



AeroSpace and Defence
Industries Association of Europe



AIA - ASD interoperability coordination confcal 18th of October 2017 : Implementer Forums

Jean-Yves DELAUNAY
Airbus

- Summary of 2017 CAX-IF activities for STEP AP242 e1 recommended practices
- Summary of 2017 PDM-IF activities for STEP AP242 e1 recommended practices
- AFNeT – ProSTEP iViP STEP AP242 Benchmark n°2 – PDM WP
- AFNeT – ProSTEP iViP STEP AP242 Benchmark n°2 – CAD geometry WP
- Interoperability test rounds of the CAX-IF and PDM-IF, to speed up the deployment of STEP COTS interfaces
- Change of the model of the CAX IF to be prepared for 2019
- Future trends for PLM Implementer Forums

Summary of 2017 CAX-IF activities

for STEP AP242 e1 recommended practices



- **Supporting associations:** ProSTEP iViP, PDES Inc, AFNeT,
- Web site: <http://www.cax-if.org/>
- Main 2017 activities
 - 4 meetings + regular confcalls
 - 2 interoperability test rounds, 2 meetings with LOTAR and CAD vendors
- COTS solutions providers members of the CAX IF:
 - CAD systems: Autodesk Inventor, Dassault Systemes CATIA and SolidWorks, PTC Creo, Siemens PLM NX and Solidedge
 - CAD integrators: Core Technologie, Datakit, Elysium, Jotne EPM Technology, ITI, Techsoft 3D, Theorem Solution,
- Overview of main 2017 test rounds and preparation of associated rec. practices:
 - Testing of **Alternative shapes** (Example: sheet metal with folded / unfolded shape)
 - **3D PMI** (graphic presentation & semantic representation), PMI with UDA (User Defined Attribute)
 - **Assembly PMI** (graphic presentation & semantic representation),
 - Start of testing of **Persistent identifiers**. 2 usage scenarios: CAD <=> CAD and CAD <=> Manufacturing <=> Inspection
 - **Composite design**
 - **Geometric and Assembly Validation Properties** (new version published)
 - STEP AP242 Business Object Model **XML Product & Assembly Structure** : test based on AP242 ed1 TC1
- **Launch of the CAE IF in Sept. 2017, for structural analysis, based on STEP AP209**



- Supporting associations: AFNeT, ProSTEP iViP
- Web site: <http://www.pdm-if.org/>
- Main 2017 activities
 - PDM IF User Group: 2 meetings + confcals ; PDM IF Implementer Group: 4 meetings + confcals
 - 3 interoperability test rounds
- Overview of 2016 rec. practices:
 - STEP AP242 Business Object Model XML Product & Assembly Structure (*including PDM-IF feedback* [V1.2](#), November - December 2016)
 - STEP AP242 Business Object Model XML Product & Assembly Structure (*aligned with AP242 TC1* [V2.0](#), in preparation)
 - STEP AP242 Business Object Model XML Configuration Management (*in preparation*)
- Scope of 2017 activities
 - Exchange of nested STEP AP242 product structure
 - Exchange of company specific PDM attributes. Definition of a list of generic attributes common to most manufacturers
 - Exchange of AP242 PDM product structure between parametrized PDM systems
 - Exchange of configured product structure (resolved configuration)

Tests of COTS interfaces by independent specialists



AFNeT & ProSTEP iViP STEP AP242 Benchmark

Test report for the STEP AP242 Benchmark #2
PDM test case - Short Report

March 2017

Content

- 1 Introduction
- 2 References and terms
 - 2.1 Reference documents
 - 2.2 Terms
- 3 Test methodology
 - 3.1 Functionalities tested in this Benchmark
 - 3.2 Testing Strategy
 - 3.3 Synthetic Test Case Specifications
 - : PDM Assembly with 3D Geometry
 - 3.4 List of tested applications
 - 3.5 STEP file selected as reference for phase 3
- 4 Test Results
 - 4.1 Overview of the Test Results
 - 4.2 Overall Test Results
- 5 Summary
- 6 Publication of the Long Report of PDM test case
- 7 Acknowledgements

- The results show a good level of STEP AP242 BO XML implementation for PDM product structure exchange.
- Most of in-scope PDM functionalities are robustly supported, except for the transfer of the benchmarked assembly validation properties.

Access to the short report:

<http://benchmark.ap242.org/>

Tests of COTS interfaces by independent specialists

Planning: Start in June 2016; report end of April 2017

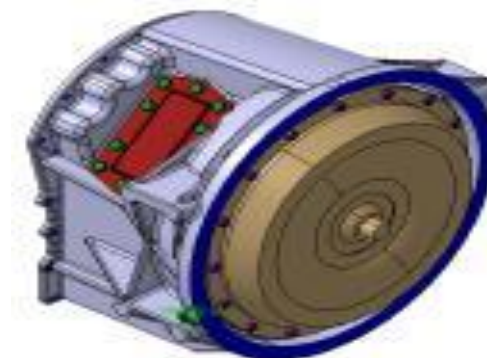
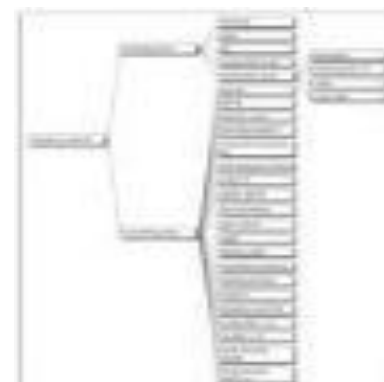
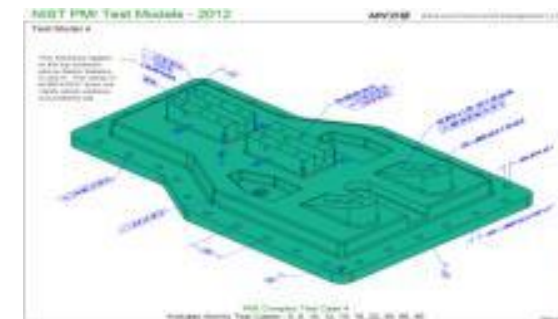
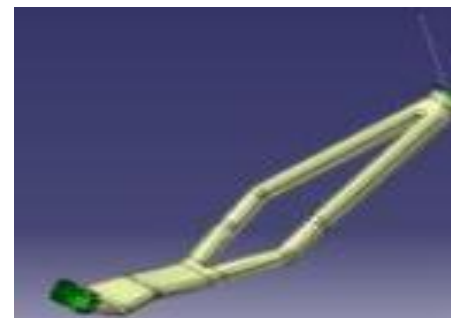
Use cases: data exchange of:

- 3D exact geometry,
- 3D tessellated geometry,
- 3D PMI representation and graphic presentation,
- assembly structure,
- associated validation properties

Applications tested:

- Autodesk (Inventor Professional 2017),
- CoreTechnologie (3DEvolution, 3DAnalyzer),
- Datakit (CrossManager),
- Elysium (ASFALIS)
- Dassault Systèmes (CATIAV5-6R2016, 3DEXPERIENCE 2016x),
- Theorem (CADVerter),
- TechSoft3D (Tetra 4D Converter),

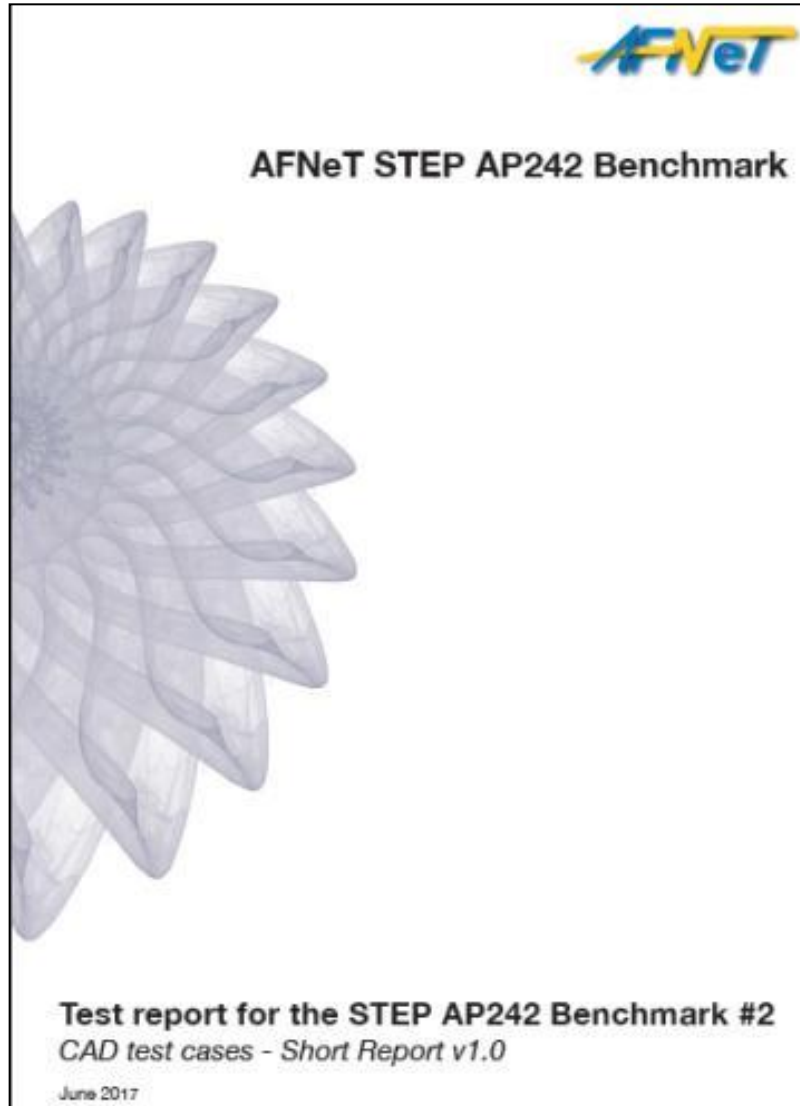
- Test cases:



AP242 benchmark website



Access to public test report of AFNeT STEP AP 242 benchmark #2



LINK
to public
report



Table of content
of the public test report

- 1 Introduction
- 2 Terms and definitions
- 3 Test methodology
- 4 Test results for each tool
- 5 Test results for each test case
- 6 Summary
- 7 Publication of the long report
- 8 Acknowledgements

type	Source format	Target format	Solution name	TC1 3D exact geometry	TC2 3D Translated geometry	TC6c assembly BO model XML + translated geo.	TC6d CAD assembly (P21 & nested) + exact geometry
import	STEP AP242	3DEXPERIENCE	3DEXPERIENCE R2016a	●	●	●	●
import	STEP AP242	3D PDF	Tetra4D Reviewer 2016.1.0	●	●		●
import	STEP AP242	3D PDF	CrossManager 16.2	●	●		●
import	STEP AP242	CATIA V5	3DEvolution v4.0 SP2	●	●	●	●
import	STEP AP242	CATIA V5	CATIA V5-6R2016	●	●	●	●
import	STEP AP242	CATIA V5	CrossManager 16.2	●	●		●
import	STEP AP242	CATIA V5	ASFALIS	●		●	
import	STEP AP242	Crea	3DEvolution v4.0 SP2	●	●	●	●
import	STEP AP242	Crea	ASFALIS	●		●	
import	STEP AP242	Inventor	Inventor Professional 2017	●	●		●
import	STEP AP242	Inventor	3DEvolution v4.0 SP2	●	●	●	●
import	STEP AP242	Inventor	ASFALIS	●			
import	STEP AP242	NX	3DEvolution v4.0 SP2	●	●	●	●
import	STEP AP242	NX	CrossManager 16.2	●			
import	STEP AP242	NX	ASFALIS	●		●	
import	STEP AP242	SOLIDWORKS	3DEvolution v4.0 SP2	●	●	●	●
import	STEP AP242	SOLIDWORKS	ASFALIS	●		●	
viewer	STEP AP242	Viewer	3DAnalyzer	●	●	●	●
viewer	STEP AP242	Viewer	Tetra4D Reviewer 2016.1.0	●	●		●

Interoperability test rounds of the CAX-IF and PDM-IF to speed up the deployment of STEP COTS interfaces

CAX IF

PDES Inc, ProSTEP iVIP
and AFNeT

Kinematics

Composite

ALM

CAM

Mechanical

Electrical

CAE

xDM IF

AFNeT, ProSTEP iVIP

Assembly
Structure.

PDM / CM

Req. Mngt and V&V
traceability (N1)

SimulationData
Mngt.

Modeling &
Simul.

PDES Inc ?

Maintenance

N1: Text based and model based

Functionality covered / tested
by the Implementer Forum
as a specific Working Group

covered

Planned
Extension

Related ISO STEP standards (AP = Application Protocols)

AP242 e1

IS in 2014 (IS = International Standard)

AP242 e2

In development - Planned IS in 2018

AP209 e2

IS in 2014

AP239 e3

In development - Planned IS in 2019

MoSSEC e1

In development - Planned IS in 2019

In 2018: **extension** of the CAX IF with the creation of 2 new WGs, + **consolidation** of the PDM-IF

Context

- Increasing activities planned in 2018 and 2019 in new technical disciplines
 - Mechanical design => Mechanical manufacturing
 - Composite design
 - Kinematics
 - Electrical harness for design and construction
 - Additive Manufacturing (design part)
 - Structural analysis
- : Increasing deliverables / results: rec. practices, test round steering, etc.
 - ➔ Increasing resources requested
- Decrease of funding by ProSTEP iViP (42 K€ in 2017 to 10 K€? In 2019)
 - ➔ Proposal of change of funding models in the European side
 - Setting up of a Manufacturers User Group
 - Working in close relationship with the Implementer Group
 - : see next page

A&D

Target
(Draft)

LOTAR

Other business- e.g. exchange in the EE
needs - migration

PDES Inc

AFNeT

NAFEMS

ProSTEP iViP

LOTAR
Mechanical

LOTAR
EAS

LOTAR
Electrical

LOTAR
PDM

CAX IF ("Overall organization")

xDM IF ("Overall organization")

Mechanical WG

EAS WG CAE IF

Elect

PDMW

SDMW

User Group ↔ Impl. Group

User Group ↔ Impl. Group

User Group ↔ Impl. Group

User Group ↔ Impl. Group

User Group ↔ Impl. Group

AP242

AP209 ed2

AP242 ed1(2017)

AP209 ed2

Other industries contributions

- Use cases involving complex set of data, made of inter related models of different technical disciplines
(could be part of a technical data package)
 - PDM /CM, R, V&V management information
 - Mechanical (composite, tubing, etc)
 - Electronic
 - Functional models
 - Electrical
 - ...
 - Combination of different families of use cases /implementations forms for the same technical disciplines
 - MBx exchange
 - MBxLT archiving and retrieval
 - MBx visualization
 - **MBx linked data with web services**
- MBx interoperability

Back up
slides

Remind of the objective and business value of an Implementer Forum

- **OBJECTIVE**: Cooperation platform between industries and COTS PLM vendors / integrators to speed up the development of COTS interoperable solutions, and ensure that user's business needs are satisfied.
- **BUSINESS VALUE**: Secure the investment in standard development by ensuring coordination between manufacturers and COTS PLM solutions providers

- User requirements drive implementation & testing
- Interoperable COTS PLM solutions
- Consensus based solutions

