

DIN SPEC 91383

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JT Industrial Application Package (JTIAP)

JT Industrielles Anwendungspaket (JTIAP)

JT progiciel pour application industrielle (JTIAP)

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Das vorliegende Dokument wurde nach den Verfahrensregeln einer PAS erstellt.

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Dieses Dokument wurde durch die im Vorwort genannten Verfasser erarbeitet und verabschiedet.

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Foreword

This DIN SPEC has been developed according to the PAS procedure. The development of a DIN SPEC according to the PAS procedure is carried out in workshops and does not require the participation of all stakeholders.

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A draft of this DIN SPEC has not been published.

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Introduction

With the spreading influence of the virtual product development in manufacturing, discussions have been taking place arising from the acknowledgment that persistent weak points in complex product emergence processes are alike across the industry. For the product development in organization-spanning collaboration, these weaknesses erode the productivity and the quality of product information flow and raise the costs of overall systems sustainment. Consequently, the need to leverage 3D particularly across the different product lifecycle stages based on established open IT standards has been a common objective.

For the digital enterprise, which has set up highly complex process chains, JT is a suitable description offering solutions alongside with the XML schema of the ISO 10303-242 Business Object Model (STEP AP242 BO model XML). These file format specifications – available as ISO 14306 and ISO 10303 international standards – form the foundation for an industrial application to realize a multi-disciplinary 3D Backbone for the digital enterprise.

The scope and the technical capabilities of JT have strongly grown over the last years based on the application requirements of the industry – initially for visualization, and meanwhile for interoperability, and long-term data retention. They have been continuously taken into account by significant interest groups and international standardization organizations to safeguard the investment made by users, vendors and service providers.

The capabilities, the performance and the openness of JT have remarkably contributed to its adoption in the industrial IT landscape. Millions of users actively use it in Automotive, Aerospace & Defence alone with a rapidly growing trend. The intensive use of JT since more than a decade has led to new ideas and requirements for the format specification. Strategies, methods, and applications have evolved in this regard to secure interoperability, performance, and consistency in the communication.

ISO 14306:2017 is a file format for capturing and repurposing 3D product definition data for visualization to enable collaboration and validation throughout the extended enterprise. The JT Open version 9.5 (JT V9.5) builds its technical foundation, with no enhancement of the file format in comparison to ISO 14306:2012. It handles the widely adopted XT B-Rep Segment as an informative part conflicting with the established industrial demand. It restricts the scope of implementation to visualization in contradiction to the industrial applications. A normative STEP B-Rep segment enlarges the exact geometry descriptions of ISO 14306:2017, using STEP boundary representation format (ISO 10303-42), which extensive implementation first needs to be validated by IT and services providers. The progress with ISO 14306:2017 does come with disadvantages. These shortcomings are threatening established processes, insofar that ISO 14306:2017 calls current use cases and millions of records into question without providing an additional worth contribution.

The automotive industry has elaborated an extensive JT specification under the leadership of the prostep ivip Association – the prostep ivip Recommendation: JT Industrial Application Package edition 2 (PSI 14-1:2016 – JTIAP). It extends ISO 14306 in the scope of use, clarifies the application, corrects errors and introduces functional enhancements. PSI 14-1:2016 – JTIAP technically is based on the JT Open version 10 (JT V10.0).

DIN SPEC 91383 is an open, vendor-independent, state of the art, ISO-compliant, royalty-free specification founded on ISO 14306:2017 and STEP AP242 XML BO model (Figure 1). It defines the syntax and semantics of the JT file format and is compatible to the JT file format specification in ISO 14306 (in its version from 2012 and successors) as well as to the essential implementations currently available to the market.

DIN SPEC 91383 offers a comprehensive solution for visualization, interoperability and long-term retention of 3D data. It comes along with enhanced functionalities needed for industrial applications.

To implement DIN SPEC 91383, the specifications of ISO 14306:2017 and PSI 14-1:2016 are required. The usage of XT B-Rep shall be treated normative and mandatory for use cases with precise geometry. DIN SPEC 91383 incorporates improved artifacts and descriptions from version 10.0 of the JT Open specification.

DIN SPEC 91383 is supposed to stimulate IT vendors and IT system integrators to provide additional enhancements and functions. These can be added in a next edition if they are used intensively and approved by industrial usage.

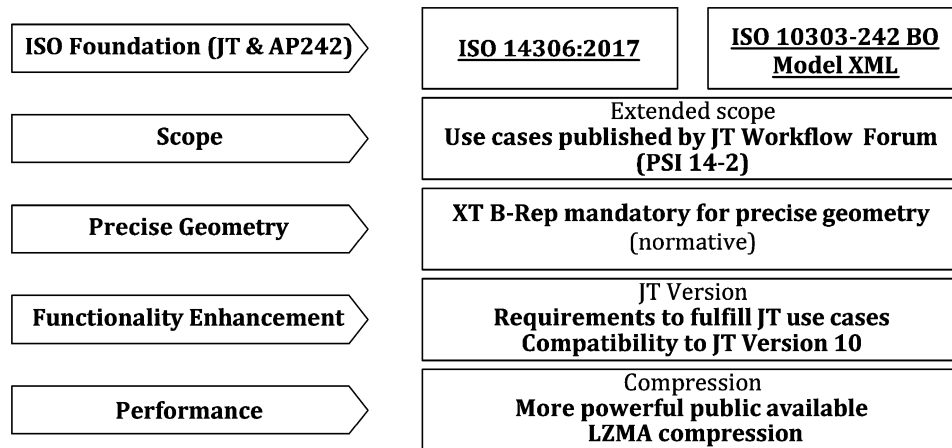


Figure 1 — The modular concept of DIN SPEC 91383 – JT Industrial Application Package

NOTE 1 ISO 14306:2017 — For the purpose of this document, the JT file format enables the creation and utilization of high-performance 3D models for all life stages of the product lifecycle. The compressible data format contains a neutral description of product data and acts as a critical factor in the integration of multiple authoring and data management systems. Various industrial use cases adopt it as the means for capturing and repurposing 3D product definition data that enables collaboration, validation, and visualization throughout the extended enterprise.

The JT file format is both robust, and streamable, and contains compression for compact and efficient representation. It was designed to be easily integrated into enterprise translation solutions, delivering a single set of 3D digital assets that support a full range of downstream processes from lightweight web-based viewing to full product digital mockups.

NOTE 2 ISO 10303-242 BO Model XML — ISO 10303-242 and particularly its Business Object Model ISO 10303:3001 describes essential concepts and information requirements for model-based 3D engineering of Automotive, Aerospace and Defense industries. It uses the vocabulary of STEP and reflects the terminology of domain experts in an XML schema to enable service-oriented applications.

For the purpose of this document, STEP AP242 XML Business Object describes the structure and attribute population for particular instance models needed to support the kinematics and mechanical design needs. These instance models illustrate how to encode attributes, external references, product structures and kinematic data in support of fundamental industry requirements common across the mechanical design domain.

NOTE 3 Precise Geometry — DIN SPEC 91383 recommends the usage of the XT B-Rep as mandatory segment type for use cases requiring exact 3D geometry.

Besides the capabilities provided by ISO 14306:2017, some of the highlights of DIN SPEC 91383 include:

- complex structure descriptions for assemblies, sub-assemblies and part constructs using STEP AP242 XML BO;
- interoperability of kinematic simulations using external references to JT files;
- precise B-Rep (boundary representation) geometry, offering the highest level of precision with XT B-Rep;
- product manufacturing information (such as geometric dimensions, tolerances or surface properties);
- support for various use cases in the realm of visualization, data exchange between partners and CAD systems, long-term data retention and more.

1 Scope

This DIN SPEC extends and states the syntax and semantics of the ISO 14306:2017 file format more precisely to:

- enable lightweight 3D Visualization and exact geometric representation
- secure CAD Interoperability, performance and consistency in the communication across internal business domains and company borders
- safeguard long-term data retention and long-term usage of standard.

It comprises the latest enhancement requests gathered by the prostep ivip / VDA JT Workflow Forum and the prostep ivip / VDA JT Implementor Forum. It covers the over 32 JT use cases specified in the prostep ivip Recommendation PSI 14-2:2015 edition 1, Part 2. It is downward compatible to ISO 14306:2017 and addresses the related ISO/TC 184/SC 4 enhancement proposals. At its core, the JT format is a scene graph with Computer Aided Design (CAD) specific node and attributes support.

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 10303-242:2014, *Industrial automation systems and integration — Product data representation and exchange — Part 242: Application protocol: Managed model-based 3D engineering*

ISO 14306:2017, *Industrial automation systems and integration — JT file format specification for 3D visualization*

PSI 14-1:2016, *JT Industrial Application Package — JT file format specification*¹⁾

PSI 14-2:2015, *Industrial Use Cases*²⁾

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply / the terms and definitions given in [external document reference] and the following apply.

3.1 Terms — defined in ISO 14306:2017

For the purposes of this document, the terms defined in ISO 14306:2017 apply.

3.2 Abbreviated terms — defined in ISO 14306:2017

For the purposes of this document, the abbreviated terms defined in ISO 14306:2017 apply.

1) Available at: prostep ivip Verein, Dolivostr. 11, 64293 Darmstadt, www.prostep.org

2) Available at: prostep ivip Verein, Dolivostr. 11, 64293 Darmstadt, www.prostep.org