



**Test Suite for the  
CAX Implementor Forum  
Round 26J**

April – October 2010

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## 1.0 Introduction

This document describes the suite of test cases to be used for the twenty-sixth round of testing of the CAx Implementor Forum (CAx-IF). The CAx-IF is a joint testing forum organized by PDES, Inc. and the ProSTEP iViP Association. The test rounds of the CAx-IF concentrate primarily on testing the interoperability and conformance of STEP processors based on AP203 and AP214.

The test rounds in general combine testing of synthetic and production models. Production models will in most cases be provided by the member companies of the organizations PDES, Inc. and ProSTEP iViP Association. When production models are not available from the member companies, “production-like” models will be solicited from the various CAx-IF participants.

This test suite includes synthetic models for testing the following capabilities: Presentation of Product Manufacturing Information (PMI), both as Polylines and semantically based on Representation, User Defined Attributes, and Supplemental Geometry.

Production models are provided for assemblies and piece parts. The basis for the production test cases is native CAD models. Each test case therefore originates from a single CAD system, and the set of test cases to be pre-processed (converted to STEP files) is unique for each CAD system. After pre-processing, the resulting STEP files are then to be imported/post-processed/read in by the rest of the participants.

### 1.1 **Functionality tested in this round**

Functionality tested in this round relates to:

- **Product Manufacturing Information (PMI)** describes the capability to embed information about dimensions, tolerances and other parameters which are necessary input for the manufacturing of the part from the 3D model. In Round26J, the focus will be on the two main approaches for the transfer of PMI in the 3D model:
  - “Polyline Presentation” refers to breaking down each annotation into polylines and arcs, and exchanging them as wireframe geometry. This preserves the exact shape of the annotation, but is human readable only.
  - “Representation and Semantic Presentation” relies on the “Representation” capability to render the information contents to be displayed. These are supplemented with basic styling and positioning information, to enable the importing CAD system to re-create the annotation elements using its internal PMI capability, and may be supplemented with additional textual information.
  - In Round26J, both capabilities will be extended by using an advanced approach for the implementation of Saved Views, and adding section views as well.
- **User Defined Attributes** are descriptions or values that can be added by the user in the CAD system and associated with a part or geometric elements in the model. Material or production costs are an example for this. This has been tested for some rounds, and the scope is being extended further in Round26J.

- **Supplemental Geometry** defines all geometric elements in a model that do not belong to the manufactured shape of the part, but serve as a reference basis for other information, such as the center line of a hole for example. This will be the final test of this functionality.
- **Production Models** are included in this round of testing in addition to the synthetic models for the above capabilities.

## 1.2 General test instructions for this round

The general procedures for communication of models and statistics are outlined in a separate document 'General Testing Instructions'. The general instructions can be retrieved from CAx Implementor Forum web sites. The latest version is v1.7, dated July 2008.

## 1.3 Preliminary testing schedule

The following schedule has been agreed on for Round 26J:

Date	Action
<b>May 5, 2010</b> (Wed)	<b>Test Suite available / 1<sup>st</sup> CAx Implementor Forum conference call</b>
<b>ASAP</b>	<b>Production Models (native) released</b>
<b>July 30 (Fri)</b>	<b>Initial STEP files and native stats due</b>
<b>August 25</b> (Wed)	<b>STEP files and native stats frozen / Initial release of files for testing</b>
<b>September 8 (Wed)</b>	<b>Initial Target stats due / 2<sup>nd</sup> conference call</b>
<b>September 29 (Wed)</b>	<b>Target stats frozen / 3<sup>rd</sup> conference call</b>
<b>October 5 (Tue)</b>	<b>Review meeting for test round</b>
<b>October 6 - 7</b> (Wed – Thu)	<b>CAx Implementor Forum meeting, Darmstadt, Germany</b>

The CAx-IF meeting will take place in conjunction with an "Infoplatform" user group meeting. In addition, conference calls and web sessions will be available for those not attending the meeting to dial in.

## 1.4 Copyrights on test cases

None of the production test cases which were provided by the PDES, Inc. and ProSTEP iViP member companies are released for any purpose. The test cases can be freely distributed among the CAx-IF members, and can be used for any purposes that are related to CAx-IF testing (i.e. testing, documentation of testing efforts), as long as a reference to the originating company is made.

The test cases must not be used for any purposes other than the CAx-IF testing or outside of PDES, Inc. and ProSTEP iViP.

## **2.0 Synthetic Test Case Specifications**

### **2.1 Model PP2: PMI Polyline Presentation**

All information about this test case can also be viewed in CAESAR on its Information page.

#### **2.1.1 Motivation**

Product Manufacturing Information is required for a number of business use cases in the context of STEP data exchange. Among others, they are a prerequisite for long-term data archiving. In addition, the PMI can be used to drive downstream applications such as coordinate measuring and manufacturing.

For documentation and long-term archiving purposes, the Polyline Presentation approach was suggested and developed by the LOTAR project group. It presents the PMI within the 3D model, broken down into lines and arcs, so that it looks exactly as generated by the native system.

#### **2.1.2 Approach**

The approach to be used is described in the latest working draft (at least version 2.6, dated April 20, 2010) of the “Recommended Practices for PMI Representation & Presentation”, which can be found in the member area of the CAx-IF web sites under “Information on Round26J of Testing”.

Within the “Polyline Presentation” area, the following functionalities are in scope of R26J:

- Polylines presenting stroked, outline and filled fonts
- Saved Views
- Section View
- PMI Validation Properties

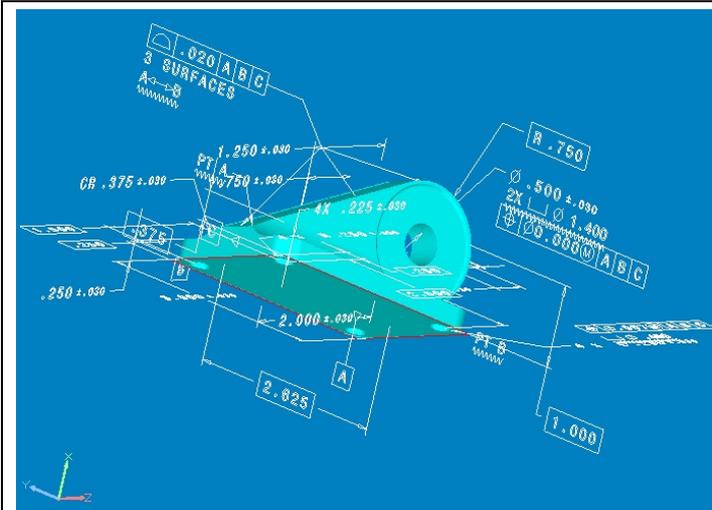
The files shall be in either AP203 Ed.2 or AP214 Ed.3 format.

**Note** that **all** CAx-IF participants, even / especially those who have not implemented Polyline Presentation, are asked to import the resulting STEP files. Since the annotations basically are broken down into wireframe geometry (which has been tested in R20J-R21J), the question is to what extent the information can be found by arbitrary CAD systems.

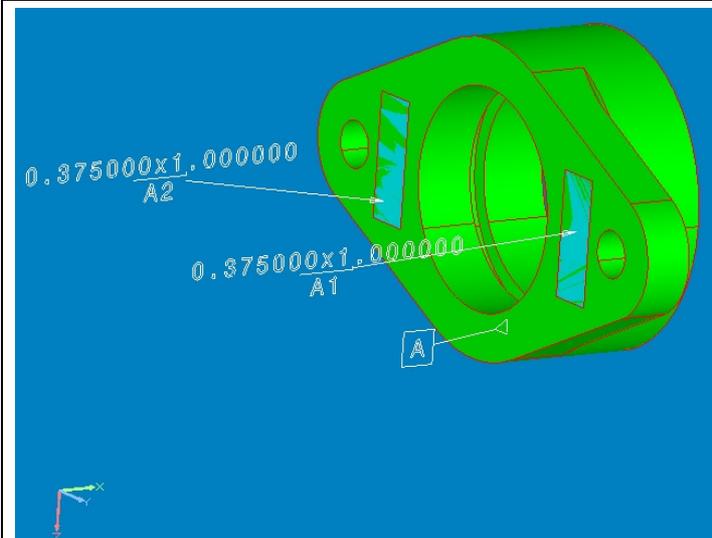
#### **2.1.3 Testing Instructions**

##### **2.1.3.1 Test Models**

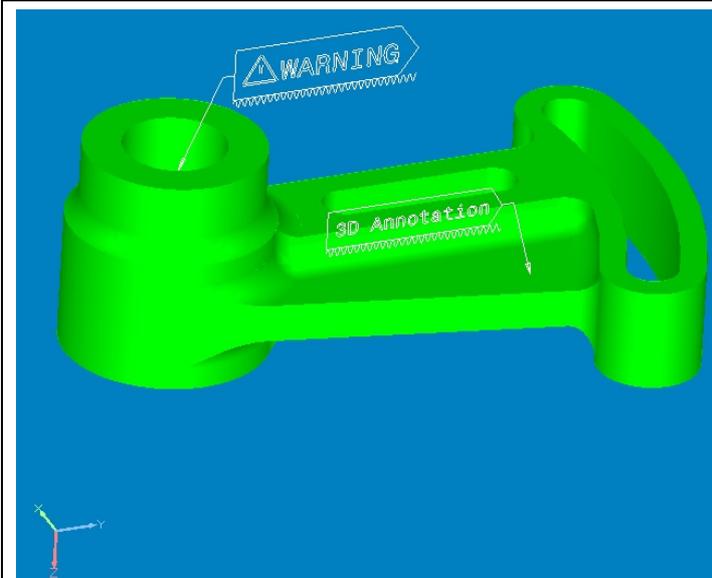
In Round 26J, PMI test models from the LOTAR pilot activities shall be used. The following three models have been selected. Native versions for CATIA, NX and Pro/E are available in CAx-IF File Repository under “Round 26J > PMI Models”.



**File:** P120TEST\_PILOT\_11  
**CAX-IF designation:** PP2\_11



**File:** P120TEST\_PILOT\_25  
**CAX-IF designation:** PP2\_25



**File:** P120TEST\_PILOT\_48  
**CAX-IF designation:** PP2\_48  
**Recommendations for Testing:**

- Add an angular dimension
- Add a cross-section

### 2.1.3.2 Test Model Configuration

The following functionality shall 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:

- Polyline Presentation – include the PMI statements as Polyline annotations. Stroked, outline and filled fonts (and combinations) are allowed, as well as styling of the annotations (colors). The type of polylines used (3D or Filled) shall be stated in the “scope” field of the statistics.
- Definition of “Saved Views” – as far as supported, include at least one saved view in the model, which contains a subset of annotations in the file, and provides a pre-defined position of the model in the design space. Further recommendations:
  - One of the views should be a “detail view”, which does not show the entire model but only part of it by zooming in. This is to validate the “zoom factor” agreement reached during the R25J meeting.
  - For each view, a screenshot showing the model layout (displayed elements, orientation, zoom) shall be provided. Note that it is possible to attach several screenshots to one set of statistics in CAESAR. The name of the view shall be given as description for the screenshot.
  - Both “basic” and “advanced” view implementation is allowed
  - To the “48” model, a view with a cross-section using a simple plane as section geometry shall be added.
- Cross-highlighting of annotations and annotated shape – if supported, include in the STEP file the information necessary to maintain the association between annotations and the annotated shape elements in a way, that after import, when highlighting an annotation, the shape elements annotated by it are highlighted too, and vice versa.
- PMI Validation Properties for Polylines – if supported, include the validation properties
  - “Polyline Curve Length” (section 10.3.1 in the PMI Rec.Pracs.)
  - “Polyline Centroid” (section 10.3.2)
  - “Equivalent Unicode String” (section 10.3.3)
  - “Affected Geometry” (section 10.3.4)

in the files, and evaluate these after import.

**Note** that for the creation of the Equivalent Unicode String, the mapping as defined by the “Unicode String Project” report (Revision I) shall be used. This document is available in the member areas of the CAx-IF homepages, under “Relevant LOTAR Documents for CAx-IF Testing”.

### 2.1.3.3 Statistics

For each STEP file exported or imported for the PP2 test case, vendors must submit the corresponding statistics to CAESAR. To do so, go to the [ PP2 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.

## Screenshots

For each Saved View in the model, provide one screenshot which illustrates the layout (displayed geometry and annotation, model orientation, and zoom factor). Give the name of the view as the description of the screenshot.

**Note** that in order to count the PMI elements for the statistics, as per agreement during the Round 22J Review Meeting, the names of the `geometric_curve_sets` shall be considered.

See Table 6 (section 8.2) in the PMI Recommended Practices for details.

## Data Sheet Columns

column name	description
<b>model</b>	The name of the test model, here: 'PP2'
<b>system_n</b>	The system code of the CAD system creating the STEP file
<b>system_t</b>	The system code of the CAD system importing the STEP file. For native stats, enter 'stp'
<b>scope</b>	A short designation of the scope tested in the model. In the case of PP2 it is one of "3D Polylines", "Filled Polylines" or "3D and Filled Polylines".
<b>dimension</b>	The number of dimensions processed
<b>datums</b>	The number of datums processed
<b>datum_targets</b>	The number of datum targets processed
<b>tolerances</b>	The number of tolerances processed
<b>labels</b>	The number of labels processed
<b>saved_view</b>	The name of the Saved View which is the basis for the view-related statistics
<b>view_annot</b>	The number of annotations included in the specified saved view.
<b>view_pos</b>	pass/fail, whether the model orientation and zoom factor stored for the Saved View could be restored successfully.
<b>section_view</b>	pass/fail, whether the section view (clipping plane and visible portion of the model) was transferred correctly.
<b>highlight</b>	all/partial/none – whether the cross-highlighting for annotations and annotated shape elements works correctly

<b>poly_length</b>	all/partial/none – whether the lengths of the Polyline annotation was validated successfully for all, some or none of the given annotations.
<b>poly_cent</b>	all/partial/none – whether the positioning of the Polyline annotation was validated successfully for all, some or none of the given annotations.
<b>eq_unicode</b>	all/partial/none - if the encoding of the equivalent Unicode string was correct for all, some or none of the given annotations.
<b>valid_poly_vp</b>	pass/fail, is the instantiation of the Polyline-related validation properties in the STEP file as per the PMI recommended practices?
<b>affected_geo</b>	all/partial/none – whether the affected geometry could be validated correctly for all, some or none of the PMI statements in the model.
<b>date</b>	The date when the statistics were last updated (will be filled in automatically)
<b>issues</b>	A short statement on issues with the file

## 2.2 Model SP2: PMI Representation & Semantic Presentation

All information about this test case can also be viewed in CAESAR on its Information page.

### 2.2.1 Motivation

Product Manufacturing Information is required for a number of business use cases in the context of STEP data exchange. Among others, they are a prerequisite for long-term data archiving. In addition, the PMI can be used to drive downstream applications such as coordinate measuring and manufacturing.

In contrast to the Polyline approach, Semantic Presentation relies on the PMI Representation capability to define the contents to be displayed, and supplements these with positioning and styling information to create the appropriate notes in 3D space. 3D Text Annotations including Unicode characters have been tested in previous rounds in preparation for this test case.

### 2.2.2 Approach

The approach to be used is described in the latest working draft (at least version 2.6, dated April 20, 2010) of the “Recommended Practices for PMI Representation & Presentation”, which can be found in the member area of the CAx-IF web sites under “Information on Round26J of Testing”.

Within the “Representation and Semantic Presentation” area, the following functionalities are in scope of R26J:

- PMI Representation
- PMI Semantic Presentation
- Saved Views
- Section View
- PMI Validation Properties

The files shall be in either AP203 Ed.2 or AP214 Ed.3 format.

## 2.2.3 Testing Instructions

### 2.2.3.1 Test Models

In Round 26J, PMI test models from the LOTAR pilot activities shall be used. The following three models have been selected. Native versions for CATIA, NX and Pro/E are available in CAx-IF File Repository under “Round 26J > PMI Models”.

Illustrations of the models are given in the PP2 Test Case, see section 2.1.3.1.

For this test, the models shall be named “SP2\_11”, “SP2\_25” and “SP2\_48” respectively.

### 2.2.3.2 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 SP2 models to the extent supported by the native system.
- PMI Semantic Presentation – In contrast to Polyline Presentation, this approach uses text literals and other dedicated STEP entities to transfer the annotations and their associated geometry (e.g. leader lines, symbols). Semantic Presentation should be included in the test models if and as far as supported by the native system.
- Definition of “Saved Views” – as far as supported, include at least one saved view in the model, which contains a subset of annotations in the file, and provides a pre-defined position of the model in the design space. Further recommendations:
  - One of the views should be a “detail view”, which does not show the entire model but only part of it by zooming in. This is to validate the “zoom factor” agreement reached during the R25J meeting.
  - For each view, a screenshot showing the model layout (displayed elements, orientation, zoom) shall be provided. Note that it is possible to attach several screenshots to one set of statistics in CAESAR. The name of the view shall be given as description for the screenshot.
  - Both “basic” and “advanced” view implementation is allowed
  - To the “48” model, a view with a cross-section using a simple plane as section geometry shall be added.
- Cross-highlighting of annotations and annotated shape – if supported, include in the STEP file the information necessary to maintain the association between annotations and the annotated shape elements in a way, that after import, when highlighting an annotation, the shape elements annotated by it are highlighted, too, and vice versa.
- PMI Validation Properties – if supported, include the validation properties
  - “Total number of annotations / views” (section 10.1 in the PMI Rec.Pracs.)
  - “Number of annotations per view” (section 10.2)
  - “Affected Geometry” (section 10.3.4)

in the files, and evaluate these after import.

**Note** that the “Affected Geometry” validation property is currently under development and has not yet been defined in detail for the semantic approach. It is offered here as a placeholder in case implementations become available during the test round.

**Note** that models with representation only, semantic presentation only, or both, are allowed in this test. This shall be stated in the “scope” column in the statistics.

### 2.2.3.3 Statistics

For each STEP file exported or imported for the SP2 test case, vendors must submit the corresponding statistics. To do so, go to the [ SP2 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.

#### Screenshots

For each Saved View in the model, provide one screenshot which illustrates the layout (displayed geometry and annotation, model orientation, zoom factor). Give the name of the view as the description of the screenshot. **Note** that in order to count the GD&T elements for the statistics, as per agreement during the Round 22J Review Meeting, the actual STEP entity types (datum, datum\_target,...) shall be considered.

#### Data Sheet Columns

column name	description
model	The name of the test model, here: 'PP2'
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'
scope	A short designation of the scope tested in the model. In the case of SP2, it is one of “Representation”, “Semantic Presentation” or “Both”.
dimension	The number of dimensions processed
datums	The number of datums processed
datum_targets	The number of datum targets processed
tolerances	The number of tolerances processed
labels	The number of labels processed
saved_view	The name of the Saved View which is the basis for the view-related statistics
view_annot	The number of annotations included in the specified saved view.

<b>view_pos</b>	pass/fail, whether the model orientation and zoom factor stored for the Saved View could be restored successfully.
<b>section_view</b>	pass/fail, whether the section view (clipping plane and visible portion of the model) was transferred correctly.
<b>highlight</b>	all/partial/none – whether the cross-highlighting for annotations and annotated shape elements works correctly
<b>affected_geo</b>	all/partial/none – whether the affected geometry could be validated correctly for all, some or none of the PMI statements in the model.
<b>date</b>	The date when the statistics were last updated (will be filled in automatically)
<b>issues</b>	A short statement on issues with the file

## 2.3 Model UD3: User Defined Attributes

All information about this test case can also be viewed in CAESAR on its Information page.

### 2.3.1 Motivation

Most CAD systems allow the user to add user-defined attributes in the form of key-value pairs to a part or shape. These carry information which can not be derived from the geometry, such as material costs, but is of relevance to downstream processes or for archiving purposes. In Round 26J, this capability will be extended to include UDA validation properties.

### 2.3.2 Approach

The approach to be used to transfer the user-defined attributes is described in the Draft Recommended Practices for User Defined Attributes (v0.6, dated April 15, 2010), which are available in the member area of the CAx-IF homepages under “Information on Round 26J of Testing”.

**Note** that the version 0.6 of the Recommended Practices includes some significant changes compared to the previous version 0.5 used in Round25J.

User Defined Attributes can be attached to either a single part, an instance of a component in an assembly, or a geometric element of its shape. Each attribute can be descriptive (i.e. the value is a text string) or numeric (with and without unit). Attributes and attribute values can also be grouped together.

Validation Properties for User Defined Attributes can be given by creating a count of how many attributes are attached where in model structure – i.e. at the part/product level or various classes of geometric elements – and by creating a count of the major attribute type classes (string, integer, real, boolean). The two sums have to match in the end.

### 2.3.3 Testing Instructions

The User Defined Attributes shall be tested using the well-known as AS1 model.

**Note** that the LOTAR group has been queried for “real world” models containing a preferably large number of real (or at least realistic) user defined attributes. If they become available in time for R26J testing, they will be made available in the File Repository, and added here.

### 2.3.3.1 Construction of the model

The following attributes are suggested values for use in the UD3 test. **Note** that the locations where the attributes should be attached (solid/surface, instance, part/product) are proposals, not mandatory. All attribute types should be contained in the model and attached in the file structure where meaningful for the originating system.

- To one of the faces of the 'plate' part, add a descriptive attribute (see section 5.2 in the Recommended Practices):
  - Name: 'Surface Finish'
  - Description: 'Anodize per specification MIL-A-8625, Type I'
- To the two instances of the L-bracket assembly, add a value attribute each (see section 5.1 in the Recommended Practices):
  - Name: 'asm\_step'
  - Values: 1. and 2. respectively
- To the 'plate' part, add a measure attribute (see section 5.1 in the Recommended Practices):
  - Name: 'weight'
  - Unit: kilograms (kg) or pounds (lbs)
  - Value: <calculated weight of component preferred but generic value can be provided if necessary>

It is allowable to add additional information to each of the attributes (see section 5.4 in the Recommended Practices).

In addition, Validation Properties for the UDA shall be included, giving the following values (see section 7 in the Rec.Pracs.):

- the number of UDAs per model element type
- the number of UDAs per attribute type class

### 2.3.3.2 Statistics

For each STEP file exported or imported for the UD3 test case, vendors must submit the corresponding statistics. To do so, go to the [ UD3 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
<b>model</b>	The name of the test model, here: 'UD3'
<b>system_n</b>	The system code of the CAD system creating the STEP file
<b>system_t</b>	The system code of the CAD system importing the STEP file. For native stats, enter 'stp'
<b>face_attr</b>	pass/fail, have the User Defined Attributes at the solid/surface level been processed correctly?
<b>instance_attr</b>	pass/fail, have the User Defined Attributes at the assembly component instance level been processed correctly?
<b>part_attr</b>	pass/fail, have the User Defined Attributes at the part/product level been processed correctly?
<b>valid_attr</b>	pass/fail, is the instantiation of the User Defined Attributes as per the Recommended Practices?
<b>uda_part_vp</b>	pass/fail, has the number of User Defined Attributes at the Part/Product level been processed correctly? This includes UDA VP at assembly component instances and for groups of UDA.
<b>uda_geo_vp</b>	pass/fail, has the number of User Defined Attributes at the Geometry level been processed correctly?
<b>uda_type_vp</b>	pass/fail, has the number of User Defined Attributes per attribute type class (boolean/integer/real/string) been processed correctly?
<b>uda_group</b>	pass/fail, have the groups of attributes and values been processed correctly?
<b>date</b>	The date when the statistics were last updated (will be filled in automatically)
<b>issues</b>	A short statement on issues with the file

## 2.4 Model SG1: Supplemental Geometry

All information about this test case can also be viewed in CAESAR on its Information page.

### 2.4.1 Motivation

When designing a part in a CAD system, geometrical elements are often created that do not belong to the actual, i.e. manufactured, shape of the part, but are used to either create other geometric shapes, or to relate additional information about the part.

The main business applications for this capability are the transfer of reference elements for PMI information, such as cutting planes and center lines, and named axis placements as tool targets for machining applications.

In Round 26J, this capability will be tested for the third time.

In preparation for the release of the final (public) version of the corresponding Recommended Practices, all participants in this test case are asked to provide at least one test file which has

only Supplemental Geometry, without PMI attached to it. These files, if tested successfully and syntactically and structurally clean, will be added to the STEP File Library on the CAx-IF homepage.

## 2.4.2 Approach

The approach to be used is described in the Draft Recommended Practices for Supplemental Geometry (v0.5), which is available in the member area of the CAx-IF homepages under “Information on Round 26J of Testing”.

## 2.4.3 Testing Instructions

The transfer of supplemental geometry will be tested using a simple test model (see below). The following elements shall be included:

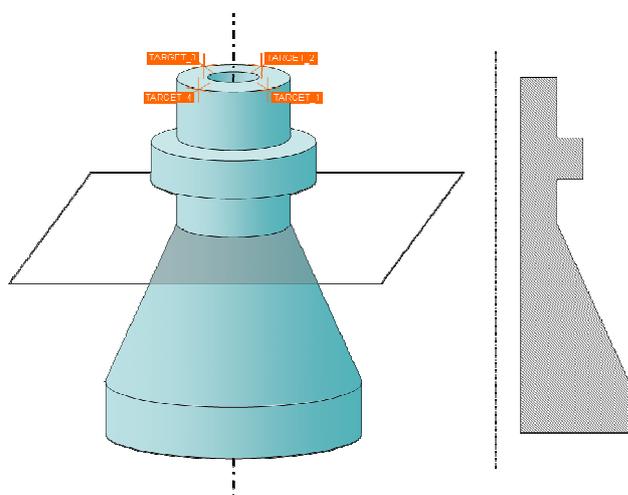
- The center line for the cylindrical hole through the part
- A reference plane at the upper end of the truncated cone, its face normal parallel to the center line of the hole
- Four named axis placements along the outer top edge of the part

**Note** that when comparing the results, the supplemental geometry elements may look differently in different CAD systems (e.g. bounded vs. unbounded plane). The essential criteria are they correctly identified as supplemental geometry elements in the target system.

In addition to the scope tested in previous rounds, for those systems supporting it, PMI elements shall be added referencing supplemental geometry elements. For an example illustration, see the Supplemental Geometry Rec.Pracs. It is recommended to add a datum to the reference plane and a dimension to the center axis, plus a tolerance referencing the datum to define meaningful PMI content.

Both Polyline or Semantic Presentation can be used to display these. It is recommended to note the approach used in the “issues” column of the statistics. If no PMI elements are included, the respective columns in the statistics shall be filled with “na”.

### 2.4.3.1 Construction of the SG1 model



Dimensions for the part are arbitrary; suggested values are height 15cm, base diameter 10cm and tip diameter 5cm.

### 2.4.3.2 Statistics

For each STEP file exported or imported for the SG1 test case, vendors must submit the corresponding statistics. To do so, go to the [ SG1 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: 'UD3'
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'
center_line	pass/fail, if the center line was found in the STEP file and correctly displayed in the CAD system.
ref_plane	pass/fail, if the reference plane was found in the STEP file and correctly displayed in the CAD system.
tool_tgt	pass/fail, if the named axis placements (tool targets) were found in the STEP file and correctly displayed in the CAD system or identified in the product structure.
valid_supp_geo	pass/fail, whether the implementation of the Supplemental Geometry elements in the STEP file is as defined in the recommended practices.
date	The date when the statistics were last updated (will be filled in automatically)
issues	A short statement on issues with the file

## 3.0 Production Models

### 3.1 PM23

All information about this test case can also be viewed in CAESAR on its Information page.

#### 3.1.1 Motivation

In an attempt to test the STEP processors on real world models, the CAx Implementor Forum will be testing production parts in this round and future rounds of CAx-IF testing. These production models are characteristic for components and assemblies that are encountered in the

aerospace and automotive industries. PDES, Inc. and ProSTEP iViP member companies and vendors have supplied these models. As they may contain data about current products of these companies, all native and STEP files related to these models have to be handled confidentially and their use is strictly limited to the CAX-IF activities.

### 3.1.2 Approach

Testing of Production Models focuses mainly on data quality, not on specific functionalities. Assemblies should therefore be exported as a single STEP file. The file format should be either AP214-IS, AP214e3 or AP203e2. In order to support quality validation of the Production Model exchange, all vendors shall include the maximum level of Validation Properties they support, and report them in the statistics.

All source system native models and STEP files may be analyzed for data quality by the “CADIQ” developers. STEP syntax and structure will be checked by the CAX-IF facilitators. In order to enable an end-to-end analysis of the data exchange, all vendors importing Production Model STEP files may submit the resulting target model from their system along with the target statistics.

### 3.1.3 Testing Instructions

The native models as provided by the user companies should be exported to STEP by all participants who maintain a STEP processor for the respective CAD system. The native models will be made available on the CAX-IF File Repository in the member area under “Round 26J > Production Models”.

### 3.1.4 List of available models

Model name	Stats code	Native System	Remarks
Combiner Assembly	pm23_asm	SolidWorks	Courtesy of Rockwell-Collins
Combiner Arm Casting	pm23_cast	SolidWorks	Courtesy of Rockwell-Collins
MFD Chassis	pm23	NX	Courtesy of Rockwell-Collins

### 3.1.5 Statistics

For each STEP file exported or imported for the PM23 test case, vendors must submit the corresponding statistics. To do so, go to the [ PM23 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
<b>model</b>	The name of the test model, here: 'PM23'
<b>system_n</b>	The system code of the CAD system creating the STEP file
<b>system_t</b>	The system code of the CAD system importing the STEP file. For native stats, enter 'stp'
<b>unit</b>	The unit the model is designed in
<b>volume</b>	Total volume of all solids
<b>validation_volume</b>	Total volume of all solids as received via the validation property capability
<b>valid_vol</b>	pass/fail, is the instantiation of the validation property 'volume' in the STEP file as per the recommended practices for validation properties?
<b>area</b>	Total surface area of all solids
<b>validation_area</b>	Total surface area of all solids (entire assembly), as received via the validation property capability
<b>valid_area</b>	pass/fail, is the instantiation of the validation property 'area' the STEP file as per the recommended practices for validation properties?
<b>cx</b>	Centroid of all solids
<b>cy</b>	
<b>cz</b>	
<b>validation_cx</b>	Centroid of all solids (entire assembly) as received via the validation property capability
<b>validation_cy</b>	
<b>validation_cz</b>	
<b>valid_cent</b>	pass/fail, is the instantiation of the validation property 'centroid' in the STEP file as per the recommended practices for validation properties?
<b>model_size</b>	model_size is the length of the space diagonal of the 3dimensional bounding box enclosing all entities in the model. The result is the Centroid deviation divided by the model_size
<b>shoveit_ok</b>	pass/fail, indicates whether the model passed comparison of the Extended GVP (i.e. no parts/subassemblies misplaced), or failed.
<b>valid_shoveit</b>	pass/fail, indicates whether the target system considers the implementation of the instance information valid as per the recommended practices
<b>date</b>	The date when the statistics were last updated (will be filled in automatically)
<b>issues</b>	A short statement on issues with the file