ELYSIUM

SIMPLIFY YOUR 3D MODELS

Use Cases for Automotive Engineering and Simulation

May 13, 2020

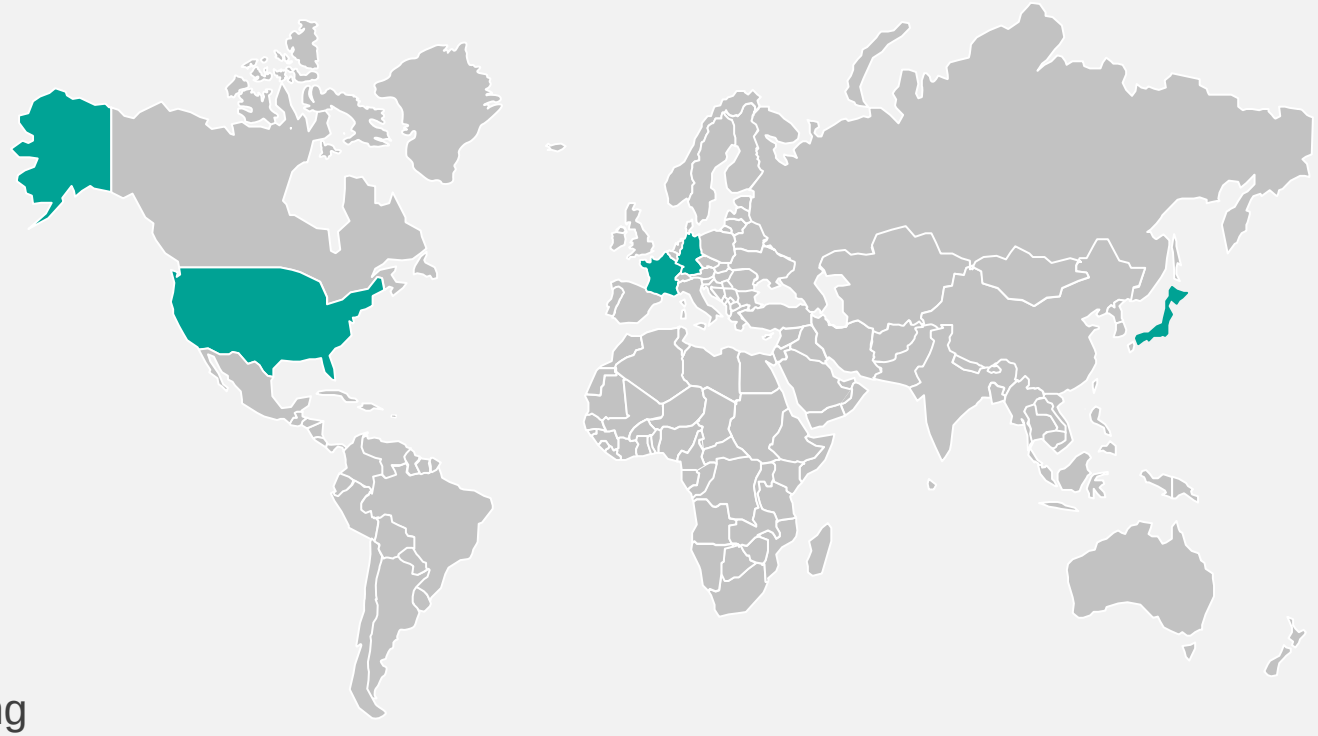
SHUN HIGASHIDE

ELYSIUM CO. LTD.

ELYSIUM

SW solutions for seamless 3D interoperability

- Over 30 years of CAD Expertise
- Strong partnerships with CAD Vendors
- 3D Data Expertise
  - Translation
  - Geometry Healing
  - Product Data Quality
  - Validation & Verification
  - Simplification
  - Reverse Engineering/ Point Cloud Rendering
- Software, Development Projects & Migration Services



AUTODESK. SIEMENS DASSAULT SYSTEMES

Altair SOLIDWORKS ptc aras corp

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ELYSIUM PRODUCT LINE

Interoperability Solutions from Single User to Enterprise

CADdoctor

- Interactive healer and multi-CAD translator

DirectTranslator *Not included in APA version*

- Workgroup point to point translation solution
- CATIAV5-JT for Daimler suppliers

ASFALIS *Not included in APA version*

- Command line driven translator
- WEB interface - enterprise translation solution, configuration management
- PMI/Attribute support
- Validation, delta detection

CADdoctor for NX *Not included in APA version*

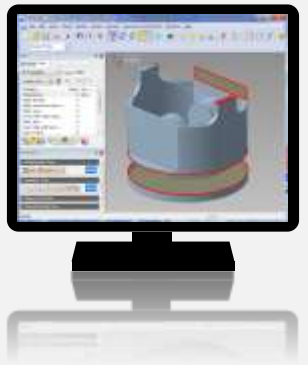
- Product Data Quality check, heal & guarantee embedded into NX

CADfeature *Not included in APA version*

- Native to native feature-based translator
- Associative drawing support
- Remastering assist

InfiPoints *Not included in APA version*

- One stop solution for Point Cloud Utilization



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What is CadDoctor?

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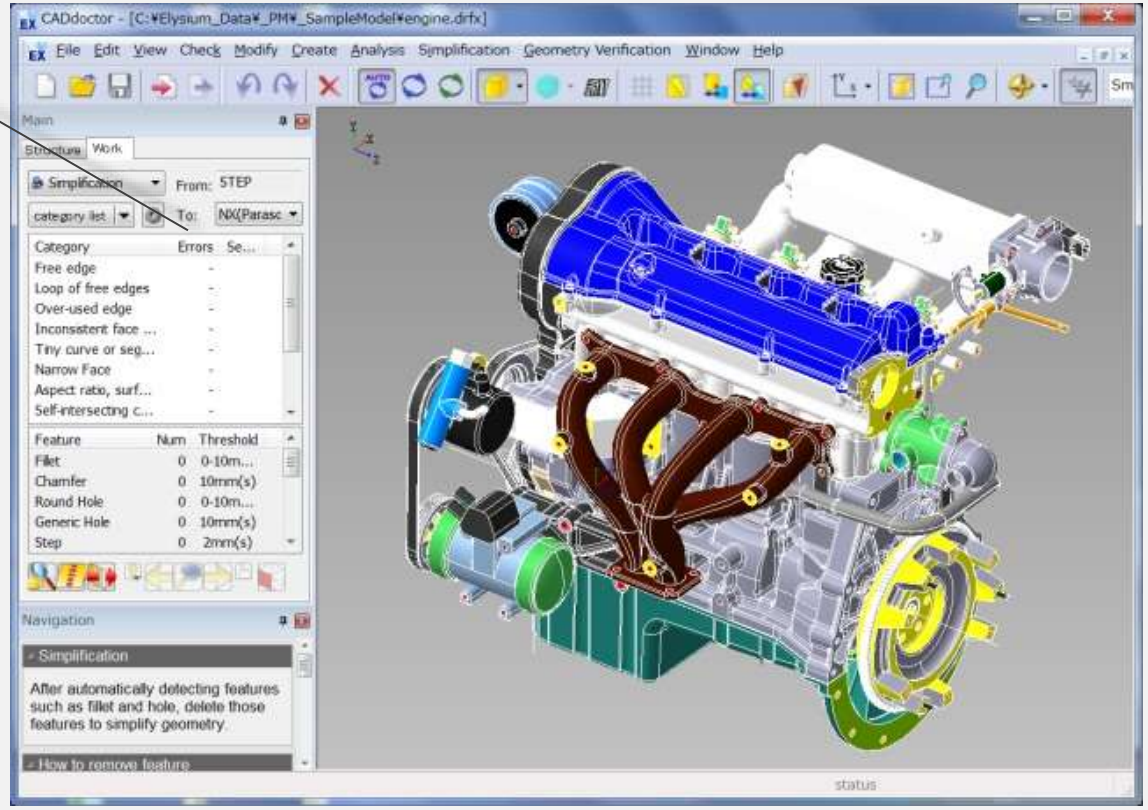
CADDOCTOR

CADdoctor is package software for geometry PDQ checking, geometry healing, data translation, geometry optimization.

CADdoctor has a built-in geometry healing module called Data Exchange Kernel (DEK) with pre-defined ‘flavoring’ options for the following CAD systems.

- CATIA V4
- CATIA V5
- I-DEAS
- NX (Unigraphics)
- Creo Parametric
- Creo E/D
- SolidWorks
- Autodesk Inventor
- Mechanical Desktop
- CADCEUS
- etc.



CADdoctor also has interactive operation menus to retrieve heavy geometry errors and apply geometry simplifications.

** STL, IGES, Parasolid are the only export available in the APA*

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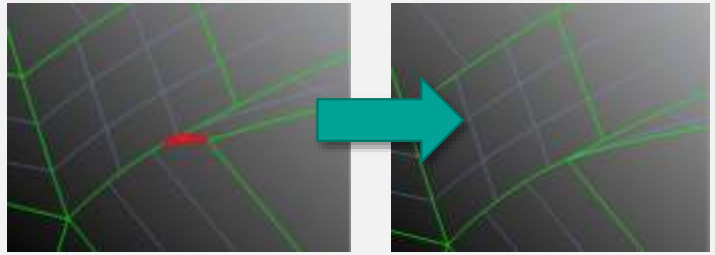
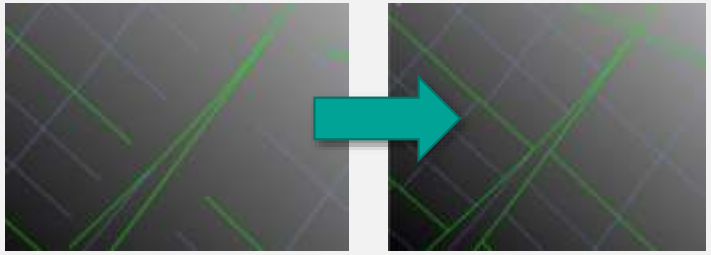
PDQ Check & Healing

Digital incoming inspection to safeguard a high-quality level of 3D data throughout the entire process

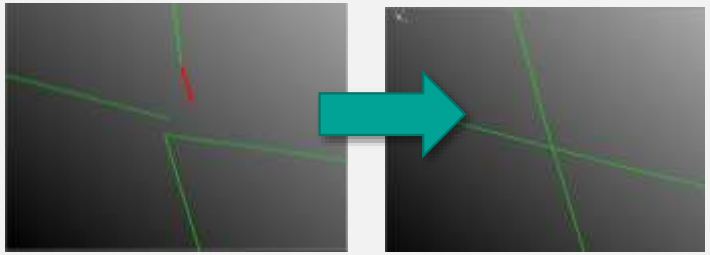
Tiny face removal and edge adjustment

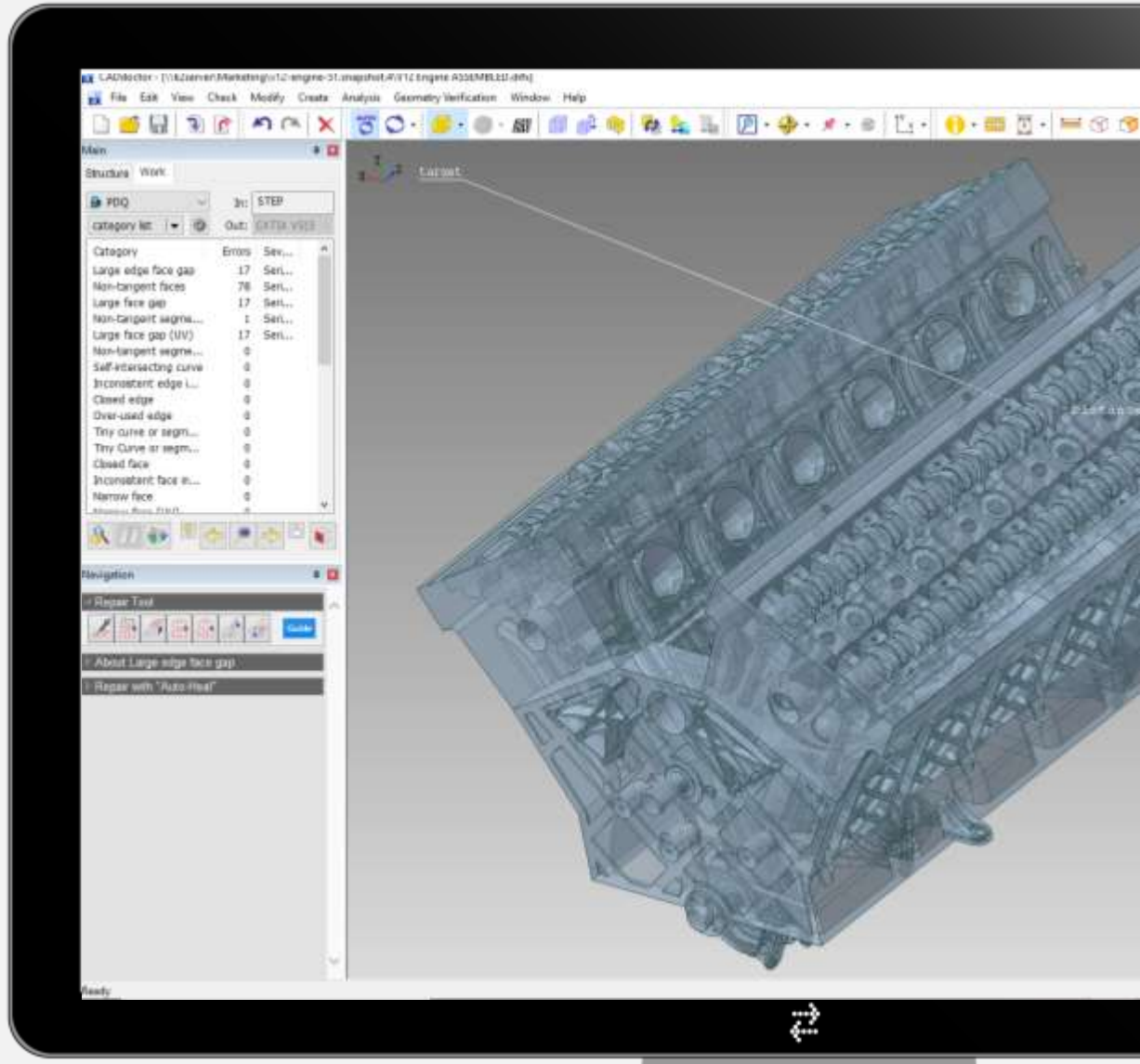


Face extension for gap filling



Tiny edge removal and face extension





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GEOMETRY SIMPLIFICATION

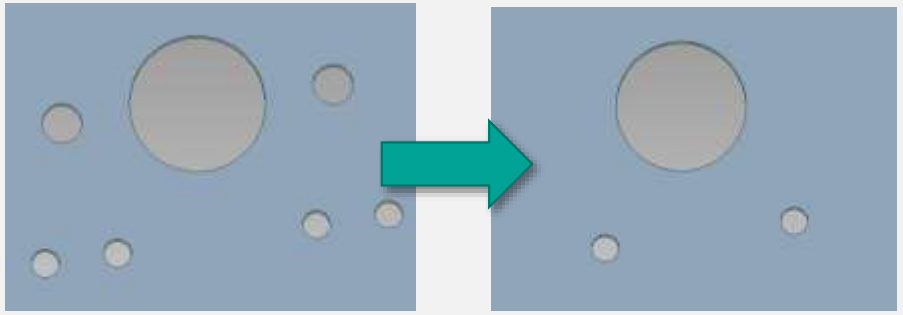
Optimize models for CAE analysis and intellectual property protection

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

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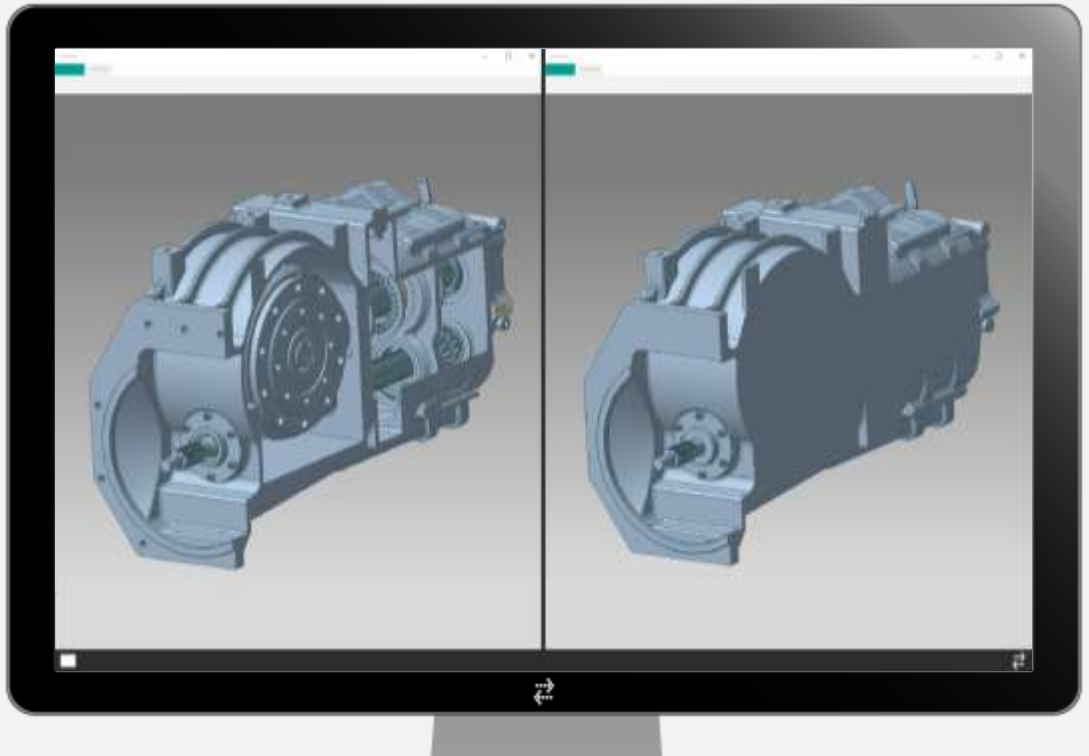
SOLID ENVELOPE | SURFACE EXTRACTION

Automatically simplify models for CAE, DMU or other downstream processes

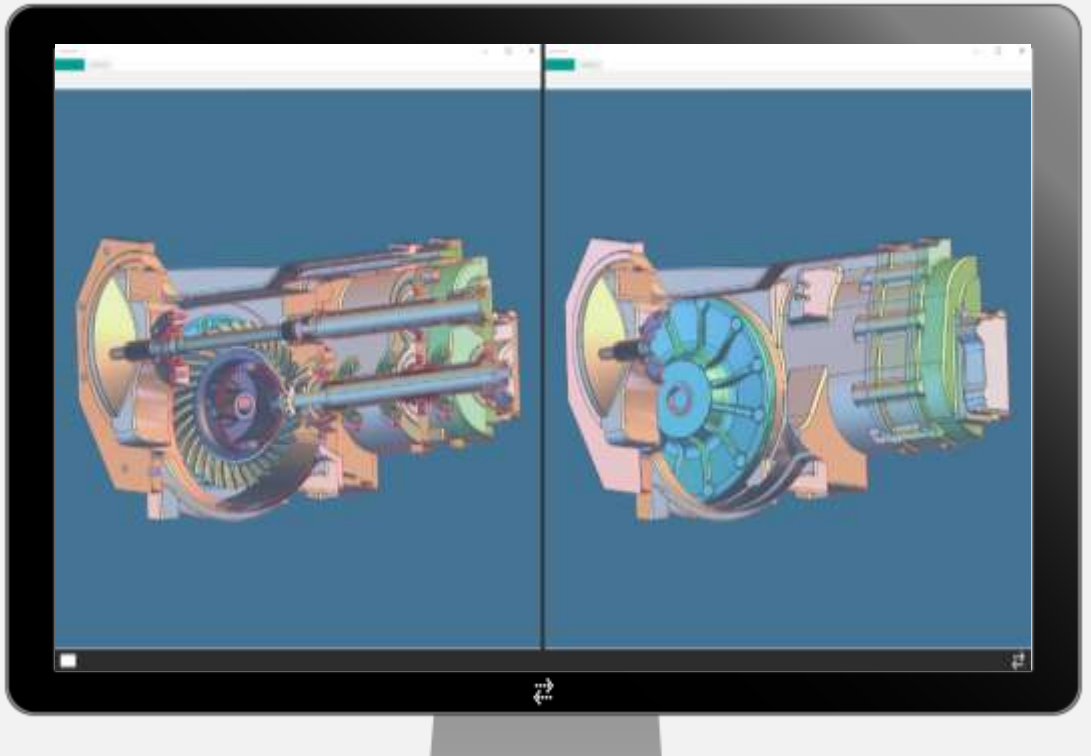
Solid Envelope

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.



SIMPLIFYING YOUR 3D MODELS

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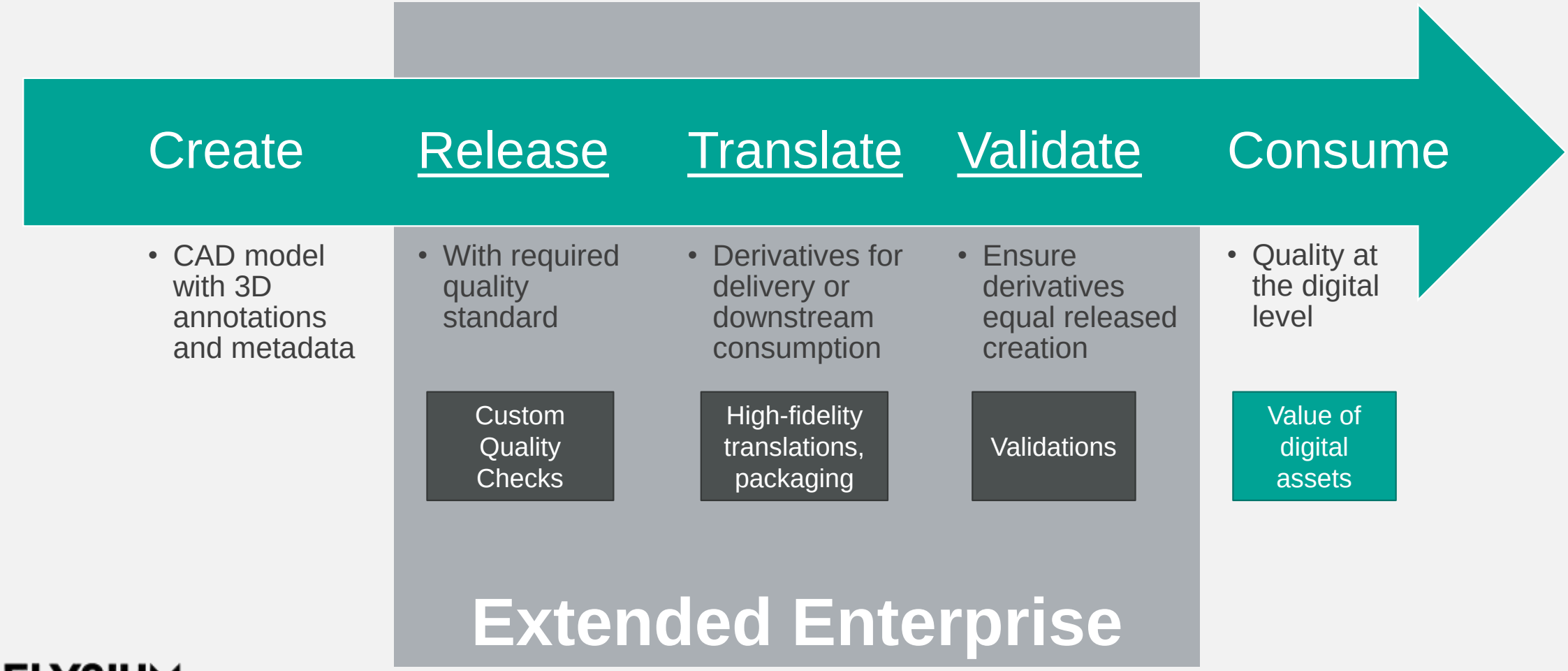
Steps in the Model-Based Lifecycle

Vision of the Extended Enterprise



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Simplification: Methods & Use Cases

Article in ProductData Journal 2018 #2

4 Methods

- Approximation
- Defeaturing
- Substitution
- Enveloping

3 Use cases

- File size reduction
- IP protection
- CAE data preparation

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USE CASE 1: DATA HEALING

Product data quality check and repair

Challenge

- Quality of CAD data is poor for succeeding in downstream workflows
- Trying to work with multiple formats from external parties causes issues

Solution

- Heal bad geometry with CADdoctor technology
- Tolerance/topology adjustment for each target system

Benefits

- Easier data handling in downstream workflows, regardless of the format

TROESTER
EXCELLENCE IN EXTRUSION.

"Without using CADdoctor it would require utmost efforts to be able to process external CAD data with our CAD system."

Martin Wosnitza, IT-department
TROESTER GmbH & Co. KG

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Use case 2: File size reduction

Enveloping function

Challenge

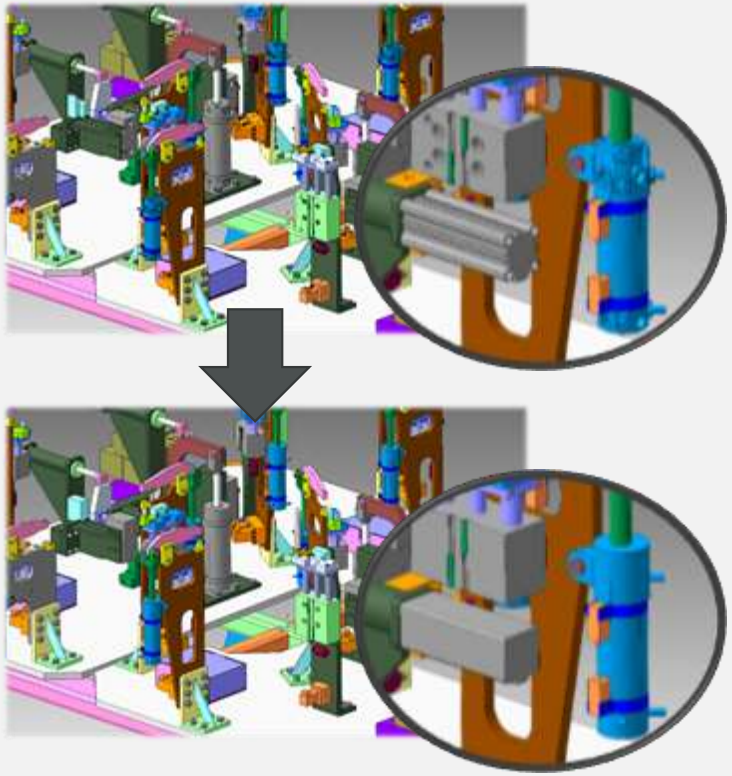
- Issues with data exchange due to large file sizes
- Slow and stressful viewing experience with large data size models in some devices and software

Solution: CADdoctor

- Automatically create a light-weight model from a huge assembly model
- Can remove holes, grooves, and protrusions
- Can replace volumes with simple shapes

Benefits

- Can be utilized in various scenes such as digital mock-up, interference check, translation to viewer formats, etc.



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Use case 3: IP protection

Enveloping function

Challenge

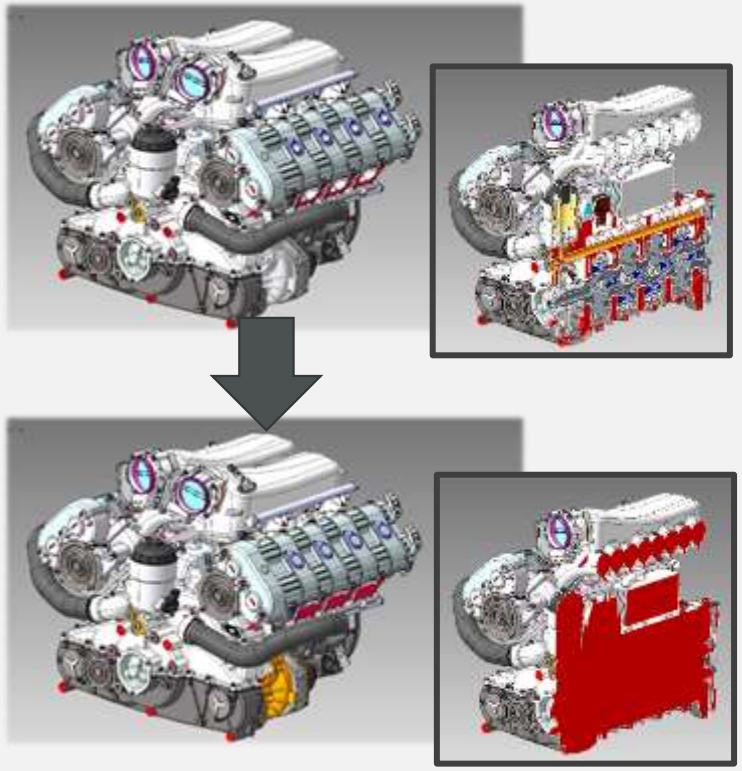
- Had to manually remove technical design details on parts to prepare models that can be shared with partners without the risk of data breach or plagiarism

Solution: CADdoctor

- Automatically delete internal geometry with a click of a button

Benefits

- Exchange complex datasets without security risk with much less time
- Easier handling with less data size



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Use case 4: Preparation for CAE analysis

Data optimization

Challenge

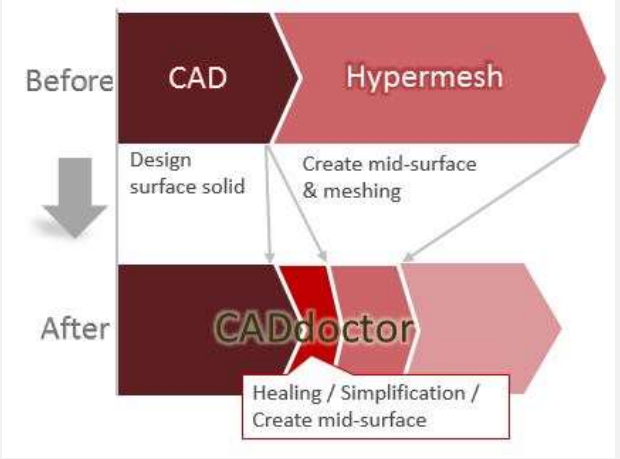
- Mesh quality of CAE data was poor, adding more work to the process of data preparation for CAE

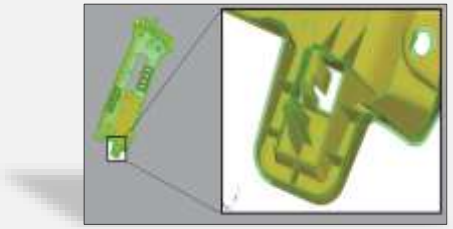
Solution

- Heal bad geometry with CADdoctor technology
- Simplify features and create mid-surface suitable for meshing and CAE

Benefits

- Reduced their CAE data preparation time by 40%
- Higher quality of meshing was possible in HyperMesh





Mid-surface automatic extraction (CADdoctor)

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USE CASE 5: TIME REDUCTION

Creation of FEA models

Challenge

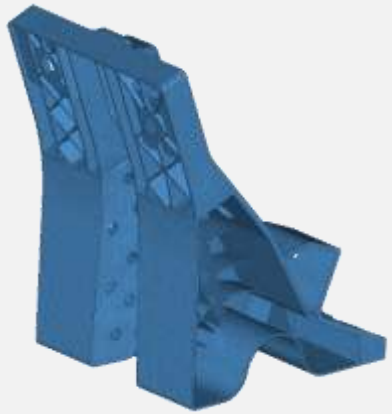
- Capacity increasement leads to a need for reduced preprocessing time in simulations
- Create better mesh through geometry simplification

Solution

- Use CADdoctor Translation and Simplification platforms to reduce time in creating simpler models
- The creation of a CAD free of fillets chamfers, ribs and bosses, is much better for HyperMesh to handle in the creation of 2d and 3D mesh.

Benefits

- Meshing a model with the help of the CADdoctor will create higher quality mesh with fewer elements for engineers to repair.



"Creating mesh directly on a model you received from your costumer is simply not enough, you must simplify and clean your model, fast and easy! And in this gap the CADdoctor comes for help"

Konstantin Arhiptsov, Simulation department
Arkal Automotive

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USE CASE 6: REVERSE ENGINEERING

Creation of CAE models

Challenge

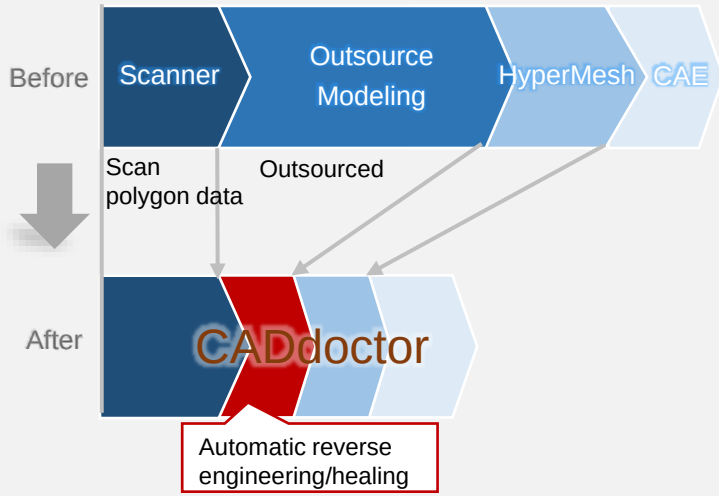
- Long lead time for creating CAD models as the scanned data was outsourced for modeling

Solution

- Use CADdoctor to automatically & semi-automatically create b-rep surfaces from STL polygon data
- Use CADdoctor polygon function to heal polygon for high quality b-rep data creation

Benefits

- Reduced their CAE data preparation time by 75%
- Faster meshing in HyperMesh



Reverse Engineering (CADdoctor)

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What's New in the Latest Release?

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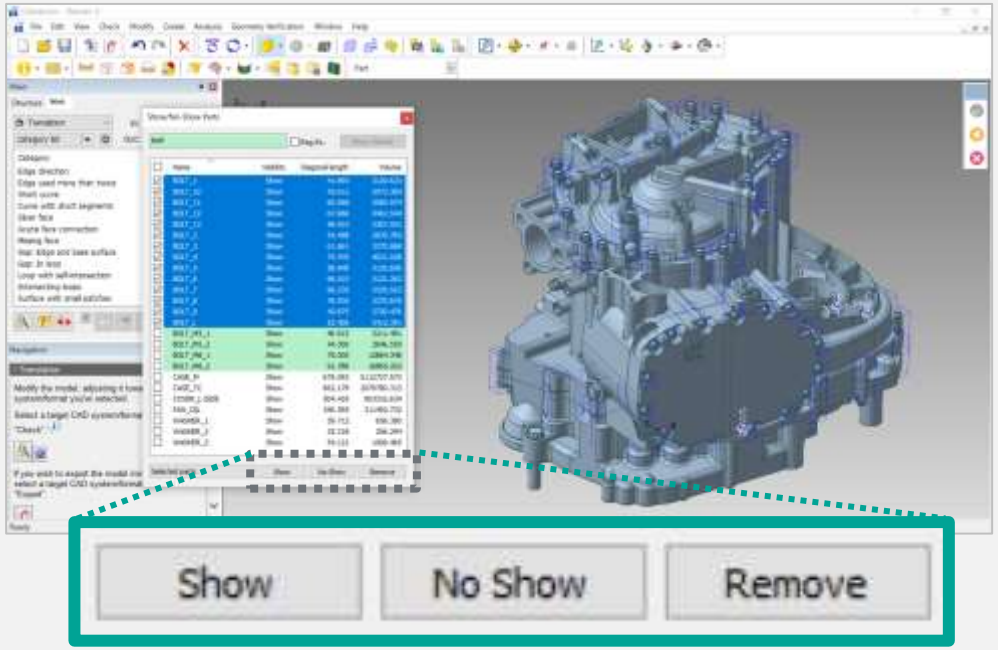
CADdoctor EX8.2 Enhancement

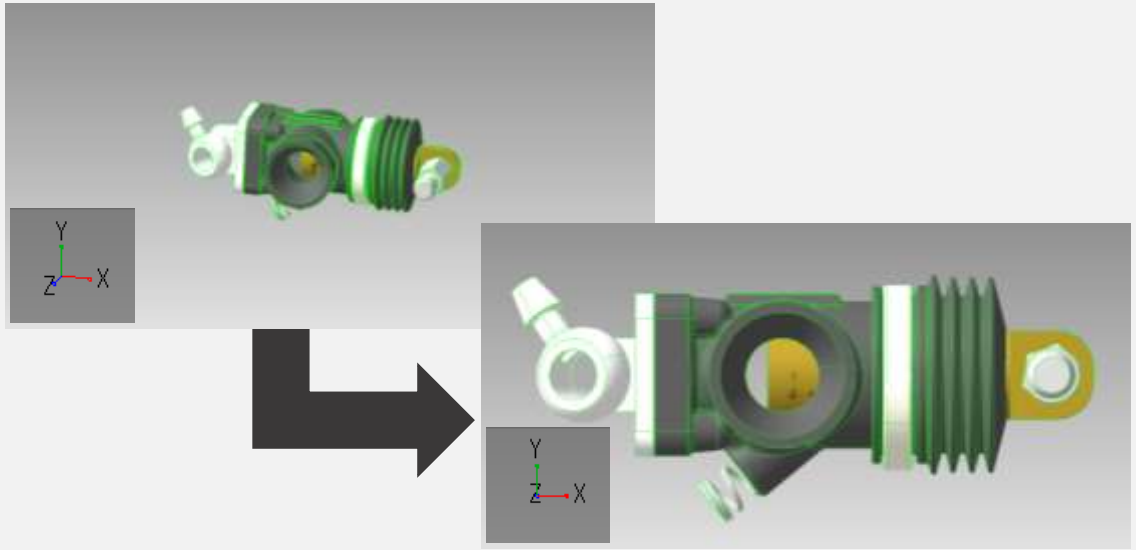
◆Part Searching Function

- Enabled to delete parts from the search dialog



◆"Snap to Axis" Function

- New viewing function
- Change the view direction to one of X, Y, Z axes closest to the current view direction



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Other Enhancements

Supporting the latest CAD versions

CAD	Supported CAD Versions
CATIA V5 Import	R7-R29 (V5-6R2019)
CATIA V4 Import	V4.2.1 – V4.2.5
NX Import	UG10 – NX 1872 Series
Creo Parametric Import	200i – Creo Parametric 6.0
Parasolid Import/Export	V7 – V32.0
ACIS Import	R6 – R29
STEP Import	AP203, AP214, AP242
JT Import	V6.4 – v10.5
IGES Import/Export	V5.2, V5.3

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APPENDIX

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APA CADdoctor & Elysium CADdoctor (1)

		APA CADdoctor	Elysium CADdoctor
Standard	PDQ Checking/Healing/Translation	✓	✓
Options	Geometry Simplification	✓	✓
	Reverse Engineering	✓	✓
	Mid-surface	✓	✓
	Geometry Verification	✓	✓
	Polygon Extension	✓	✓
	Deformation		✓
	Quality Check for Mold Manufacturing		✓
	Batch (for Multiple file conversion)		✓

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APA CADdoctor & Elysium CADdoctor (2)

APA CADdoctor

		Input	Output
Standard	IGES	✓	✓
	STL	✓	✓
Options	CATIA V5	✓	
	CATIA V4	✓	
	NX	✓	
	Creo	✓	
	I-deas		
	Parasolid	✓	✓
	ACIS	✓	
	STEP	✓	
	CADmeister		
	JT	✓	

Elysium CADdoctor

		Input	Output
Standard	IGES	✓	✓
	STL	✓	✓
Options	CATIA V5	✓	✓
	CATIA V4	✓	✓
	NX	✓	✓
	Creo	✓	✓
	I-deas	✓	✓
	Parasolid	✓	✓
	ACIS	✓	✓
	STEP	✓	✓
	CADmeister	✓	✓
	JT	✓	✓

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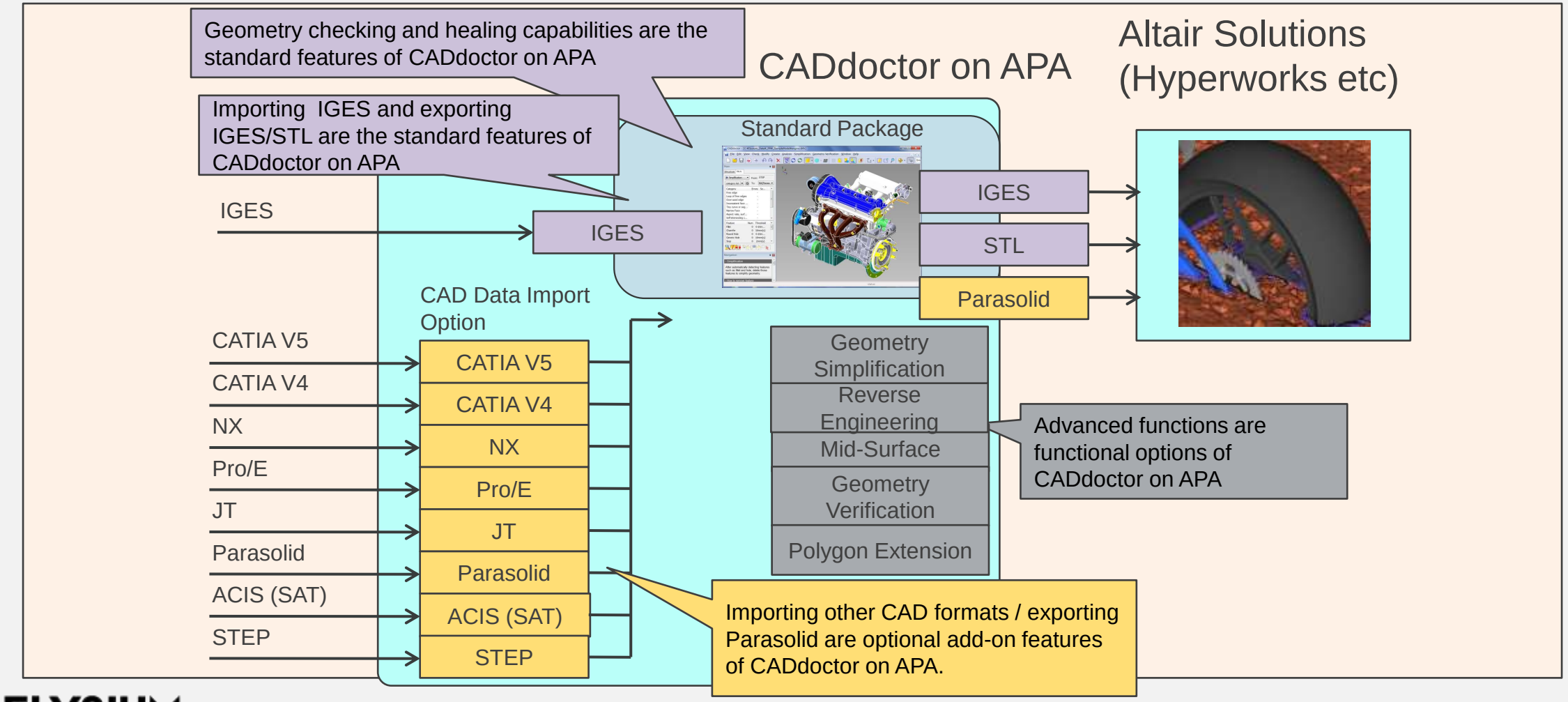
CADdoctor on APA Product Config.



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Each Module and HWUs

Standard Package

CADdoctor	30 HWUs (Windows)

Optimization Options

Geometry Simplification	28 HWUs (Windows)
Geometry Verification	12 HWUs (Windows)
Reverse Engineering	28 HWUs (Windows)
Polygon Extension	12 HWUs (Windows)
Mid-surface	28 HWUs (Windows)

Import/Export Options

CATIA V5 Import Add-on	10 HWUs (Windows)
CATIA V4 Import Add-on	10 HWUs (Windows)
Creo Import Add-on	10 HWUs (Windows)
Parasolid Import Add-on	10 HWUs (Windows)
ACIS Import Add-on	10 HWUs (Windows)
STEP Import Add-on	10 HWUs (Windows)
Parasolid Export Add-on	10 HWUs (Windows)

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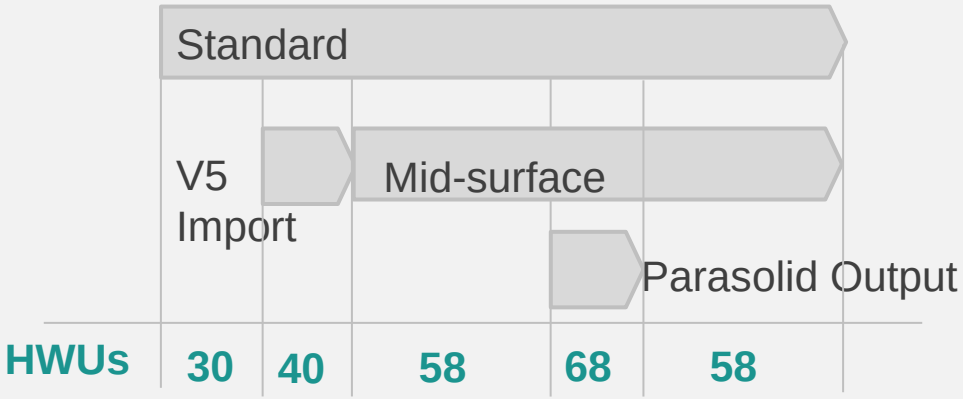
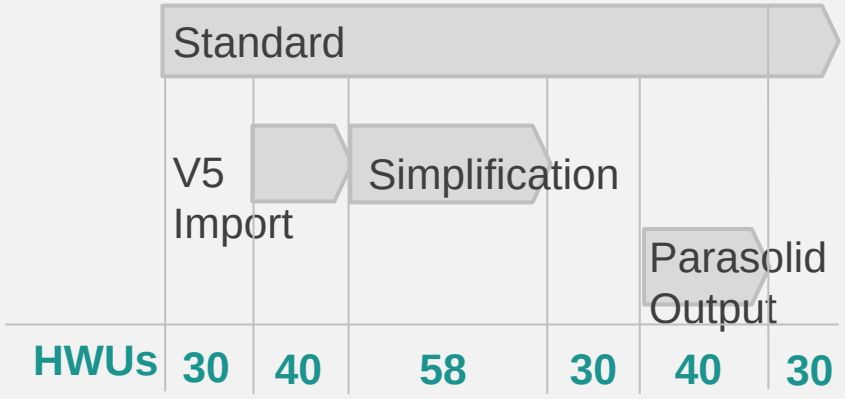
APA CADdoctor Unit Draw Behavior

■ **Case1**



1. Open CADdoctor
2. Import V5 file
3. Change to mid-surface mode
4. Create mid-surface
5. Export Parasolid file

■ **Case2**



1. Open CADdoctor
2. Import V5 file
3. Change to simplification mode
4. Simplify geometry
5. Change back to translation mode
6. Heal data for Parasolid
7. Export Parasolid file

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