



# *A TEMPLATE FOR INTEROPERABILITY TESTING*

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# CAx Implementor Forum (CAx-IF)

- Joint testing forum hosted by PDES, Inc., prostep ivip, and AFNeT
- Composed of CAD and CAE vendors as well as translation and validation software developers providing STEP translators
- Closed group (sandbox) allowing implementors to develop and test new approaches in a trusted environment
- Launched in 1999, by merging previous PDES, Inc. and prostep ivip efforts. Since then, 40 test rounds have been completed focused on CAD domain. CAE domain test rounds started in September, 2017
- Mission is to meet industry's needs by developing and testing standards based interoperable products

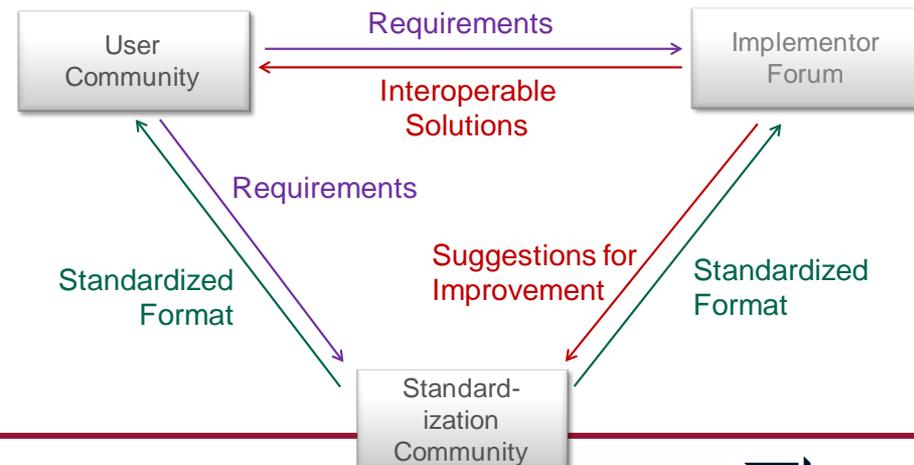
# How Industry benefits from the CAx-IF

## Member / Vendor Benefits

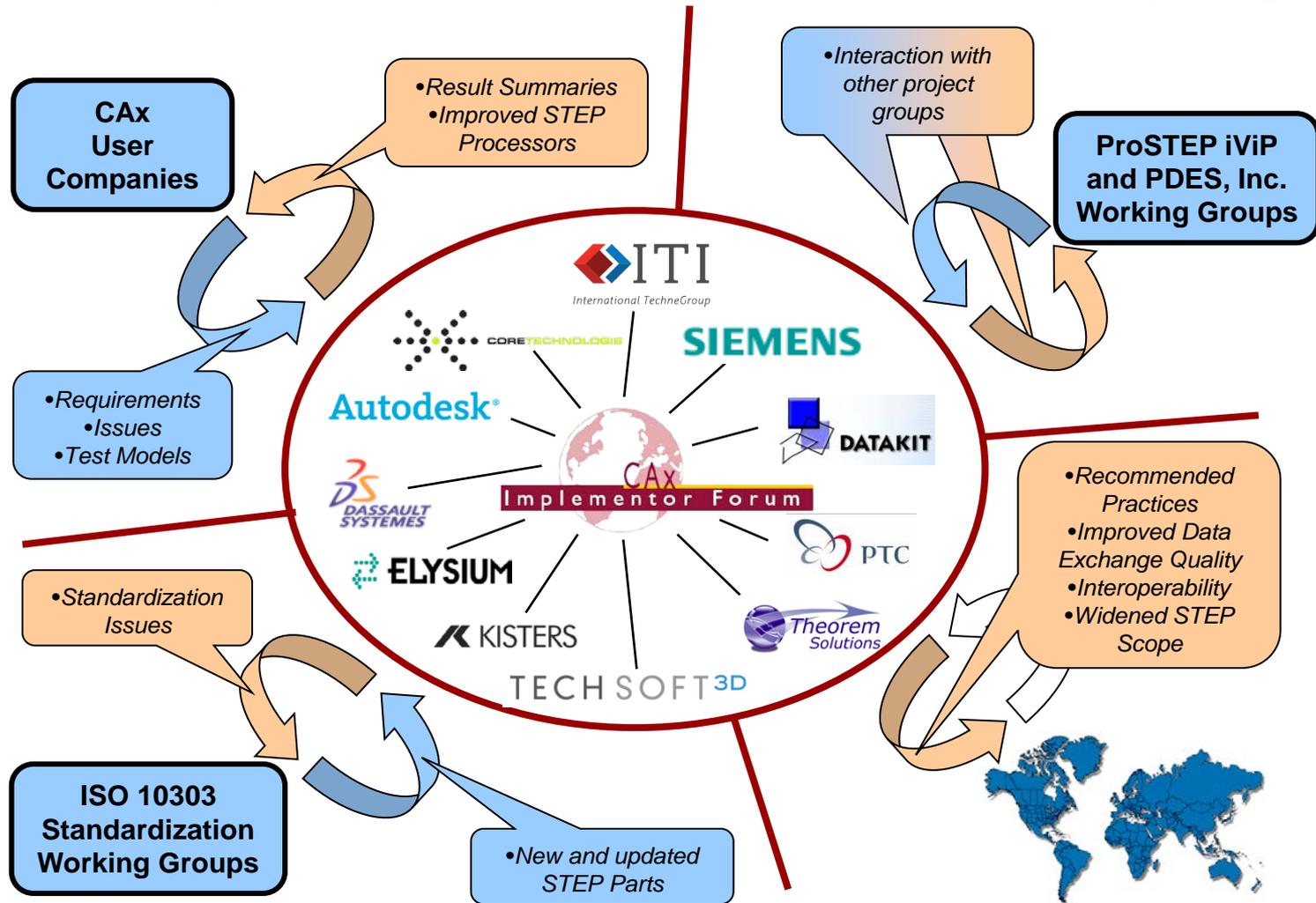
- Testing in a closed, trusted environment
- Early detection of errors leads to faster development cycles
- Beta-testing with other systems enhances product interoperability and robustness even before production release
- User requirements can be communicated, and common implementation approaches agreed upon

## User / Customer Benefits

- Stability of new capabilities
  - E.g. PMI Polyline Presentation: Since testing started in 2008, no major changes to implementation structure. Widely used in industry now!
- Early feedback on requirements
  - Concerning feasibility, and timeframe for support in various tools



# CAX Implementor Forum “on a page”

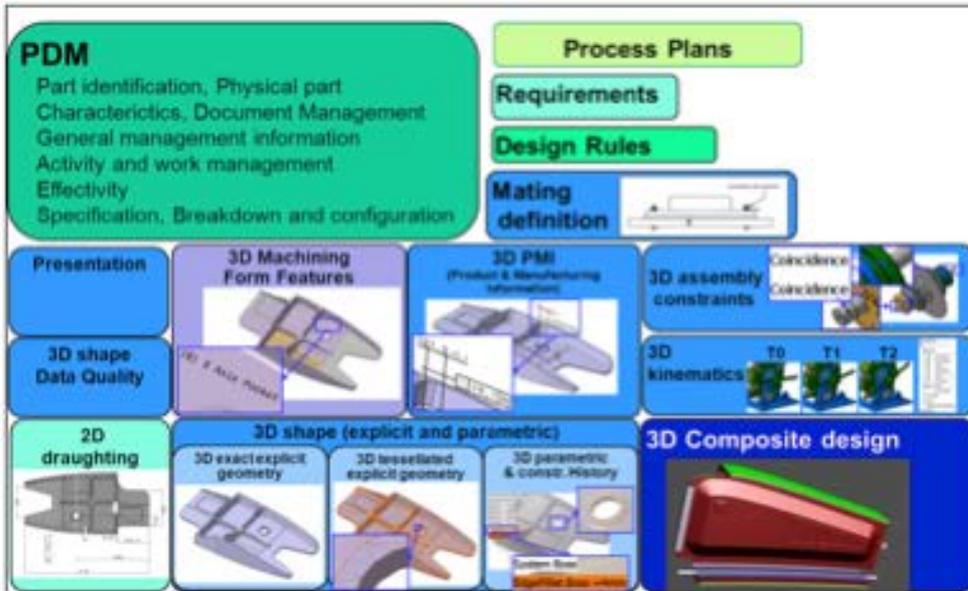


# ISO 10303 standard STEP AP 242

for

## Managed Model Based 3D Engineering

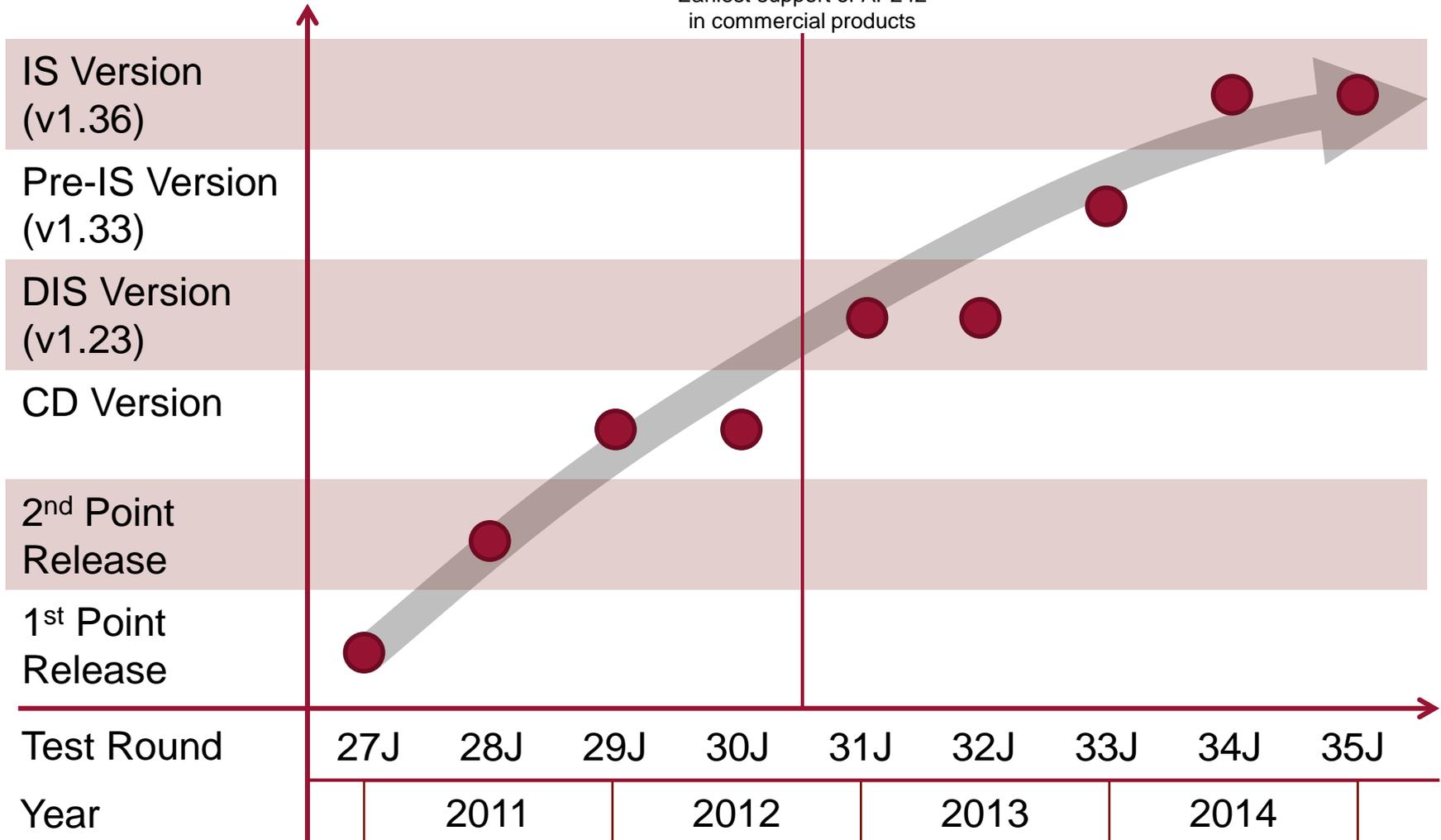
For the aerospace, automotive,  
& other mechanical manufacturers  
and their suppliers



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

# AP242 Implementation History

Earliest support of AP242  
in commercial products



# CAx-IF Testing Methodology

1. Participants provide STEP files based on:
  - Current EXPRESS / XML Schemas
  - Latest (draft) Recommended Practices
  - Test Case definitions
2. STEP files are checked for:
  - Syntax (conformance to schema)
  - Structure / Semantics (conformance to Recommended Practices)
3. STEP files and corresponding statistics are provided in the member area of the CAx-IF homepage
4. Participants grab all provided files, process them, and report on their results. Detailed review at meeting.
5. If issues are found, they are resolved during the test round as far as possible.

# Recommended Practices Documents



**Recommended Practices  
for  
AP242 Business Object Model XML  
Assembly Structure**

*Release 1.00*

February 13, 2015

**Contacts:**

CAx-IF	
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**Recommended Practices  
for  
Geometric and Assembly  
Validation Properties**

*Release 4.2*

October 9, 2014

**Contacts**

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**Recommended Practices  
for  
External (Element)  
References**

*Release 3.1*

January 20, 2014

**Contacts**

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# CAx-IF Test Case Specification



**Test Suite for the  
CAx Implementor Forum  
Round 31J**

October 2012 – March 2013

**Release 1.0**

December 19, 2012

**Contacts**

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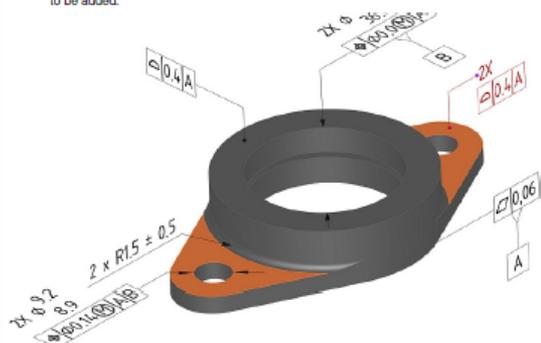
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CAx Implementor Forum  
Round 31J Test Suite  
Version 1.0, December 19, 2012

### 2.3.3.2 Test Model "16792"

Another test model testing PMI Representation capabilities is taken from ISO 16792. The model is provided in the member area of the CAx-IF homepage, under "Information on Round31J of Testing", as ZIP file containing:

- A STEP file containing the geometry (\*.stp) for re-creation in other CAD systems
- A PDF document (extract from ISO 16792) providing the detailed description of the PMI to be added.



*Figure 3: Illustration of the SP3 "16792" Model*

### 2.3.3.3 Test Model Configuration

The following additional functionality should be included in the test files provided for this round of testing, as far as it has been implemented by the CAx-IF participants and is described in the Recommended Practices:

- PMI Representation** – the re-usable representation of PMI data should be included in all SP3 models to the extent supported by the native system.
- PMI Graphic Presentation** – Many CAD systems require some minimal presentation information to be able to handle the PMI data in a model. There are also use cases where both PMI representation and presentation data will be included in the same file. Thus, some form of presentation information shall be included in the SP3 test case as well. The test model configuration for the presentation part is similar to the PP3 test case, see section 2.1.3.2.
- Linking PMI Representation to Presentation** – If a model contains PMI Representation information as well as Presentation data, it is very useful to link the corresponding ele-

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### 2.4.3.2 Statistics

For each STEP file exported or imported for the C2 test case, vendors must submit the corresponding statistics. To do so, go to the [C2 Data Sheet], and either fill in the web form, or upload a comma-delimited file (.csv) with the data as listed below.

#### Native Statistics

When exporting a STEP file, report what data importing systems should expect to find. For numeric statistics, enter the respective value or 'na' if not supported. For other statistics, select either 'full support' (i.e. test case and Rec.Pracs. definitions are fulfilled), 'limited support' (meaning the implementation does not meet all criteria and issues may be expected on import), or 'na' if not supported.

#### Target Statistics

When importing a STEP file, report the results found after processing the file as described in the table below.

#### Data Sheet Columns

column name	description
model	The name of the test model, here: 'C2'
system_n	The system code of the CAD system creating the STEP file
system_t	The system code of the CAD system importing the STEP file. For native stats, enter 'stp'
unit	The unit the model is designed in
volume	Total volume of all solids
validation_volume	Total volume of all solids as received via the validation property capability
valid_vol	pass/fail, is the instantiation of the validation property 'volume' in the STEP file as per the recommended practices for validation properties?
area	Total surface area of all solids
validation_area	Total surface area of all solids (entire assembly), as received via the validation property capability
valid_area	pass/fail, is the instantiation of the validation property 'area' in the STEP file as per the recommended practices for validation properties?
cx	Centroid of all solids
cy	
cz	
validation_cx	Centroid of all solids (entire assembly) as received via the validation property capability
validation_cy	
validation_cz	
valid_cent	pass/fail, is the instantiation of the validation property 'centroid' in the STEP file as per the recommended practices for validation properties?
curve_length	Total length of all (independent) curves in the model

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# CAX-IF Online Test Environment

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You are here: Start > Test Rounds > R23J Test Cases > PM21 Data Sheet

[ Information ] [ Results ] [ Issues ] [ Comments (1) ] [ Admin Results ]

### Round23J - PM21 Data Sheet

This is not a current round of testing, hence read-only for regular users.

Display Options Choose an action: (Choose one)

model	system_n	system_u	unit	volume	validation_volume	valid_vol	area	validation_area	valid_area
pm21_c5	c5	stp	mm	206873000	206873000	pass	9662144	9662144	pass
pm21_du	du	stp	mm	232903	232903	pass	246022	246022	pass
pm21_lu	lu	stp	mm	178118	178118	pass	149317	149317	pass
pm21_du	lu	stp	in	14.213	na	na	377.92	na	na
pm21_du	lu	stp	in	10.869	na	na	231.44	na	na
pm21_du	tu	stp	in	14.2129	14.2129	pass	377.211	377.211	pass
pm21_lu	tu	stp	in	10.869465	10.869465	pass	231.4416	231.4416	pass
pm21_du	ug	stp	in	1.4213e+01	na	na	3.7772e+02	na	na
pm21_du2	ug	stp	in	1.4213e+01	na	na	3.7772e+02	na	na
pm21_lu	ug	stp	in	1.0869e+01	na	na	2.3144e+02	na	na
pm21_c5	c5	a3	mm	20688266.13	na	na	966198.61	na	na
pm21_du	lu	a3	in	14.21	na	na	377.68	na	na
pm21_lu	lu	a3	in	10.87	na	na	231.44	na	na
pm21_du	ug	a3	in	14.21	na	na	377.36	na	na
pm21_lu	ug	a3	in	10.83	na	na	231.38	na	na
pm21_c5	c5	c5	mm	206873400	206873000	na	9662152	9662144	pass
pm21_du	du	c5	mm	232916.3	232903.3	pass	246021.7	246021.9	pass
pm21_lu	lu	c5	mm	178118.1	178118.1	pass	149316.6	149316.6	pass
pm21_du	lu	c5	mm	232916.224	na	na	243687.266	na	na
pm21_lu	lu	c5	mm	178118.138	na	na	149316.61	na	na
pm21_du	tu	c5	mm	232916.361	232907.8	pass	243687.201	243361.4	pass
pm21_lu	tu	c5	mm	178118.0	178118.6	pass	149316.5	149316.6	pass
pm21_du	ug	c5	mm	232916.835	na	na	243688.825	na	na
pm21_du2	ug	c5	mm	242947.01	na	na	233886.345	na	na
pm21_lu	du	cm	mm	178118.182	na	na	149316.368	na	na
pm21_lu	du	cm	mm	178121.465345	na	na	149316.480848	na	na
pm21_du	lu	cm	mm	232930.9206237	na	na	243702.9764496	na	na
pm21_lu	lu	cm	mm	178117.16081321	na	na	149316.26679633	na	na
pm21_lu	ug	cm	mm	178124.5045	na	na	149316.31793	na	na
pm21_c5	c5	i5	mm	2.069e+008	na	na	9.662e+006	na	na
pm21_du	du	i5	mm	232916.752	na	na	243686.994	na	na
pm21_lu	du	i5	mm	178118.409	na	na	149316.615	na	na

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### Results Overview for CAX-IF Round23J - PM21

<b>Volume Change</b> 60 exchanges 92% 5%	<b>Validation Volume</b> 11 exchanges 91% 9%	<b>Valid GVP Volume</b> 10 exchanges 100%	<b>Area Change</b> 60 exchanges 93% 5%
<b>Validation Area</b> 11 exchanges 100%	<b>Valid GVP Area</b> 11 exchanges 100%	<b>Centroid Change</b> 60 exchanges 93% 7%	<b>Validation Centroid</b> 11 exchanges 100%
<b>Valid GVP Centroid</b> 10 exchanges 100%	<b>Scaled Centroid</b> 30 exchanges 66% 7% 27%	<b>Extended GVP</b> 5 exchanges 100%	<b>Valid Extended GVP</b> 5 exchanges 100%

Last modified on 24 Mar 2010 -  
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# Activities supporting and promoting STEP AP242 implementation

- PDES, Inc. / prostep ivip “**CAx Implementor Forum**”
  - Creation of Recommended Practices for STEP (Part 21 and XML)
  - Joint test rounds, focus on geometry and assembly structure
  - Closed group / development environment
- Prostep ivip / VDA “**JT Implementor Forum**”
  - Creation of Implementation Guidelines for JT
  - Joint Test Rounds, focus on geometry and assembly structure
    - including combined use of AP242 XML and JT
  - Closed group / development environment
- AFNeT / prostep ivip “**PDM Implementor Forum**”
  - Creation of Recommended Practices for STEP (XML)
  - Joint test rounds, focus on PDM-relevant information
  - Closed group / development environment

# For more information about the CAx-IF:

<https://www.cax-if.org/>

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