ISO 14306:2017 – JT edition 2

Abstract

ISO 14306 provides the description of the structure and content for a binary file having the extension of .jt. A binary file with the .jt extension is generally referred to as a JT file. The ISO 14306 format is used primarily in industrial use cases as the means for capturing and repurposing lightweight 3D product definition data.

The JT format is an industry focused, high-performance, lightweight, flexible file format for capturing and repurposing three-dimensional product definition data that enables collaboration, validation and visualization throughout the extended enterprise

JT was originally developed by Engineering Animation, Inc. and Hewlett Packard as the DirectModel toolkit (initially Jupiter).

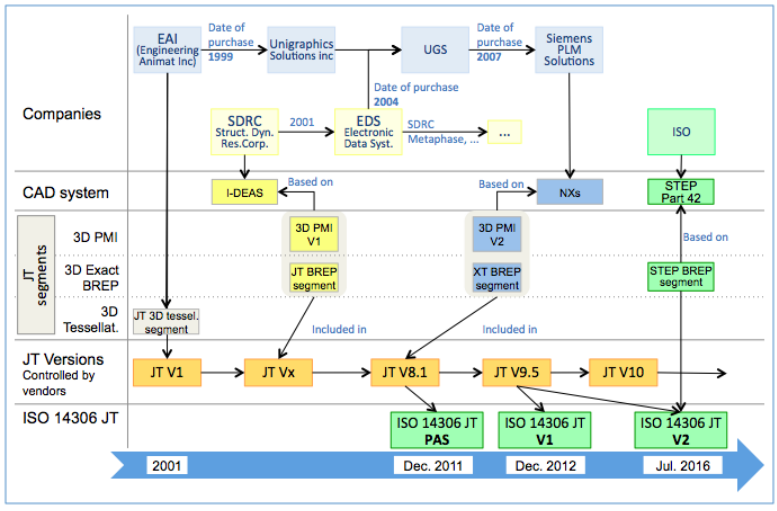
When EAI was purchased by UGS, JT became a part of UGS Corp.'s suite of products

Siemens PLM Software (formerly UGS Corp.) use it for product visualization, collaboration, and CAD data exchange

On 2009 September 18, JT specification has been accepted for publication as an ISO Publicly Available Specification (PAS14306).

In December 2012, it was published as ISO 14306: Industrial automation systems and integration -- JT file format specification for 3D visualization

In parallel of the publication of ISO 14306 ed1, ISO has launched a follow-up project to better integrate JT in the ISO standards framework by introducing the STEP BRep Geometry definition as the normative geometry for JT in ISO 14306 ed2.



In November 2017, ISO 14306 ed2 was published with the following main changes:

- 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- Deprecation of the PMI data segment which is superseded by the meta data segment.

ISO 14306:2017 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.

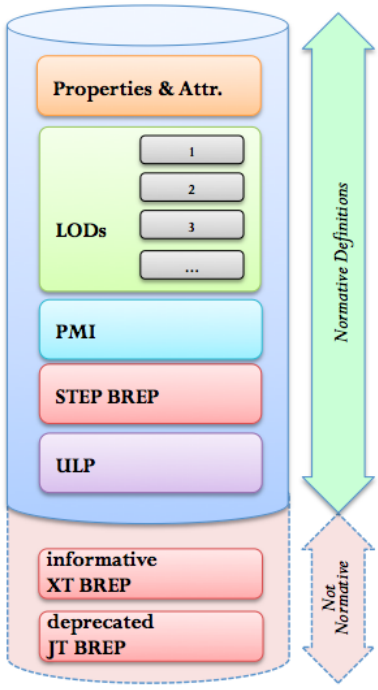
In ISO 14306:2017 3D visualization is defined as the visual presentation on a screen or another media of graphical and textual 3-dimensional representations of a set of data representing an object, information or results of a computational process in order to enable decision process by a human looking 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.

The design and manufacture of today's products is largely based on 3D electronic models developed on CAx systems. While these tools provide powerful capabilities for developing product definitions, the objective of 3D visualization is to allow the resulting information to be viewed across a wider population without the need for high-end CAD workstations or CAD software licenses. This facilitates review and information use, accelerating product development. Standard information formats for visualization allow such tools to be used to view information generated by different native CAx systems.



The JT format is a scene graph with CAD specific node and attributes support that includes:

- Built-in support for assemblies, sub-assemblies and part constructs
- Flexible partitioning scheme, supporting single or multiple files
- Precise Part definition (B-Rep), including normative STEP BRep geometry
- Product Manufacturing Information (PMI) in support of paperless manufacturing initiatives
- Precise and imprecise wireframe
- Discrete purpose-built Levels of Detail (LOD)
- Triangle sets, Polygon sets, Point sets, Line sets and Implicit Primitive sets (cylinder, cone, sphere, etc…) with sophisticated geometry compression techniques
- Full array of visual attributes: Materials, Textures, Lights, Shaders
- Hierarchical Bounding Box and Bounding Spheres
- Advanced data compression

Example scenarios

- Request for quotation
- Digital mockup work to validate that a product can be assembled together (spatial validation and clash detection)
- Transmission of product models by manufacturing or subcontractors, for viewing and possible annotations
- Extraction of images for technical publications
- Viewing of design data for manufacturing and maintenance

Responsible organization

ISO TC 184/SC 4 is coordinating the standardization process related to the use of 3D visualization for industrial data.

Future Versions of ISO 14306 will be developed under the responsibility of TC 184/SC4/JWG16

Lead Organization within ASD

ASD Strategic Standardization Group - contact: Jean Brangé

Other stakeholders – by function/organization

ASD Customer and Product Support Committee

AIA EEIC

Business Justification

CAD visual presentations without integrating the underlying data. It will also allow such information to be generated from standard data formats such as STEP (ISO 10303) in a consistent manner.

There is a strong requirement from industry of being able to gain ISO conformance of their existing JT Data.

Description of activity/deliverables

Activities

The ISO/TC 184/SC 4 activity has developed a set of requirements that need to be fulfilled by a 3D visual format, covering functionality, openness and the availability of tools. The requirements have been used to recommend which of the candidate solutions can be used to satisfy industrial needs. The necessary standardization activities have been initiated.

SSG members have been involved in the SC 4 activity as representative of their national standards bodies.

Deliverables

- Edition 1: ISO 14306:2012
- Edition 2: ISO 14306:2017
- Edition 3: Preliminary Work Item in 2018, NWI draft proposed in 2019 under review by ISO/TC 184/SC 4/JWG 16

Business benefits

1. Use of standard format for communicating design information (approved documents) through the organization for visualization purposes
2. Avoidance of cost of CAx workstations and software for viewing purposes

Location in ASD SSG Framework

The 3D visualization specifications fall into the data category, derived from product definition data

ASD SSG action plan

Follow-up the ISO TC 184/SC 4/JWG 16 work program on Visualization including any NWI on ISO 14306 ed3

Contribute to the ISO 14306 ed3 requirements and developments

ASD SSG Status

Blip introduced at SSG meeting mid of November 2010. Last update March 2019

Progress of JT activities followed through the ASD SSG Radar Chart.

Adoption Plan

Following the establishment of an ASD policy, the results will be made available through an ASD 3D Visualization policy and recommendation.

ASD adoption statement

ASD has formally adopted the following recommendation after blip validation process lead by ASD SSG in April 2013.

ASD recommendation

ASD recognizes the use of ISO 14306:2017 as suitable for 3D light visualization, limited to the 3D tessellated geometry and “STEP BREP” representations.

ASD SSG observes that there is a possible confusion in industry between the various flavors of JT available on the market, and that conformance of implementations to the standard should be evaluated by individual companies, as there is no official certification.

ASD does not recommend using ISO 14306 for long term archiving – See LOTAR blip.

Link to a standard host site

ISO https://www.iso.org/standard/62770.html

Link to supporting material

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