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

Part 3:
Version 2

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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 document 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).

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This document was prepared by Technical Committee ISO/TC 184, *Automation systems and integration*, Subcommittee SC 4, *Industrial data,* in collaboration with Technical Committee ISO/IEC JTC 1 *Information Technology*, Subcommittee SC 24, *Computer graphics, image processing and environmental data representation* and Technical Committee ISO/TC 171, *Document management applications*, Subcommittee SC 2, *Document file formats, EDMS systems and authenticity of information*.

This first edition cancels and replaces the second edition (ISO 14306:2017), which has been technically revised.

The main changes are as follows:

- correction of specification of TRANSMIT FILE in section H.2 which previously stated the definition to be SCH_1200000_12. This has been corrected to read SCH_ SCH_1200000_12006;
- added a normative reference to ISO 14306-2;
- updated reference to STEP schema to read {1 0 14306 3 114};
- changed references to JT to read ISO 14306 where applicable.

A list of all parts in the ISO 13406 series can be found on the ISO website.

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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 ISO 14306 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, therefore file granularity and flexibility optimized to meet the needs of enterprise data translation solutions;
— asynchronous streaming of content, therefore 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 the ISO 10303 series.

Annex A contains an identifier that conforms to ISO/IEC 8824-1. The identifier unambiguously identifies this document and the schema in an open information system. The ISO 14306 series applies the method as described by ISO 10303-1.

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

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

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

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ISO 14306-2, *Industrial automation systems and integration — JT file format specification for 3D visualization — Part 2: Vocabulary*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14306-2 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.2 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply.

Abs	Absolute Value
Bbox	Bounding Box
B-Rep	Boundary Representation
CAD	Computer Aided Design
CODEC	Coder-Decoder
GD&T	Geometric Dimensioning and Tolerancing
GUID	Globally Unique Identifier
HSV	Hue, Saturation, Value
JT	Jupiter Tesselation
LsbFirst	Least Significant Byte First
Max	Maximum
Min	Minimum
MsbFirst	Most Significant Byte First
N/A	Not Applicable
PCS	Parameter Coordinate Space
PLM	Product Lifecycle Management
RGB	Red, Green, Blue
RGBA	Red, Green, Blue, Alpha

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