MBE Starts with Interoperability:
*Supporting MBD CAD & Automation for a Model-Based Enterprise*

Annalise Suzuki
Elysium Inc.
Specialized + dedicated technologies with a global reach

- Over 30 years of CAD Expertise
- Strong partnerships with CAD Vendors
- 3D Data Expertise
  - Translation
  - Geometry Healing
  - Quality Management
  - Validation
  - Simplification
  - Reverse Engineering/ Point Cloud Rendering
- “Off-the-Shelf” Software, Development Projects & Migration Services
Industries Served

ELYSIUM has over 2800 customers around the world with a strong position in the manufacturing industry.

- Aerospace & Military
- Automotive OEM
- Automotive Supplier (Tier-x)
- Energy | Oil & Gas
- Engineering Services
- Architecture & Construction
- Automotive Supplier (Tier-1)
- Consumer Electronics & Products
- Heavy Industry
- Shipbuilding
Model Quality in all Applications

Many solutions to help your 3D data interoperability

Translation

Healing

Simplification

Validation

Migration
(Feature-Based Translation)

Quality Check

Solid Enveloping
# Steps in a Model-Based Lifecycle

## Global Product Data Interoperability Summit | 2018

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<th>Create</th>
<th>Release</th>
<th>Translate</th>
<th>Validate</th>
<th>Inspect</th>
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<tr>
<td>• MBD CAD model with 3D annotations and metadata</td>
<td>• With required quality standard</td>
<td>• Derivatives for delivery or downstream consumption</td>
<td>• Ensure derivatives equal released creation</td>
<td>• Quality at the digital level</td>
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- **Custom Quality Checks**
- **High-fidelity translations, packaging**
- **MBD Validations**
- **Reverse Engineering**
The precision and expertise of Elysium relies on this powerful format.
Accurate Geometry Error Checking

Elysium provides Product Data Quality (PDQ) checking to assure 100% high fidelity models for an enterprise.
Product Data Quality-Check/Verification

- Elysium offers 78 PDQ check items
- Customize checking criteria
- Check against multiple criteria
Check model quality to a standard (SASIG, LOTAR, MIL STD 31000) and customer requirements
Elysium’s geometry healing capability creates perfect geometry for assured downstream consumption.

- Tiny face removal and edge adjustment
- Face extension for gap filling
- Tiny edge removal and face extension
CAD systems have differences. To move from one to another you need to understand these differences. Elysium’s topological and geometry expertise allows us to breakdown each model to basic mathematical representation to apply into another mathematical definition.
PMI/FTA Translations

Cross-multiple translation of fully annotated 3D drawing data

**Fully Annotated 3D Drawing Translation**
Support both native PMI/FTA translation and appearance translation. Keep associativity between annotation and element.

**Flexible Mapping of PMI/FTA and Attribute**
Enable to map specific annotation and attribute to recover non-supported entities at destination CAD.

Map spot weld point of CATIA V5 to user attribute of specific parts of Inventor which are automatically created as spot point symbol through translation.
Elysium supports a variety of different platforms, formats, and entities.

**Entities**
- Geometry
- Product Structure
- PMI/FTA
- Attributes
- Features
- Sketches
- Constraints
- Associative 2D Drawings

**CAD Platforms**
- CATIA V4 / V5 / V6
- NX
- I-Deas
- Creo
- Solidworks
- Inventor
- CoCreate

**Neutral/Viewable**
- STEP
- JT
- Parasolid
- ACIS
- STL
- OBJ
- 3D PDF
- HTML
- IGES
Feature-based 3D data translation maintains design intent and enables modification by features.

**Fully Automatic Translation**

Automatically extract feature tree from source CAD, map the feature tree to destination CAD, and rebuild 3D model at destination CAD with the mapped feature tree.

**Hybrid Translation of Feature and Geometry**

- Translate representation of fabricated material as geometry and definition of machining feature as feature tree.
- Recover un-supported feature as B-Rep translation.
Geometry Simplification

Optimize models for CAE analysis and intellectual property protection

Feature Recognition and Simplification

Automatically recognize geometric features like fillets or holes and remove them. Enable to recognize and remove overlapped/converging fillets and variation fillets.

Flexibility for Feature Removal

Choose which features you want to remove and which ones you want to remain. Allowing you to have full control of information shared.

Automatically recognize features, such as holes, and allow you to remove all or select the ones you want to remove.
Solid Envelope | Surface Extraction

Automatically simplify models for CAE, DMU or other downstream processes

Solid Envelope

Fill inside of assembly model to create a solid model for size reduction and protect IP.

Surface Extraction

Extract the outline of the exterior parts or interior parts.
Mold Manufacturing Check

Optimize models for CAE analysis and intellectual property protection

**Built-in plastic injection knowledge**

Mold manufacturing check is built on a knowledge base of plastic injection molding manufacturing processes. Utilizing this expertise, the software automatically knows what to look for and fixes it.

**Check to manufacture**

Checks 11 items in 3 categories: Product Formability, Mold Construction, and Mold Formability. Check items such as excessive/inadequate thicknesses, undercuts, sharp edges, deep trenches, small bumps and many others. Check criteria and tolerances can be set to company standards to ensure quality before production.

- Sharp edge area detection
- Undercut area detection
CAD Data Validation

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Robust Validation Solutions & Reports

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3D PDF

HTML

Diff Viewer

XML

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Validation of MBD Data

Quickly identify differences between 2 files

Detecting Differences

Elysium will examine files and provide comparison of geometry, PMI and attributes. Easily navigate to the difference with a click of a button.

Shareable Report

Elysium provides validation reports in 3D PDF, HTML, and XML for easy share across organization(s). No CAD system required.
Data Packages

Create easy to share Data Packages that includes 3D model viewing and ability to add support docs (spreadsheets, BOM, etc.)
ASFALIS™ Functionality

Enterprise system for automated translation and optimization of 3D CAD data

Native CAD
Neutral CAD

Data Exchange Kernel

PDQ Check
Validation
Simplification

Interference Check
Assembly Editor
Attribute Editor

Deliverables & Outputs

CAD File
PDQ Report
Validation Report

CADdoctor® Interactive Healing

Asfalis functionality diagram
Elysium’s technologies can simplify your archival process for accurate and shareable documents for future use.
Aerospace OEM

Current CATIA V5 Version

Future CATIA V5 Version

Validation
Geometry, PMI, Attributes

500K+ files in less than 2 months

Deliverables & Outputs
Machine Readable Summary Reports
Validation Reports

ASFALIS™
Work in Progress [WIP] Validation

Tier One Automotive Supplier

Initial CATIA V5 OEM Delivery

Supplier begins work

Supplier doesn’t know what has changed / OEM provides no change information

Additional CATIA V5 OEM Delivery

1st V5 Delivery

Validation

Product Structure, Geometry

2nd V5 Delivery

Deliverables & Outputs

Validation Reports
Engineering Change Order [ECO] / Change Request [CR]

Initial Creo Release “Revision A”

Military Supplier

Proposed Creo Release “Revision B”

Engineering wants to make a change

Publish Approved Change Request to Appropriate Groups

Creo “Rev A”

Creo “Rev B”

Validation
Product Structure, Geometry, PMI, Attributes

Dynamically Build Change Request:
Filter / color code approved & unacceptable changes

Deliverables & Outputs

Validation Report

Initial Creo Release

“Revision A”

“Revision B”

“Revision B”

“Revision A”

“Revision B”

“Revision A”

“Revision B”

“Revision A”

“Revision B”

“Revision A”

“Revision B”
Supplier / OEM Collaboration [PDQ + Validation]

Tier One Automotive Supplier

**PLM**
- CATIA V5
- New CATIA V5

**PDQ Check**
- Translate
  - Based on supplier profile
- STEP AP214 / IGES

**Validation**
- V5 ↔ V5
  - Product Structure, Geometry
- CATIA V5
- Translate
  - STEP AP214 / IGES

**Derivative Deliverable**
- STEP AP214 / IGES

**Tier Two Supplier**
- Performs work
Large aerospace supplier

Initial CAD Release “Revision A”

CAD “Rev A”

Validation
Product Structure, Geometry, PMI, Attributes

CAD “Rev B”

Store corresponding reports in PLM

Validation Reports

Deliverables & Outputs

Email to User
ECO / Derivative CAD / PDQ in PLM

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Large aerospace supplier

PLM

CAD Release Revision A

- CATIA V5
- NX
- Creo

CAD Derivative Revision A'

- CATIA V5
- NX
- Creo

Store corresponding reports in PLM

Validation

Product Structure, Geometry, PMI, Attributes

Deliverables & Outputs

- Email to User
- Validation Reports

PASS
FAIL

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Large aerospace supplier

PLM

CAD Release Revision A

CATIA V5
NX
Creo

STEP Derivative

Store corresponding reports in PLM

Validation
Product Structure, Geometry, PMI, Attributes

Deliverables & Outputs

Email to User

Validation
Reports

FAIL

PASS

CAD Rev A

Derivative CAD Rev A'
Large aerospace supplier

PLM

CAD Release Revision A

CATIA V5

NX

Creo

Store corresponding reports in PLM

ASFA™

CAD Rev A

PDQ Check

• Based on target CAD
• Based upon OEM standards
• Based on industry standards:
  MIL-STD 31000A

Deliverables & Outputs

PDQ Reports

FAIL

Email to User

PASS
Thank you. Stop by our booth for more!

Ready-to-go software with powerful results

**CADdoctor®**
PDQ checking, Auto/Interactive Healing, Optimizing, and Translation

**ASFALIS™**
Enterprise-level PDQ checking, Automatic Healing, Optimizing, Translation, and Validation. Designed for heavy volume data.

**CADfeature™**
Feature-based translation with 2D drawing associativity

**DirectTranslator™**
Simple to use,

**InfiPoints™**
Point cloud handling software to register, process, analyze and export to CAD and BIM software