

JT OPEN

JT Validation – Panel Session

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Siemens

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2010 International Conference

VISUALIZING THE FUTURE

JT Validation – Panel Session

Sept 2010

Andy Attfield

Product Manager, Open Tools
Siemens PLM Software

Introducing the Panel....

Practitioners:

- **Brad Whitmore – P&G**
- **Dan Mason - CAT**
- **Jeff Stevens - GM**
- **Ilan Weitzer – Ford**
- **Reinhold Klass - Daimler**

JT Validation Working Group Members

- Surveying workflows, practices and tools
- Recommend process and tool requirements
- Developing best practices

Jeff Jensen
 Kai Schwebke/Reinhold Klass
 Jeff Stevens
 Ilan Weitzer
 Dale Nicholls
 Vikal Sachdeva
 Vern Tranel/Kevin Kulak
 Mark Stowe
 Damir Ratkovic
 Brad Whitmore/Guido Gomoll
 Parviz Rushenas
 Nate Hartman
 Andy Attfield

Boeing
 Daimler
 GM
 Ford
 Bosch
 Chrysler
 Caterpillar
 Theorem Solutions
 Siemens CT
 Procter & Gamble
 Autodesk
 Purdue University
 Siemens PLM Software



WHITE PAPER

Agenda

- Andy - Introduction: The case for JT Validation
- Panel - JT Validation current practices
- Andy - JT Validation Resources from Vendor Members
- All - Questions for the Panel

JT Trend - broad adoption and process maturity

JT - 3D interoperability asset feeds PLM processes



- PLM application interoperability
- NX MultiCAD solution, Tecnomatix data acquisition
- Increased Reliance on JT data
- Broad use as CAD independent visual BOM
- Scalable content and multiple workflows

“3d4All”

- Bosch

“Everyone talks about the same car”

- BMW

“3D for everyone, everything in 3D”

- TML

“JT enabled visualization and Interoperability”

- Ford

“3D annotated model based solution”

- Honda

“Powerful, affordable standard evolving from Digital Engineering Visualization to Process Data Format”

- Daimler

The case for Validation – JT is no exception

Data Processes

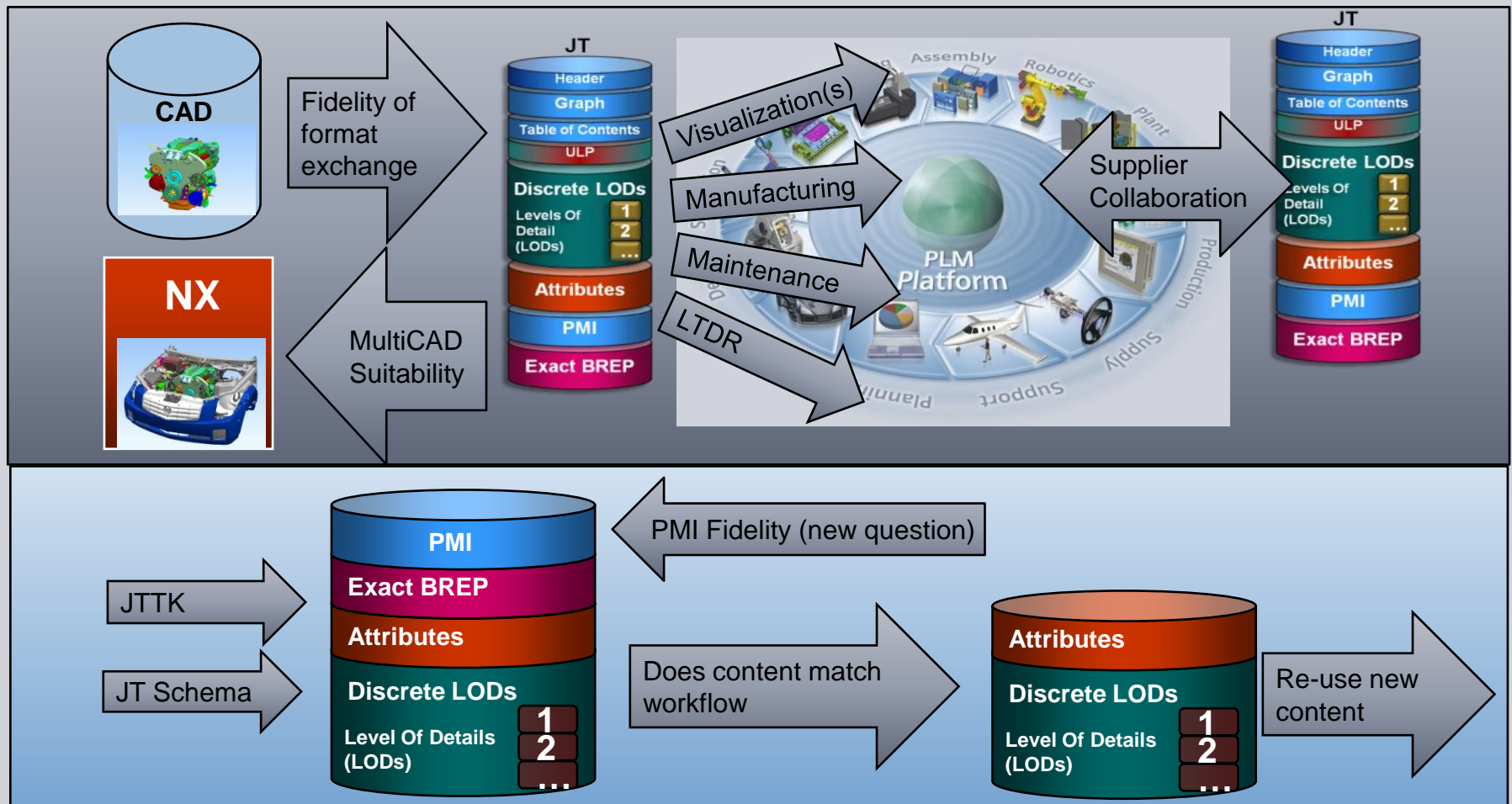
- Publishing the completed revision of a design
 - Correct JT content representing the completed design entering PLM processes
- Checking fidelity after format exchange
 - For non-Parasolid based systems, JT becomes *source geometry* derived to a measurable fidelity
- Interoperability workflows
 - Meeting paired systems' combined workflow/data requirements
 - **MultiCAD** Open to the tools of choice (CAD, CAM, CAE etc)
- Supplier collaboration
 - Meeting the recipients corporate data standards
 - Meets security IP protection needs.
- Archival (LTDR)
 - Ensuring JT information can be re-interpreted and re-used

JT Business Processes

- Mock-up
- Geometric Analysis
- Reference Design
- Geometric Edit
- Styling
- Manufacturing
- Tolerance Analysis
- Manufacturing Layout
- Component inspection
- Bid
- Maintenance Schedule
- Catalogue of parts
- Contractual Signoff

“Unique” Characteristics of JT validation

- Solving diverse business processes from a single JT source
- Creates a unique combination of validation requirements



JT Open TRB - JT Validation Working Group

- Workflows, practices and tools
- Process and tool requirements
- Developing best practices
- White Paper



WHITE PAPER

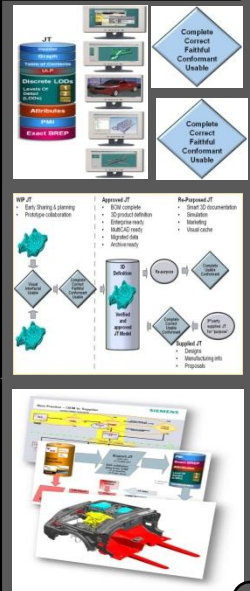
<https://mycommunity.ugs.com/col/JTOpen/TRB/JT%20Validation/White%20Paper/JTValidation%20whitepaper.docx>

Framework

JT Fit for Purpose

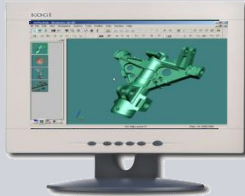
Validation Process Checkpoints

Validation Management



JT Validation Framework:- JT Fit for Purpose

Per segment
Per workflow



Contents:- Valid JT file can be read by JT Toolkit
JT has suitable content for the intended workflow(s)

Graph:- Fidelity and Usability of Product Structure
Correct components for workflow

LODs:- Usability of tessellation
From photo realistic, to assembly browsing, to factory layout

Attributes:- Complete, MultiCAD
Semantics for intelligent import, Identifiers persist associativity

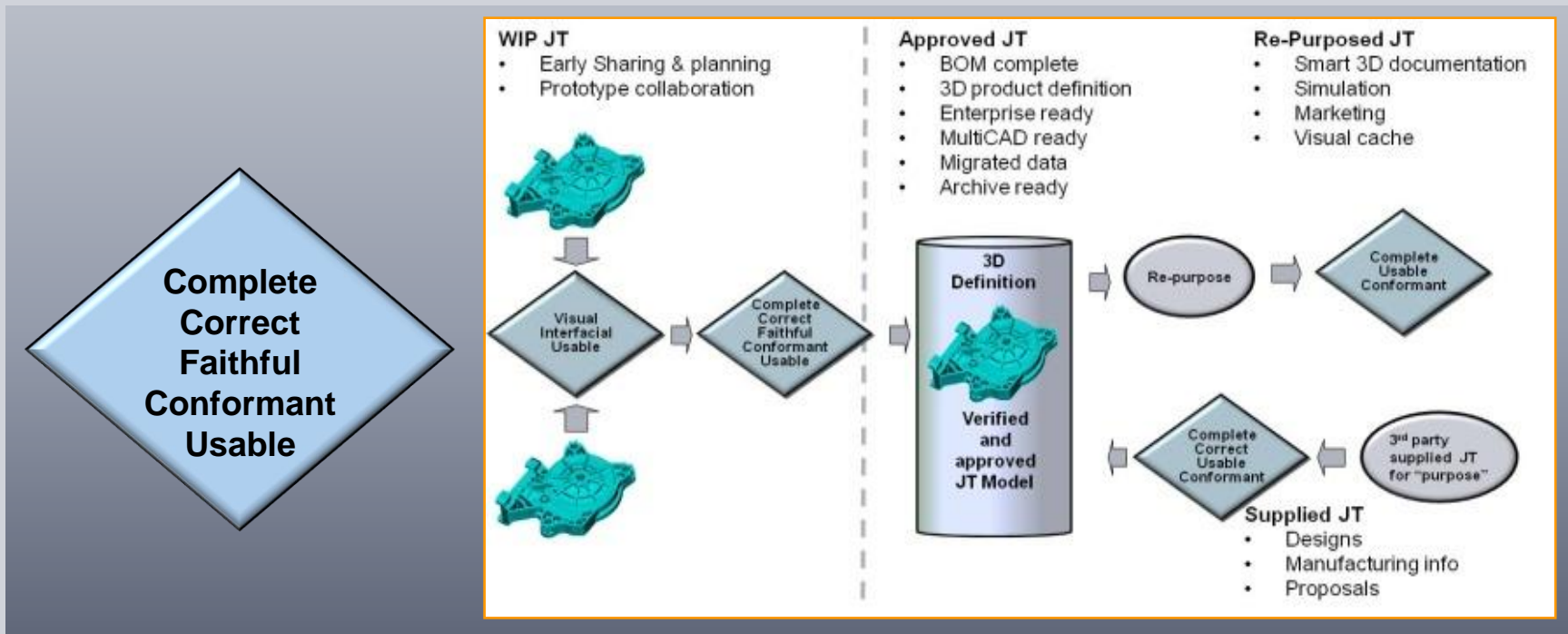
PMI:-
semantically correct for CAM automation or tolerance stack-up
Visual fidelity meaningful to manufacturing engineer

Precise Geometry:-
Valid Parasolid with suitable fidelity
Measurement, analysis, reference geometry, synchronous edit

JT Validation Framework:- Process Checkpoints

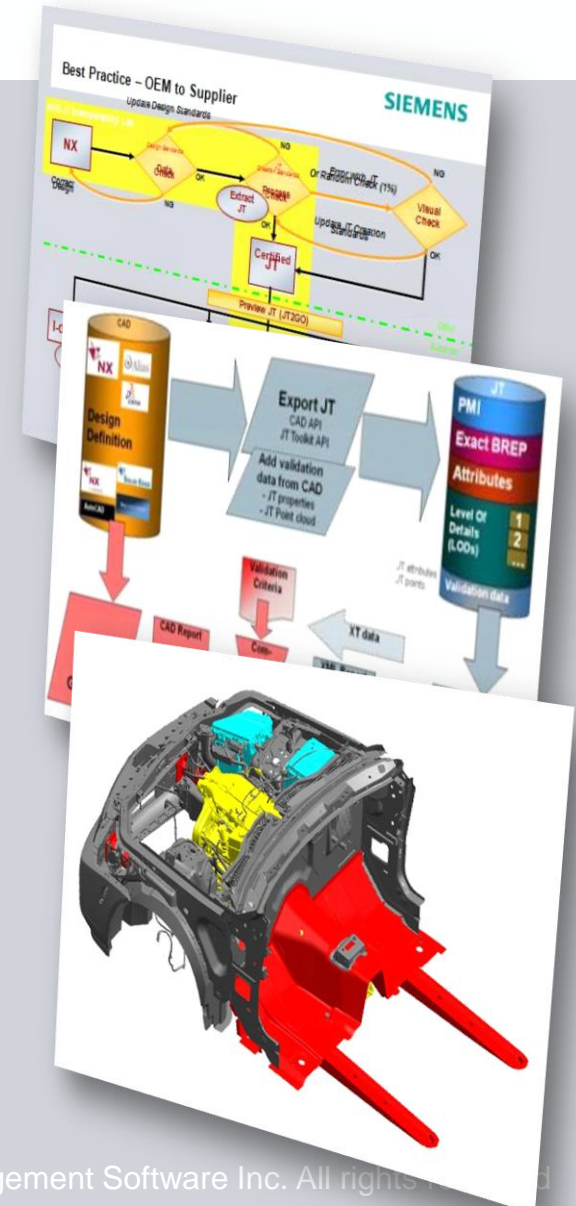
Identifies 4 validation points and their characteristics in the JT life-cycle

- | | |
|--------------------------|---|
| 1. WIP JT | <i>"Early usability across Process interfaces"</i> |
| 2. Approved JT | <i>"Fit for purpose and Faithful to source data"</i> |
| 3. Re-purposed JT | <i>"Content change is fit for new purpose"</i> |
| 4. Supplied JT | <i>"Single source data – standalone checks – multi-usage"</i> |



JT Validation Framework:- Management

- **Validation is managed and takes place in a business workflow**
 - Triggered, Scheduled and PDM managed
 - Starts with CAD data quality
 - Translation process
 - Fidelity check
- **The process provides valuable metrics**
 - Indicates BOM completion
- **JT files can have Conformance levels associated with their intended use**
 - Content and quality
- **Exceptions must be marked and managed**
 - Rework
 - Continue with constrained use



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Resources

CAD best practices:

- Specifying Original CAD Quality
 - Product Data Quality (e.g. NX Check-Mate)
 - Using well defined Design standards and processes
 - Check original CAD data is good quality
 - Check appropriate data for translation
 - Correct CAD data at source
- Specifying JT configuration file to match workflow standards
 - Fit for purpose
 - Correct and usable JT content
- Review Translation logs and output

Resources:- JT Inspector

Ships as part of Teamcenter Lifecycle Viewer

Actions -> Inspector Interactive menu for loaded model

The image displays the Siemens JT Inspector software interface, which is used for inspecting JT (Interchangeable) models. The main window shows a 3D model of a ship hull. On the left, there is a 'Tests' panel with a tree view showing various inspection categories like 'JT Content', 'Geometry', 'PMI Validity', and 'Fidelity'. The 'Results' panel on the right shows the status of these tests, with 'All' selected. Below the 3D model, there is a 'Summary' panel with tabs for 'All', 'Pass', 'Fail', and 'Info'. The 'All' tab is active, showing a tree view of the inspection results. The 'Summary' panel also includes a 'Fly to selected failure geometry' checkbox. The 'Results' panel on the right shows a detailed view of the 'PMI Validity' test results, including 'Polyline Data', 'Polygon Data', 'Persisted IDs', 'Fonts', 'Functional', 'Associations', 'Fidelity', 'Surface Area', 'Mass', 'Volume', 'Density', and 'Center of Gravity'. The 'Fidelity' section is expanded, showing 'Surface Area' and 'Mass' with their respective values.

Summary

- JT Content
 - XT Brep
 - Bodies : 1
 - Regions : 2
 - Shells : 2
 - Faces : 4569
 - JT Brep
 - Regions : 0
 - Shells : 0
 - Faces : 0
- Tessellation
 - LODs : 3
 - LOD : 0
 - Angular
 - Chordal
 - Minimum : 0.00070
 - Maximum : 0.00070
 - Average : 0.00070
 - Triangles : 133650
 - Line Segments : 242
 - LOD : 1
 - LOD : 2
- PMI
 - EntityCounts : 1367
 - Generic Entities : 385
 - Datum Feature Symbol : 13
 - Note : 3
 - Surface Finish : 21
 - Feature Control Frame : 32
 - Dimension : 316
 - Other : 982
 - Meta Properties : 13
 - XT Brep Physical Properties
 - Solid Surface Area : 1286020.618029 sq mm
 - Open Surface Area : 0.000000 sq mm
 - Mass : 4.032774 g
 - Volume : 4032774.223729 cu mm
 - Density : 0.000001 g / cu mm
 - Weight : 39521.187393 g mm / sq sec
 - Geometry
 - Level 0
 - Passed : 1
 - Failed : 0
 - Level 1
 - Passed : 0
 - Failed : 1
 - Level 2
 - Passed : 0
 - Failed : 1

JT Inspector



JT Segment	Content	Validity	Fidelity
Structure	Summary and per node display of results		
B-rep	Type, Bodies, regions, shells, faces count	Ordered series of Parasolid validity checks on XT	
Tessellation	Number of LODS Resultant LOD parameters, triangles, line segments		
PMI	PMI types and quantities of each	Data structures correctly defined and associations resolvable	
Metadata	Quantity of properties		
Mass Properties	Parasolid Computed Properties		Compares computed with CAD reported against user tolerance

JT Inspector

Command line utility for Automation

JTInspector H1-Assembly.jt -output h1.xml -config /mydir/myconfig.cfg

Configuration File "JT Inspector"

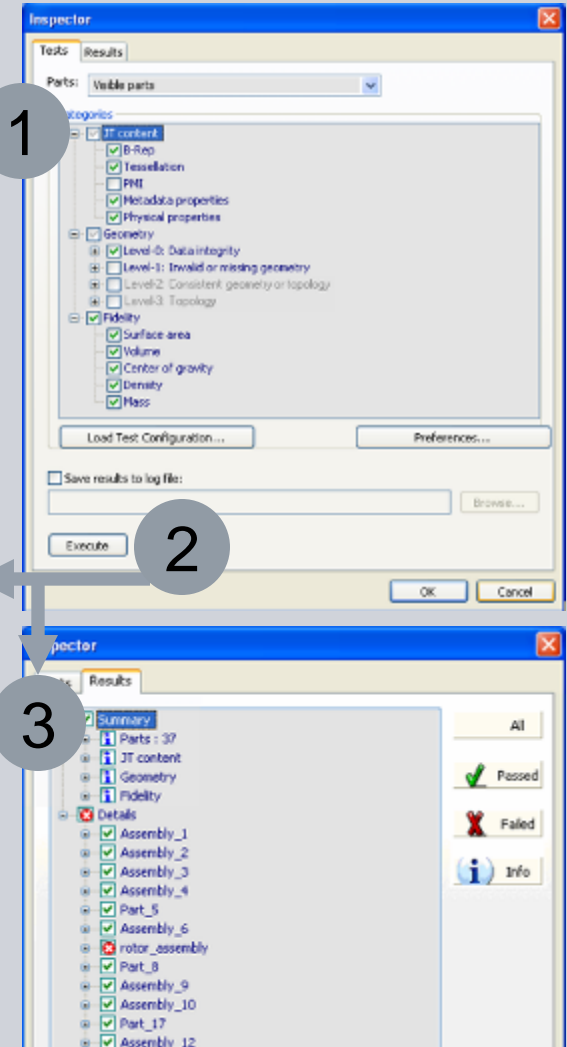
```
JTInspector {
  reportOn = "ENTIRE_FILE";
  reportSummary = false;
}

JTContent {
  preciseGeometry = true;
  tessellation = true;
  pmi = true;
  properties = true;
}

Geometry {
  checkValidParasolid = true;
  checkFaceFace = false;
}

Fidelity {
  checkSurfaceArea = false;
}
```

```
<?xml version="1.0" encoding="utf-8" ?>
<File name="asm0002" summary="false">
  <node name="prt0003_prt" type="part">
    <JTContent>
      <Geometry>
        <XTBrep>
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            <region>
              <shells>
                <shell>
                  <faces>
                    <face>
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                        <max_z>200.00</max_z>
                      </max>
                    </face>
                  </shells>
                </region>
              </regions>
            </shell>
          </faces>
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      </JTContent>
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        <CADSurfaceArea>103.30</CADSurfaceArea>
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              <region>
                <shells>
                  <shell>
                    <faces>
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                        </max>
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                    </shells>
                  </region>
                </regions>
              </shell>
            </faces>
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        </Geometry>
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        </JTContent>
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        <FailedChecks>
          <check name="VertexCurveTolerance" id="12345" point1="10.00,15.00,20.00" point2="40.00,50.00,60.00" />
          <check name="DegenerateCurveSegment" id="54321" point1="20.00,25.00,40.00" point2="40.00,50.00,60.00" />
        </FailedChecks>
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          <calculatedArea>205.50</calculatedArea>
          <CADSurfaceArea>205.00</CADSurfaceArea>
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        </SurfaceArea>
      </node>
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          <Geometry>
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              <regions>
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                        <face>
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                            </min>
                          <max>
                            <max_x>600.00</max_x>
                            <max_y>600.00</max_y>
                            <max_z>600.00</max_z>
                          </max>
                        </face>
                      </shells>
                    </region>
                  </regions>
                </shell>
              </faces>
              <chordal>0.001</chordal>
              <angular>20.0</angular>
            </XTBrep>
          </Geometry>
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                    <shells>
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                            <max>
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                              <max_z>400.00</max_z>
                            </max>
                          </face>
                        </shells>
                      </region>
                    </regions>
                  </shell>
                </faces>
                <chordal>0.001</chordal>
                <angular>20.0</angular>
              </XTBrep>
            </Geometry>
            <JTContent>
              <Properties>
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              </Properties>
            </JTContent>
          </node>
        </node>
      </node>
    </node>
  </node>
</File>
```



Viewer Action for detailed inspection

1. Check tests to be performed
2. Execute
3. Examine Results

Resources:- Part Edit

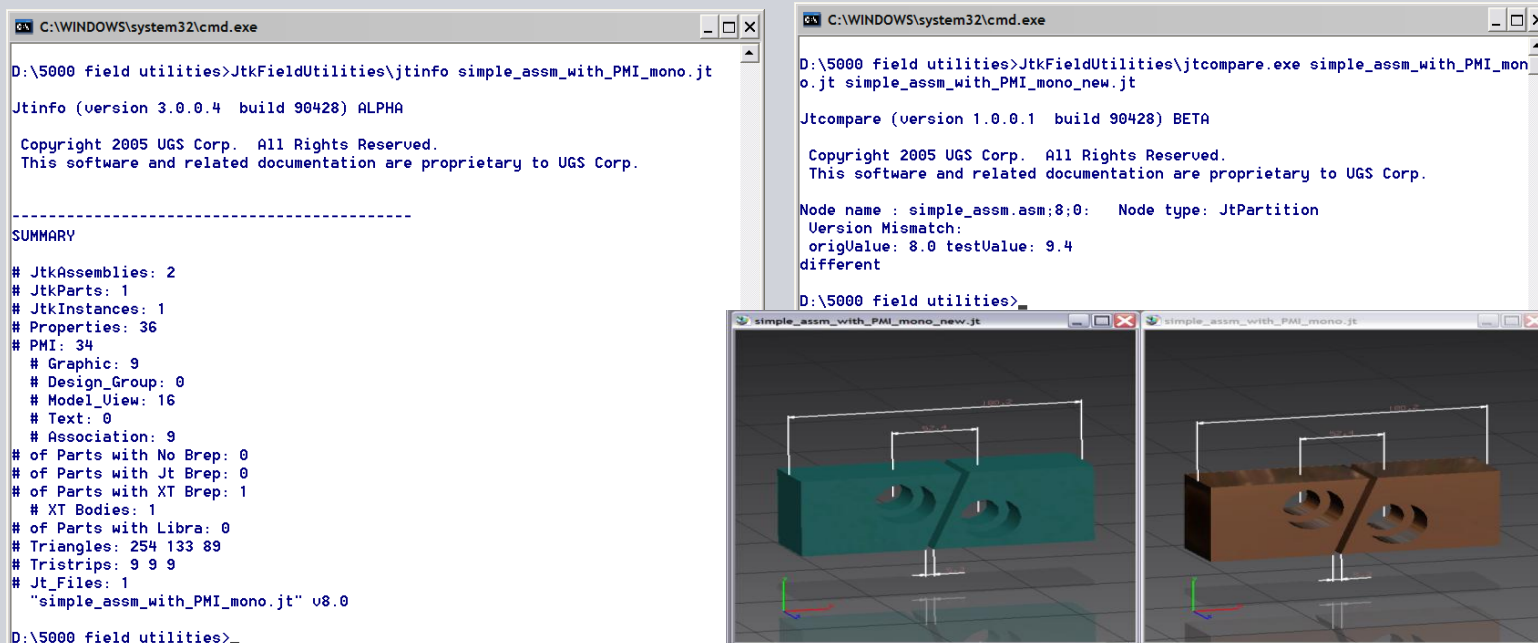
Teamcenter Lifecycle Viewer

Tools->Part Edit

JT Field Utilities

Available to JT Open Members as examples built from JT Toolkit

- **JTInfo** – Information at varying levels of granularity
- **JTCompare** – Compare specified elements of two JT files
- **XTfromJT** – Extracts the XT b-rep to a file.



May 2010 JT Open TRB – Vendor Presentations



Elysium

- healing
- PDQ check & comparison
- validation customer projects
- version shape comparison
- assembly comparison
- pmi semantic comparison
- pmi fidelity check points

Theorem

- Processing framework
- management and audit
- previous implementation
- Ideas to JT
- cloud of points, mass props



T-Systems

- in-line PDQ, geometry and topology checks
- pmi report and compare



Core Technologie

- healing
- PDQ check & compare
- 2 way geometry comparison
- PMI comparison
- batch processing



ITI

- face sampling points
- ambiguous geometry
- graphics comparison
- dimension comparison



Questions for the Panel?