

NX Connection

NX Simulation for Design Engineers

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Product Manager, NX Simulation Pre/Post

**Siemens
PLM Connection**



Americas 2008

PLM Software

Answers for industry.

SIEMENS

Agenda

NX Simulation – Vision, Heritage and Scalability / Consistency

NX Stress Wizard & NX Vibration Wizard

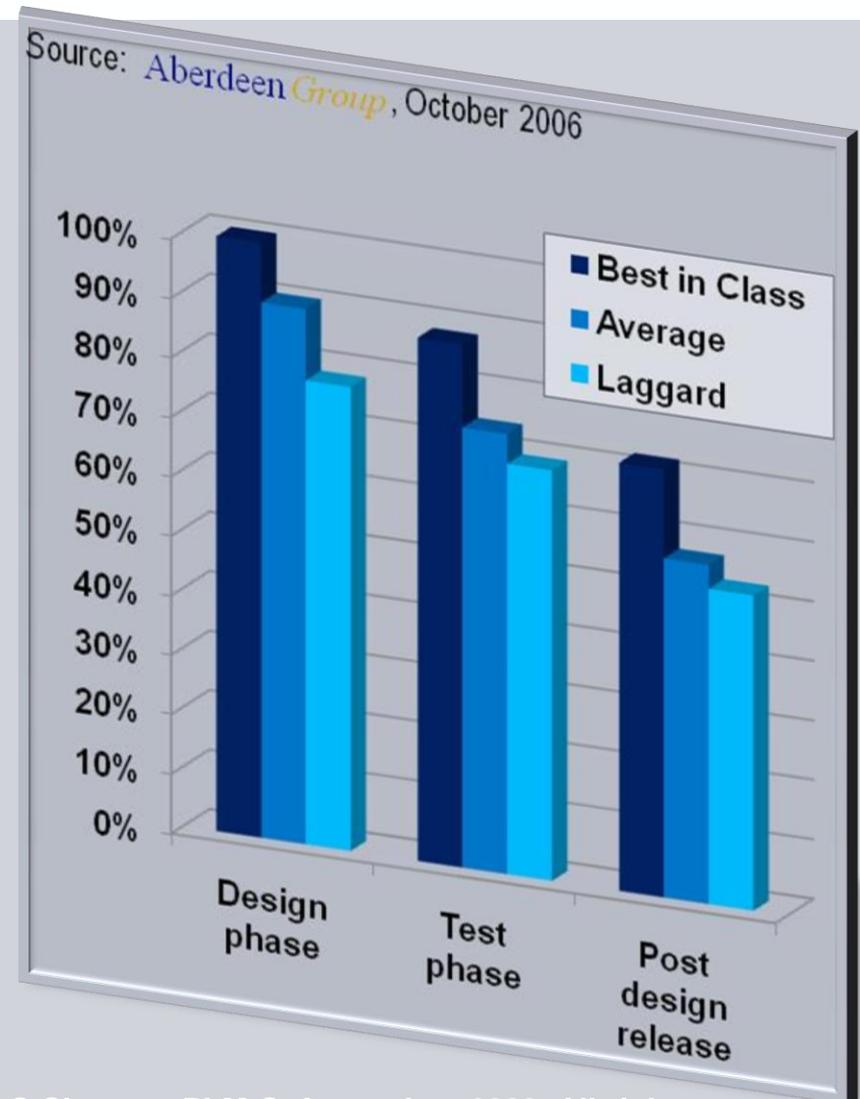
NX Design Simulation

Example

Best in Class Perform More Simulations

Simulation allows companies to Evaluate and optimize product performance virtually.

- Evaluate more ideas and improve the best
- Speed-up development
- Avoid costly redesigns and reduce warranty exposure
- Reduce development costs



NX Simulation Vision & Objectives

Vision

- To make simulation pervasive throughout the product lifecycle in order to design in Quality and drive Product Innovation

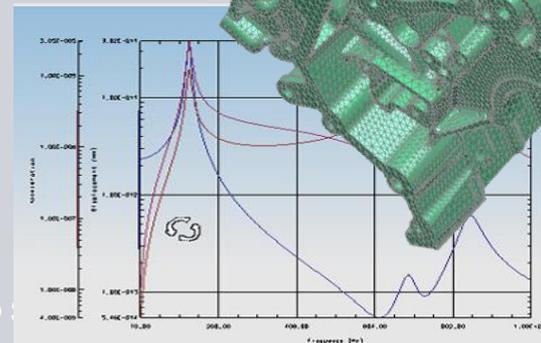
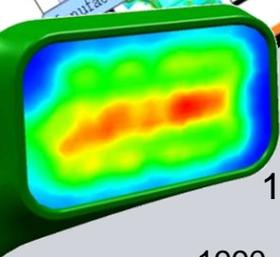
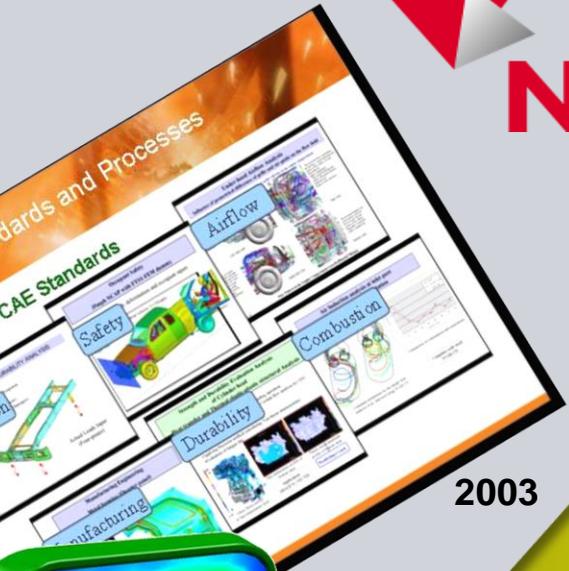
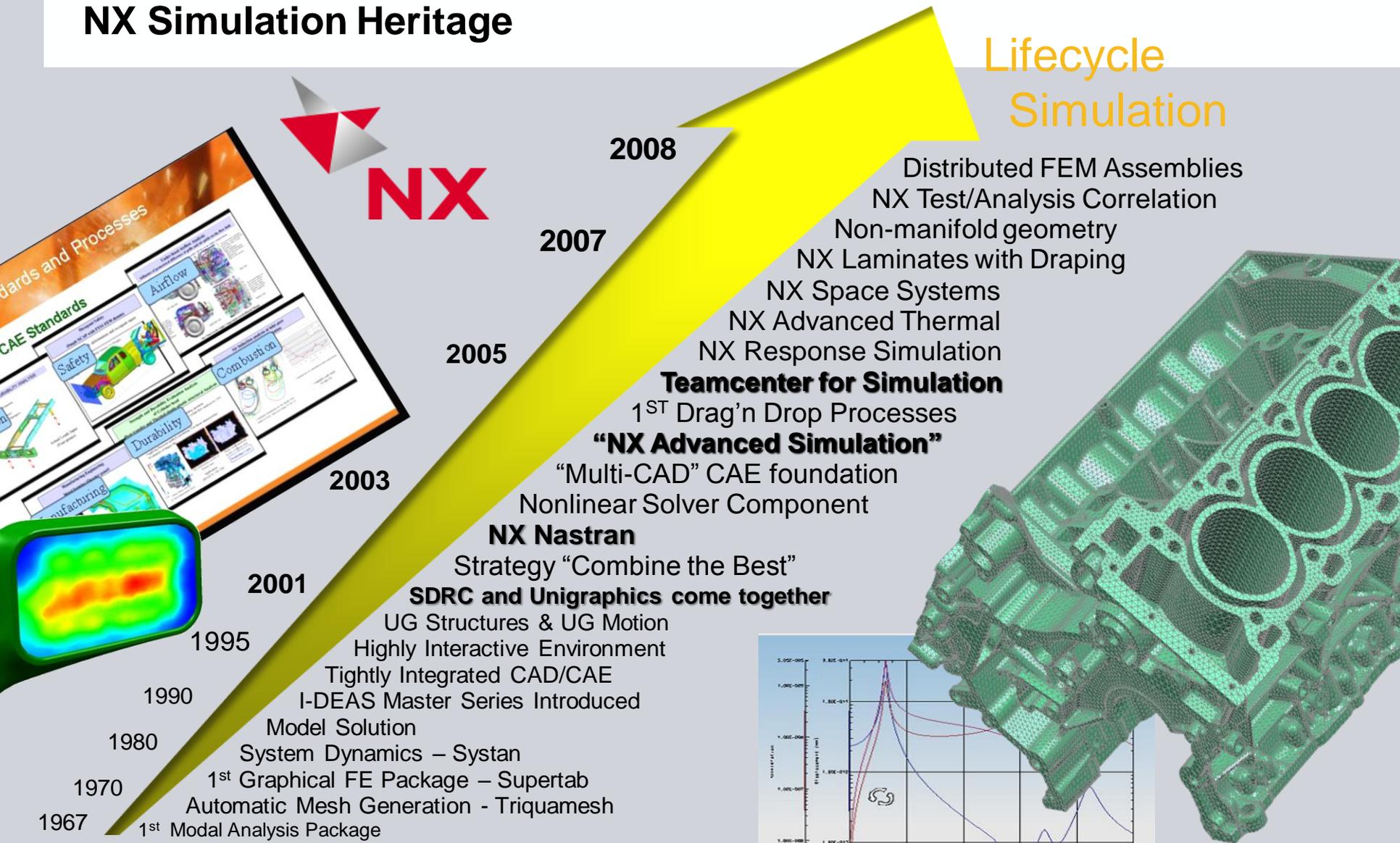
Key Objectives

- Best-in-class, scalable CAE pre-post modelers
- Market-leading physics based system solutions
- Integrated system analysis for multi-body motion dynamics
- Data management



NX Simulation Heritage

Lifecycle
Simulation



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NX Simulation – Scalability and Consistency

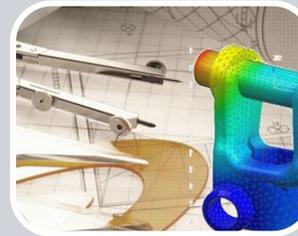


Scalability

- ▶ Configurable technology components
- ▶ Data compatibility – single data model

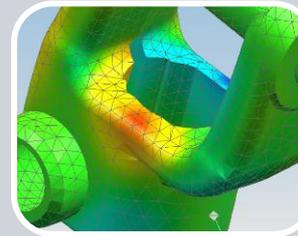
Consistency

- ▶ Common tools for all users
- ▶ Enable collaboration and re-use
- ▶ Break down barriers
- ▶ Promote trust, lower risk



Best Practice Wizards

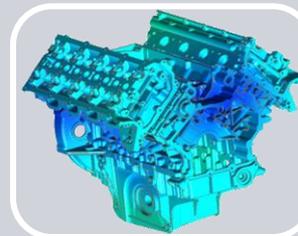
Extends the value of simulation to new and infrequent users



NX Design Simulation

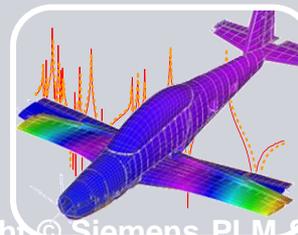
NX Motion Simulation

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

Agenda

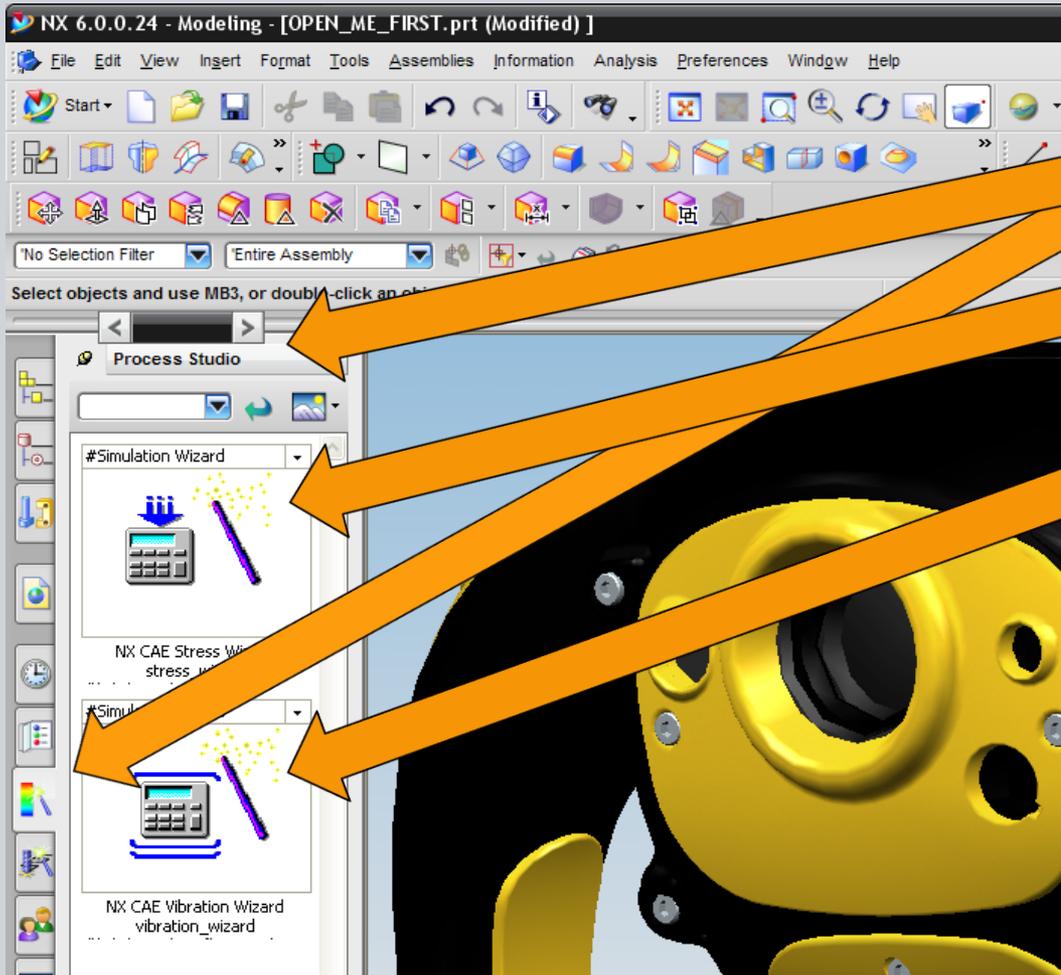
NX Simulation – Vision, Heritage and Scalability / Consistency

NX Stress Wizard & NX Vibration Wizard

NX Design Simulation

Example

NX Stress Wizard & NX Vibration Wizard



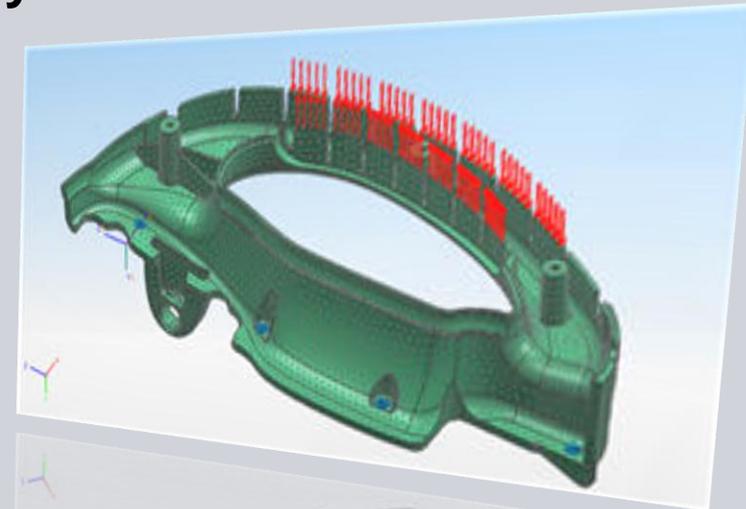
How to get to wizards?

- Process Studio Navigator
- Stress Wizard: available in NX Modeling
- Vibration Wizard: available in NX Modeling

NX Stress Wizard

What does it do?

- **Performs Finite Element Structural Analysis on your part geometry**
 - Will it fail for a given load
- **Linear Statics**
 - Assumes material property behavior is linear (i.e. below yield stress)
 - Assumes constant load (not varying with time)
- **Leverages NX Simulation Technology**
 - Powerful automatic geometry cleanup and 3D meshing
 - Nastran solver
- **Results**
 - Displacement, stress, safety factor
 - Creates report, with images



NX Stress Wizard

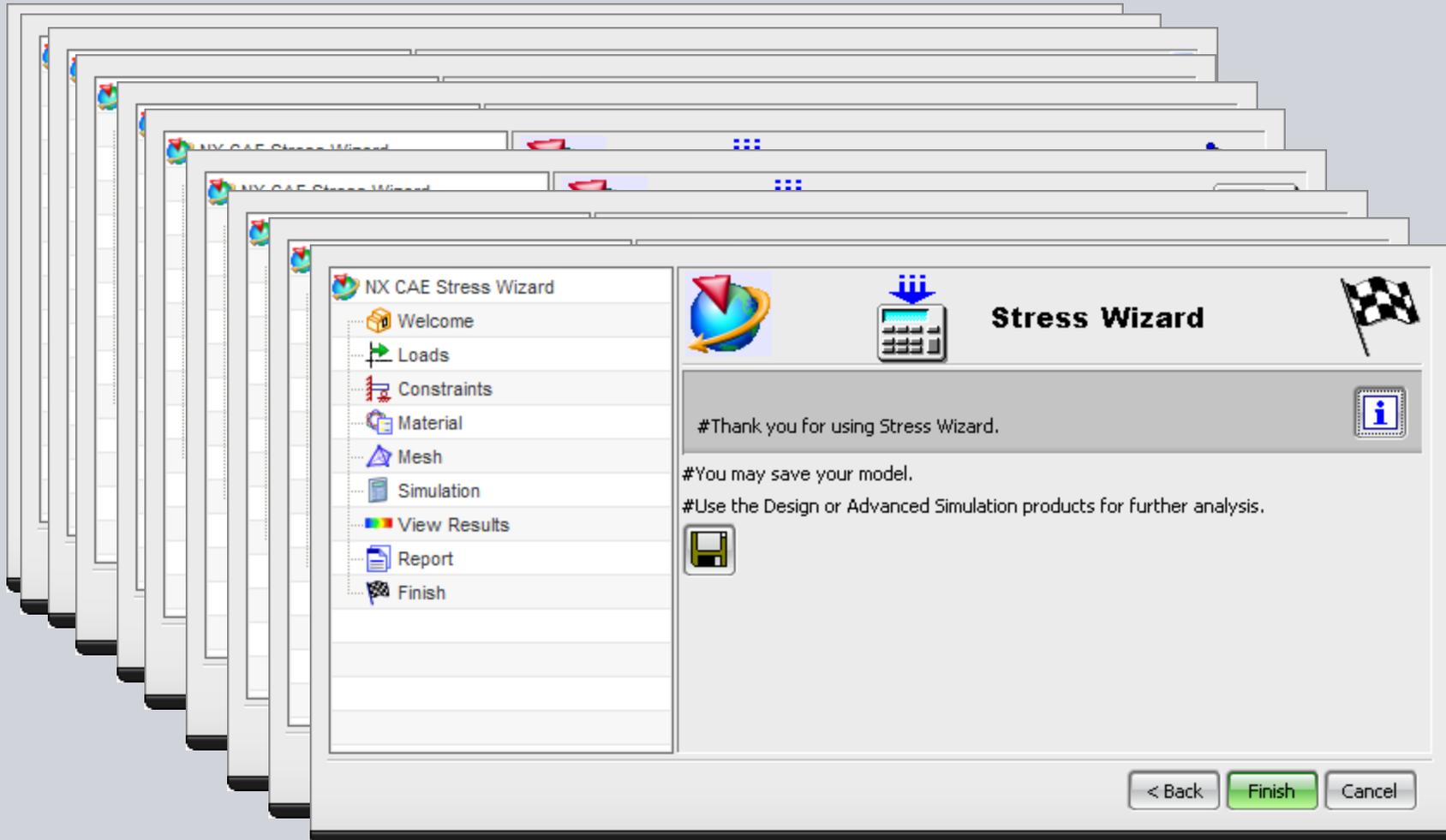
Intended Audience

- **NX Modeling users**
- **Exposure to Simulation functionality**
- **Use as a quick check for stress, gain knowledge early in the process**
- **Easy to use – walks you through the analysis steps**
- **Limited in scope**
 - Single solid body only
 - Forward create only
 - No manual geometry cleanup
 - No manual element repair



NX Stress Wizard

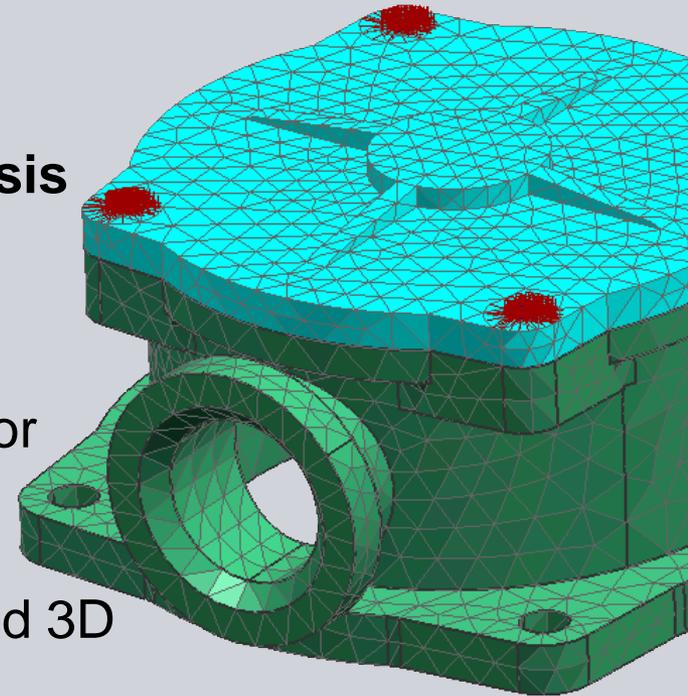
Walks You Through The Analysis Steps



NX Vibration Wizard

What does it do?

- **Performs Finite Element Structural Analysis on your part geometry**
 - What are the dynamic properties
- **Dynamics – Eigenvalue Solution**
 - Assumes linear material property behavior
 - Finds modes of vibration
- **Leverages NX Simulation Technology**
 - Powerful automatic geometry cleanup and 3D meshing
 - Nastran solver
- **Results**
 - 1st five displacement modes
 - Creates report, with images

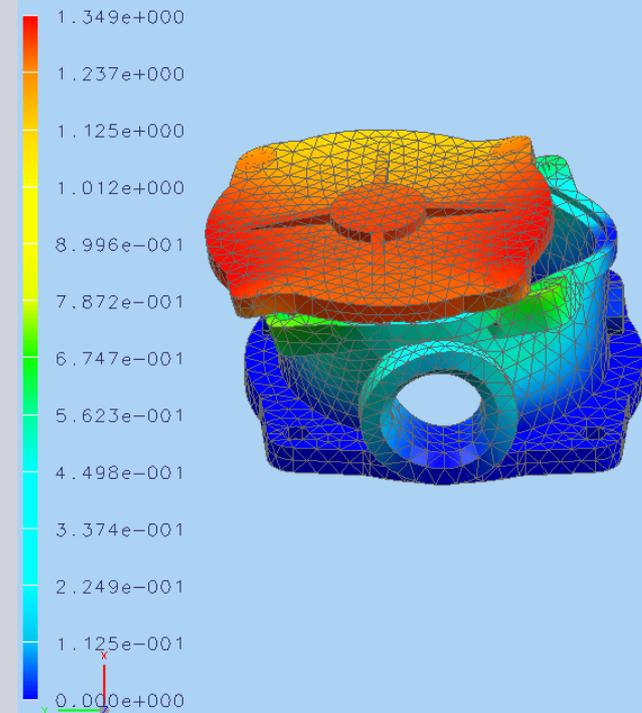


NX Vibration Wizard

Intended Audience

- **NX Modeling users**
- **Exposure to Simulation functionality**
- **Use as a quick check for modes of vibration, gain knowledge early in the process**
- **Easy to use – walks you through the analysis steps**
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 - 1st five modes only

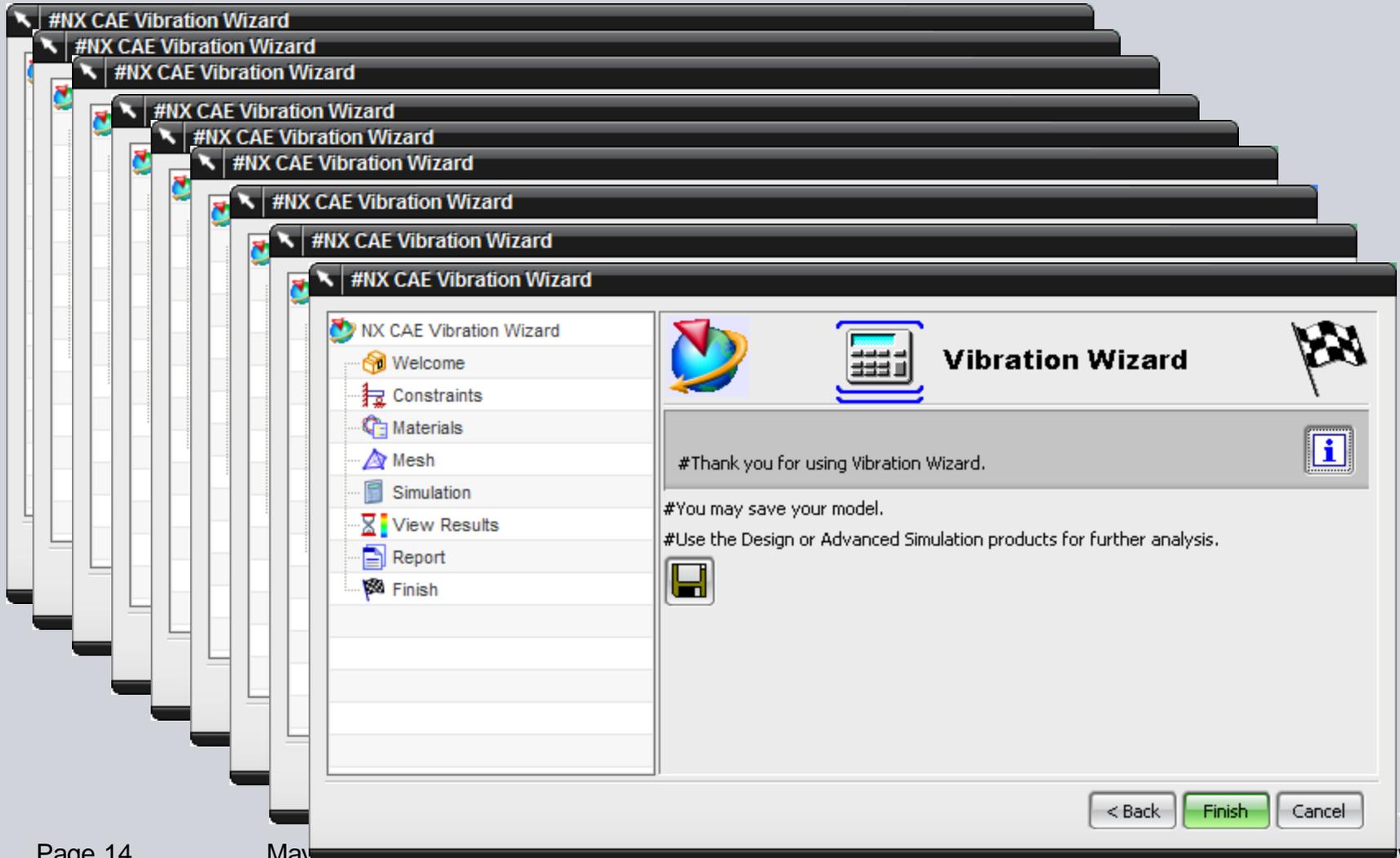
```
OilPickup_sim : Modes Result
Load Case 1, Mode 1, 1.702e+003 Hz
Displacement - Nodal, Magnitude
Min : 0.000e+000, Max : 1.349e+000, mm
Deformation : Displacement - Nodal
Animation Frame 1 of 8
```



ANALYSIS_1 WORK Camera ANALYSIS_1

NX Vibration Wizard

Walks You Through The Analysis Steps



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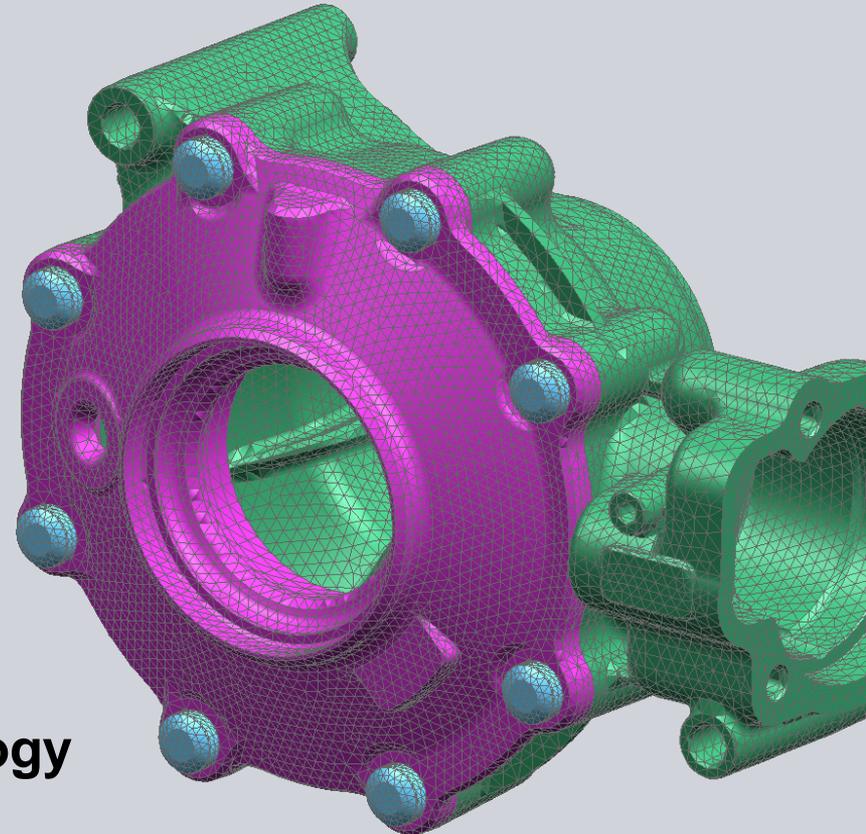
NX Design Simulation

Example

NX Design Simulation

What does it do?

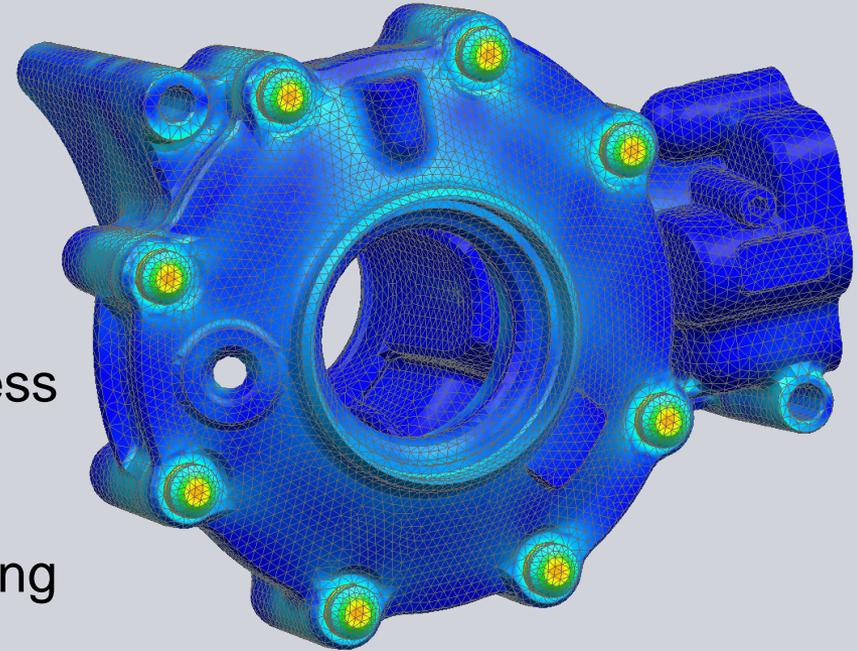
- **Performs Finite Element Structural Analysis on your part geometry**
 - Linear Statics
 - Dynamics (Vibration modes)
 - Linear Buckling
 - Thermal
 - Durability
 - Adaptivity
 - Optimization
- **Leverages NX Simulation Technology**
 - Fully associative to CAD part
 - Powerful automatic geometry cleanup and 3D meshing
 - Nastran solver



NX Design Simulation

Intended Audience

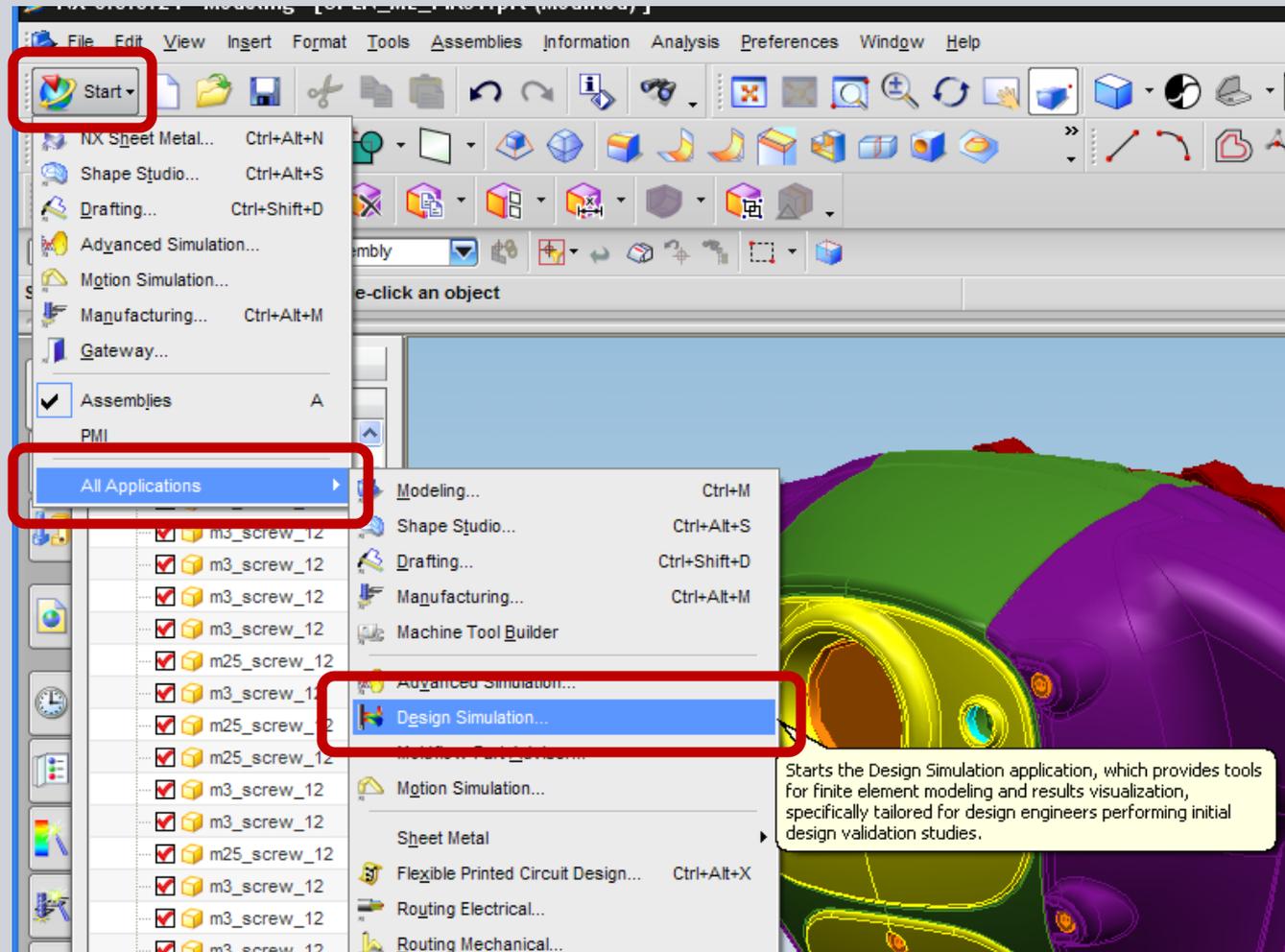
- **Design Engineers**
 - NX Modeling users
 - Non-native CAD
- **Initial validation studies**
 - Gain knowledge early in the process
- **Easy to use**
 - NX look and feel
 - Provides process flow while allowing freedom
- **Lifts wizard limitations**
 - Supports multiple bodies / assemblies
 - Re-use FE models
 - No limits on number of modes



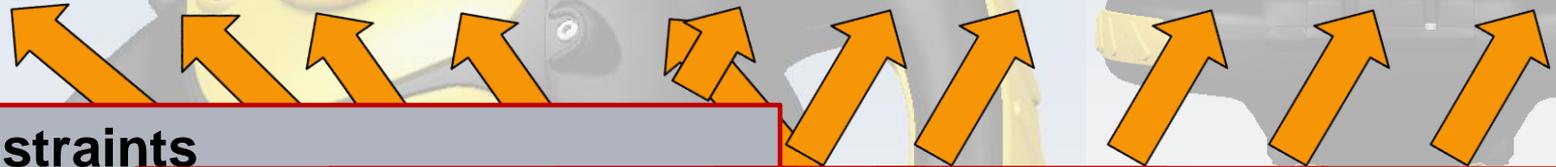
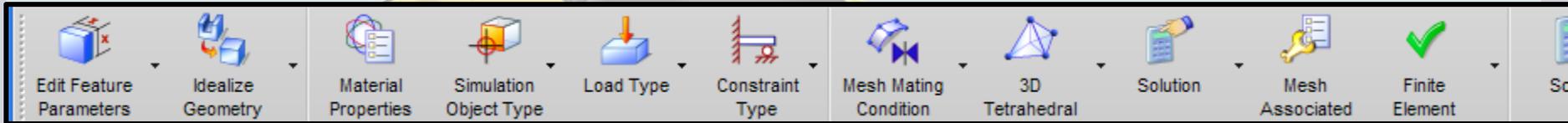
NX Design Simulation

Where is it?

- Start
- All Applications
- Design Simulation



NX Design Simulation Toolbar



Constraints

- Fixed Constraint
- Translation Constraint
- Enforced Displacement Constraint
- Simply Supported Constraint
- Pinned Constraint
- Cylindrical Constraint
- Slider Constraint
- Roller Constraint
- Symmetric Constraint
- Anti-Symmetric Constraint
- User Defined Constraint

Mesh Mating

- Durability
- Optimization Setup
- Adaptivity Setup
- Step-Subcase

3D Tetrahedral

- Pressure
- Hydrostatic Pressure
- Centrifugal Pressure
- Gravity
- Temperature Load

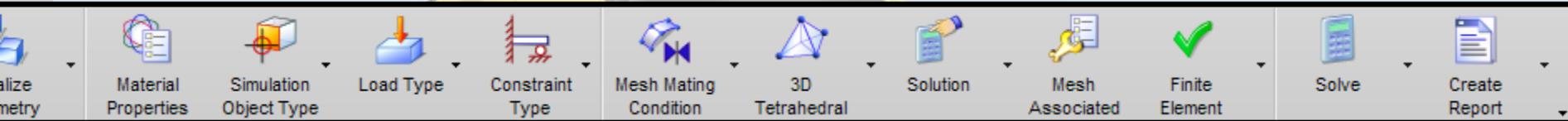
Solution

- Mesh
- Finite Element Model Check
- Simulation Summary

Finite Element Model Check

- Simulation Summary

NX Design Simulation Toolbar



- Solve
 - Analysis Job Monitor
- Create Report**



Agenda

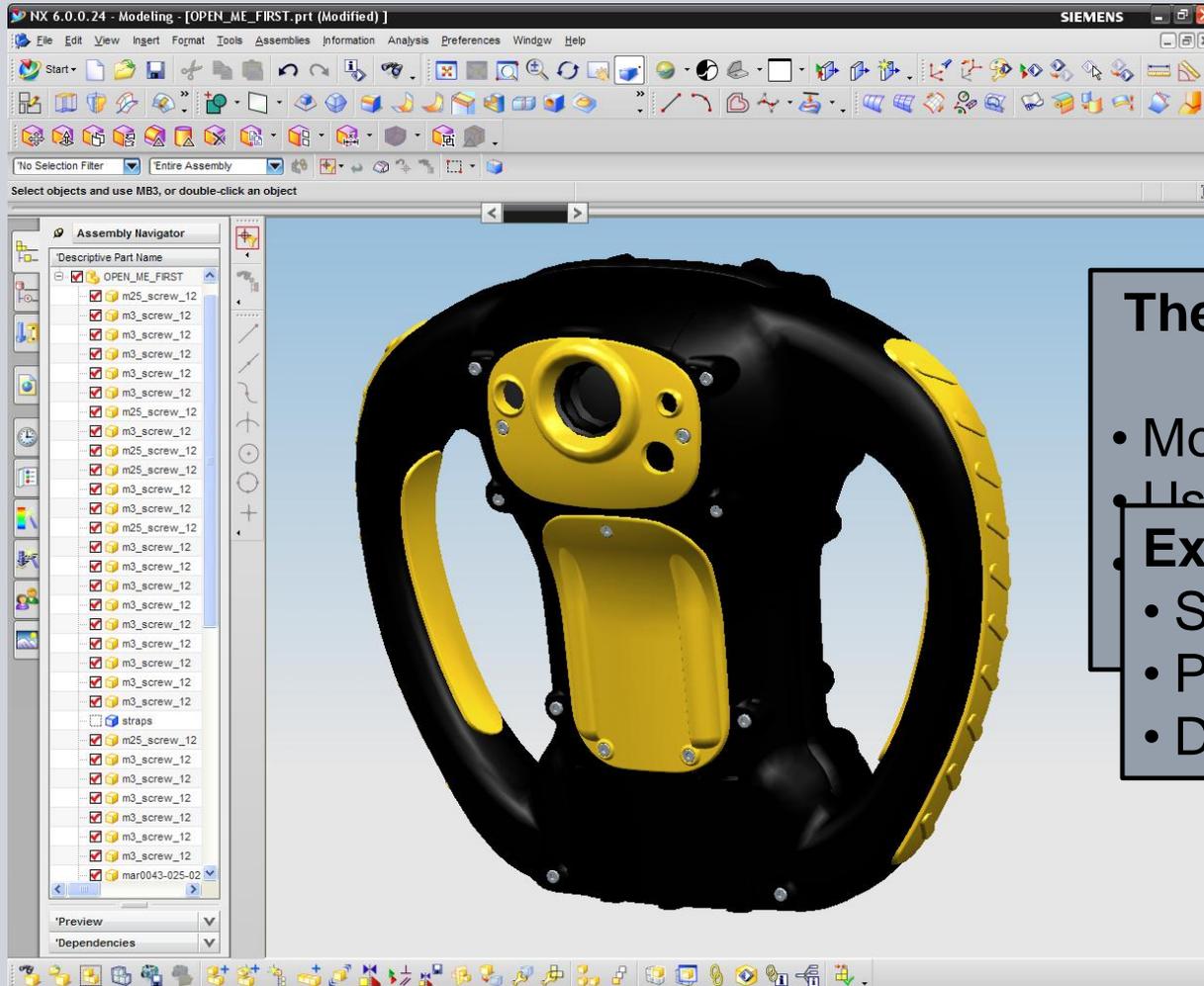
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Example

Example – Thermal Imaging Camera

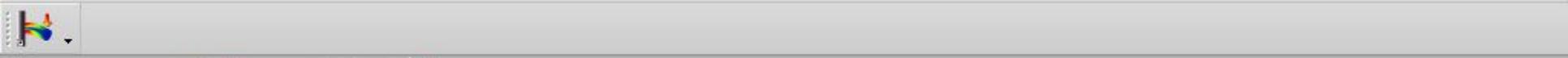


Thermal Imaging Camera: A Firefighter's Tool

- Model: Argus 3
- User Driven Design

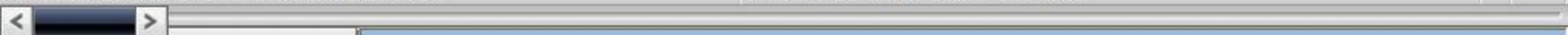
Example - AVI

- Stress Wizard
- Part Change / Update
- Design Simulation



No Selection Filter

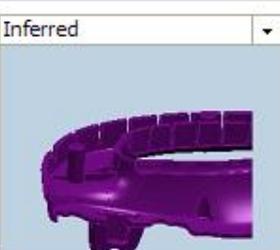
Select objects and use MB3, or double-click an object Restore data was reset by this operation



History

Today

Inferred



dpp701146aa-issue2.prt from C:\analysis

Inferred



Thermal_Camera_Assembly.prt from C:\analysis



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Thank You!

2008

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PLM Software

Answers for industry.

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Contact

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www.siemens.com/plm