CAD Model Validation in the Product Life Cycle Management

CAPVIDIA CEO
Tomasz Luniewski
Company Introduction

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- Founded in 1994
- Development of Engineering Software
- Engineering services
- 80+ programmers & scientists (20% PhD)

Applications Areas:

3D CAD data
- Interoperability
- Repair & Healing
- Validation
- Quality Assessment

CFD simulations - FlowVision
- Automatic CAD fitted adaptive meshing
- Multi-physics (fluid-structure-interaction)
- Parallel processing & optimisation
Capvidia Solutions

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**CAD Interoperability - 3D TransVidia, FormatWorks**
- CAD data translation with automatic repair & healing
- Server, batch translation
- CATIA V4 to CATIA V5 migration

**CAD Validation - CompareVidia**
- CAD model validation and compare

**CAD Quality - QualityVidia**
- PDQ Standards (AIAG D15,VDA 4955, JAMA)
- User/Process driven criteria
- Long term CAD data archiving (ISO 10303 STEP)

**CAD Collaboration – ViewVidia**
- Native, neutral, PMI CAD formats
- Annotation and measurements
- XML format through all Capvidia products
Product Life Cycle Management – challenges

- Different Systems (software, hardware, OS)
- Different Data Formats (native, neutral, interpretation)
**3D CAD model validation with CompareVidia**

**CompareVidia** - CAD model validation
- Data formats IGES/STEP/CATIA/UGX/Pro/E, etc.
- Authority / Check Model
- Validation report
- Classification of incompatibilities
- Multilevel compare criteria
  - global check – volume, surface, center
  - local check – geometry, shape
  - additional check – topology, colour, etc.
- Validation against CMM points
- Validation of assembly definition

**ViewVidia** – collaboration 3D viewer
- Communicate validation results
- Visualise, annotate, measure 3D model
- Free of charge (XML)
CompareVidia case studies

High tolerance aerospace machining

USA

Europe

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High Tolerance Check for High Tolerance Aerospace Machining

Aero-Plastics is a two-time award winner for Boeing Suppliers
Since 1945 it has been machining parts in metals and plastics
ISO 9002 and AS 9000 certified company
Facility include four Fadal machining centers, CNC lathes, EDM equipment and several plastic injection molding machines
CAD Validation Process

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CATIA V5 → Native CATIA → SolidWorks → Parasolid → EdgeCAM → CMM

Validation 1

Native CATIA → Parasolid → Validation 2

Native CATIA → Validation 3

IGES, STEP → CMM Points

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ASCO - Boeing "Exceptional Engineering Achievement" Award for the slat tracks design

A310
A320
A330/340
A340-500/600
A380
Boeing 737 NG
Boeing 777
Boeing 787
CRJ-700/900
ERJ 170/190
Dassault F7X
CompareVidia validation at ASCO

How to validate the validation software?

- Known errors are introduced in the CAD model
- Original model and model with errors are compared
- All errors should be detected by CompareVidia
CAD Validation Process

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CATIA V5  Native CATIA  Power Inspect  CMM

Native CATIA  Validation 1  ACIS

Native CATIA  Validation 2  CMM Points

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Summary CAD model validation

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• **CompareVidia benefits:**
  • Brings prediction into processes based on the reuse of 3D CAD models
  • Complies with Boeing D6-56991 standard
  • Documents validation processes
  • Easy to implement and use
  • Easy to integrate with existing ISO procedures
Selected Aerospace Customers
Questions

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Thank you for your attention

www.capvidia.com
CompareVidia extensions (PMI Validation)

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Different representations:
• Semantic PMI Object – CATIA V5, UGX, Pro/E
• Non-Semantic PMI Object (poly-lines) - STEP
Non-Semantic PMI (poly-lines)
PMI Validation

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Non-Semantic PMI (poly-lines)
Non-Semantic PMI
(poly-lines)