AFNeT STEP AP242 Benchmark

Test report for the STEP AP242 Benchmark #1

Short Report

September 2015

Preamble

AFNeT mission is to promote the use of digital technologies in the extended enterprise. The standards are a key enabler of this mission.

The use of 3D Model Based interoperability to support global Engineering and Manufacturing of complex products relies on international interoperability standards and on associated Implementor Forums.

So we have contributed to the launch and development of the STEP AP242 initiative since 2010 and the availability of the first COTS STEP AP242 interoperable solutions is the achievement of this challenge.

Today we are pleased to provide you the results of the first edition of the STEP AP242 Benchmark reports, focused on the tests of CAD converters and 3D viewers.

New editions of this Benchmark report will be published, addressing additional software & functionalities.

This work has been realized with the support of Airbus Group, Dassault Aviation, Daher, MBDA, Liebherr, CIMPA, Boost, IRT-SystemX, GIFAS, ASD-SSG, PFA, AFNeT Members and the AFNeT Team.

Pierre Faure

Chairman of AFNeT

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Changes

Date	Version	Changes
18/09/2015	V1.1	Chapter 7 - Ortographic corrections

1 Introduction

ISO 103010 STEP AP242 has been released as “International Standard” (IS) in December 2014. Several COTS applications based on STEP AP242 “Draft International Standard” (DIS) have been tested during the 2013 year by the CAx Implementor Forum.

The AFNeT association with the support of several industry associations (GIFAS, PFA, ASD-SSG) and manufacturers have set up this first benchmark in order to get an independent assessment of COTS STEP AP242 interfaces and related 3D viewers.

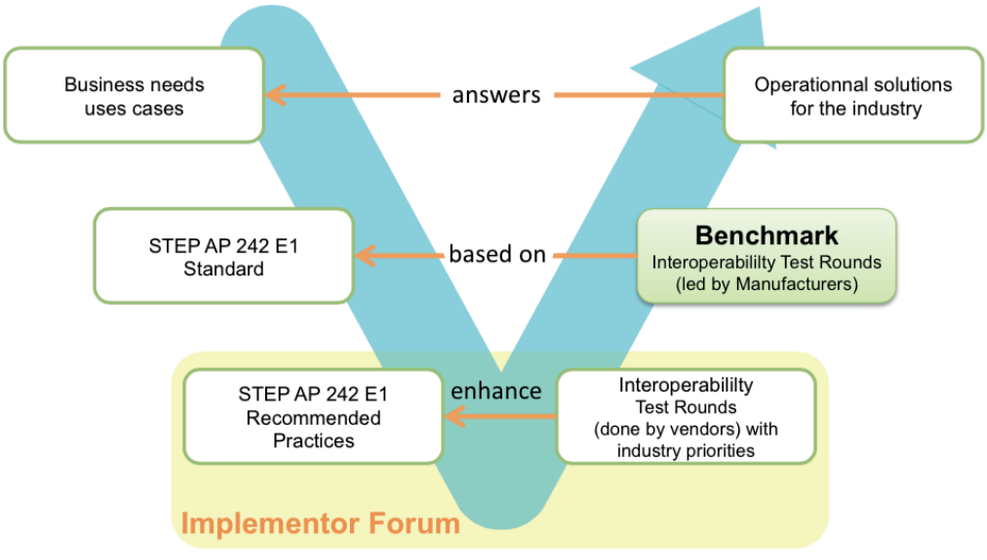

Figure 1: V cycle for STEP AP242 solutions

The objective of this benchmark is to provide a public status of STEP AP242 functionalities available for operational use, tested by the industry, and to identify limitations of the tested PLM COTS AP242 applications.

The preparation of this benchmark was jointly ensured by AFNeT and ProSTEP iViP from October 2014 to April 2015.

The organization of this benchmark is based on the following principles:

- Business priorities defined by the industry stakeholders supporting the STEP AP242 benchmark,
- AP242 interoperability functionalities already tested by the CAx-IF,
- tests based on STEP AP242 COTS solutions available on the market or on their way to be shipped to the industry,
- publication of the public report of the 1st benchmark in Q3 2015.

The list of the main AP242 functionalities tested by this benchmark is the following:

- 3D geometry (exact and tessellated),
- 3D Product and Manufacturing Information (PMI) “presentation”,
- assembly structure with external reference (nested and non-nested),
- composite design based on plies with implicit surfaces,
- related end to end conversions quality controls based on validation properties.

Since PLM vendors and CAD integrators constantly enhance the functionalities and robustness of their STEP AP242 interfaces, the results of this benchmark provide a snapshot of the functionalities tested at a certain moment in time for a specific version of the vendors solutions.

2 Terms

CAD	Computer-aided design
CAx-IF	CAx Implementor Forum
COPS	Cloud Of PointS
COTS	Commercial Of The Shelf
DIS	Draft International Standard
DMU	Digital mockup
EN	European Norms
IS	International Standard (status of maturity of ISO standards development)
ISO	International Organization for Standardization
GD&T	geometric dimensioning and tolerancing
GVP	Geometric Validation properties
LTA	Long term archiving
LOTAR	LOng Term Archiving and Retrieval
NIST	National Institute of Standards and Technology (US)
PDF	Portable Document Format
PMI	Product and manufacturing information
PLM	Product Life cycle Management
P21	ISO 10303-21
STEP	Standard for the Exchange of Product model data
STEP AP203	Application protocol: Configuration controlled 3D design of mechanical parts and assemblies (ISO10303-203:2011)
STEP AP214	Application protocol: Core data for automotive mechanical design processes (ISO10303-214:2010)
STEP AP242	Application protocol: Managed model-based 3D engineering (ISO10303-242:2014)
XML	Extensible Markup Language
UDA	User defined attributes

2.1 Definition of terms used in this document

2.1.1 Reminder of definition for PMI graphic presentation AP242 edition 1:

Graphic Presentation is a type of Presentation where the conveyed information is converted to geometric elements (lines, arcs, surfaces) by the source system in a way that preserves the exact appearance (color, shape, positioning) of the presented information. The arrangement of these geometric elements can be interpreted by a competent human by looking at them, while the information content is no longer directly computer-accessible.

Polyline Presentation

Polyline Presentation designates a specific implementation form of Graphic Presentation that is supported by many STEP Application Protocols, including AP203e2, AP214e3 and AP242.

Tessellated Presentation

Tessellated Presentation designates a specific implementation form of Graphic Presentation that is has been introduced during the development of STEP AP242.

2.1.2 Reminder of definition for the validation properties

The Validation Properties are used within automatic processes to check the end to end consistency of data content during transformations from one format into another format.

3 Test methodology

3.1 Test strategy

The test strategy was:

- First, the creation of STEP files from all the selected applications;
- then, the selection per test case of one of the STEP file based on the syntax check and the loop tests (conversion from STEP to native with the same application used for the conversion from native to STEP);
- finally, the import of the selected files into all of the selected applications.

These selections of STEP files have been done in order to decrease the test phase workload according to the availability of the resources. A systematic import of a STEP file in each application increases the workload, depending on the number of applications able to create the STEP files, and the quality issues of the STEP files.

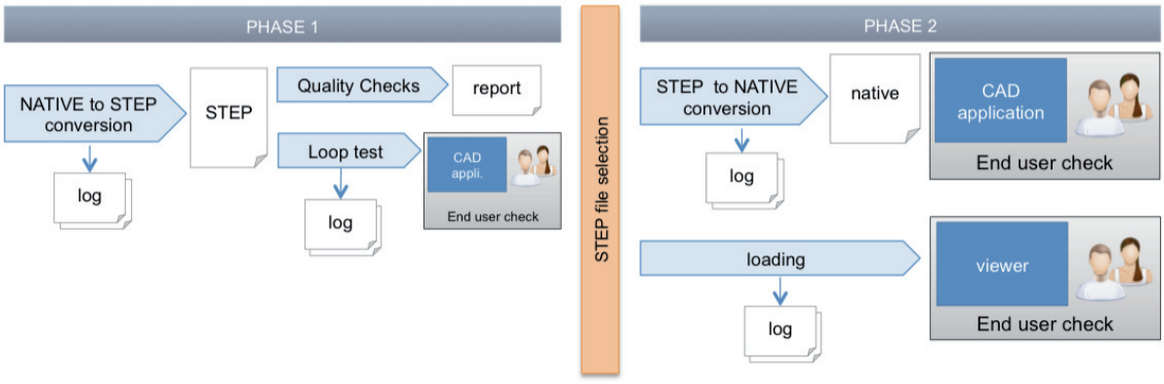

Figure 2: Illustration of the CAD strategy

3.1.1 Rules for the STEP files selection

The general approach was to select a STEP file of good quality for each functionality tested in phase 2.

3.2 Test models

This section gives an overview of the test models. Each test model was available in the 3 native CAD formats (CATIA V5, Creo and NX).

3.2.1 Geometry test model

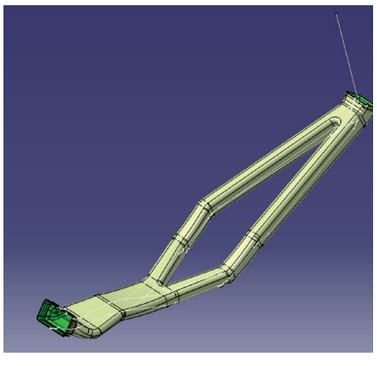

Figure 3: Overview the model

The test model contains:

- Geometry:
  - Solid
  - “independent” surface (open shell)
  - “independent” curves
- User defined attributes

3.2.2 Product Manufacturing Information (PMI) test model

The model comes from NIST “MBE PMI Validation and Conformance Testing”.
http://www.nist.gov/el/msid/infotest/mbe-pmi-validation.cfm

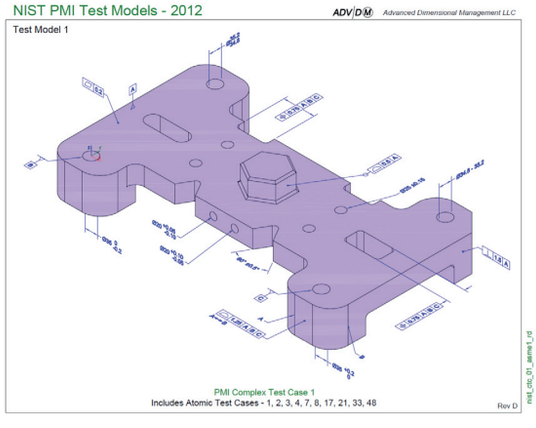

Figure 4: nist_ctc_01_asme1_ct5210_rd

3.2.3 Assembly test model

The test model is an assembly made of sub-assemblies and XX individual parts, represented by 3D solid models.

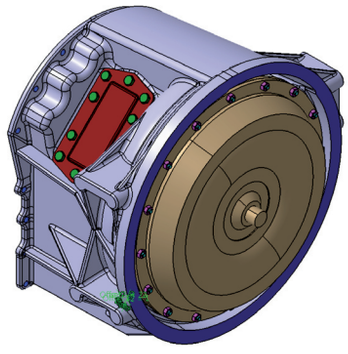

Figure 5: overview the geometry of the CAD assembly test case

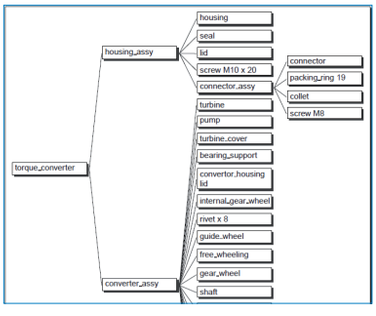

Figure 6: extract of the assembly structure of the CAD assembly test case

3.2.4 Composite test model

The model comes from NIST. The model was only available in the CATIA V5 format.

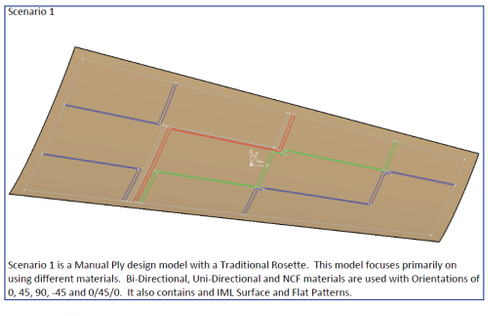

Figure 7 - overview of the geometry of the plies for the composite test model

3.3 Test criteria

The general test criteria for each test were:

- End user validation: it consists of checking the completeness of critical content between the native and the target systems.
- Validation properties: it consists of the comparison of the values stored in the STEP file and the values computed by the STEP interface/converter.

The issues reported to the PLM vendors included:

- the errors of conversions reported in the log files,
- the syntax check result,
- the STEP file analyser outputs,
- and the errors of conversion detected by the visual control between the source CAD model and the converted CAD model.

3.4 Test cases

3.4.1 3D exact geometry (TC1)

The 3D exact geometry is used in various use cases such as the exchange of the CAD data, the long term archiving and retrieval of the CAD data.

The validation properties mechanism is essential to ensure the end to end quality control.

The approach of this TC1 is to export and import a STEP file containing the exact geometry (solid, surface, curve, point). The geometry test model has been used (see 3.2.1 Geometry test model).

3.4.2 3D tessellated geometry (TC2)

The 3D tessellated geometry is used for the long term archiving and the exchange of approximate geometry and the light visualization.

The approach of this TC2 is to export and import STEP files containing the tessellated geometry (solids, surfaces and curves). The geometry test model has been used (see 3.2.1 Geometry test model). The STEP interface or converters derived the tessellated geometry from the exact geometry.

3.4.3 PMI Graphic presentation (polyline) on 3D exact geometry (TC3a)

Product and Manufacturing Information (PMI) is required for a number of business use cases in the context of STEP data exchange. Among others, it is a prerequisite for exchanging geometric dimensions and tolerances, 3D symbols, allowing the suppression of 2D drawing, and for long-term data archiving of 3D model based definition

The approach of this TC3a is to export and import STEP files containing the PMI graphic polyline presentation. The PMI test model has been used (see 3.2.2 Product Manufacturing Information test model (PMI)). The STEP interface or converters derived a graphic presentation based on polyline from the PMI.

PMI export based on the graphic polyline presentation

3.4.4 PMI Graphic presentation (tessellated) on 3D exact geometry (TC3b)

Product and Manufacturing Information (PMI) is required for a number of business use cases in the context of STEP data exchange. Among others, it is a prerequisite for long-term data archiving.

The PMI test model has been used (see 3.2.2 Product Manufacturing Information test model (PMI)). The STEP interface or converters derived a graphic presentation based on tessellated entities from the PMI.

3.4.5 PMI export based on PMI Graphic presentation on 3D tessellated geometry (TC4)

Product and Manufacturing Information (PMI) is required for a number of business use cases in the context of STEP data exchange. The motivation for this test case is the visualization.

The PMI test model has been used (see 3.2.2 Product Manufacturing Information test model (PMI)). The STEP interface or converters derived a graphic presentation based on tessellated entities from the PMI. The PMI graphic tessellated presentation was associated to the tessellated geometry.

3.4.6 PMI export based on Composite part information with plies defined by 3D surfaces and contours (TC5)

The motivation is to be able to migrate, exchange and archive for long term the composite information from the CAD system.

The scope of the benchmark #1 is the exact implicit representation of composites where the 3D representation is based on surfaces and contours. Out of scope of the benchmark #1 is the approximate explicit representation of composite plies, where there is a 3D tessellated solid for each ply. The approach is to export and import the composite information in STEP AP242 AIM P21.

3.4.7 CAD assembly file with reference to 3D tessellated geometry (TC6)

The first motivation of this test case is the exchange of CAD assembly structure referencing geometry. The second motivation of this test case is the visualization of a CAD assembly structure with the 3D tessellated geometry.

The approach for the “CAD assembly external reference assembly” test case is to export/import the assembly structure in one single file, and the tessellated geometry in separate STEP files. All the STEP files are compressed automatically by the STEP converter or STEP interface.

3.4.8 CAD assembly (nested) files with reference to 3D exact geometry (TC6d)

The motivation of this case is the exchange and the long term archiving of CAD assembly structure referencing files containing exact geometry. For this test case, the objective is to keep the file structure as the native structure.

The approach for the CAD assembly nested assembly is to export/import the assembly structure in several files and the exact geometry in separate STEP files.

3.5 List of tested applications

This section describes the list of tested applications during this benchmark. The selection of applications has been done according to:

- the needs of industry representatives supporting the benchmark;
- the availability of resources and funding;
- the availability of COTS tools according to the tests planning;
- the commitment of the support of PLM vendors to the benchmark.

Other tests will be done in future benchmarks according to industry priorities and resource availability.

3.5.1 CAD systems and converters

	Application name
Autodesk	Autodesk Inventor Professional 2016 - import only*
Dassault Systèmes	CATIA V5-6R2015 GA
CoreTechnologie	3D_Evolution 4.0 NX V10 ➔➔ AP242 (All TCs except composite) 3D_Evolution 4.0 CATIA V5 ➔AP242 (Composite)**
Datakit	CrossManager V2015.2 CATIA V5 ➔➔AP242 CrossManager V2015.2 NX ➔AP242 – export only CrossManager V2015.2 Creo ➔AP242 – export only

(*) The export has not been tested due to test planning and the availability of test models in the native format.

(**) 3D_Evolution supports other functionalities for CATIA conversion but the benchmark team chose to evaluate only the composite functions.

3.5.2 3D Viewers

	Application name
Dassault Systèmes	3DLive V6R2013x FP1450
CoreTechnologie	3D_Analyzer 4.0
Tech Soft 3D	3D PDF Converter V5.0
Datakit	CrossManager V2015.2 STEP=>PDF 3D
Kisters	3DViewStation V2015.0.8551

3.6 STEP file selected as reference for phase 2:

According to the rules described in section 3.1.1 Rules for the STEP files selection, the following table lists the origin of the STEP file used during the test of the phase 2:

TC n°	TC description	Origin of the STEP file
TC1	3D exact geometry	Datakit CrossManager NX
TC2	3D tessellated geometry	Dassault Systèmes CATIA V5
TC3a	PMI graphic polyline presentation and exact geometry	CoreTechnologie 3D_Evolution NX
TC3b	PMI graphic tessellated presentation and exact geometry	Dassault Systèmes CATIA V5
TC4	PMI graphic tessellated presentation and tessellated geometry	Dassault Systèmes CATIA V5
TC6b	CAD assembly AIM P21 with external references on tessellated geometry	Dassault Systèmes CATIA V5
TC6d	CAD assembly AIM P21 nested assembly on exact geometry	Datakit CATIA V5

4.1 Summary of the test results

	CAD EXPORT					CAD IMPORT				3D VIEWER				
	Dassault Systèmes CATIA V5R2015	Datakit CrossManager V2015.2	CoreTechnologie 3D_Evolution 4.0	Datakit CrossManager V2015.2	Datakit CrossManager V2015.2	Autodesk Inventor Professional 2016	Dassault Systèmes CATIA V5R2015	Datakit CrossManager V2015.2	CoreTechnologie 3D_Evolution 4.0	Datakit CrossManager V2015.2	CoreTechnologie 3D_Analyzer 4.0	Dassault Systèmes 3DLive V6R2013X	Kisters 3DViewStation	Tech Soft 3D 3D PDF Converter V5.0
	STEP EXPORT	CATIA V5 to STEP	NX to STEP	NX to STEP	CREO to STEP	STEP IMPORT	STEP IMPORT	STEP to CATIA V5	STEP to NX	STEP to PDF 3D				
3D exact geometry (TC1)														
End user validation	◕	◕	◕	◕	◕	◕	●	●	●	●	●		●	●
Geometric Validation Properties	●	◑	◑	●	●		◑	●	◑	●	◑			
3D tessellated geometry (TC2)														
End user validation	●	●	●	●	◕	◕	●	◔	◑	◕	●	◕	●	●
Tessellated validation Properties	●	●	●	●	●		●	●	◑	●	●			
PMI Graphic presentation (polyline) on 3D exact geometry (TC3a)														
End user validation	●	◑	◕	◕		◕	◕		◕	●	●		◕	◕
Validation Properties	◕	◕	●	●			○		●	●	●			
PMI Graphic presentation (tessellated) on 3D exact geometry (TC3b)														
End user validation	●	◑	◕	◕		◑	●		◑	◕	●			
Validation Properties	◕	◕	◕	◕			●		●	◕	●			
PMI Graphic presentation on 3D tessellated geometry (TC4)														
End user validation	●	◑	◕	◑		◑	●		◑	◑	●	◕		
CAD assembly file with reference to 3D tessellated geometry (TC6b)														
End user validation	●	●	●	◔	●		●	◕	◕	●	◕	◕	●	●
Assembly Validation Properties	●	●	●	●	●		●	●	●	●	●			
Compression	●	●	●	●	●		●	●	○	●	●	●	◑	◑
CAD assembly (nested) files with reference to 3D exact geometry (TC6d)														
End user Validation	●	●	●	●	●		●	●	●	●	●		●	●
Assembly Validation Properties	●	●	●	●	●		●	●	●	●	●			

	CAD EXPORT		CAD IMPORT	3D VIEWER
	Dassault Systèmes CATIA V5R2015	CoreTechnologie 3D_Evolution 4.0	Dassault Systèmes CATIA V5R2015	CoreTechnologie 3D_Analyzer 4.0
	STEP EXPORT	CATIA V5 to STEP	STEP IMPORT	
Composite part information with plies defined by 3D surfaces and contours (TC5)				
End user valdation	◕	◑	◕	◕

test result	symbol	% of success
Success	●	=100%
Partial success fail	◕	>66%
	◑	≥33%
	◔	<33%
Total Fail	○	=0%
Not supported		
Not tested		

Note: The 3D_Evolution application supports other functionalities for CATIA conversion but the benchmark team chose to evaluate only the composite functions.

Table 1: summary of the test result per test case and per tools

4.2 Autodesk - Inventor Professional 2016

The import of STEP AP242 file of Inventor has been tested. The export has not been tested due to test planning and the availability of test models in the native format.

The quality of the import is very good for the exact geometry, the tessellated geometry, the graphic polyline presentation of PMI and the graphic tessellated presentation of PMI.

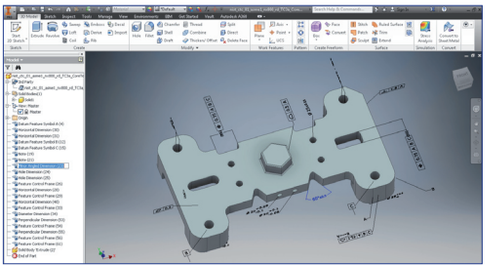

Figure 8: Example of the import in Inventor of STEP AP242 file with graphic polyline presentation of PMI on exact geometry

4.3 Dassault Systèmes - CATIA V5-6 R2015

The STEP AP242 interface of CATIA V5 has been tested for the export and the import. This STEP interface supports all the functionalities (including composite information) evaluated during this benchmark.

The result of the export was a success in more than 90% of the tested functionalities.

The result of the import was successful except for some validation properties (geometry and PMI polyline).

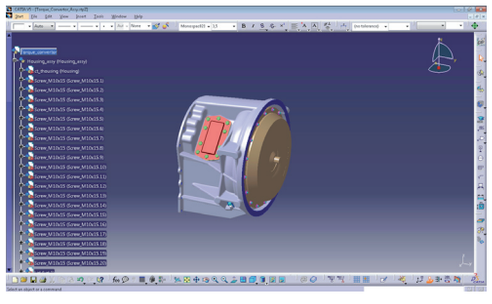

Figure 9: Result of the import in CATIA V5 of a compressed assembly with external reference to tessellated geometry

4.4 CoreTechnologie 3D_Evolution 4.0

4.4.1 NX conversions

For the benchmark, the 3D_Evolution application was used as a tool to convert from the NX to STEP AP242 and from STEP AP242 to NX.

The NX to STEP conversion was successful for all test cases.

For the STEP to NX conversion, the reading of the STEP file was good in most of the tests (exact geometry, assembly, graphic polyline presentation of the PMI). Nevertheless, the rebuild in NX of tessellated geometry, and graphic tessellated presentation of PMI, was partially successful.

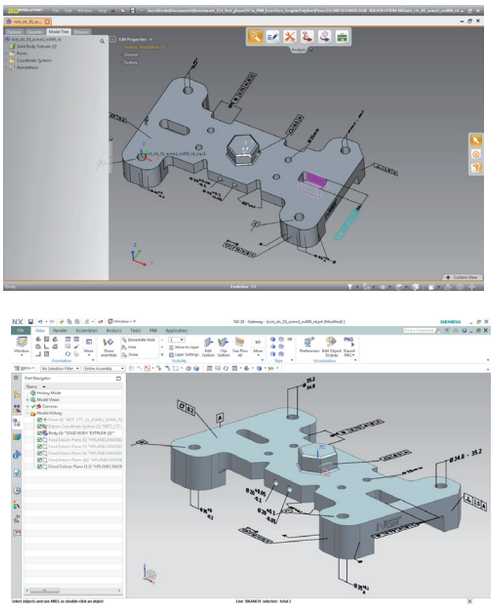

Figure 10: rebuilt of the exact geometry with PMI (polyline) in NX (right) by 3D_Evolution (left)

4.4.2 CATIA conversion for composite test case

The 3D_Evolution application supports other functionalities for CATIA conversion but the benchmark team chose to evaluate only the composite functions.

The CATIA to STEP conversion of composite was successful for the laminate tables, their sequences, their plies, and also for the association of the material for each plies.

4.5 Datakit - CrossManager V2015.2 (CATIA, NX, Creo)

During this benchmark, the following functionalities of conversion of CrossManager were tested:

- CATIA V5 to STEP AP242, STEP AP242 to CATIA V5;
- NX 8 to STEP AP242;
- and Creo Parametric 2.0 to STEP AP242.

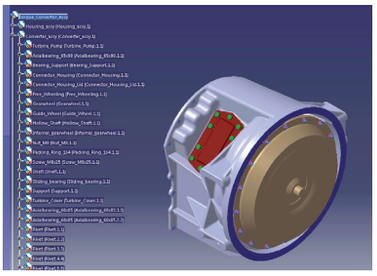

Figure 11: Result of the conversion STEP to CATIA V5 by CrossManager for the nested assembly

CrossManager supports all the test cases and most of the functionalities of the benchmark, except for Creo conversions where the licence of the PMI functionalities wasn't available, and for composite (functionality not available).

4.6 CoreTechnologie - 3D_Analyzer 4.0

All the tests cases (including composites) and functionalities of this benchmark are supported by 3D_Analyzer. The test results were successful for more than 90% of the tested functionalities without taking into account composite test cases.

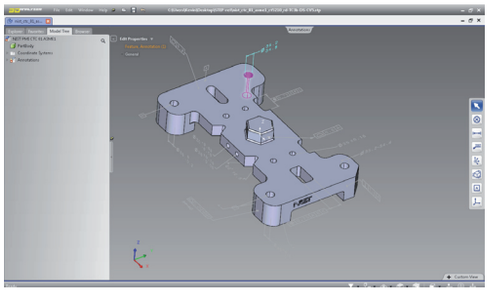

Figure 12: Visualization of tessellated PMI and exact geometry in 3D_Analyzer

4.7 Dassault Systèmes - 3DLive V6R2013x

3DLive supports only the visualization of the STEP tessellated geometry. So the test scope was limited to the 3 related test cases. The end user result was good in most of the cases.

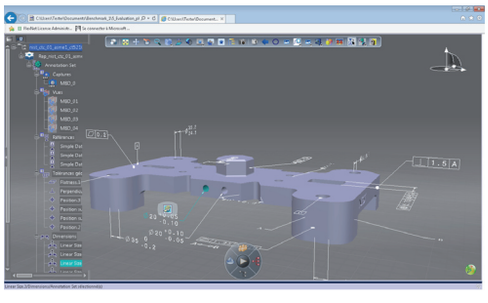

Figure 13: Visualization of tessellated PMI and tessellated geometry in 3DLive

4.8 Datakit - CrossManager V2015.2 3D PDF

All the tests cases (except composites) and functionalities of this benchmark are supported by CrossManager 3D PDF. The test results were succesful for around 90% of the tested functionalities.

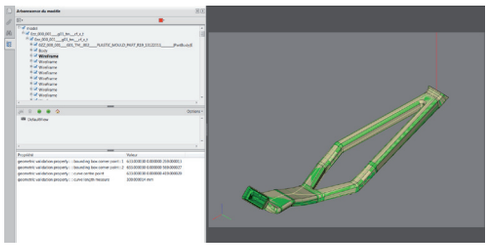

Figure 14: Visualization of tessellated geometry in acrobat reader of the PDF file created by CrossManager

4.9 Kisters - 3DViewStation V2015.0

3DViewStation supports the geometry test cases (exact and tessellated), the PMI graphic polyline presentation test case, and the assembly structure test cases. In this scope, the end user test results are successful.

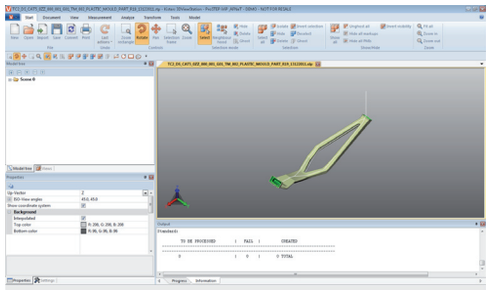

Figure 15: Visualization of tessellated geometry in 3DViewStation

4.10 Tech Soft 3D - 3D PDF converter V5.0

3D PDF converter supports the geometry test cases (exact and tessellated), the PMI graphic polyline presentation test case, and the assembly structure test cases. In this scope, the end user test results are successful.

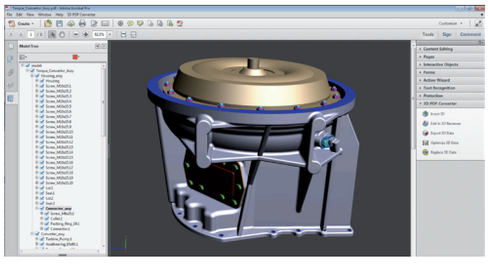

Figure 16: Visualisation of assembly with exact geometry in 3D PDF converter

5 Test results for each test case

This section gives an overview of some representative test results for each test case.

The test case results were done according to several criteria. In the following sections, the result overview are focused on one/two important criteria for each test case.

5.1 3D exact geometry (TC1)

Without considering the geometry presentation (colour of the geometry, styling of the curve), the export, import, conversion, and viewing of exact geometry (solid, surface and independent curves) are successful with all tools.

Only 1 tool does not support the visualization of exact geometry.

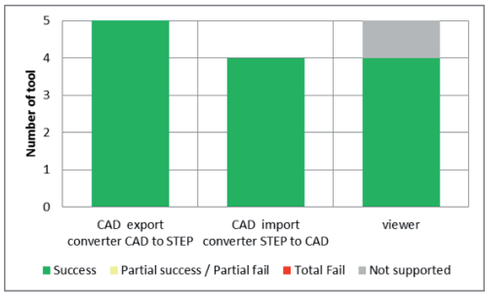

Figure 17: test result of the end user validation on exact geometry (excluding the presentation)

5.2 3D tessellated geometry (TC2)

Without considering the geometry presentation (colour of the geometry, styling of the curve), the export of tessellated solids are successful with any tool.

The test result was unsuccessful one tool only.

The partial success results are due to issues with the tessellated curves.

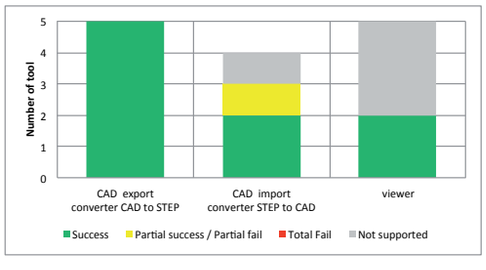

Figure 18: test result of the end user validation on tessellated geometry (excluding the presentation)

5.3 PMI Graphic presentation (polyline) on 3D exact geometry (TC3a)

The CAD systems import, the STEP to native conversion and visualization of the PMI are successful for every tool supporting the test cases.

The partial success result in the native to STEP conversion is due to a change on the presentation of PMI.

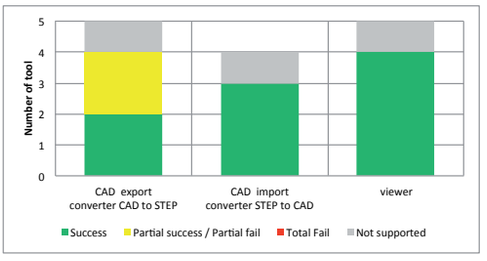

Figure 19: test result of the end user validation on the graphic polyline presentation of PMI (including the color, styling).

5.4 PMI Graphic presentation (tessellated) on 3D exact geometry (TC3b)

The CAD system import and visualization of the PMI are successful for every tool supporting the test cases.

The partial success result in the CAD to STEP conversion and STEP to CAD are due to a change on the presentation of PMI.

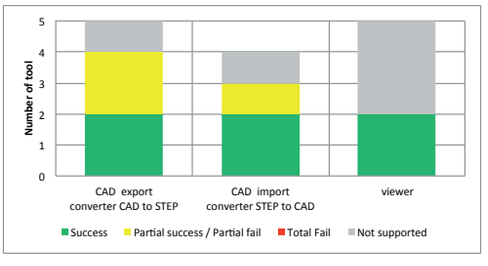

Figure 20: test result of the end user validation on the graphic tessellated presentation of PMI (including the color, styling).

5.5 PMI Graphic presentation on 3D tessellated geometry (TC4)

For the PMI presentation, the result is the same as the test case with exact geometry.

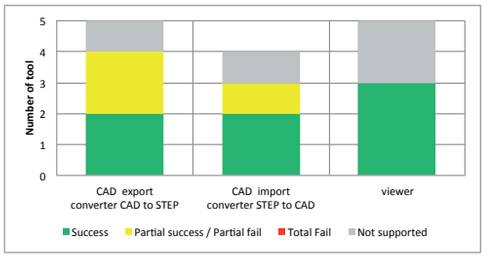

Figure 21: test result of the end user validation on the graphic tessellated presentation of PMI (including the color, styling).

5.6 Composite part information with plies defined by 3D surfaces and contours (TC5)

The laminate tables, the sequences and the list of plies were successfully converted by the 3 applications.

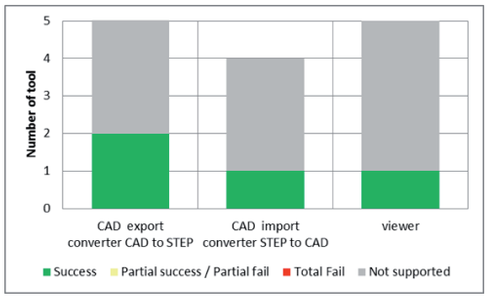

Figure 22: test result of the end user validation on laminate tables, the sequences and list of plies

The information on the plies such as the material, the orientation, the rosette, and the link to the geometry are well exported by CATIA V5. But, for the import and the visualisation, it was only partially covered.

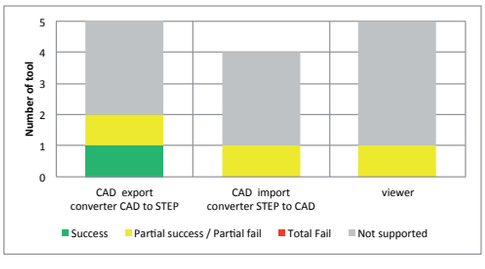

Figure 23: test result of the end user validation on ply properties (material, orientation, rosette and geometry)

5.7 CAD assembly file with reference to 3D tessellated geometry (TC6b)

The exports, imports, conversions and viewings of assembly structure were successful. Only in one case, error messages are logged in the conversion report but without any impact on the assembly structure created in STEP.

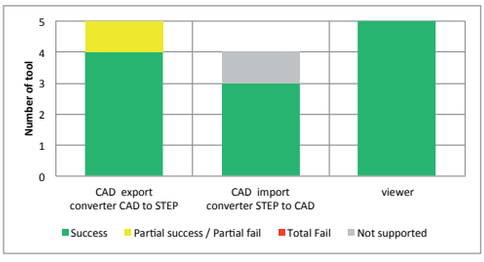

Figure 24: test result of the end user validation on the assembly structure

5.8 CAD assembly (nested) files with reference to 3D exact geometry (TC6d)

The tests were successful for each tool supporting the functionality.

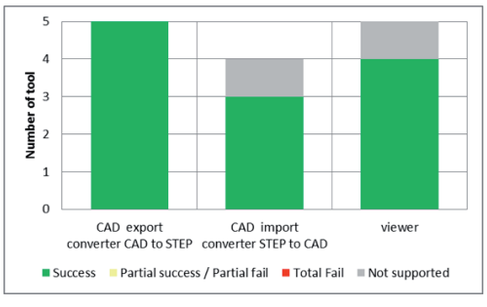

Figure 25: test result of the end user validation on the assembly structure

6 Summary

STEP AP242 (ISO 10303-242 “Managed model based 3D engineering”) has been published as “International Standard” end of 2014.

The objectives of the industry is reached only when COTS STEP AP242 applications are available and used by a broad community, with the appropriate level of functionalities and quality.

This first benchmark provides a snapshot of STEP AP242 interoperability functionalities of priority 1 requested by the industries; it is focused on a specific scope of STEP AP242 edition 1 functionalities already assessed by the CAx IF. Some COTS tools were not tested by lack of availability according to the tight planning of the benchmark tests plan.

The following criteria were evaluated:

- Syntax quality control of STEP files,
- validation of the conversion of the detailed content of the source information,
- end to end quality control of conversion based on STEP validation properties.

For 3D exact geometry and for assembly structure, the results show that a high level of quality of STEP AP242 processors is already achieved, based on the extended operational uses of STEP AP203 and AP214 converters.

For 3D exact or 3D tessellated geometry associated with 3D PMI graphic presentation, the results are promising and we are still expecting better results with the availability of new COTS applications in the benchmark #2.

For composite design, only two applications have been tested, the results list limitations, and there is an industry need to have robust STEP interfaces available for CAD systems and 3D viewers; enhancements are expected with the tests of Composite capabilities by the CAx IF in 2016.

Some findings of the AFNeT Benchmark will be communicated to the CAx IF as an input for the update of the STEP AP242 recommended practices, and for the development of STEP AP242 edition 2.

The use of international open standards for 3D Model Based interoperability is seen as a key enabler to support global Engineering and Manufacturing of complex products within the Extended Enterprise. It also contributes to ensure a better independence regarding PLM vendors proprietary formats, and long term preservation of 3D Model Based design. The availability of COTS STEP AP242 interoperable solution is the answer to this challenge.

The present benchmark provides a first status of COTS AP 242 CAD converters and viewers; it will be completed by a second benchmark, in preparation by AFNeT and ProSTEP iViP for the end of 2015. This second Benchmark will include the tests of:

- New STEP AP242 converters of CAx & PLM systems such as 3DEXPERIENCE, Creo, Solid Edge, SolidWorks, etc. and 3D viewers;
- new functionnalities such as STEP AP242 Assembly XML.

7 Publication of the detailed report

The publication of the detailed report of the first AFNeT STEP AP242 benchmark is available for the members of the AFNeT association, and can be downloaded from the AFNeT website

➔ http://www.afnet.fr/dotank/sps/ap242benchmark/

8 Acknowledgements

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30, rue de Miromesnil - 75008 Paris - France
Phone: + 33 1 53 42 82 70 - team@afnet.fr - http://www.afnet.fr