CAx-IF CAD Round 42J Review / CAE Round 3S Kick-Off Summary

The CAx-IF completed its 42nd round of CAD testing at its meeting September 24-26, 2018 in Jacksonville, FL, USA. Highlights from the meeting include:
- Successful session with Judith Crockford of Airbus to discuss web services
- Joint Meetings with several other teams
  - LOTAR PMI (Product & Manufacturing Information)
  - LOTAR EAS (Engineering Analysis & Simulation)
  - LOTAR Composites
- Widespread Technical Discussions
  - PMI Presentation Placeholder and Graphic Presentation
  - Saved View Validation Properties
  - Improvements to PMI Recommended Practices
  - Persistent IDs
  - Extensions for Supplemental Geometry
  - Machining features (Counterbore, chamfer, slope, taper...)
  - Enhancements for Semantic PMI based on ISO 1101:2017

Regarding the results of Round 42J testing:
- Successful collaboration with other Implementor Forums
  - PDM-IF for Interoperability (AP242 XML)
  - JT-IF for Kinematics (AP242 XML)
- PDM interoperability showed excellent results post-processing two files from the PDM-IF. Updated Recommended Practices helped to resolve issues found in the initial tests.
- For Kinematics, one AP242 XML file each was provided for the two main approaches (Motion and Mechanism).
- Still a lot of work to do for Semantic PMI Representation, including Semantic PMI Validation Properties
- Tested new prostep ivip ISO PMI models for the first time

For the upcoming Round 43J of CAx-IF testing, the following scope has been agreed:
- Semantic PMI Representation using AP242 Edition 2 DIS, with emphasis on Semantic PMI Validation Properties and editable PMI text strings
- PMI Tessellated Presentation focusing on Saved Views, element visibility, and cross-highlighting
- AP 242 Business Object Model XML Kinematics (in collaboration with JT-IF)
- AP 242 Business Object Model Assembly Structure including Assembly Validation Properties (in collaboration with PDM-IF)
- Composites
- Persistent IDs

The CAE-IF held its final review of the 2nd round of CAE testing during the workshop September 24-27, 2018 in Jacksonville, FL, USA. This test round was mainly focused on translation of CAE output data and was extended by 3 months to allow the participants to better address the identified issues. The test round was completed, and good improvements were achieved:

- Translation of displacements results (primary results) was successfully tested
- Translation of derivative results such as internal element forces, strain and stress fields still needs more work
- A remaining issue has been identified regarding translation of applied loads (input data)

As a conclusion, it was decided to fix this last issue during the next test round, while a further test round will be organized to address the translation of derivate results.

In the meantime, the CAE-IF kicked off its third test round (Round 3S). While test rounds 1S and 2S concentrated on the translation of different FEA functionalities through simple test cases, the main motivation for test round 3S is to check the translation process one step further, by regenerating the original CAE input data file and re-run it with the CAE solver. This test round will be also the opportunity to implement a first set of FEA validation properties ("FEA model level" validation properties). Thus, the simple test cases ATS1-4 will be considered, with existing statistics related to input data:

- Discretized geometrical data (mesh)
- Material data
- Boundary conditions and applied loads

As well as newly defined statistics:

- Geometrical data: FEA Bounding Box   and 3D-, 2D- and 1D- elements centroid
- Metadata and control statements: FEA model title and load case identifier
- Validation properties: Center of Gravity

The technical review of the test round 3S is scheduled during the CAx-IF/LOTAR workshop in Darmstadt, December 10-12, 2018.

NIST has made numerous enhancements to the STEP File Analyzer in the past six months, these include:

- Visualization
  - B-rep geometry
  - New supplemental geometry
  - AP209 displacements, pressure loads
  - Graphical PMI colored by saved views
- Support for CAx-IF ISO models
- Support for AP242e2 DIS
- Viewer for AP209
  Tessellated geometry processing
  Automated PMI checking and color-coding
- Updated NIST STEP files with PMI