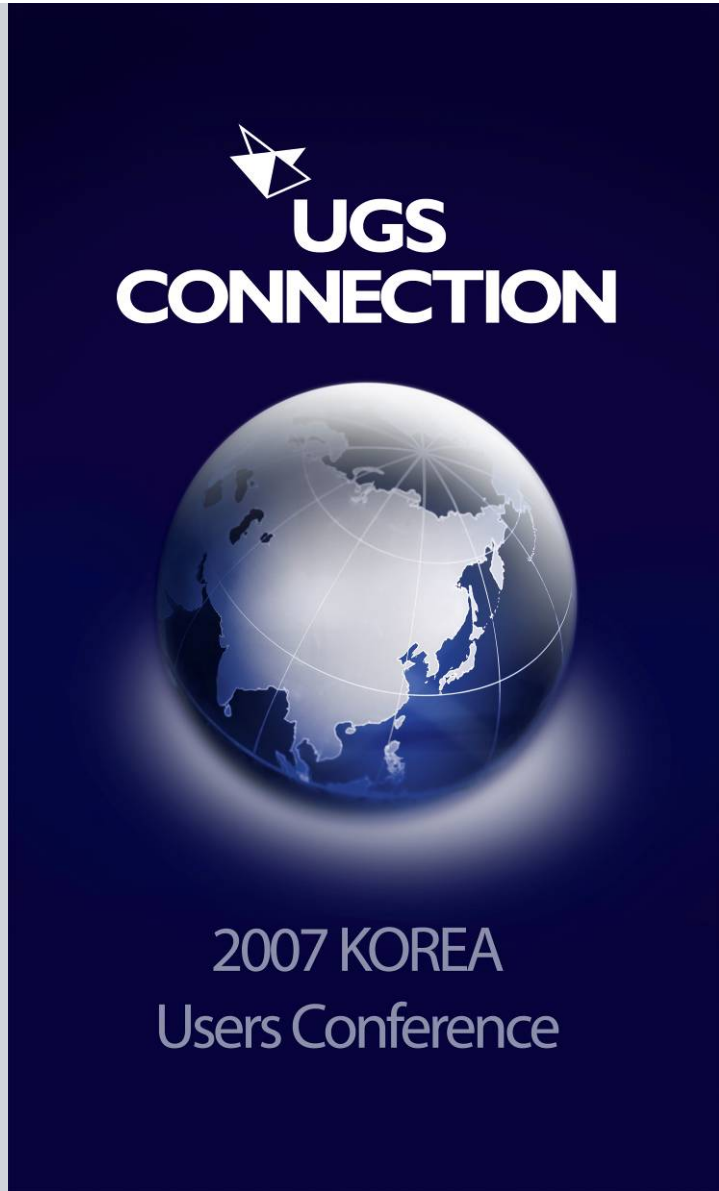
SIEMENS

Digital Simulation :

Vision and Strategy



박 재영
Siemens PLM Software

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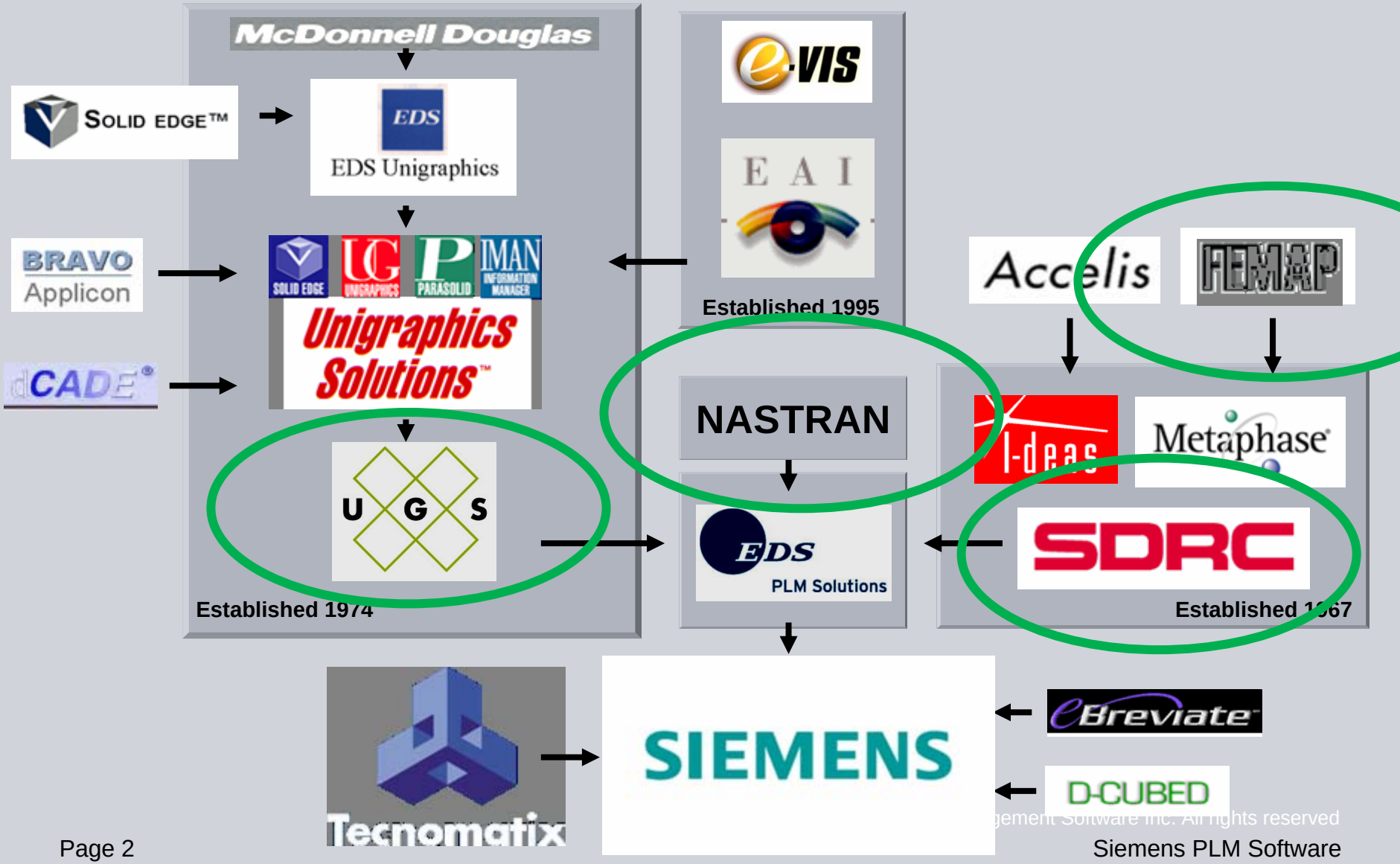
Company Evolution

SIEMENS



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NX 5 Simulation

SIEMENS

800 years of focused development built on 30 years of leadership

1967 1st Modal Analysis Package
1st Graphical FE Package

1970 1st NURBS Solid Modeler
Automatic Mesh Generation

1980 1st Commercial Enterprise Data Management System
Relational Engineering Database

1990 I-DEAS Master Series Introduced
1st Robotic Management

1995 Variational Equations
1st Virtual Commissioning

2001 SDRC and Unigraphics come together
Strategy "Combine the Best"

Bi-directional interoperability
Solver Component "NX Nastran"

2003 "Multi-CAD" CAE foundation
Nonlinear Solver Component

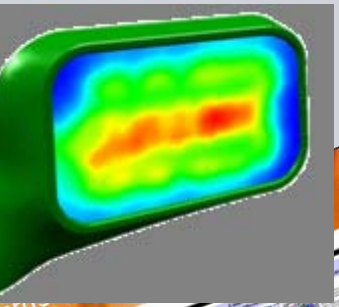
1ST Drag'n Drop Processe
Data Management Extensions

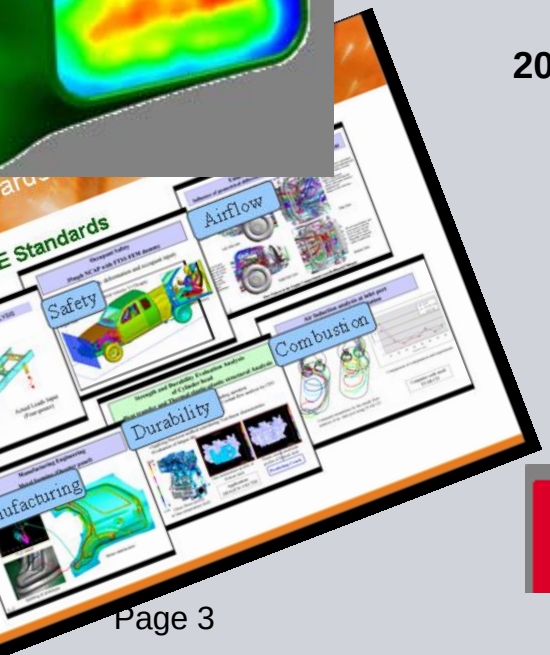
2004 **"NX Advanced Simulation"**
1st Production quality 3D Batch Mesher

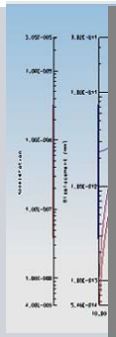
2005 **Multi-physics solvers**
"Visualization" Plug-ins

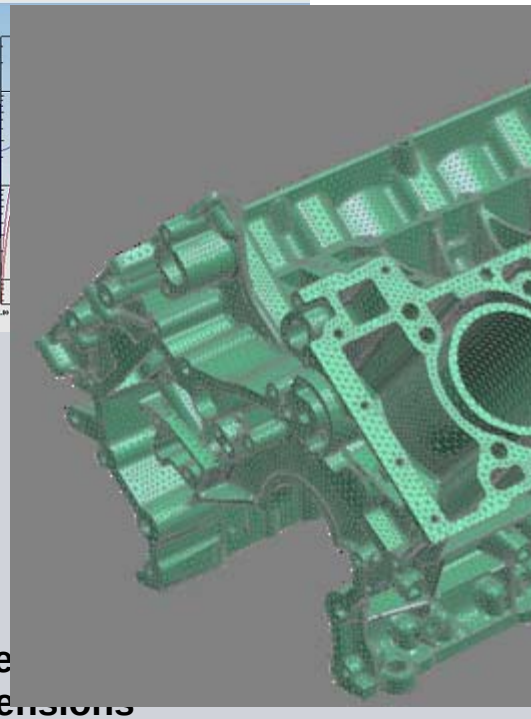
Teamcenter for Simulation

2006 **Lifecycle Simulation**









NX

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Vision

Digital Lifecycle Simulation

SIEMENS

Vision

Digital Lifecycle Simulation

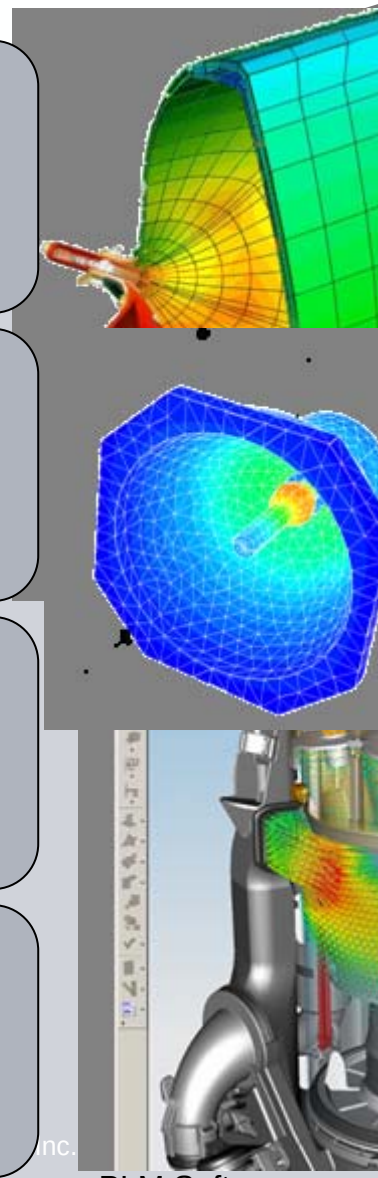
SIEMENS

Real-time — **In time to impact design**

Visual — **Productivity**

Managed — **Integrated with the World's best data management solution**

Open — **Protecting Customer Value**



Digital Lifecycle Simulation

Competitive Strengths

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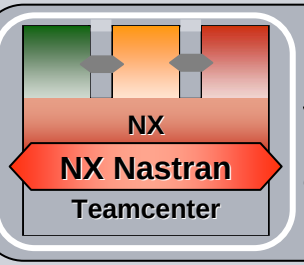
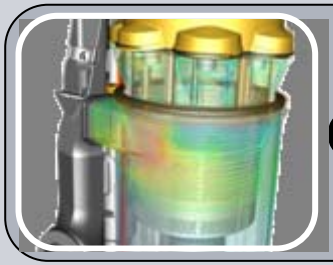
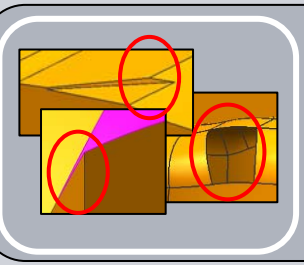


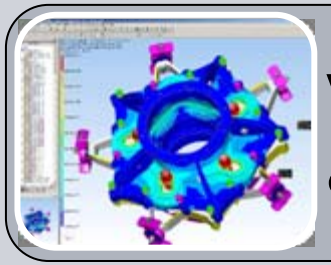
Scalability & Consistency



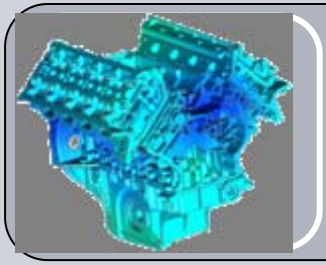
Open Integration



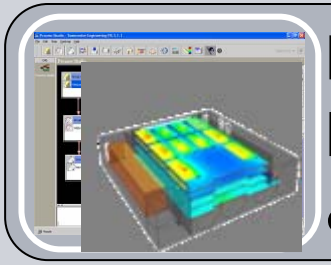
Intelligent Model Generation



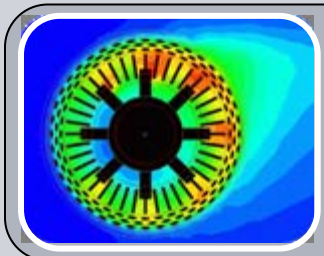
Visualization & Collaboration



Industrial Strength Productivity



Reusable Processes & Knowledge

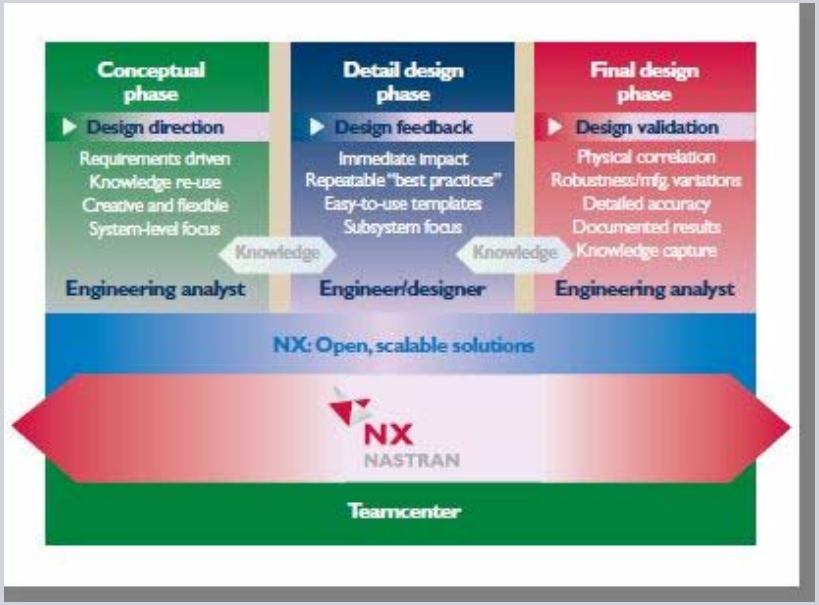


Multi-Physics, Multi-Disciplinary

Simulation Process Management

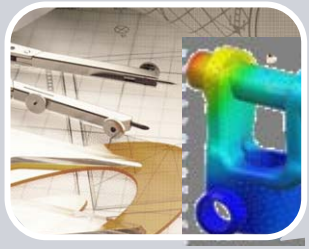
Scalability and Consistency

SIEMENS



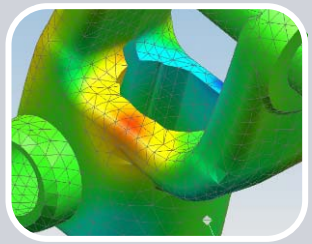
Common tools for all users

- Enable collaboration and re-use
- Break down barriers
- Increase quality
- Promote trust
- Lower risk



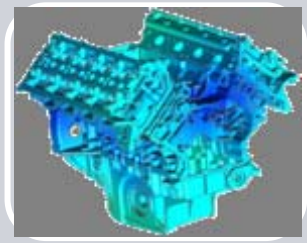
Best Practice Wizards

Extends the value of simulation to new and infrequent users



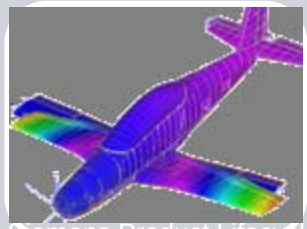
NX Design Simulation
NX Motion Simulation

Ask “what-if” and compare your options in the design process



NX Advanced Simulation

Intelligent model generation, industrial strength productivity, multi-physics, multi-disciplinary



NX Nastran

A global standard for evaluating the structural adequacy & performance of complex mechanical systems

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Intelligent Model Generation

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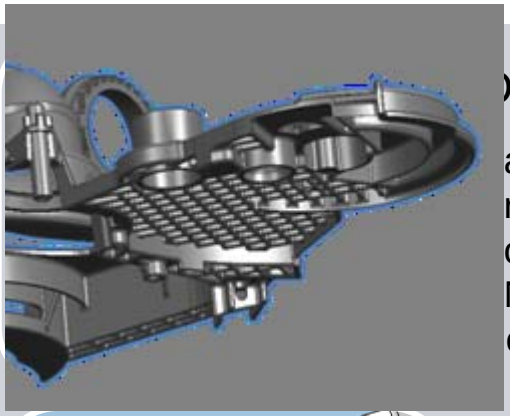
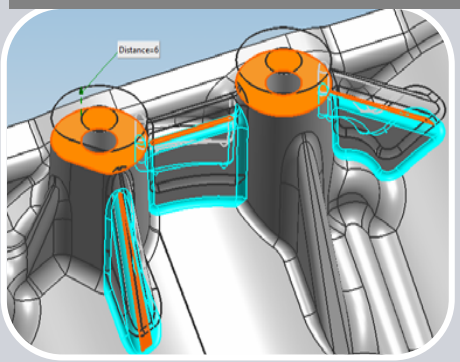


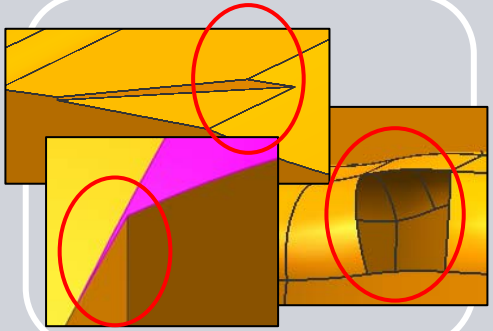
)ata Accessibility

araSolid, Step, IGES, STL,
roE, CATIA V4 & CATIA V5,
olidWorks, Autodesk,
NSYS, ABAQUS, Nastran,
ecurDyn, Adams, …



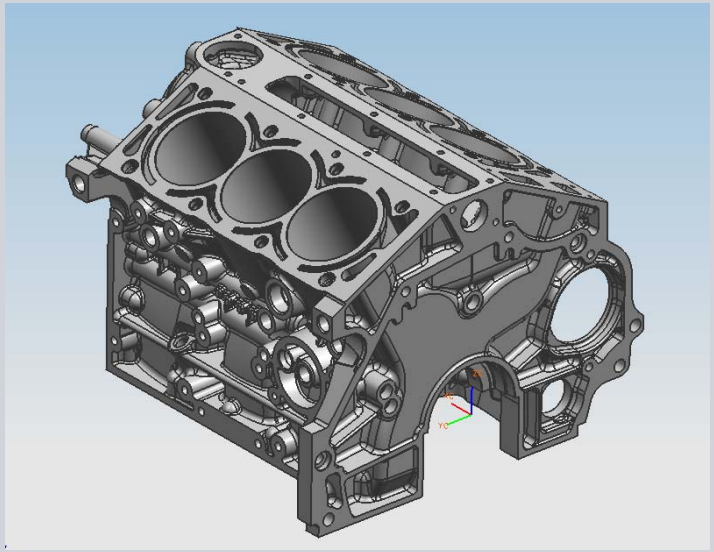
Revision Management

Geometry creation, change and update management, built-in knowledge engine, best practices, automation, validation & customization



Power Tools

Rapid geometry cleanup /repair, feature suppression /modification, topology evaluation /abstraction, CAE topology - automation and control



- **Geometry capabilities are core differentiators**
  - **Drive productivity in a multi-CAD world**
  - **Important to design process efficiency**

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NX 5.0.0.21 - Modeling - [140-f40001_2.prt in Assembly NX_5_Launch_Assembly.prt (I)]

File Edit View Insert Format Tools KBE Assemblies Information Analysis Preferences Window Help

Start

No Selection Filter

Select objects and use MB3, or double-click an object

Part Navigator

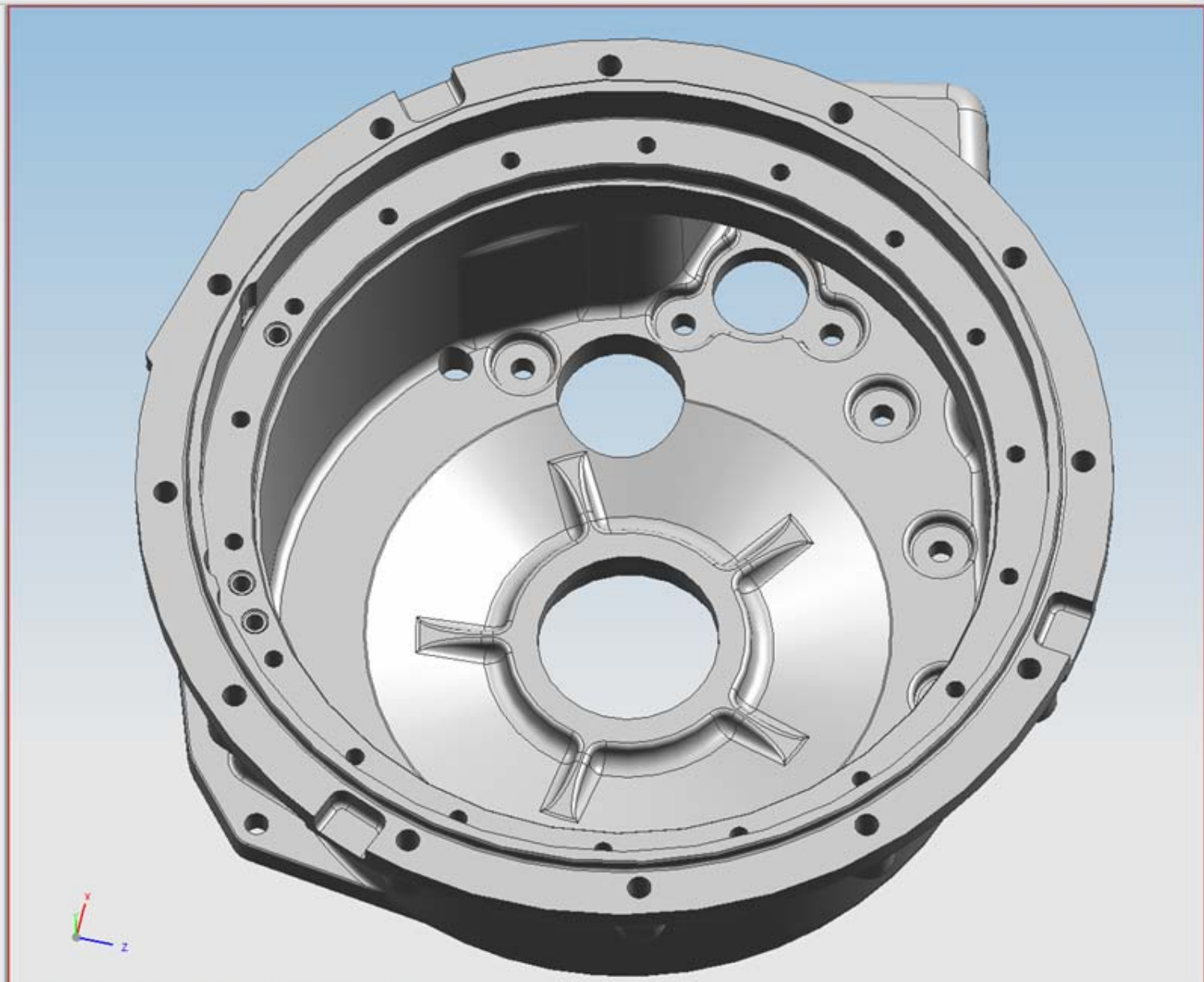
Name | Laye

- Model Views
- Model History
  - Body (0) 1
- Cameras

Dependencies

Details

Preview



NX CAE Topology

– Geometric Abstraction and Meshing

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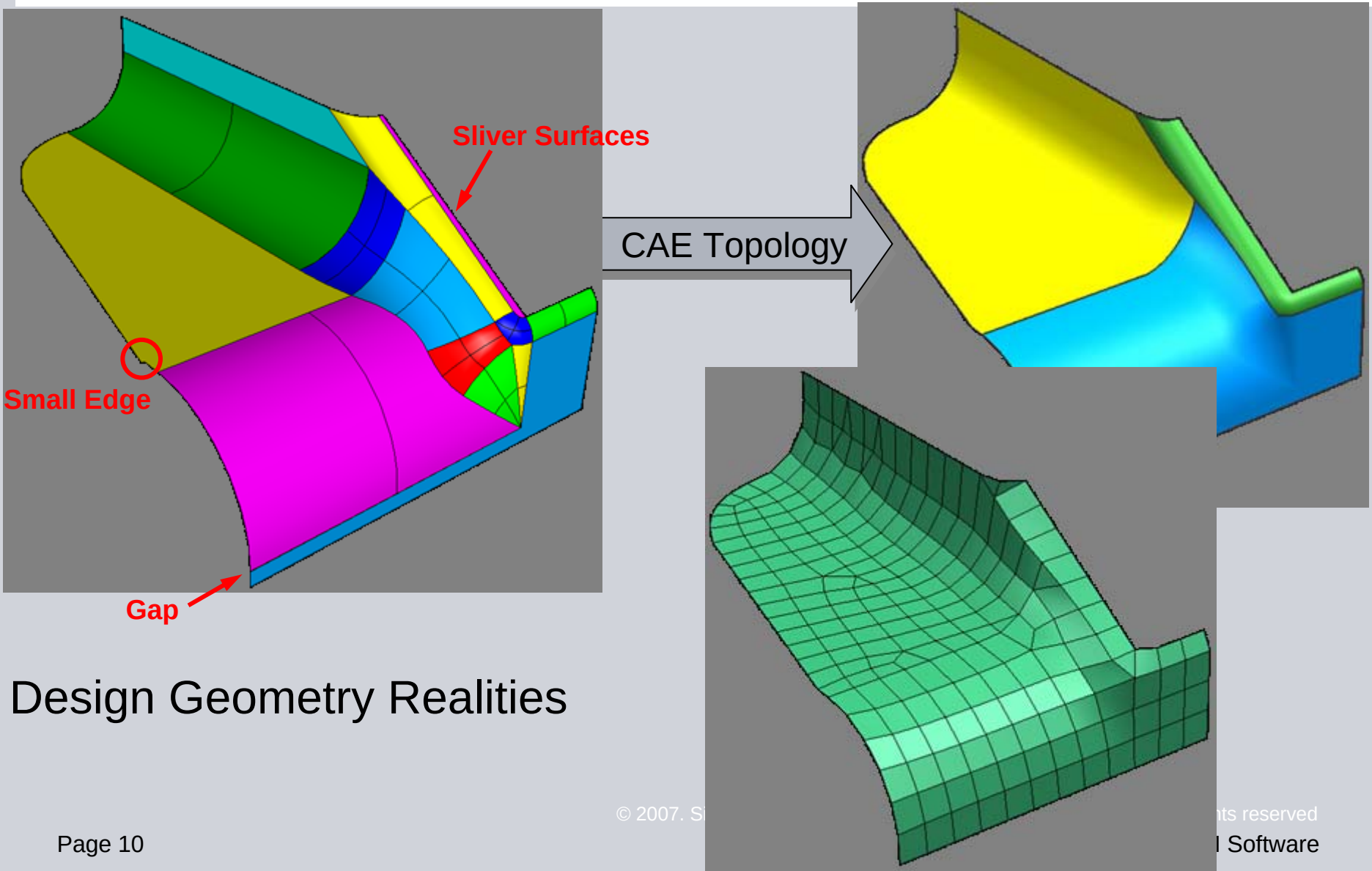

Design Geometry Realities

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Industrial Strength Productivity

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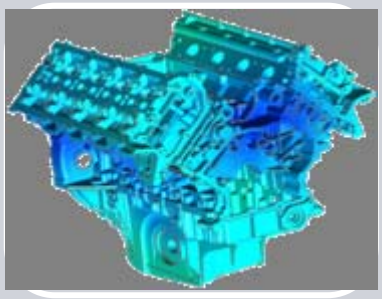
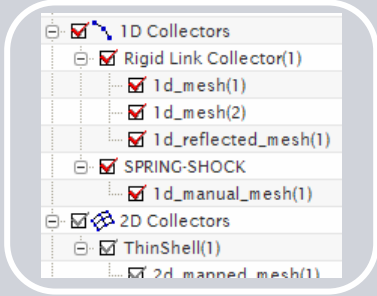


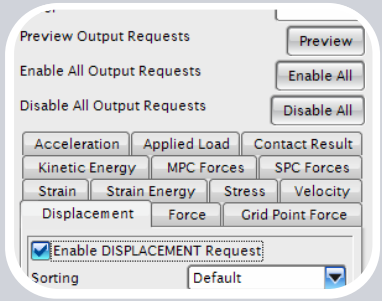
Large Complex Models

- 50,040 surfaces
- 5,193,616 elements
- 8,498,750 nodes
- ~ 25.5 MDOF



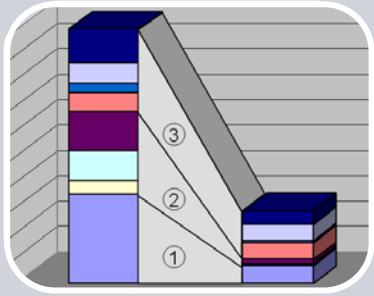
Model Management

Multi-site collaboration, common settings for solutions, solver and solution dependant, visible model organization, standards and best practices…



In-Depth Analysis Toolset

Batch and interactive mesh generation, mesh append & mating, loads, constraints, material libraries, composites..

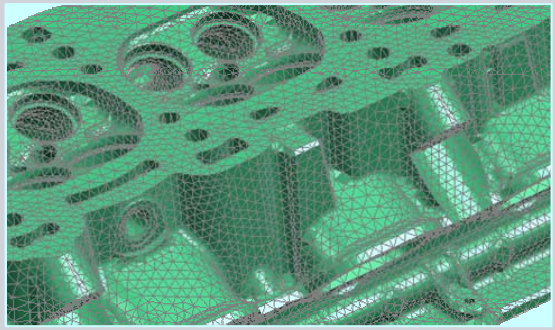


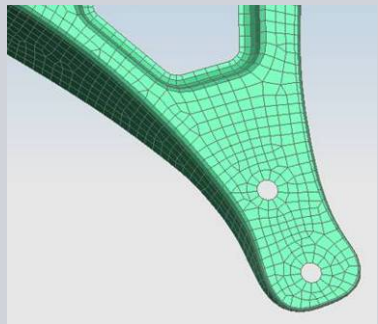
Unique Advantages

Leverages the entire NX portfolio, reporting tools, Knowledge language and tools, geometry tools, and more…

Evaluation and Reporting

Fast easy access to results, comprehensive graphing functionality, simple and complex results





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"ANSYS Environment"

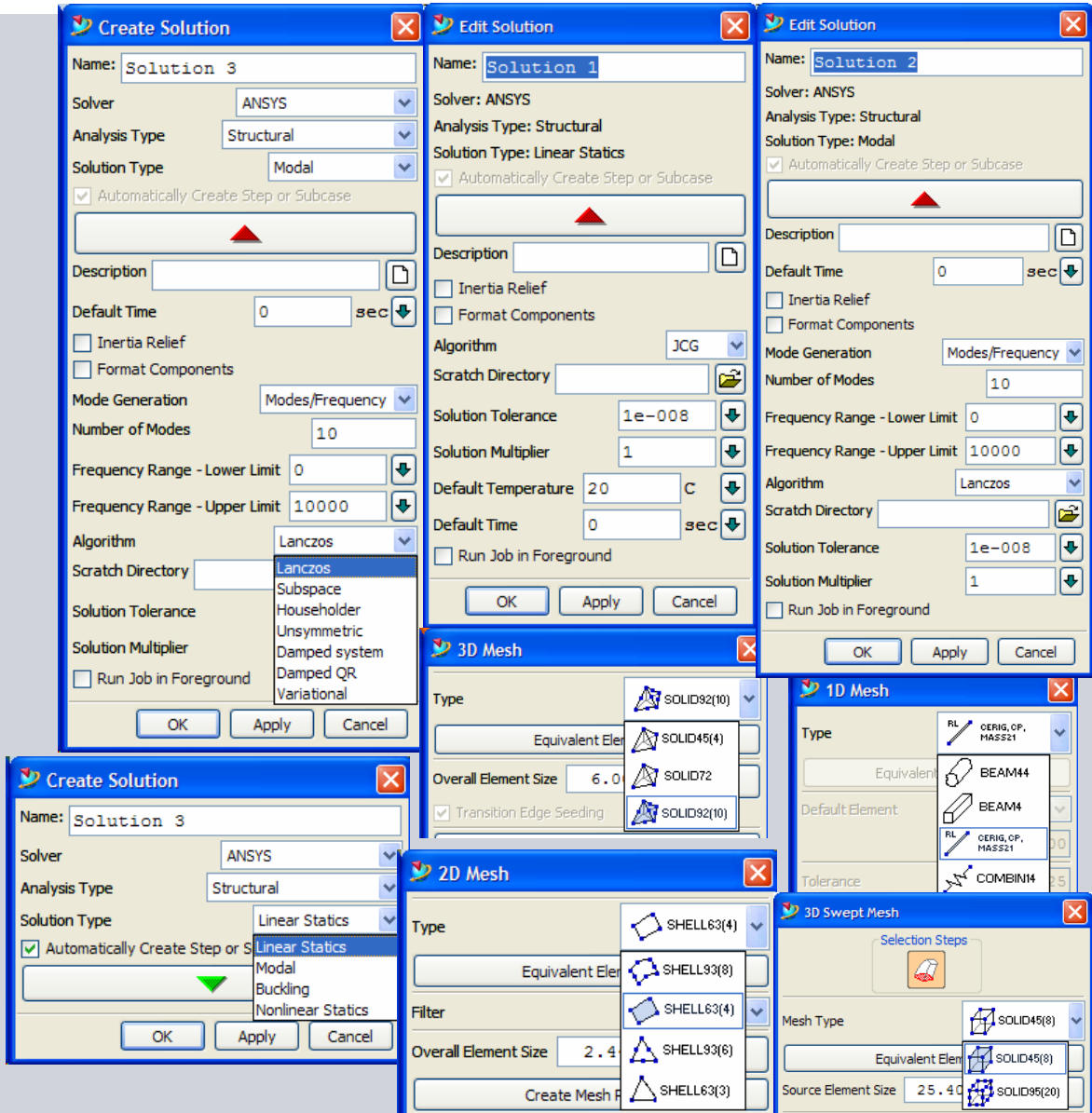
– UI Based on Solver/Solution

SIEMENS

- Selected at FEM part file creation
  - Mesh creation
- Selected at Solution creation in SIM part
  - Solution creation and editing
  - Defines Sub-Case options

Benefits

- ▶User interface words are familiar
- ▶Elements, Loads, Boundary Conditions etc are all in the words of the selected Solver



Driving multi-week processes to single day turnaround…

SIEMENS

Automated meshing techniques **~6 hours**

- Large model creation in NX CAE

Rapid Glue Connection ~0.5 hours

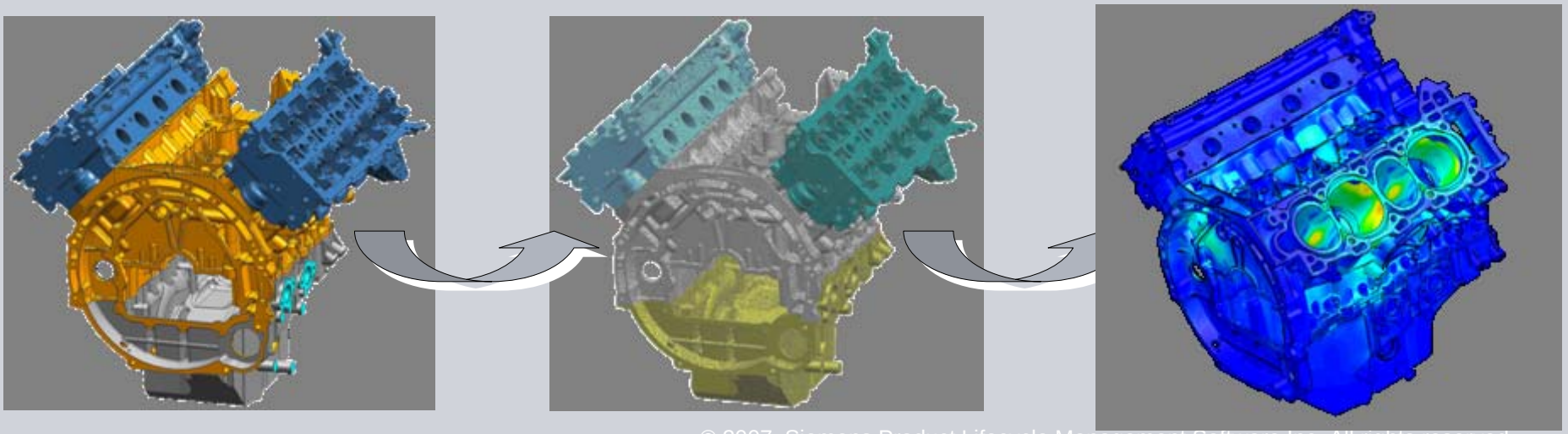
- NX CAE & NX Nastran

NX Nastran solve ~2 hours

- Stiffness analysis – linear static's

Results Review 2-3 minutes

50,040 Surfaces
5,193,616 Elements
8,498,750 Nodes
~ 25.5 MDOF



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NX Batch Meshing

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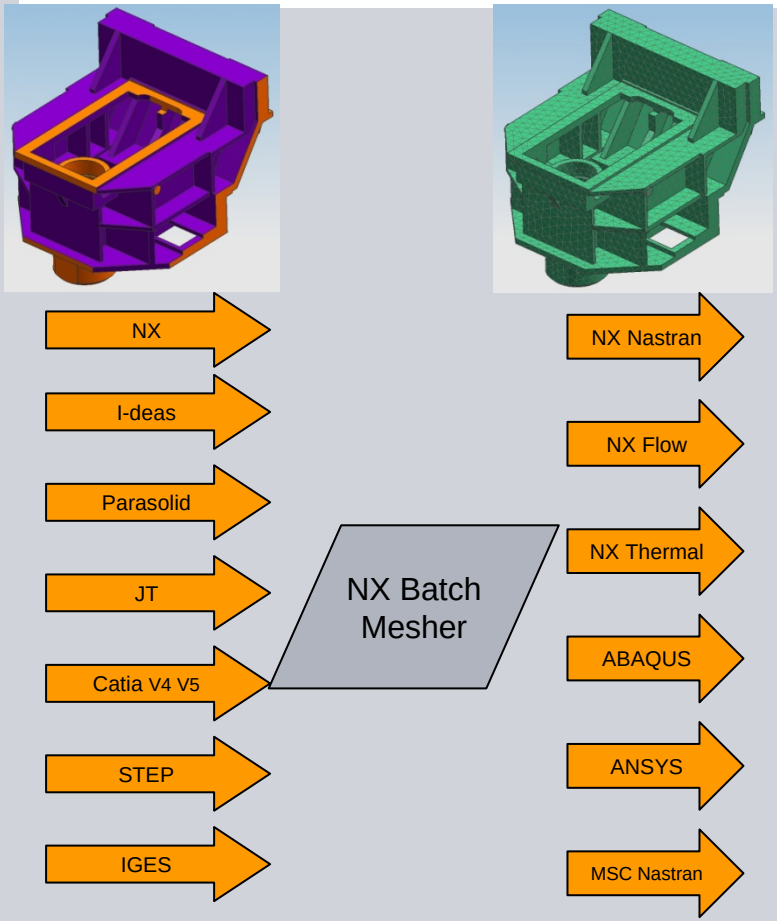
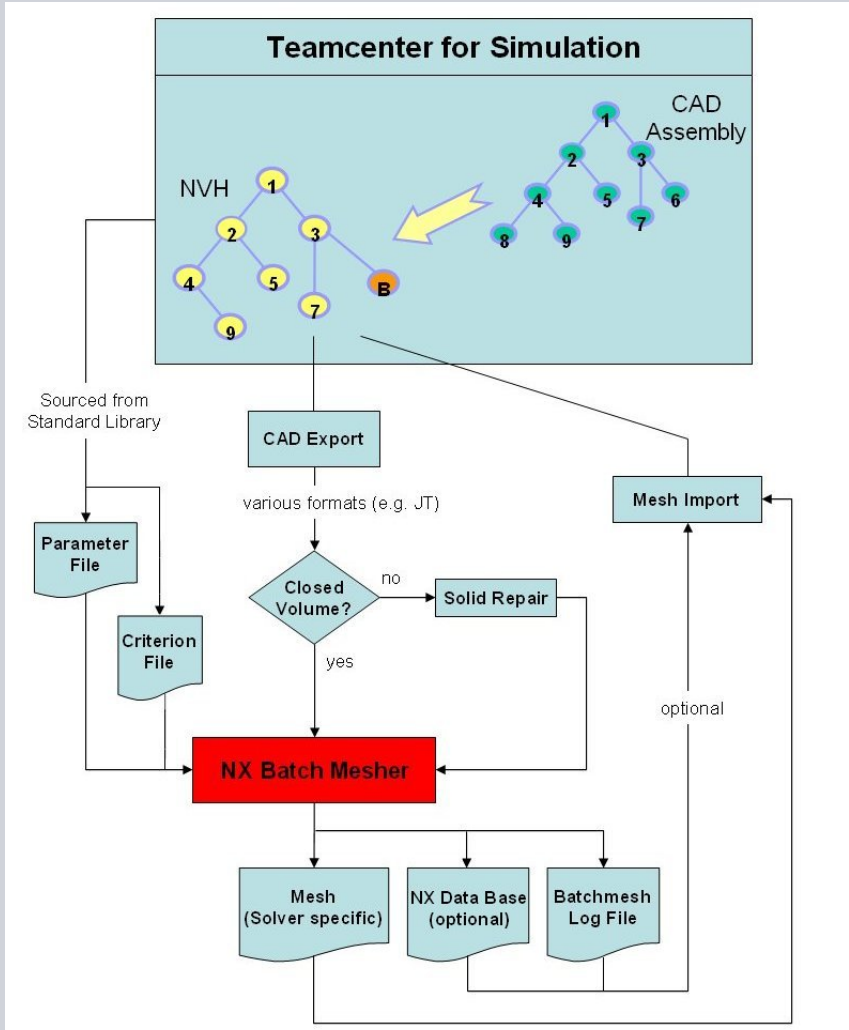


File List or PLM Product Structure Driven



NX Batch Mesher is designed for an easy interaction with a load balancing software e.g. Platform LSF (http://www.platform.com)

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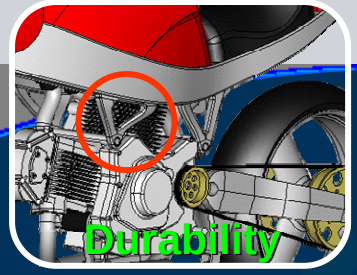
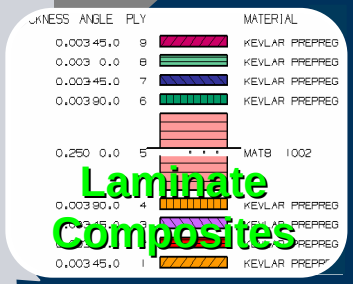
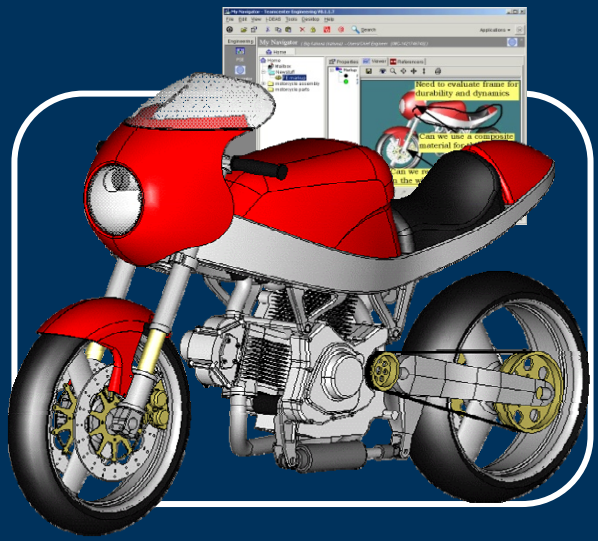
Digital Lifecycle Simulation

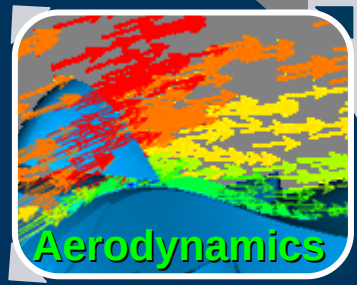
Multi-Physics, Multi-Disciplinary

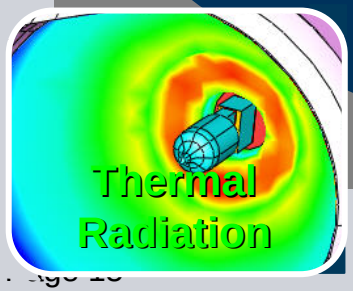
SIEMENS

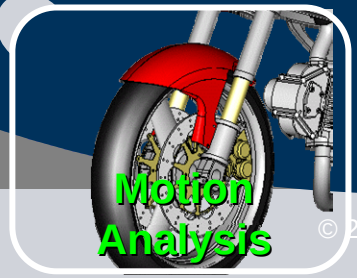


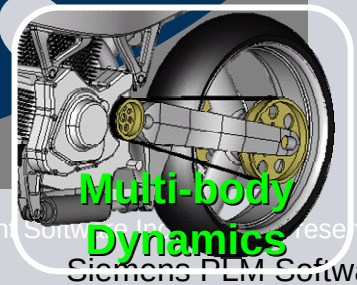












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NX 5 - Motion Simulation - [(Simulation) motion_1.sim (Modified)]

File Edit View Insert Format Tools Assemblies Information Analysis Preferences Help

Start

No Selection Filter

Select Animation function

ugsc

Open...

Animation

Slider Mode Time (seconds)

.000

.000 1.000

Play

Animation Delay

0

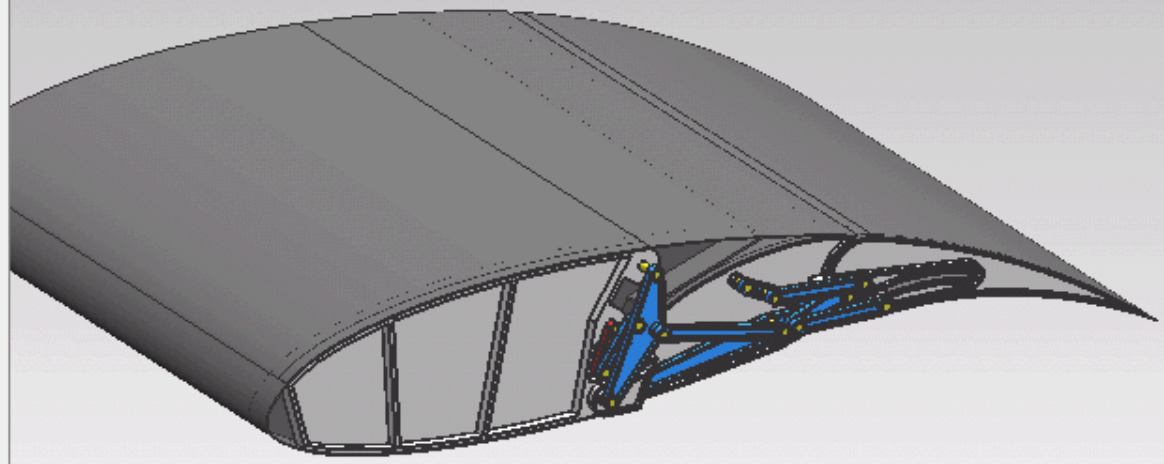
0 1000

Play Mode

List Measurements

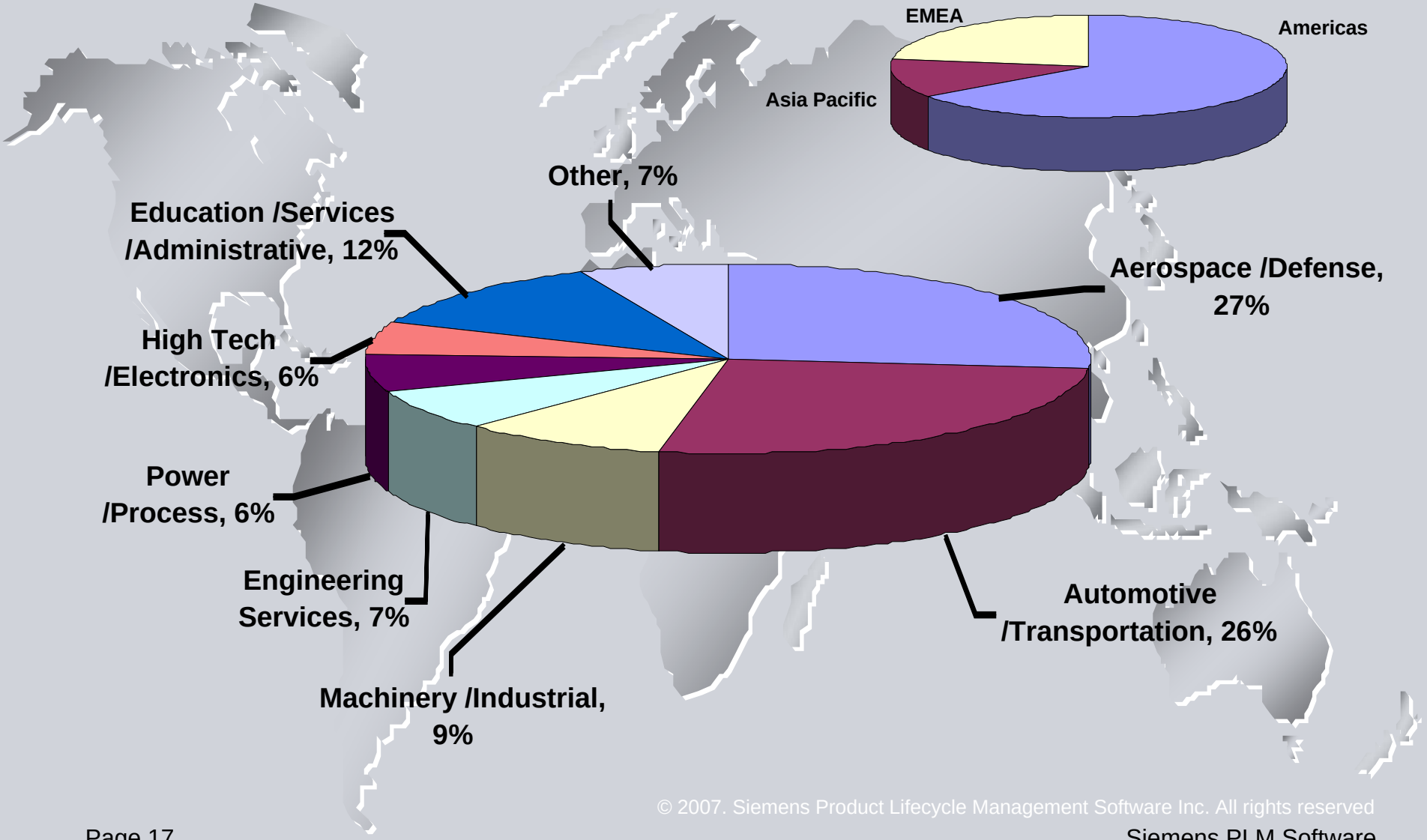
List Interferences

OK Cancel



NX Nastran – Worldwide Installations

SIEMENS



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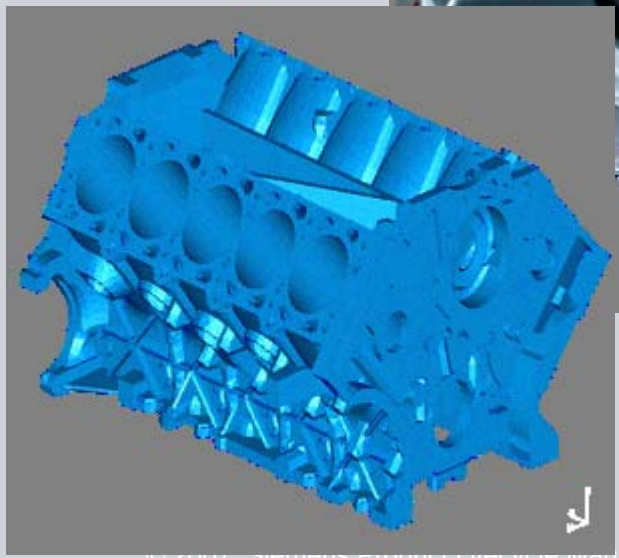
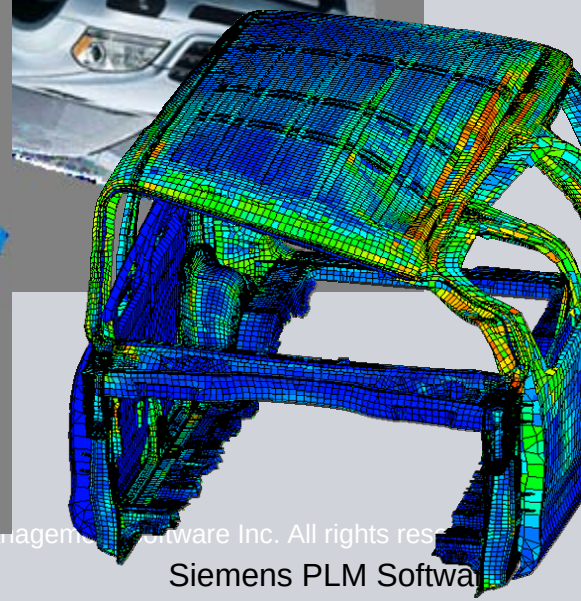
NX Nastran In Automotive

SIEMENS

- Bendix Braking Systems
- Caterpillar Tractor
- Daimler Chrysler (Mercedes)
- Freightliner
- Isuzu Motors
- Material Science Corp
- Matra Automotive
- Nissan - Japan
- Nissan R&D- USA
- Tata Daewoo
- Toyota
- Yokohama Rubber





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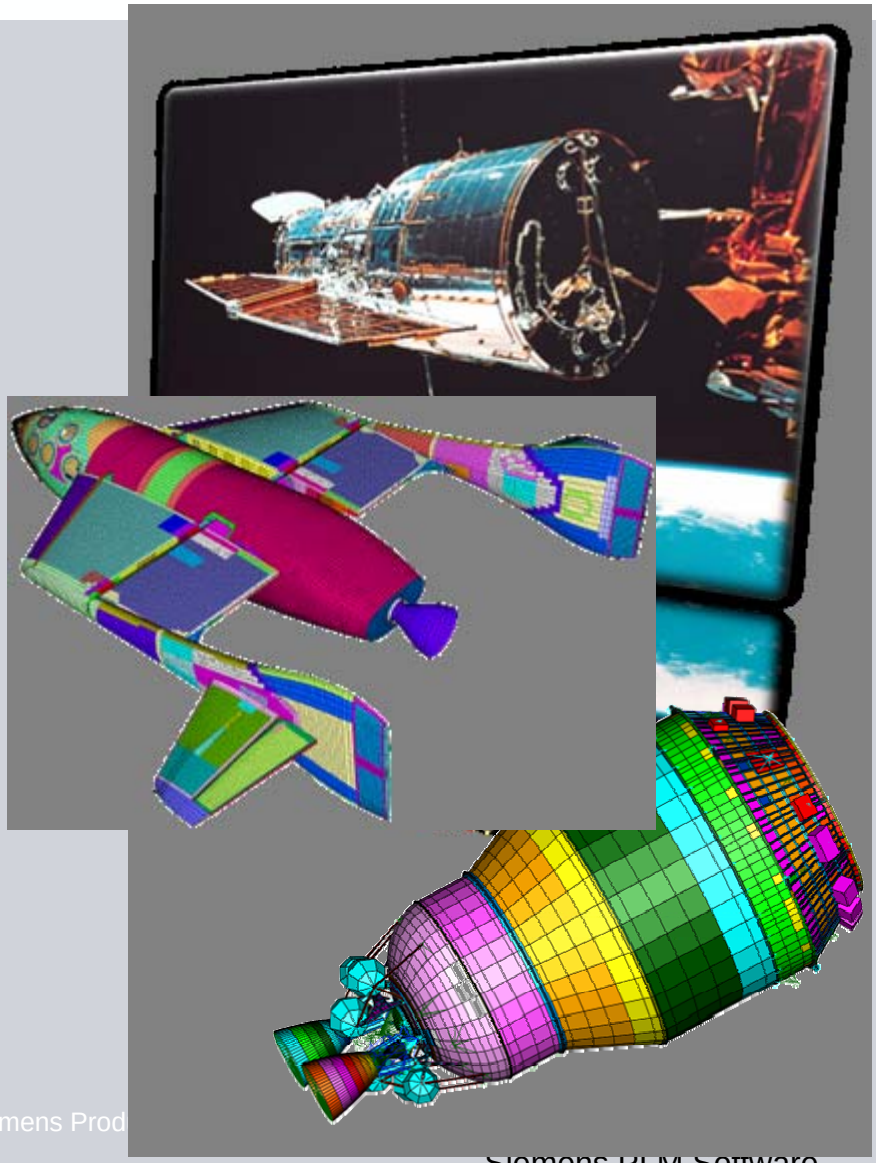
NX Nastran In Aerospace

SIEMENS

- Airbus
- Alcatel Space Valence
- Alliant Techsystems (Thiokol)
- EADS
- Honeywell Aerospace
- Liebherr Space
- Lockheed-Martin
  - Space Systems
  - Orlando & Baltimore
  - EPI
  - Aeronautics
- NASA Marshall
- Northrop Grumman Space Systems
- Orbital Sciences Corporation
- Oxford Automotive
- Pratt & Whitney Rocketdyne
- Raytheon - Space Systems
- Space Exploration Technologies



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NX Nastran In Electronics/Consumer /Industrial

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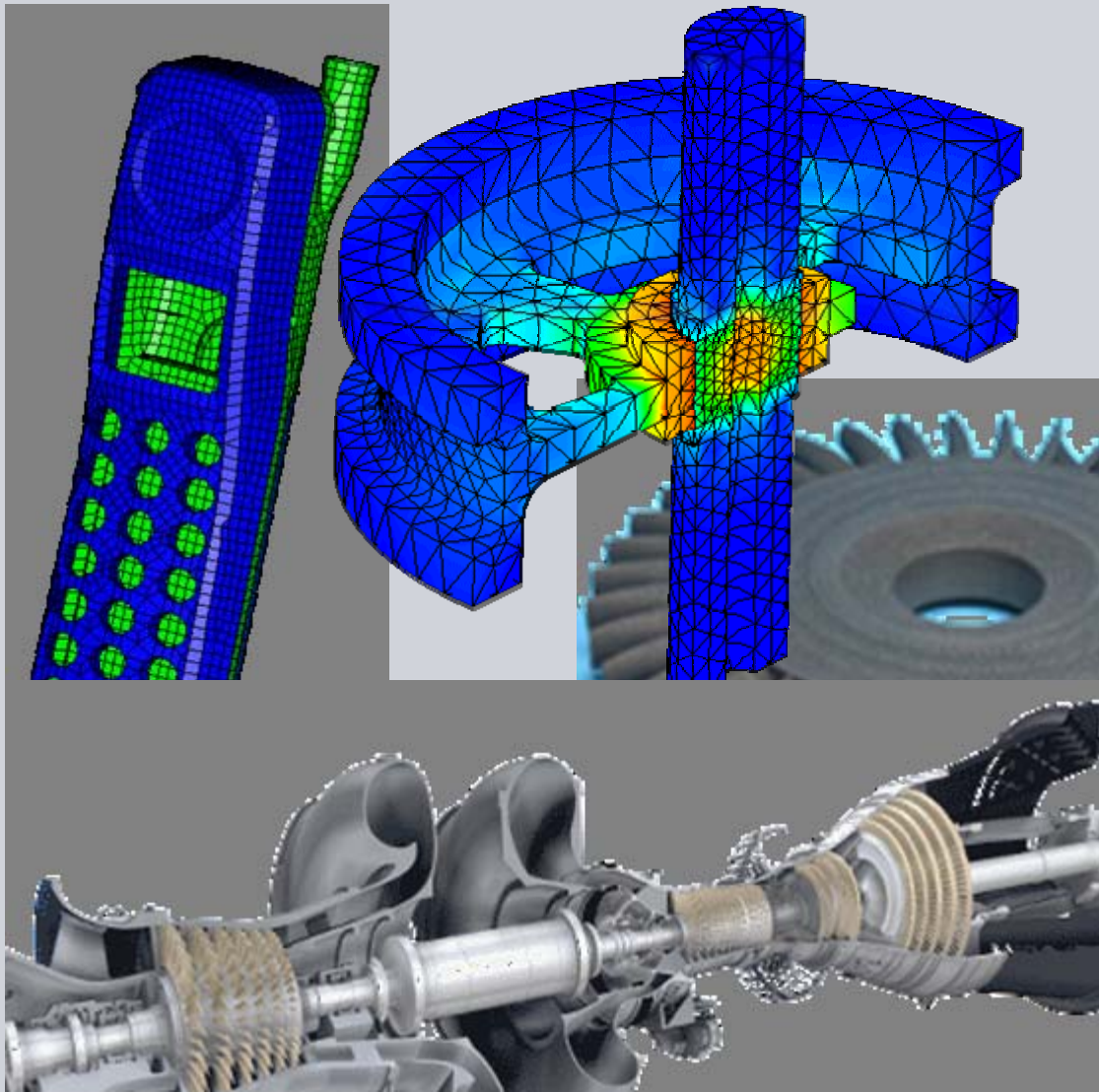
- Canon
- Cilas
- Crompton Greaves
- DevoTek
- Dongbo Co.
- GE Energy
- General Aluminum
- Harris Corp
- Ivis Inc
- Kress Corp
- Metso Paper
- Mitsumi Electric
- Ontario Power
- Rolls Royce Marine
- Shanghai Electronics
- SSG Optronics
- Vorwerk Elektrowerke

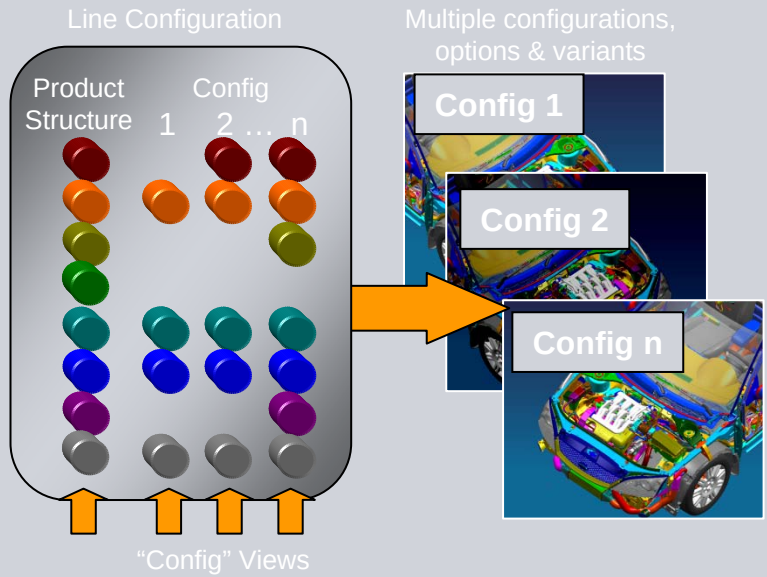


Managed Simulation

"Efficiency, Confidence and Speed"

SIEMENS

- Capture and re-use knowledge
  - Single source of product and process knowledge
- Manage simulation data and workflows
  - Integrated Process Workflow & Program Execution
- Handle the increasing variety of product data
  - Modularization and Re-use



"you can trust the data is right and the analysis is indicative of the performance"

Teamcenter Proven Global Leadership

SIEMENS

"2005 Technology of the Year"

"2006 Design Breakthrough Award"

"2006 Best PLM System for Process R&D and Manufacturing"

- **More companies trust UGS to manage product knowledge** than the next 3 competitors combined
  - 3,000,000 licenses – 7X the closest competitor
- **Customers have confidence in UGS** to protect their product lifecycle management investments
  - UGS' top 100 customers – avg. of 17 years
  - Most S/W companies haven't even been in business that long.
- **Teamcenter 2005 marks a major milestone in the evolution of the Teamcenter unified architecture**
  - Support for key PLM initiatives
  - Natural evolution of architecture & applications

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What does that mean for an Analyst ?

– Users Perspective

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Teamcenter inside NX

- New file templates
- Manual edits of input decks
- Multiple Result files
- Save and Open as usual

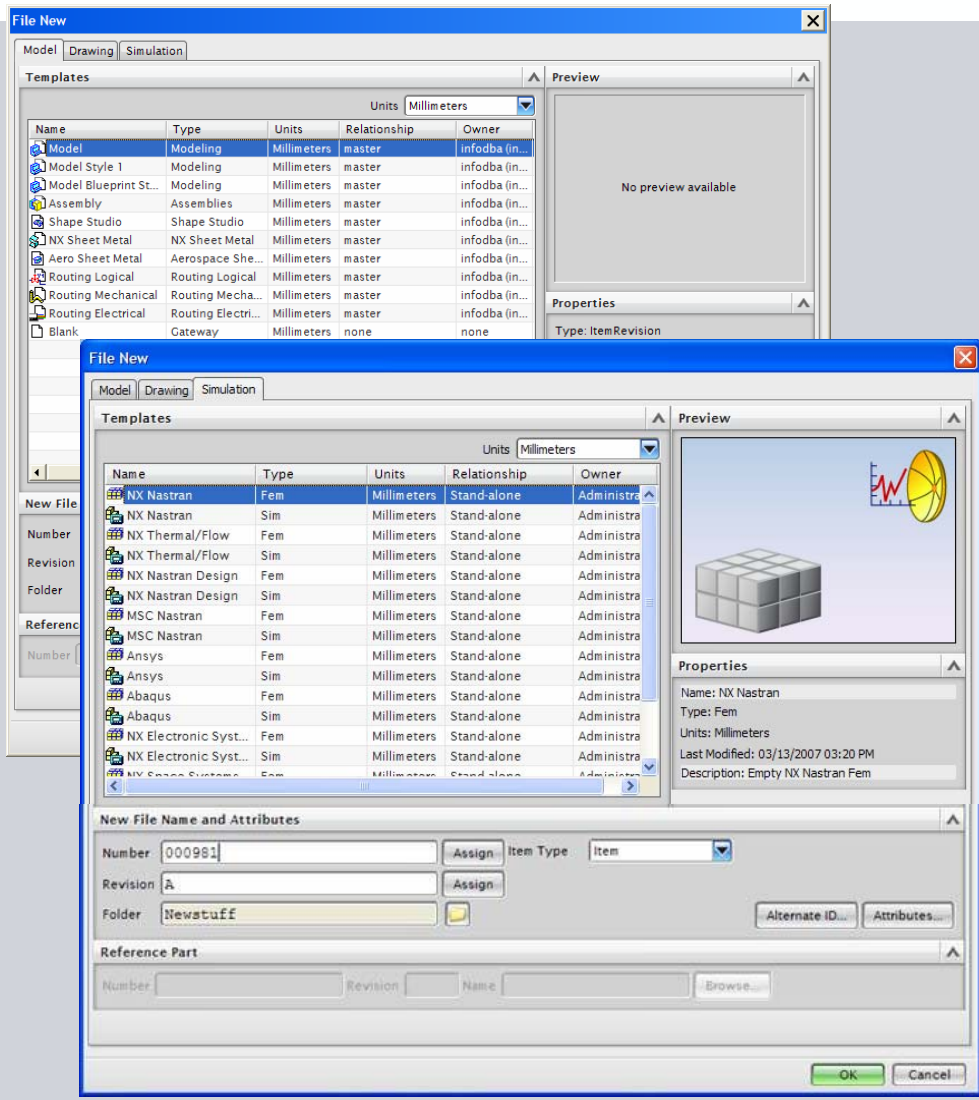
Get the whole job done

- Manual tasks still available
- Import of external data

Result and aux file storage optional

Default “Work in Progress” state

- Multiple iterations
- Release control



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What does this mean for management ?

– Management Perspective

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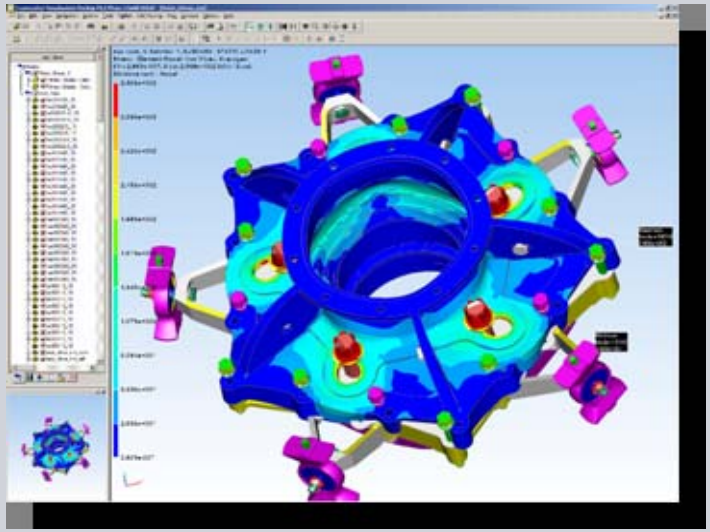
Access to all stored data

- Repeatable
- Comparison studies
- Reports
- Visualization data



Audit trail support

Development trail

Link to Product Structure

- Analysis of “As-Designed” versus “As-Built”

Communication

- Where are we on the schedule

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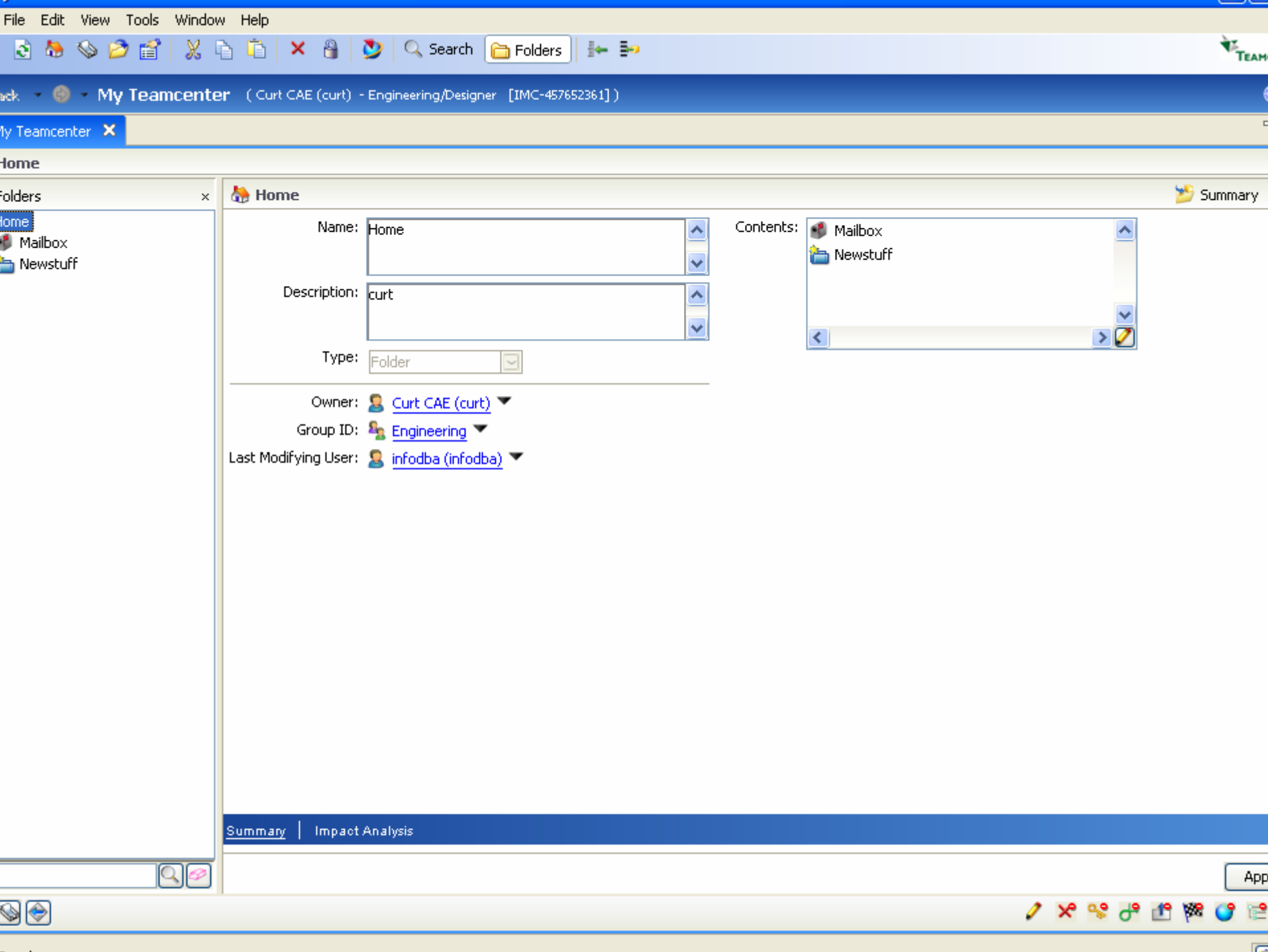
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My Teamcenter (Curt CAE (curt) - Engineering/Designer [IMC-457652361])
My Teamcenter
Home
Folders
Home
Mailbox
Newstuff
Home
Summary
Name: Home
Description: curt
Type: Folder
Contents: Mailbox Newstuff
Owner: Curt CAE (curt)
Group ID: Engineering
Last Modifying User: infodba (infodba)
Summary | Impact Analysis

Vision

Digital Lifecycle Simulation

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Thank You

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