JT Format (ISO 14306) and AP 242 (ISO 10303): The Step to the Next Generation Collaborative Product Creation

Alfred Katzenbach[1], Sebastian Handschuh[2], and Steven Vettermann[3]

[1] Executive Consultant
alfred.katzenbach@daimler.com
[2] Head of JT Workflow Forum
sebastian.handschuh@daimler.com
[3] General Manager of ProSTEP Association
steven.vettermann@prostep.com

Abstract. JT format became ISO Standard ISO14306 in December 2012 [1]. It is the beginning of new effective CAD collaboration in Multi-CAD environments. In parallel it gives innovative IT providers the chance to contribute with advanced solutions to challenge the established IT vendors. Through smart combination with the upcoming STEP AP 242 XML for the first time a process-oriented solution for supporting automotive data exchange requirements is available.

Keywords: JT Format, ISO 14306, STEP AP 242, ISO 10303, Engineering Collaboration, Product Creation.

1 Introduction

Digital Engineering Visualization is an approach which gives a broad number of individuals, being part of the product creation processes, the access to 3D data without using a traditional CAD system. As depicted in Figure 1, the number of people who only need to view information is 10 times higher than of its creators.

Over the last 5 to 8 years, JT Format (at this time owned by Siemens PLM) became more and more a de facto standard for 3D visualization in the automotive and aerospace industry. Hence, the Global Automotive Advisory Group, a forum of the international heads of automotive engineering IT, recommended Siemens PLM to handover the JT file format description to ISO for international standardization. To make this happen, ProSTEP iViP Association, the well-known organization for standardization in the field of engineering collaboration took over the operational lead to provide all documents and arrangements to support the ISO organization in the formal process to get ISO 14306 approved.

The JT format contents not only a definition of a tessellated representation with dedicated level of detail. It defines also an exact geometry description based on BREP and e.g. product and manufacturing information.

G.L. Kovács and D. Kochan (Eds.): NEW PROLAMAT 2013, IFIP AICT 411, pp. 41–52, 2013.
© IFIP International Federation for Information Processing 2013

Documents
Document Sharing Hub

Full document details: JT Format (ISO 14306) and AP 242 (ISO 10303): The Step to the Next Generation Colla...

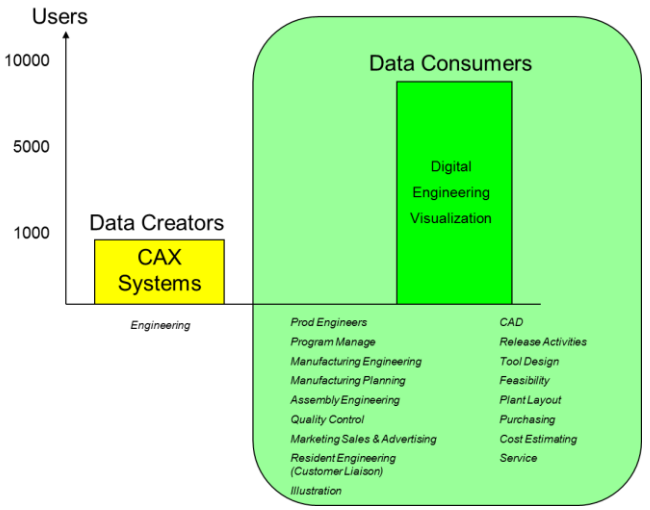


Fig. 1. Figure 1 - Hugh need for viewing information [1]

But for supporting all industrial visualization requirements JT itself could reach its full potential only by applying it in combined application with the smart XML-functionalities of the new STEP AP 242. Thus, in 2010, the decision was taken to establish STEP AP 242 XML and JT as the standard-combination for enabling lightweight data exchange. STEP AP 242 XML, as the process backbone, for assembly, meta, kinematic data etc. And JT as lightweight visualization format for 3D industrial data. By this, for the first time a process-oriented solution for supporting automotive data exchange requirements was agreed.

2 JT Based Processes

2.1 Process Overview

Only to provide an international standard without defining, how this standard can be used gains only limited value. So it is crucial to define processes first and underline these processes by concrete use cases.

Figure 2 gives an overview of the possible work share of native CAD and JT in an international automotive enterprise. Here we have to distinguish between internal company value adding processes which still require native CAD representation and integration processes between the OEM and the various numbers of suppliers. For this integration tasks, JT can contribute to be more flexible, faster and especially cost efficient.

Documents
Document Sharing Hub
Full document details: JT Format (ISO 14306) and AP 242 (ISO 10303): The Step to the Next Generation Colla...

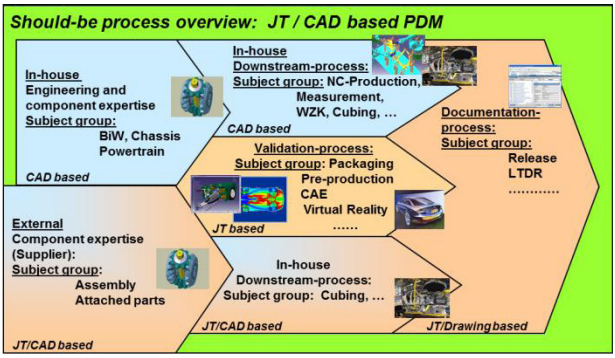


Fig. 2. Figure 2 -Future work share between CAD and JT (Source: Daimler, cf. [3])

2.2 JT Use Cases

To go into more detail it is recommended to detail the usage of JT in dedicated workflow descriptions.

The JT Workflow Forum, a working group under the umbrella of Pro STEP iViP Association defined such scenarios and published it in a whitepaper (cf. [3]).

The different use cases were classified in three categories, related to the complexity of usage

- Viewing
- Digital Mock Up
- Design in Context

2.2.1 Viewing

Viewing was the foundation of using JT. This includes also high end visualization, bidding and inquiry processes as well as material specification.

2.2.2 Digital Mock Up

Beside DMU analysis, the use cases in this cluster define processes for tolerance analysis, drawingless manufacturing, tolerance studies, supplier integration and al processes of digital factory.

2.2.3 Design in Context

Here the more advanced processes are defined. This includes hybrid design in context, all simulation activities as long term data retention.

Documents
Document Sharing Hub
Full document details: JT Format (ISO 14306) and AP 242 (ISO 10303): The Step to the Next Generation Colla...

3 Desgin in Context Using JT

3.1 Hybrid and Non-hybrid Design in Context

The Design in Context (DiC) process is one of the most complex processes which could be based on JT- and structure information (in future e.g. STEP AP 242XML) coming from various 3D-CAD-systems. These formats can be combined with native 3D-CAD-data which is often needed and beneficial in design processes (no media break). It is to be distinguished into [7]:

- Hybrid- (HDiC)and
- Non-hybrid design in context (NHDiC).

The hybrid design in context process directly uses JT-/ structure data as an input format without data translation into native 3D-CAD-formats (cf. Figure3).

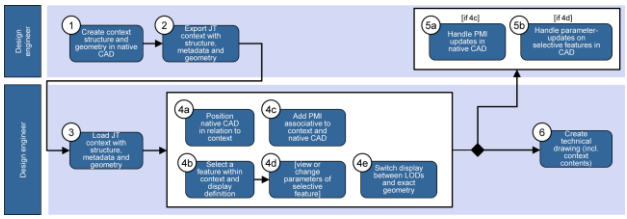


Fig. 3. Hybrid design in context use case [3]

In today's design in context processes often the exchange of geometrical change information is needed. The design in context process often refers to interface regions of (e.g. externally created) parts. Information located in these regions (e.g. geometrical elements) can be used for DiC-processes. The main categories in which this information can be divided are:

- Geometrical- and
- Technological information

Geoemtrical information is often used to define geometrical elements in surrounding parts on customer/OEM side. Therefore information such as diameters, curves or supplemental geometry is used. In case technological information is needed a broad range of information is thinkable in interface regions of parts e.g. mechanical-, electrical-information [7]. These interface related feature information can be transfered out of the sourcing 3D-CAD-system into JT-data using e.g. Product Manufacturing Information (PMI) or in future using a combination of JT and XML-based accompanying dataformats such as STEP AP242XML for the transfer of additional information. Work on this topic was done e.g. at the University of Kaiserslautern in context of value extracting use of open lightweight data formats (such as JT) in automotive collaboration and development process chains [7], [8]. Due to this fact the next chapter gives an overview of the value added chain in automotive industry and describes (as an example) a JT-based data exchange pilot project.

Documents
Document Sharing Hub
Full document details: JT Format (ISO 14306) and AP 242 (ISO 10303): The Step to the Next Generation Colla...