

Using Teamcenter Data Management with NX Simulation

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Premium Partners:



Microsoft

Topics Covered

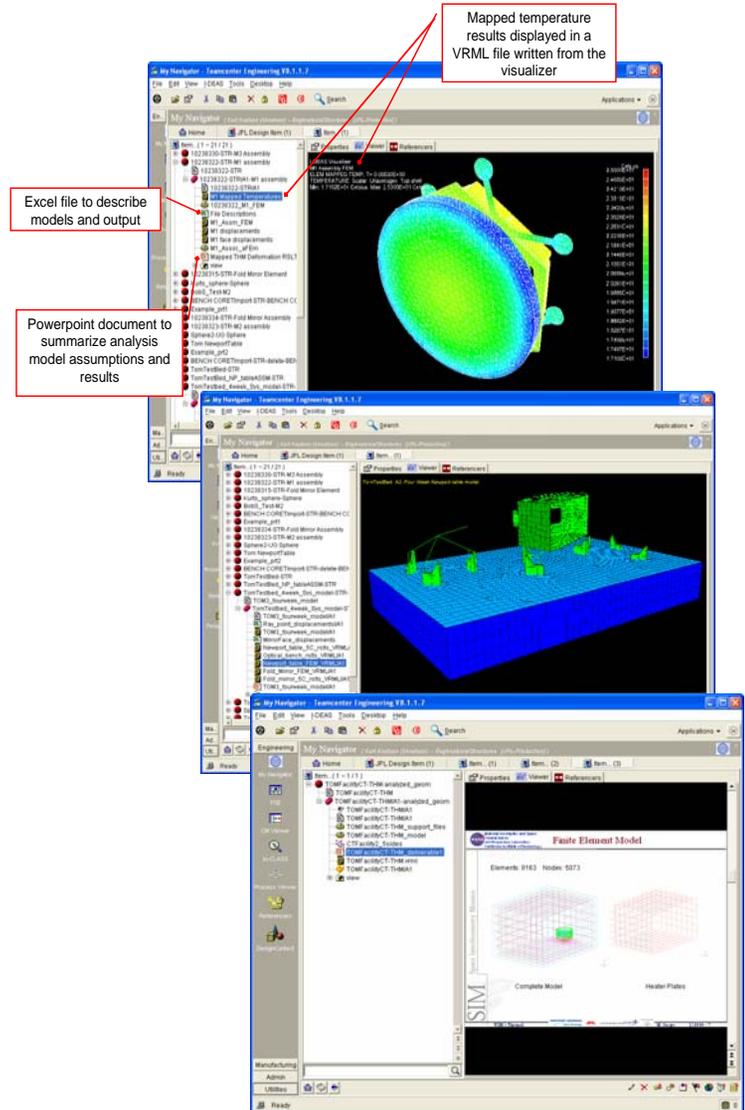
- Arrangement of CAE data in TCEng
 - Data sets and their relationships
- Managing the data sets
 - Design and analysis on the same item
 - Using separate design and analysis BOMs
- Managing multiple analyses
- Managing and sharing results
 - Using JT for results
 - Organizing reports

Where Are We In The Development Pipeline?

- Simulation is New in NX4
- Using NX 4.0.1 and TCEng 10.0.0 Here

Motivations for Using TCEng for CAE

- Data storage
 - Safe, reliable, centralized, scalable, sharable
- Search
 - Collaborative sharing, reuse, best practices
- Access control
 - Ownership -> Permissions
 - Supports teams
- Data organization
 - Structured, linked w/ relationships
- Collaboration
 - Visualization, remote access
 - Supports IDPTs



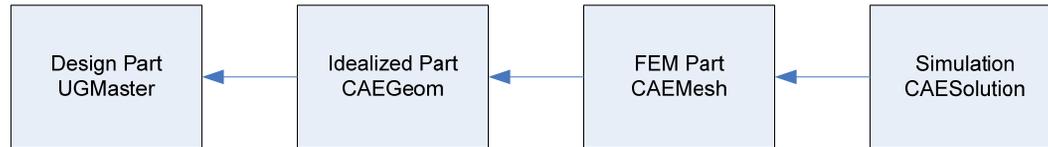
CAE Data Sets in TCEng

- NX Simulation native files
 - .sim: The loads, BCs, solution set up & solution (optional)
 - .fem_i: The idealized analytic geometry
 - .fem: The model w/ nodes, elements and materials
- Under TC Eng, these become data sets:
 - CAESolution for the .sim file
 - CAEGeom for the idealized geometry file
 - CAEMesh for the fem file
- The TC Eng relationship to the Item Revision is NXSimulations

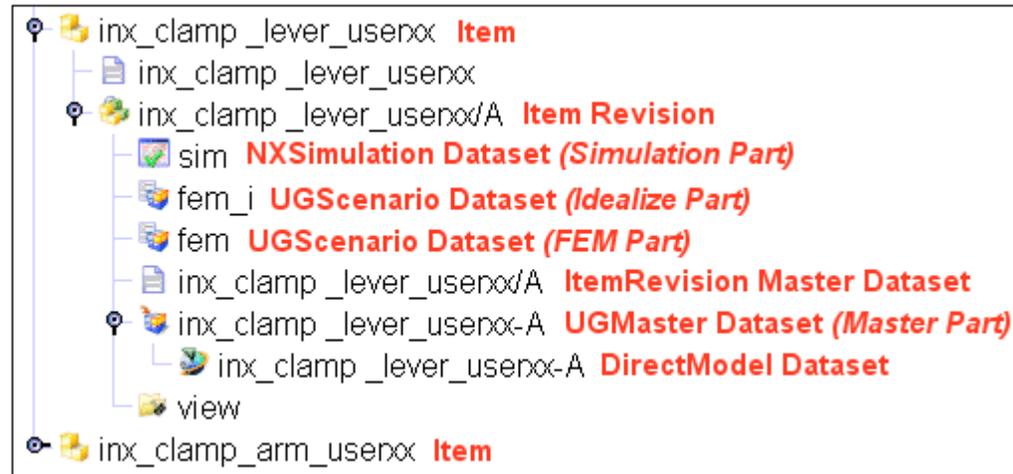
Data Set Management

- Data sets are attached to Item Revisions
 - Items are revisionable. Data sets aren't revisionable.
- CAE data sets can be on different Item from design part geometry
 - Permissions are controlled by Item Revision
 - Designer & Analyst can't modify other's data
 - Idealized part (CAEGeom) holds link to design part
 - This connection is not visible to TCEng
- Use Item Revisions for CAE data version control
 - Best Practice: Follow design practice of "only one working revision"

CAE Simulation Data Sets

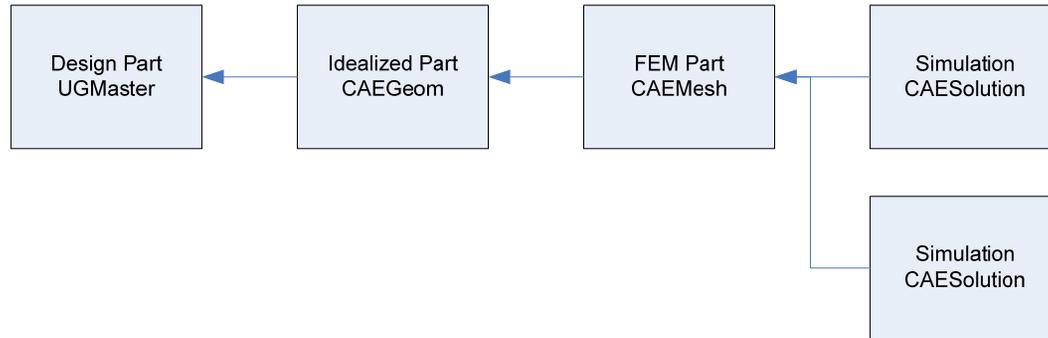


- **CAEGeom (UGSCENARIO*)**
 - Linked to the design part
 - One per design part or assembly
- **CAEMesh (UGSCENARIO*)**
 - Finite element model
 - Linked to idealized part
- **CAESolution (NXSimulation*)**
 - Contains multiple load and BC definitions
 - Solver set up
 - Solution sets (optional)



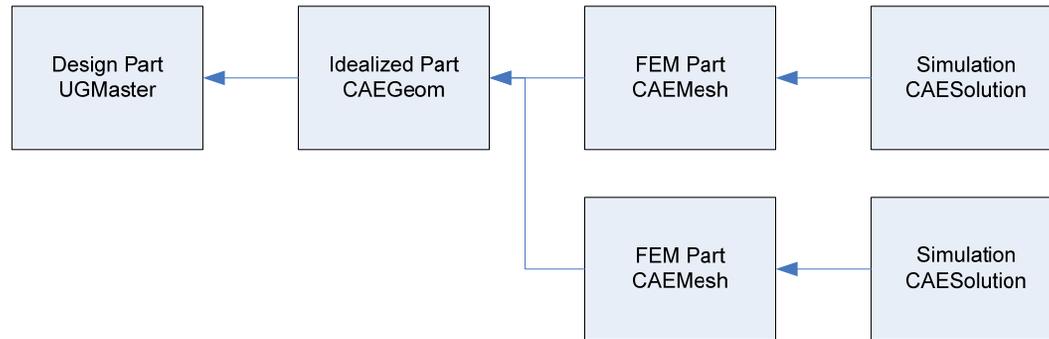
* TCEng 10.0.0

Multiple Analyses



- Multiple solutions for a FEM
 - Divide up load cases, modal frequency ranges
 - Statics vs dynamics
 - Simulation data set can hold multiple solutions internally but these are not visible to TCEng
- Use simulation overrides
 - Material properties, load application points
- Simulation and FEM can be on different Items
 - Can have different owners
 - Supports teams by dividing up work
 - Can have different revision timing

Multiple FEMs



- **Multiple Models**
 - Different materials or nongeometric properties (eg, nonstructural mass)
 - Mesh refinement, meshing trades
 - Different models of supports or boundary conditions
- **FEM and idealization can be on different Items**
 - Can have different owners
 - Supports teams by dividing up work
 - Can have different revision timing

Models w/o Design Geometry



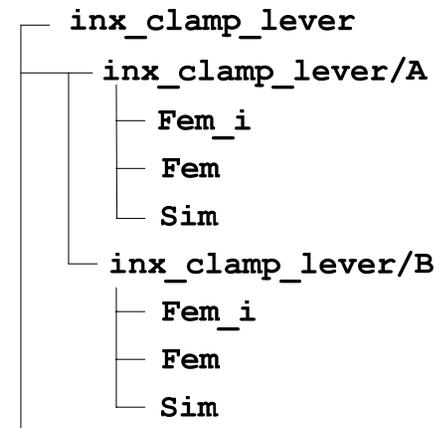
- FEM only without design geometry
 - Support initial design before configuration is available

Managing Analysis Data

- Data structures
 - Combinations of 3 possible arrangements
 - Each has different characteristics
- Multiple data sets per Item Revision
- Multiple Revisions
- Multiple Items

Typical: Analysis Follows Part Life Cycle

- One analysis, one part, for life
- All cases in one simulation
- Analysis revision follows design part revision
- Design part on separate Item
 - Idealized part (fem_i) holds link
 - Naming convention provides the tie

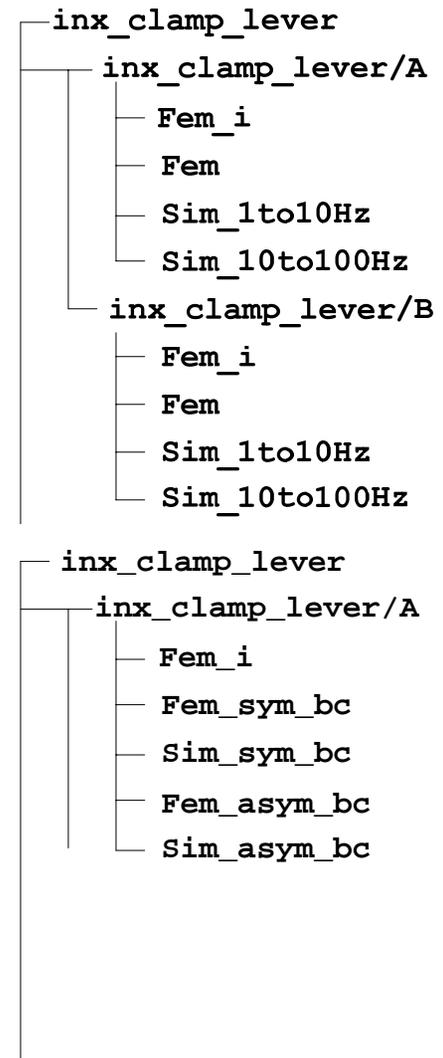


Multiple Data Sets per Item Revision

- Limitations
 - Manual data set naming for configuration control
 - Practical limit of ~5 analyses per Revision
- Suitable for
 - Fixed design geometry
 - Parametric study (BCs, material, loads)
- Data structure
 - Common design and idealized part
 - Single FEM and multiple simulations
 - Multiple FEMs, multiple simulations
- Revise all at once

Example: Multiple Data Sets per Item Revision

- Mesh refinement
 - Mesh type or change coded in data set name
 - Single design part, single idealized part
 - FEM & Sim per trial
- Load or BC study
 - Single design part, single idealized part, single FEM
 - Sim per trial
- Several load case groups
 - Single design part, single idealized part, single FEM
 - SIM per group
- Material study
 - FEM & Sim per trial
 - Single FEM with Sim per trial (use material override)
- Use Revisions to repeat studies after design change

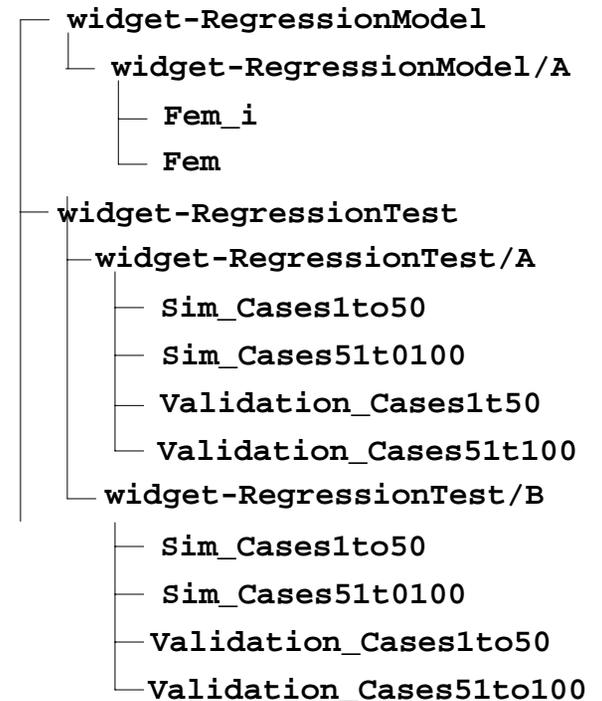


Multiple Revisions

- Limitations
 - One working, writable set of data at a Time
 - Revisions assumed to be time sequential
- Suitable for
 - Geometry trade studies, tracking design trades
 - Same analyses content for each Revision
- Data structure
 - Repeated FEM, Sim structure each Revision
 - Single design, one or few Sims
- Revise after each analysis

Example: Multiple Revisions

- Regression tests
 - Fixed analyses repeated after design changes
- Requirements check
 - Repeat as desired after design change

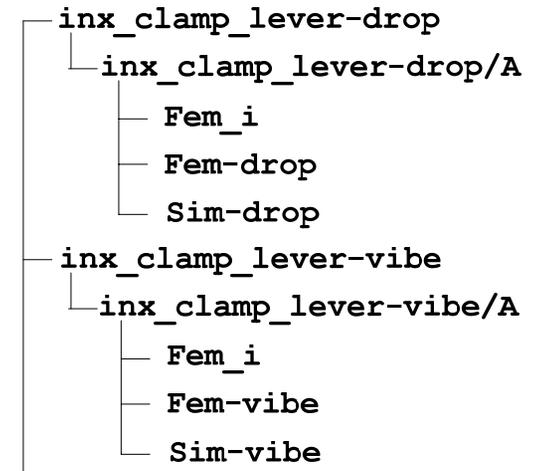


Multiple Items

- Limitations
 - Manual item naming for configuration control
- Suitable for
 - Multiple analysis types
 - Multiple studies
 - Dividing up work for teams
- Data structure
 - Items can be arranged in a BOM
 - Repeated FEM, Sim structure each Revision

Example: Multiple Items

- Item holds an analysis over time
 - Statics, dynamics or impact on individual Item



Managing Results & Collaboration

- Data sets for MSOffice are active in TCEng viewer
 - PowerPoint presentations from reviews
 - MSWord docs from reports
- JT views now show results
- DirectModel datasets hold JT files
 - Put multiple, related views in same data set
 - Select JT view in TCEng viewer via RMB
- JT views of results can be shown as part of assemblies

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