometry compression techniques
- visual attributes such as lights, textures and materials
- product manufacturing information, such as dimensions, tolerances and other attributes
- boundary representation (b-rep) solid model shape representations. Several alternatives are available, including a representation based on the geometry standard defined in ISO 10303
- configuration representations
- delivery methods such as asynchronous streaming of content

The document does not specify the implementation of, or definition of a run-time architecture for viewing or processing of the file format.

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 10303-21:2014, *Industrial automation systems and integration — Product data representation and exchange — Part 21: Implementation methods: Clear text encoding of the exchange structure*

ISO 10303-42:2014, *Industrial automation systems and integration – Product data representation and exchange – Part 42: Integrated generic resource: geometric and topological representation*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions 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>
- IEC Electropedia: available at <http://www.electropedia.org/>