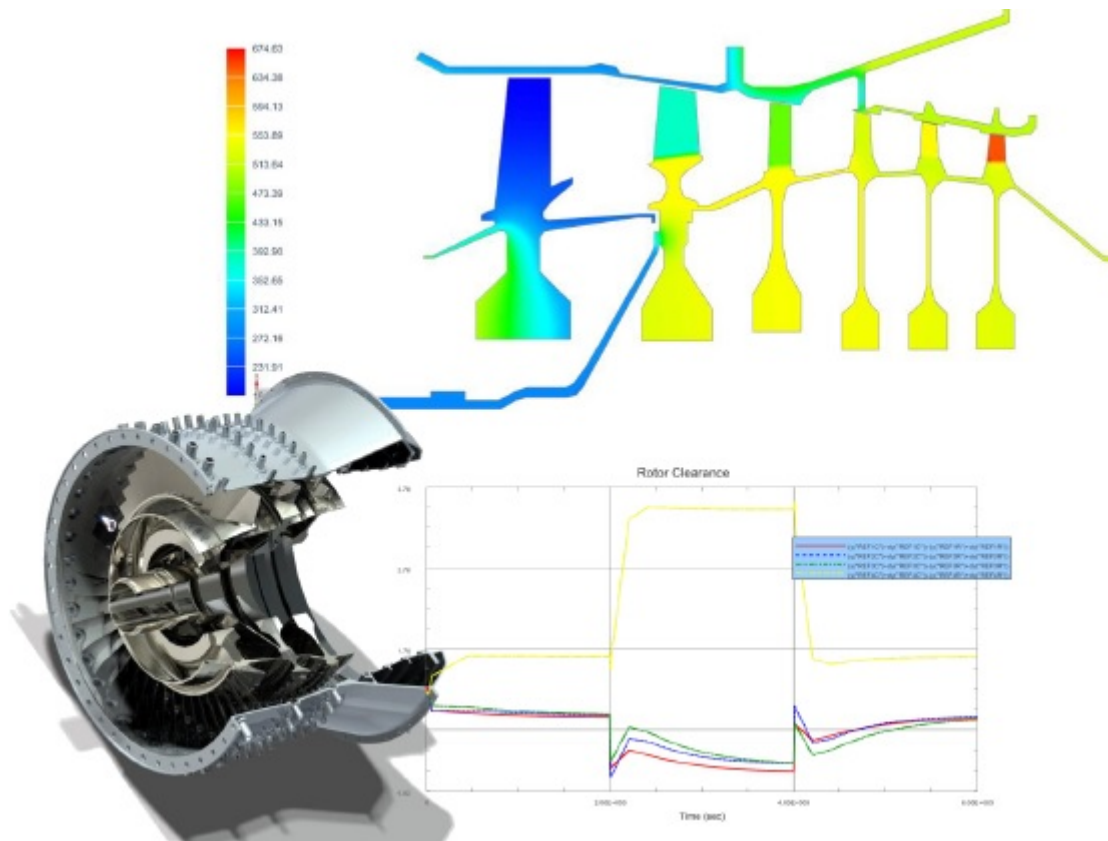


Simulation updates in Siemens' NX CAE

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The Multiphysics Environment simplifies bi-directional connections of thermal and structural simulations.

While at the Siemens' CAE & Test Symposium, held in Long Beach CA from October 22nd

to 23rd

, a preview of the [NX 10 simulation improvements](#) was presented. A big theme of the release was increased integration between LMS software, solvers, and other Siemens PLM software.

Jim Rusk, Sr. Vice President, Product Engineering Software at Siemens said, "In some cases it is easier to build standalone applications to do specific things. But the reason we work so hard on integration is because at the intersections of those integrations is where there is real benefit to be made in product development."

With [NX 10](#), Siemens promises it will be easier to tap into these points of intersection and product developments.

New Multiphysics Environment

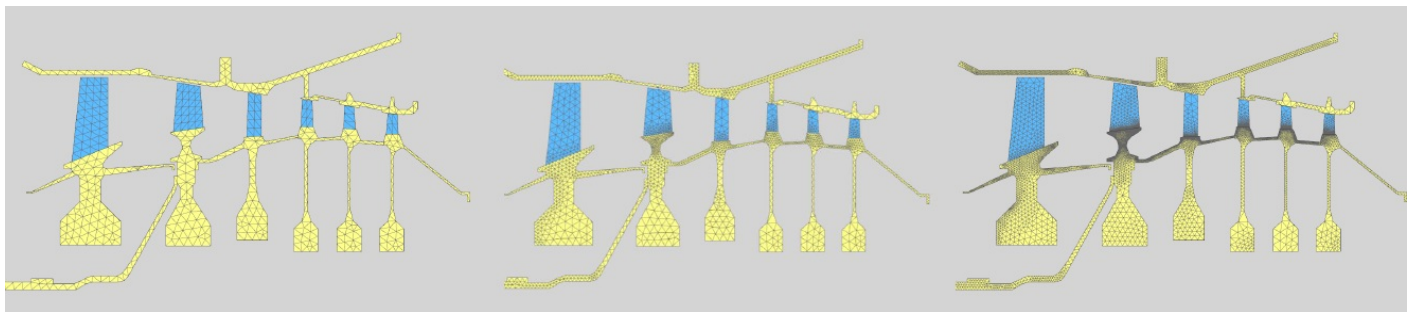
Simulation experts will be excited to see that Siemens has created an easier way to connect two or more solvers. The improvement is made possible in the new multiphysics environment. The environment allows users to perform multiphysics simulations without creating separate meshes, elements, boundary conditions, or properties.

“Think about linking the thermal characteristics to the mechanical, and the mechanical characteristics to the aerodynamics. Intelligent models can represent a lot of things thanks to multiphysics. In the case of an aircraft engine, for instance, these interactions can become highly complex,” noted Rusk.

This addition to the NX CAE environment is currently targeting thermo-mechanical problems. Analysts can use both the NX Thermal Solver and [NX Nastran](#) multi-step nonlinear solver in the simulation. The solvers can be set up as two-way, or to save compute time, one-way coupling.

S. Ravi Shankar, Director, Simulation Marketing “Though we are focusing on thermo-mechanical multiphysics, we will include more down the line like CFD.”

Adaptive Meshing



Adaptive meshing automates the mesh refinement process and delivers more accurate models.

Siemens has joined the adaptive meshing party with the release of [NX 10](#). The tool should help NX CAE users reduce the pre-processing needed to refine the mesh.

“Adaptive meshing automates the repetitiveness of solving models with varying mesh densities. Using stress/strain and temperature error NX determines areas in the model that need refinement. These changes are then done for the next solution iteration,” said Shankar.

The adaptive mesh will therefore produce more accurate models with improved convergence. It can be used for any solver application from structural, to thermal, and multiphysics.

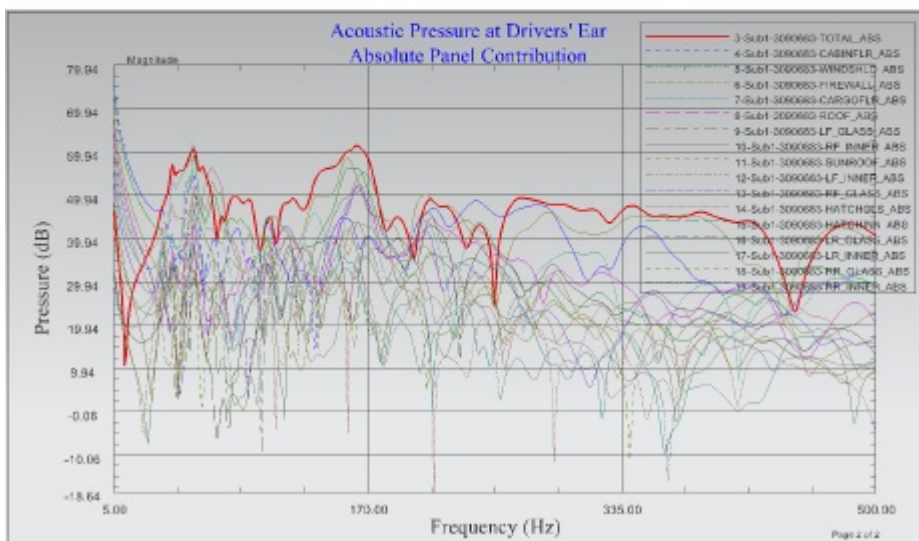
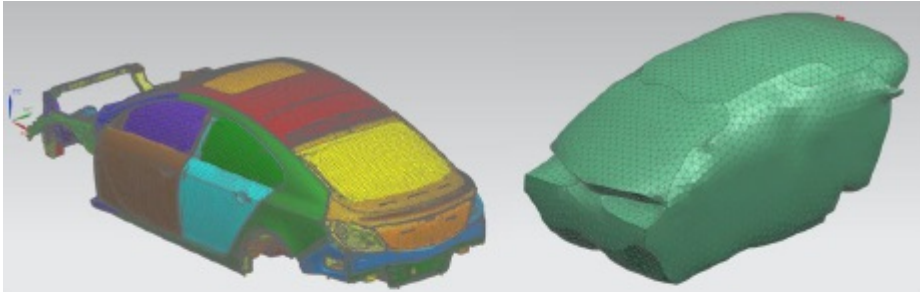
Complex Boundary Conditions

With [NX 10](#), analysts are now able to create more complex loads and boundary conditions that are governed by symbolic expressions through a management system. This allows for these entities to be automatically updated at solve time and/or updated for the next run in the iteration.

The expression can be based on simulation properties, other boundaries, user defined subroutines, and the previous iteration. Out of the box, the new release has 30 new preprogrammed NX CAE specific expressions available. With these expression governed boundary conditions, analysts can gain a better understand of the system.

“Think about an engine on a plane, the engine starts on a taxi cycle, take-off cycle, a cruise cycle, approach cycle, landing cycle, a thrust reverse cycle, and another taxi cycle. Designers need to take into account these different conditions during the duty cycle. The idea of being able to have a wide variety of expression information to drive that simulation is extremely valuable,” said Rusk.

Integrated Vibro-Acoustics Analysis & Cavity Meshing



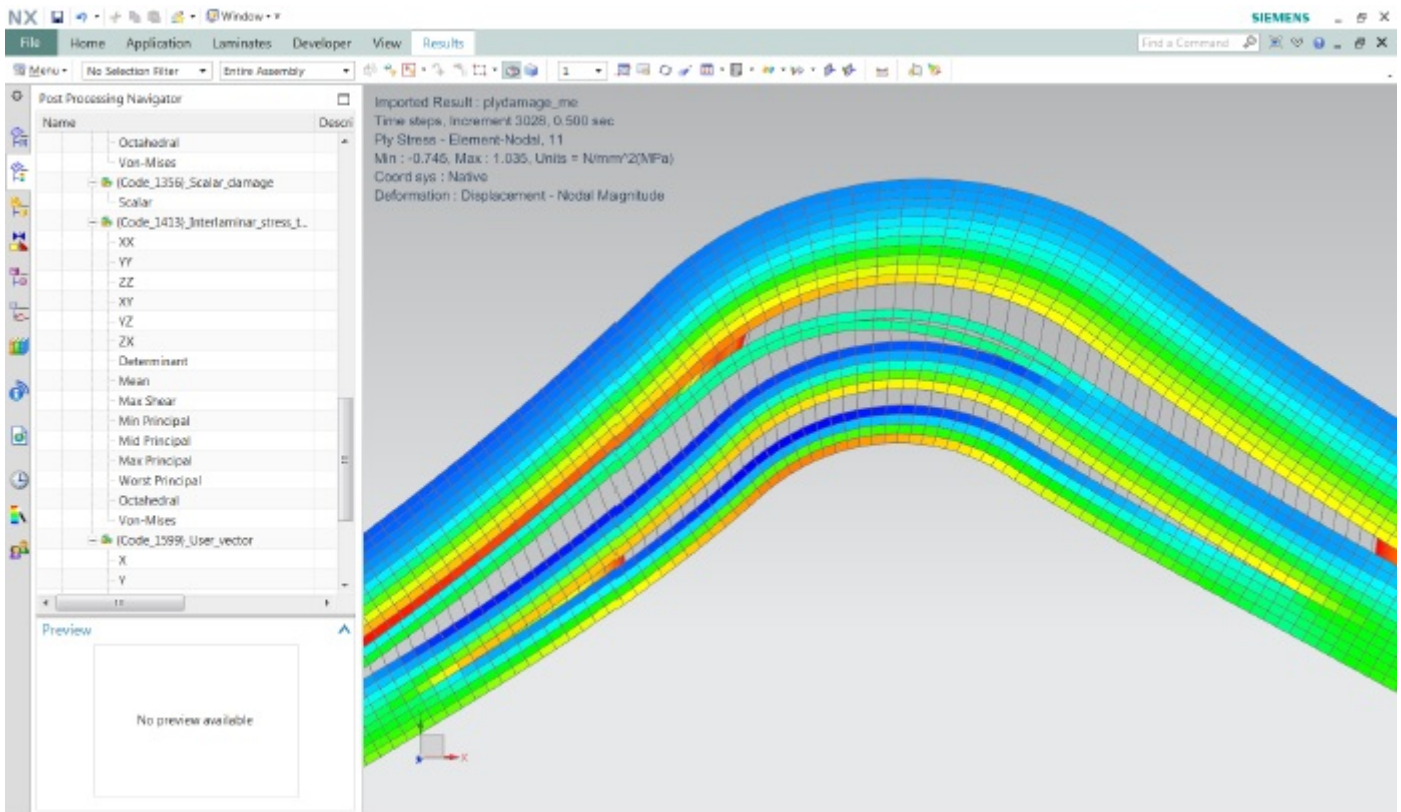
Imbedded NVH Analysis.

The [NX 10 release](#) sees a new integrated noise, vibration and harshness (NVH) analysis workflow. This will help users to increase their productivity by performing the study without a separate software.

Another productivity saver is the ability of the software to make a simple cavity mesh using mesh wrapping. “Using the new mesh wrapping function, you can start with a structural mesh and create a cavity mesh. This process will even work with legacy mesh data. Now you just load the cavity mesh into the NVH Vibro Acoustic workflow and use it to compute interior noise,” explained Shankar.

Users will also be able to input NVH loads like measured data using load recipes which will define the external noise source. Once the NVH analysis is calculated, post processing can reveal sound pressures and panel contributions curves from absorbent or reflective panels.

LMS Samcef Integration for Composites and Nonlinear

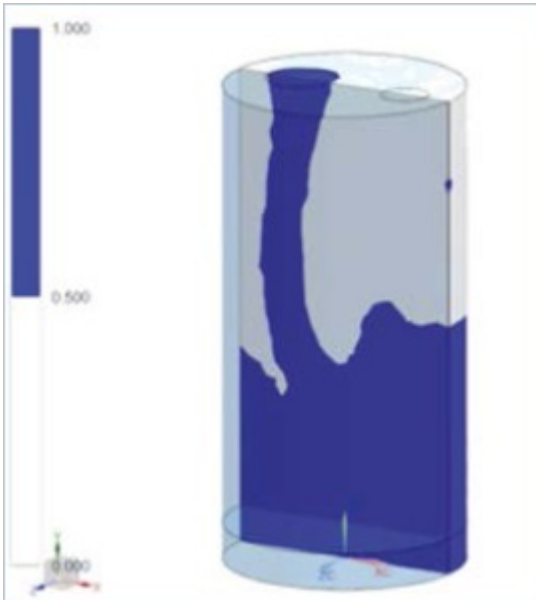


Pre/post processing with the Samcef Solver.

NX CAE now also supports the newly integrated nonlinear LMS Samcef Solver, part of the Siemens CAE portfolio following the acquisition of LMS about two years ago. Users can now study the damage and delamination of composites models in NX CAE. Given the growing use of composites this updated integration should prove useful.

“This covers a wide range of applications from aerospace, to defense, and automotive,” confirmed Shankar. “The NX CAE environment can now be used to model composite delamination, calculate ply stresses, and perform a random vibration analysis. Users can also seamlessly transfer zones onto 2D elements or Polygons from Fibersim into NX CAE.”

More CFD Capabilities



Two-phase fluid simulation of tank filling.

Large CFD simulations can now be performed in NX 10 due to extensions to the parallel flow solver. This will allow for simulations of high speed flows, shear stress transport, K-omega turbulence, and non-Newtonian fluids.

This upgrade also brings NX CAE into the realm of two-phase homogeneous flow simulations. The extended solver will now be able to model gas mixtures, tracer fluids, and interactions between gas/liquid or liquid/liquid models.

For instance, “the ability to simulate the filling or emptying of a tank,” said Shankar. “You will be able to track the fluid area, fluid fraction, and the ambient conditions. You can also simulate the mixing of these fluids.”

Other NX 10 Simulation improvements include:

- Touch Control
- Use of GPU to speed up processing
- [NX Nastran](#) access via Rescale’s cloud computing service
- Monte Carlo simulation on the cloud
- Boundary layer meshing in FEM
- Printed circuit board objects
- Adaptive time stepping scheme
- Python support for NX Open
- Results probe & expressions

For more information on other NX 10 PLM Software improvements visit this [Siemens PLM Software](#) white paper. For a more detailed look at the NX 10 Simulation improvements follow [this link](#).

SIEMENS PLM Software has sponsored promotion of their NX 10 release on ENGINEERING.com. They have no editorial input to this post - all opinions are mine. Shawn Wasserman

