Test Suite for the CAx Implementor Forum Round 28J

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1 Introduction

This document describes the suite of test cases to be used for the twenty-eighth 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. Since Round 27J, also supports prototyping of AP242.

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, and User Defined Attributes.

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 Round28J, 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 Round28J, 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 Round28J.
- **Geometric Validation Properties** is a mechanism to allow the exchange of geometric properties and their assignment to geometric representations for the purposes of data exchange validation. The typically considered properties volume, surface area and centroid have been extended by the value for total length of independent curves in the model, which will be tested in Round28J.

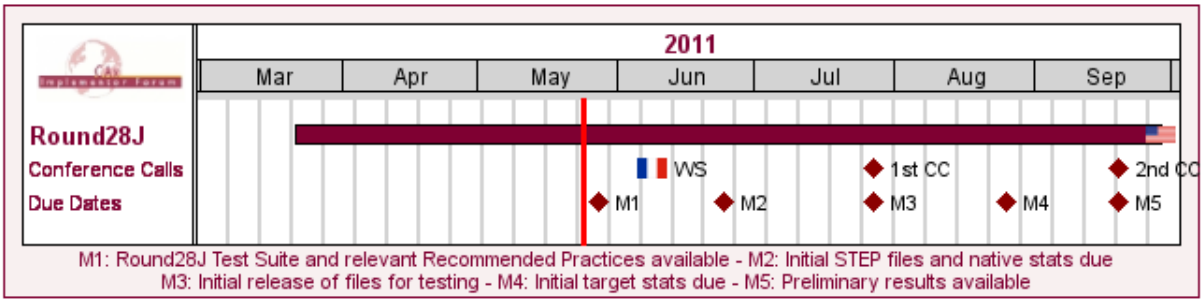
- **Colors** are a well-established capability in STEP. They are added again to the scope of this round to verify the updated approach using the global `draughting_model`, which is derived from and harmonized with the PMI Recommended Practices.
- **Production Models** are included in this round of testing 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 the CAx Implementor Forum web sites. The latest version is v1.9, dated May 2011.

1.3 Preliminary testing schedule

The following schedule has been agreed on for Round 28J:



CAx-IF Round28J Schedule

Date	Action
27 May 2011 (Fri)	Round28J Test Suite and relevant Recommended Practices available
8 Jun 2011 (Wed)	CAx-IF Technical Workshop in Toulouse, France
24 Jun 2011 (Fri)	Initial STEP files and native stats due
27 Jul 2011 (Wed)	Initial release of files for testing / 1st CAx-IF Round28J Conference Call
25 Aug 2011 (Thu)	Initial target stats due
19 Sep 2011 (Mon)	Preliminary results available / 2nd CAx-IF Round28J Conference Call
26 Sep 2011 (Mon) - 28 Sep 2011 (Wed)	CAx-IF Round28J Review Meeting in Charleston, SC, USA

The CAx-IF Technical Workshop will be embedded in a LOTAR meeting. Conference call and web session will also be available.

The CAx-IF R28J Review meeting will take place in conjunction with the PDES, Inc. Fall Offsite meeting and a LOTAR workshop. 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. Test cases provided by the LOTAR project for CAx-IF testing of specific capabilities underlie the same restrictions and may not be used outside LOTAR or CAx-IF.

2 Synthetic Test Case Specifications

2.1 Model PP3: 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 is 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 3.1, dated February 3, 2011) 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 Round27J of Testing”.

Within the “Polyline Presentation” area, the following functionalities are in scope of R28J:

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

The files shall be in either AP203 Ed.2, AP214 Ed.3 or AP242 format.

2.1.3 Testing Instructions

For Round28J, a dedicated test model has been developed by Alain Roche, which is prepared for the definition of Section Views. All members participating in this test are asked to add the scope they support to the model as described below.

2.1.3.1 Test Model

For the testing of Polylines and Views in Round28J, a dedicated test model has been developed. The model is provided in the member area of the CAx-IF homepage, under “Information on Round28J of Testing,” in two formats:

- A native CATIA V5 model (*.CATPart)
- A STEP file containing the geometry (*.stp) for re-creation of the model with PMI and views in other CAD systems

Annex A in this Test Suite document provides the detailed description of the PMI and Views to be added.

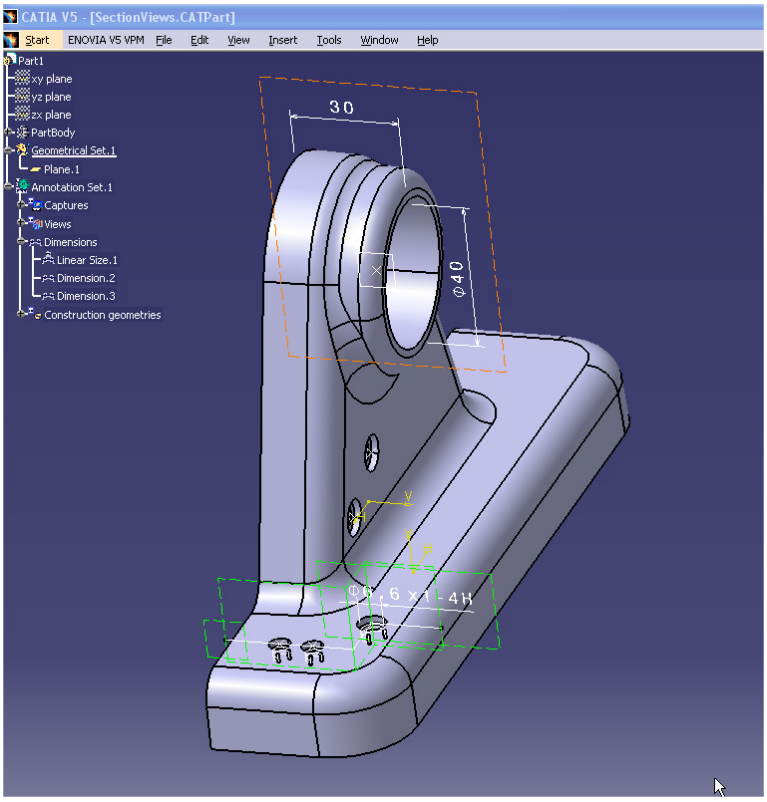


Figure 1 : Illustration of the PP3 Model

2.1.3.2 Test Model Configuration

The following functionality shall be included in the test file 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 elements 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 (see section 10.4.2 in the PMI Rec.Pracs. v3.1)
- 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
- As far as supported, the section views as defined in Annex A shall be added to the model. Screenshots for these views are essential.

- 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 11.3.1 in the PMI Rec.Pracs.)
  - “Polyline Centroid” (section 11.3.2)
  - “Equivalent Unicode String” (section 11.3.3)
  - “Affected Geometry” (section 11.3.4) – **Note:** This has not been tested yet, but is deemed and important means of validation. All CAx-IF members are encouraged to support this.

  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 PP3 test case, vendors must submit the corresponding statistics to CAESAR. To do so, go to the [PP3 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
model	The name of the test model, here: 'PP3'
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 PP2 it is one of "3D Polylines", "Filled Polylines" or "3D and Filled Polylines".
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.
view_pos	pass/fail, whether the model orientation and zoom factor stored for the Saved View could be restored successfully.
section_view	pass/fail, whether the section view (clipping plane and visible portion of the model) was transferred correctly.
highlight	all/partial/none – whether the cross-highlighting for annotations and annotated shape elements works correctly
poly_length	all/partial/none – whether the lengths of the Polyline annotation was validated successfully for all, some or none of the given annotations.
poly_cent	all/partial/none – whether the positioning of the Polyline annotation was validated successfully for all, some or none of the given annotations.
eq_unicode	all/partial/none - if the encoding of the equivalent Unicode string was correct for all, some or none of the given annotations.
valid_poly_vp	pass/fail, is the instantiation of the Polyline-related validation properties in the STEP file as per the PMI recommended practices?
affected_geo	all/partial/none – whether the affected geometry could be validated correctly for all, some or none of the PMI statements in the model.
date	The date when the statistics were last updated (will be filled in automatically)
issues	A short statement on issues with the file

2.2 Model SP3: Semantic PMI / Representation

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.

PMI Representation relates to the capability to intelligently store the PMI data in the STEP file in a computer-interpretable way, so that it can be re-used for model redesign or downstream applications. Though the definition of the data is complete, it is by itself not visible in the 3D model.

Additional presentation capabilities – Polyline or Semantic Presentation – are needed to display the data in a way that it is visible to the user in the 3D model. In the context of PMI Representation, semantic presentation (using text strings instead of Polylines) shall be used, if at all.

2.2.2 Approach

The approach to be used is described in the latest working draft (at least version 3.2a, dated June 22, 2011) 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 Round28J of Testing".

Within the "Representation and Semantic Presentation" area, the following functionalities are in scope of R28J:

- PMI Representation
- (optional) PMI Semantic Presentation including Views and Validation Properties

Note: The files shall be in AP242 format, according to the CAx-IF agreement that PMI Representation will be supported solely based on the improved data model available in AP242.

The AP242 schema to be used is "ap242_managed_model_based_3d_engineering_mim_lf.exp" dated June 22, 2011. It can be found in the member area of the CAx-IF web sites under "Information on Round28J of Testing".

2.2.3 Testing Instructions

For Round28J, a dedicated test model has been developed by Ed Paff and Bryan Fischer, which includes definition of PMI according to the current capabilities. All members participating in this test are asked to add the scope they support to the model as described below.

2.2.3.1 Test Models

For the testing of PMI Representation in Round28J, a dedicated test model has been developed. The model is provided in the member area of the CAx-IF homepage, under "Information on Round28J of Testing," in two formats:

- A STEP file containing the geometry (*.stp) for re-creation in other CAD systems

Annex B in this Test Suite document provides the detailed description of the PMI to be added.

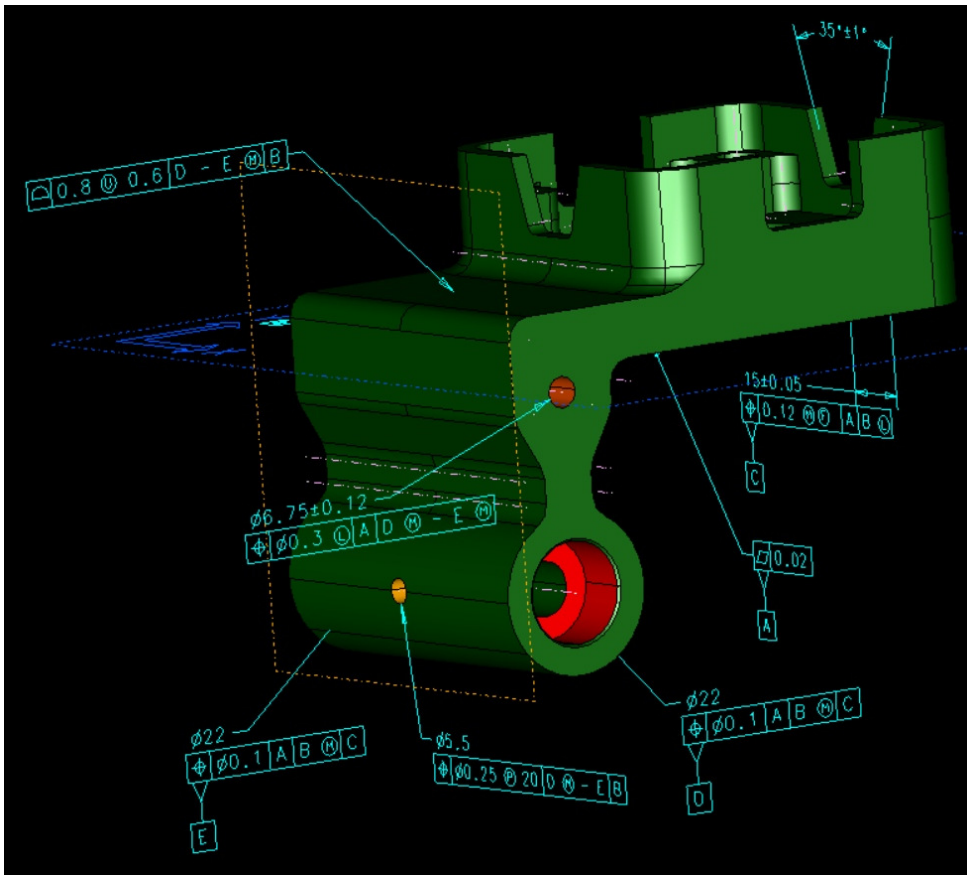


Figure 2: Illustration of the SP3 Model

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 SP3 models to the extent supported by the native system.
- (optional) Semantic PMI Presentation – presentation of the PMI data in the 3D model using the "semantic" approach is optional in this test case. Aside from not using Polylines, the test model configuration for the presentation part is the same as for the PP3 test case, see section 2.1.3.2.

Note that all models shall contain representation. Semantic presentation is allowed in addition 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 SP3 test case, vendors must submit the corresponding statistics. To do so, go to the [SP3 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

If presentation information is contained in the test files, it shall be accompanied by corresponding screenshots. Note that CASEAR allow to add more than one screenshot per set of statistics.

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: 'SP3'
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
date	The date when the statistics were last updated (will be filled in automatically)
issues	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 (v0.9, dated May 23, 2011), which are available in the member area of the CAx-IF homepages under "Information on Round 28J of Testing".

Note that the version 0.8 of the Recommended Practices introduced specific subtypes for integer, boolean and real attributes to be used with AP203e2 and AP242.

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 R28J 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 5.3 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 5.2 in the Recommended Practices):
  - Name: 'asm_step'
  - Values: 1 and 2 respectively
  - **Note:** according to version 0.8+ of the Recommended Practices, use "`integer_representation_item`" in AP203e2 and AP242 to transfer this value. In AP214, use a "`count_measure`" (that requires the values to be real, i.e. 1.0 and 2.0 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
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'
face_attr	pass/fail, have the User Defined Attributes at the solid/surface level been processed correctly?
instance_attr	pass/fail, have the User Defined Attributes at the assembly component instance level been processed correctly?
part_attr	pass/fail, have the User Defined Attributes at the part/product level been processed correctly?
valid_attr	pass/fail, is the instantiation of the User Defined Attributes as per the Recommended Practices?
uda_part_vp	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.
uda_geo_vp	pass/fail, has the number of User Defined Attributes at the Geometry level been processed correctly?
uda_type_vp	pass/fail, has the number of User Defined Attributes per attribute type class (booelan/integer/real/string) been processed correctly?

uda_group	pass/fail, have the groups of attributes and values been processed correctly?
date	The date when the statistics were last updated (will be filled in automatically)
issues	A short statement on issues with the file

2.4 Model C1: Geometric Validation Properties and Colors

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

2.4.1 Motivation

Geometric Validation Properties are one of the most important and successful capabilities of STEP, which distinguish it from other neutral exchange formats. They allow for the validation of the imported data based on key characteristics calculated by the native system and stored in the STEP file, which are then compared against the results computed for the imported model in the target system. These key values typically are total volume, total surface area and centroid of the model.

Recently, the requirement came up to extend this range of values by adding a validation property for the total length of independent curves in the model, i.e. curves that are neither edge curves of solids or faces, nor used in another context (e.g. as a Polyline PMI element). This will be tested in Round28J, using a hybrid model.

The C1 test case was originally designed to test coloring of solids, faces, and curves, as well as overriding colors for geometric elements. Coincidentally, the Recommended Practices for this capability have recently been updated as well, as a result of harmonization with the PMI Recommended Practices. Thus, this test case is for a validation of the updated guidelines.

2.4.2 Approach

For the validation properties, the approach as described in section 3.7 of the "Recommended Practices for Geometric and Assembly Validation Properties", version 3.0, dated May 23, 2011, shall be used.

For the coloring of the model, the approach as described in the “Recommended Practices for Model Styling and Organization”, version 1.0, dated May 23, 2011, shall be used.

Both documents are available in the member area of the CAx-IF homepage, under “Information on Round28J of Testing”.

2.4.3 Testing Instructions

In Round28J, the model as described below shall be either re-used or re-created, and geometric validation properties shall be included for volume, area, centroid, and curve length. The latter is mandatory as it is the new bit of data this test focuses on.

2.4.3.1 Construction of the Model

This model has originally been used to test solids, surface and curve colors. It was used in test rounds 6J – 9J (2000-2002). The buildup is quite simple. The following shall be contained in the model, with arbitrary (but reasonable) dimensions:

- A solid (e.g. cube). Recommended colors: solid color yellow; one face with an overriding color (red); one edge with an overriding color (green).
- A separate face (e.g. square). Recommended color: blue.
- A separate curve (arbitrary). Recommended color: purple or cyan.

Testing Focus

- For validation properties, it is the new “independent curves” value
- For colors, it is the use of the global `draughting_model`.

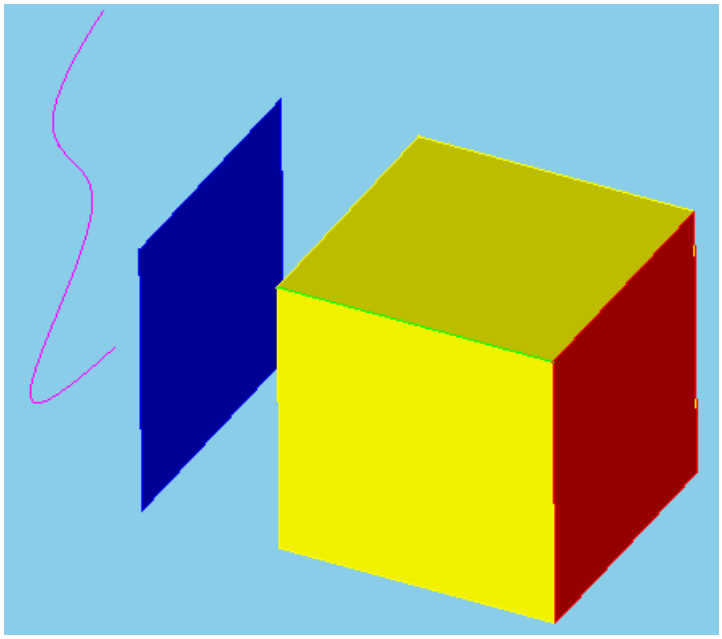


Figure 3: Illustration of the C1 model

2.4.3.2 Statistics

For each STEP file exported or imported for the C1 test case, vendors must submit the corresponding statistics. To do so, go to the [C1 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: ‘CO1
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
validation_clength	Total length of all independent curves in the model, as received via the validation property capability
valid_curve_l	pass/fail, is the instantiation of the validation property 'curve length' in the STEP file as per the recommended practices for validation properties?
date	The date when the statistics were last updated (will be filled in automatically)
issues	A short statement on issues with the file

3 Production Models

3.1 PM25

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 or 3rd Ed.), AP203 (2nd Ed.) or AP242 (latest development schema). 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.

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 are available on the CAx-IF File Repository in the member area. Once there, browse to the subfolder “Round 28J > Production Models”.

3.1.4 List of available models

Model name	Stats code	Native System	Remarks
Section 47	PM25	CATIA V5	Boeing

3.1.5 Statistics

For each STEP file exported or imported for the PM25 test case, vendors must submit the corresponding statistics. To do so, go to the [PM25 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: 'PM25'
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' 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?
model_size	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
shoveit_ok	pass/fail, indicates whether the model passed comparison of the Extended GVP (i.e. no parts/subassemblies misplaced), or failed.
valid_shoveit	pass/fail, indicates whether the target system considers the implementation of the instance information valid as per 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

Annex A Modeling Instructions for PP3

The Polyline Presentation test case in Round 28J is based upon a model provided by Dassault Systèmes. The files containing the base definitions can be found in the CAx-IF member area, under “Information on Round28J of Testing”. The provided files are:

- SectionViews.CATPart – native CATIA V5 model
- SectionViews_geo.stp – STEP file with model geometry

Construction of the Model

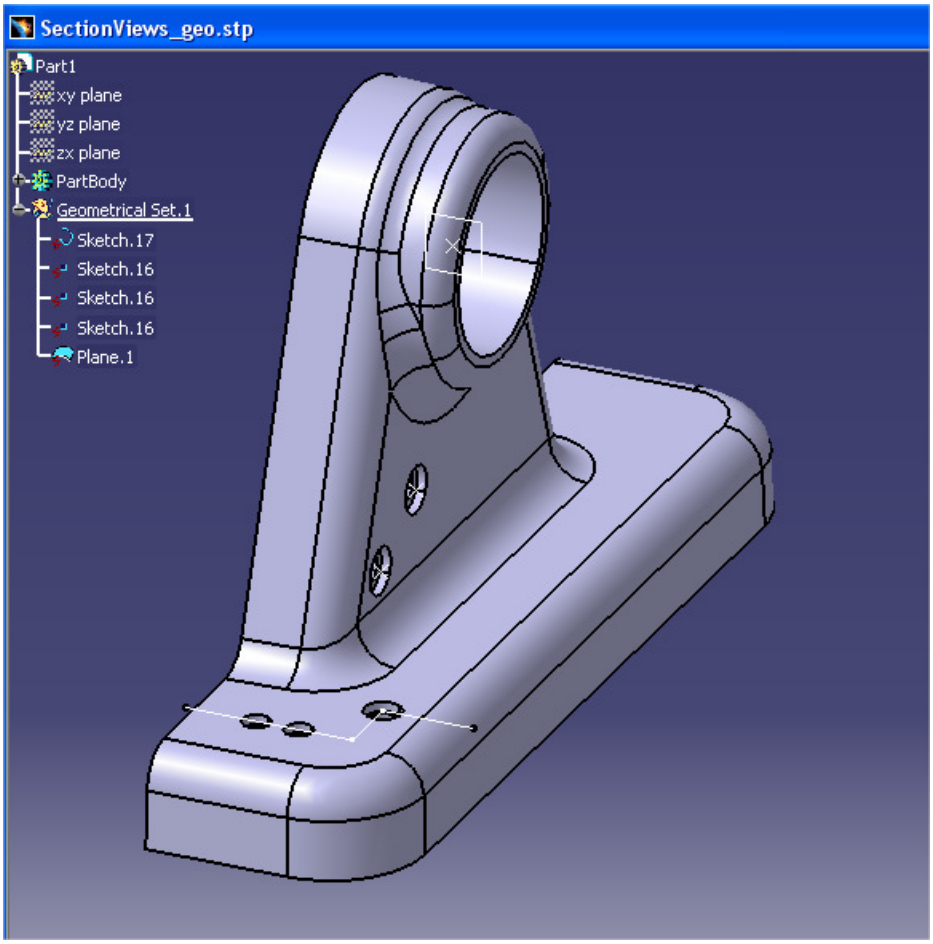


Figure 4: PP3 Geometry

Two named views shall be introduced in the model as follows :

1. Create a named view “**clipping simple plane**”

   This named view should include a section view clipping the model by the plane through the big hole. And it should show some PMI, such as the 2 dimensions shown in Figure 5 below.

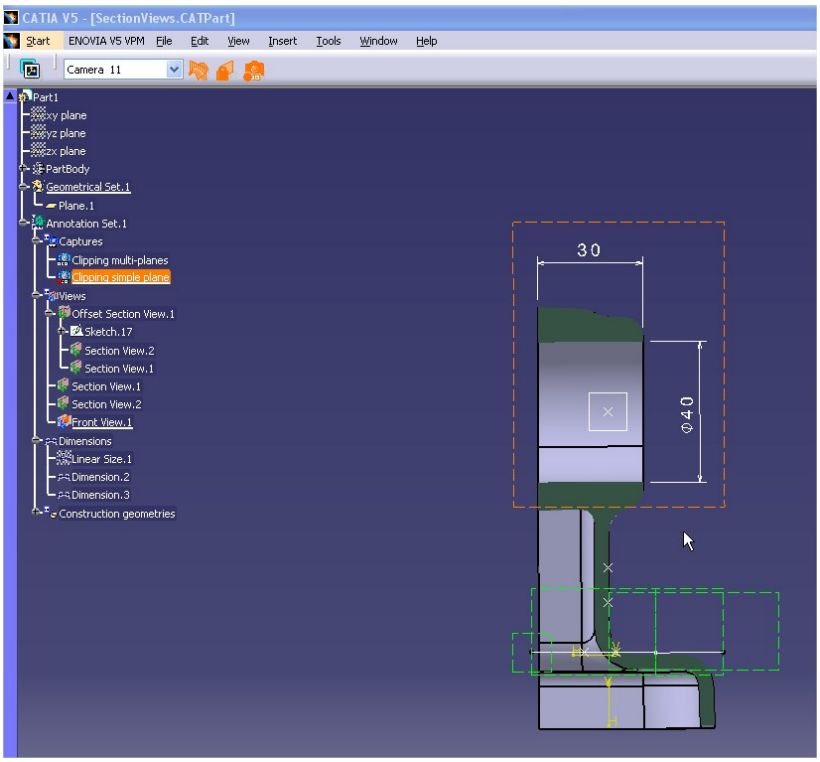


Figure 5: Named View "clipping simple plane"

2. Create a named view "**clipping multi-plane**"

   This named view should include a section view clipping the model by a combination of planes perpendicular to the Polyline provided in the geometry model. And it should show some PMI such as the dimension in Figure 6 below.

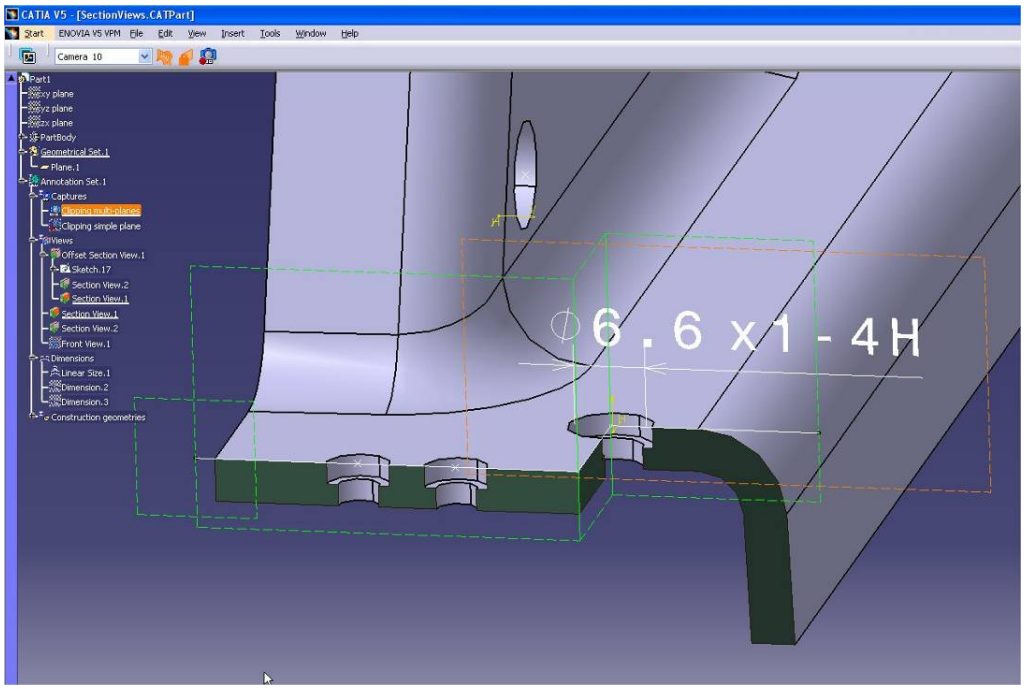


Figure 6: Named View "clipping multi-plane"

Annex B Modeling Instructions for SP3

The Semantic PMI Representation test case in Round 28J is based upon a model provided by ITI TranscenData. The file containing the base definition can be found in the CAx-IF member area, under “Information on Round28J of Testing”. The provided file is:

- r28j_sp3_geometry.stp – STEP file with model geometry

Construction of the Model

To this model, add the views and PMI as illustrated in the five images below:

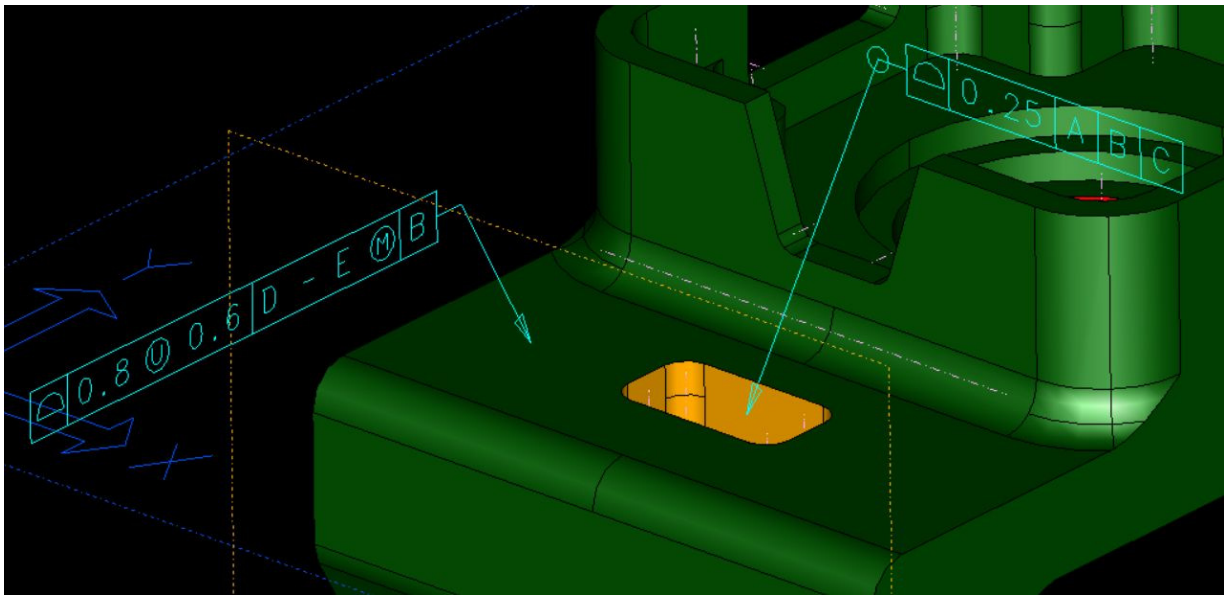


Figure 7: SP3 - View 1

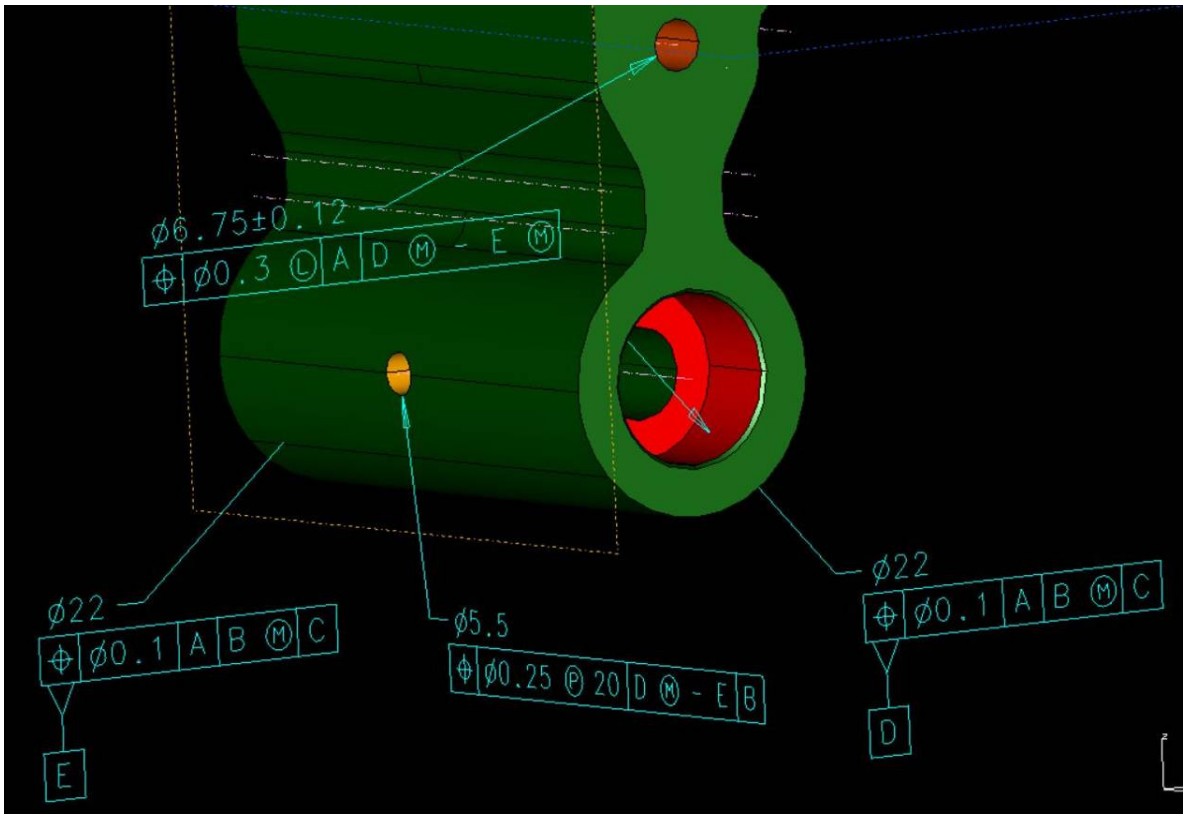


Figure 8: SP3 - View 2

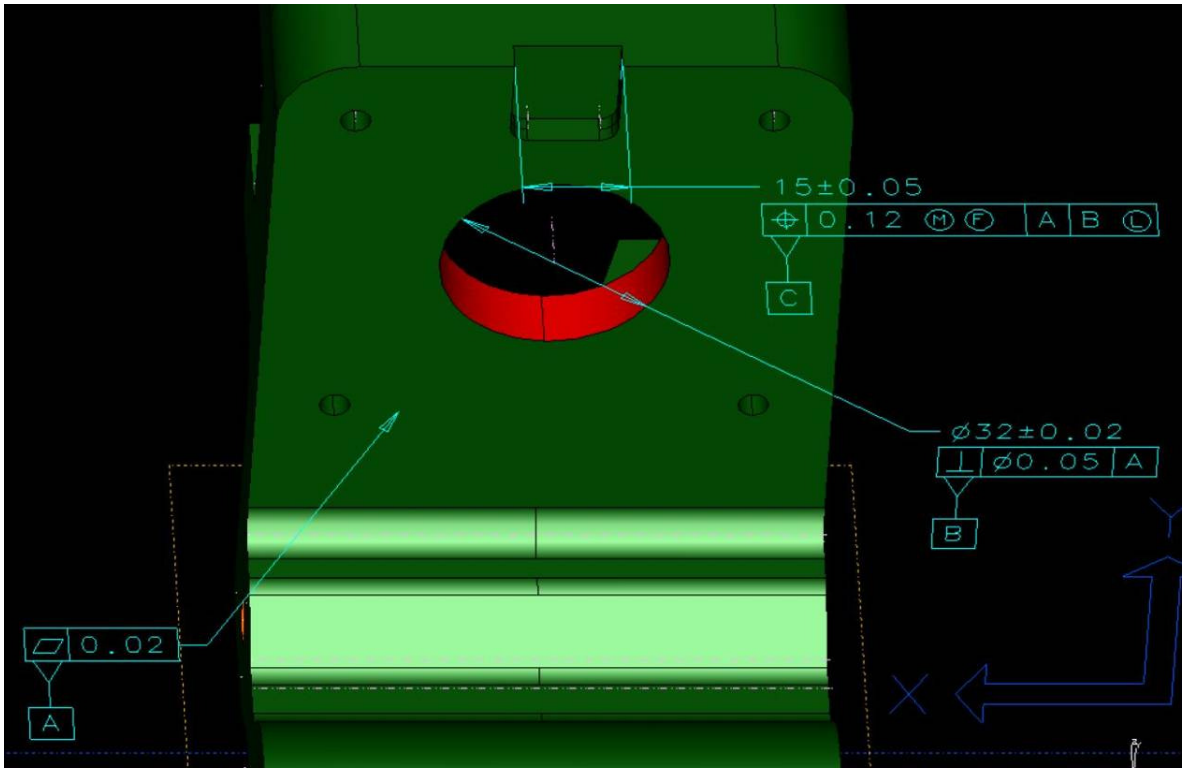


Figure 9: SP3 - View 3

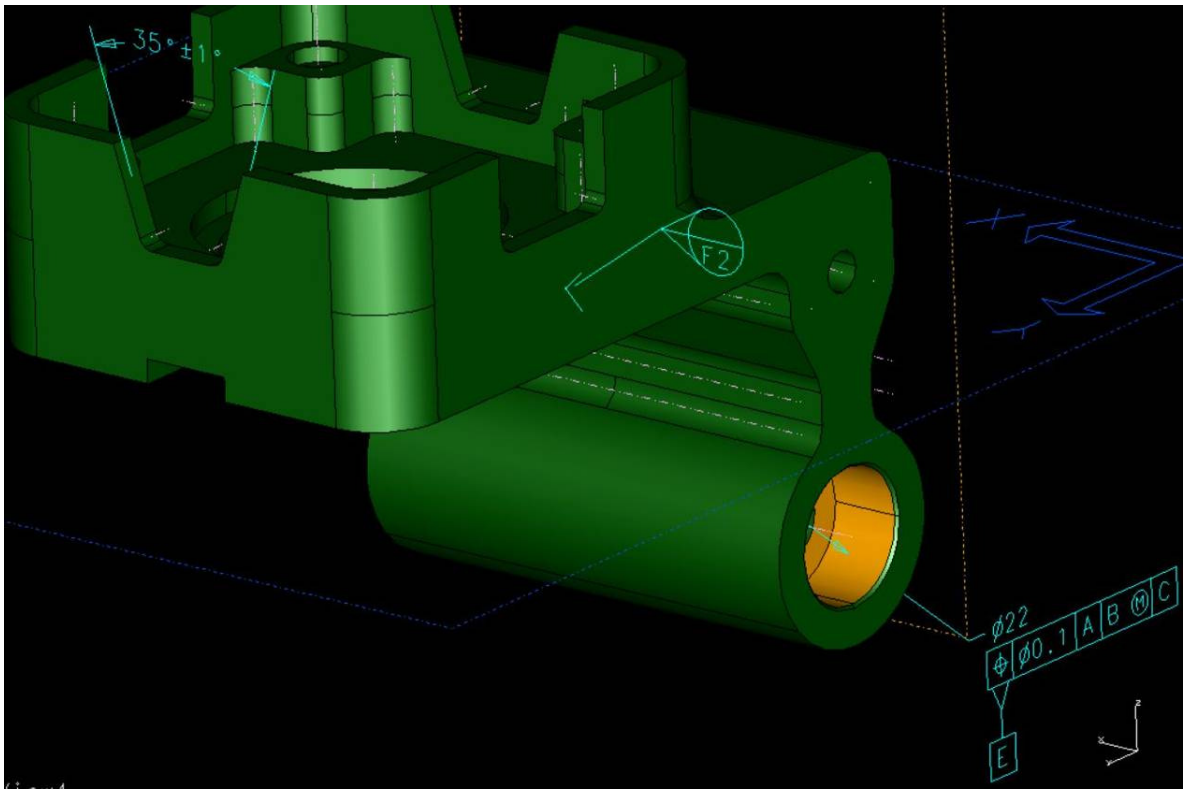


Figure 10: SP3 - View 4

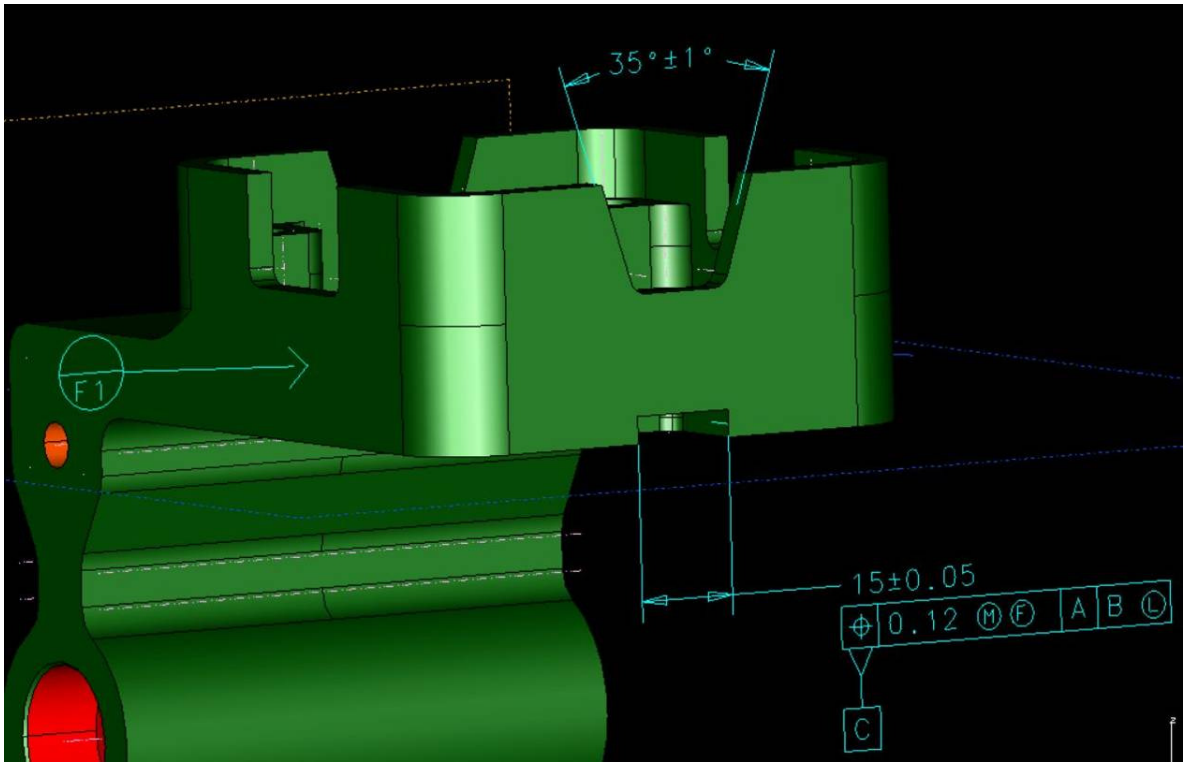


Figure 11: SP3 - View 5