



Automate Simulation Processes Easily, Quickly and Reliably with Low Code Tools

More Innovation through Systematic Democratization of Simulation

The Well Traveled Path Dilemma

“If I would have asked people what they wanted, they would have said faster horses.”

Henry Ford

The New Path Possibilities

Low Code Tools: A More Efficient Way to Simulation
Democratization

Special Low Code solution for CAD-to-Solver process and Report Generation

- ▶ Low-Code: Configure instead of programming/scripting
 1. Configure geometry independent, re-usable simulation template (AM)
 - ✓ Mesh parameters, solver settings, report content
 2. Create CAE ready CAD models
 - ✓ Text attributes
 - ✓ Simulation “view” (e.g., fluid space instead of manufacturing CAD)
 3. Submit to CAENexus (via batch command)
 - ✓ Automatic mesh creation
 - ✓ Automatic solver input files creation
 - ✓ Automatic report generation (new feature – pre-release)

Use Cases

Demo Processes

- Structural Simulation – Heavy Equipment
- CFD Simulation - Automotive HVAC System

Use Case Heavy Equipment

Automation of Structural Simulation Process

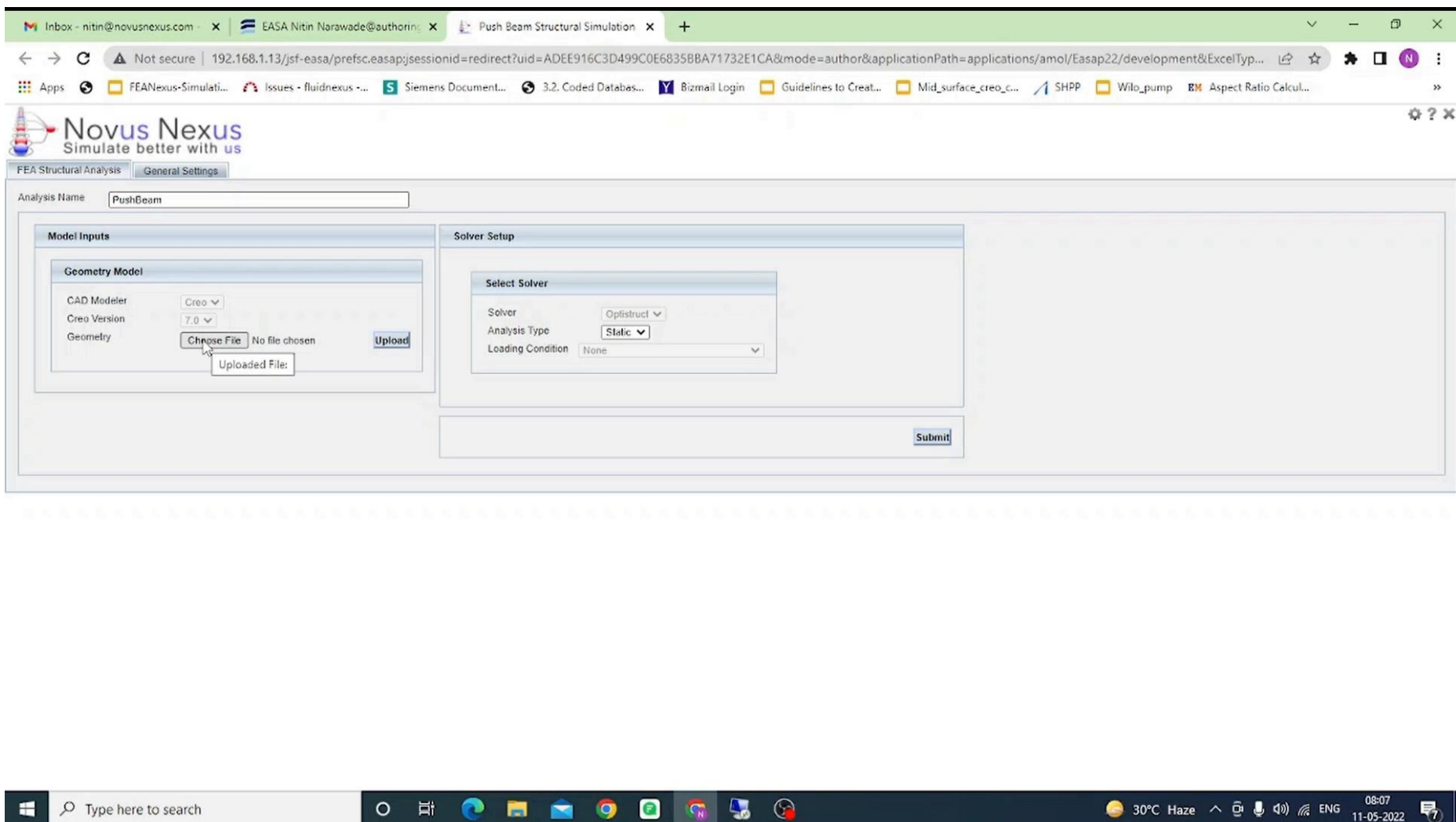


User Challenges

- Enable designers to perform dependable simulations
 - Use simulations systematically for all designs
 - Ensure that simulations done by designers are applying best practices involving the same tools as used by analysts
- Reliably handle highly complex and vastly varying geometries
- Workflow independent of specific solvers

Solution Implemented

- Automated simulation process for designers
 - Common end-to-end process and UI for multiple solvers
 - Multiple solvers, geometry types, load cases
 - Ensures that simulation results are always comparable
 - In-house team (analysts) created and maintain abstract models and overall automation workflow



GUI

- Physics oriented
 - Adapts to CAD model type
 - Loads selected for different model types and operational conditions

Implementation Effort

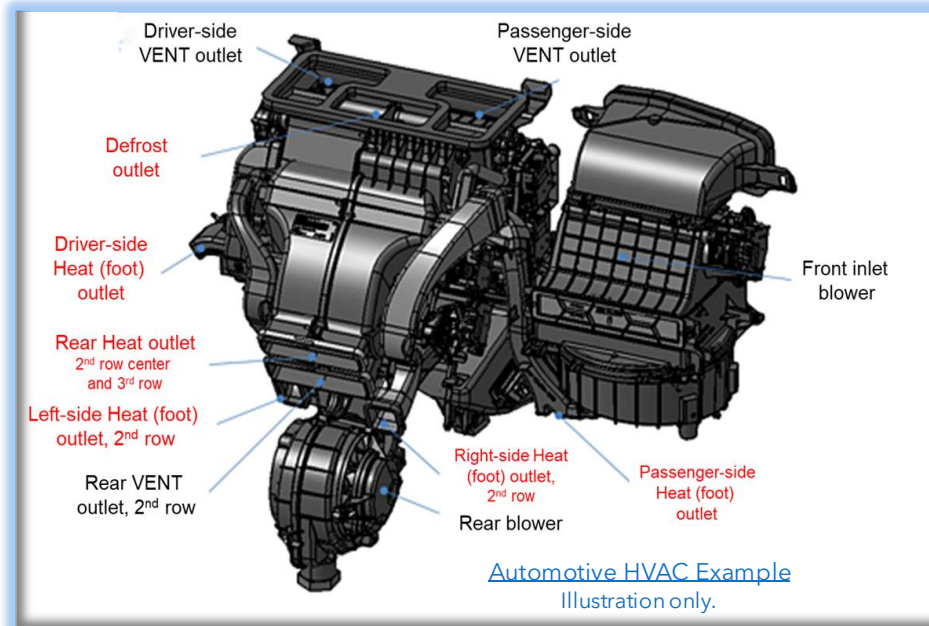
- Extra CAD effort (tagging)
 - 20 min. initial model, 0 to 20 minutes follow on models
- Abstract model configuration – total under 1 hour
 - AM is authored from a similar, already existing model
- GUI configuration – 1 day
- Workflow configuration
 - Misc. scripts, macros, batch commands – 1 day
- Additional testing – 1 day
- Total effort < 4 person days (implementation only, does not include time needed for requirement definition, simulation validation, and other planning/coordination tasks)



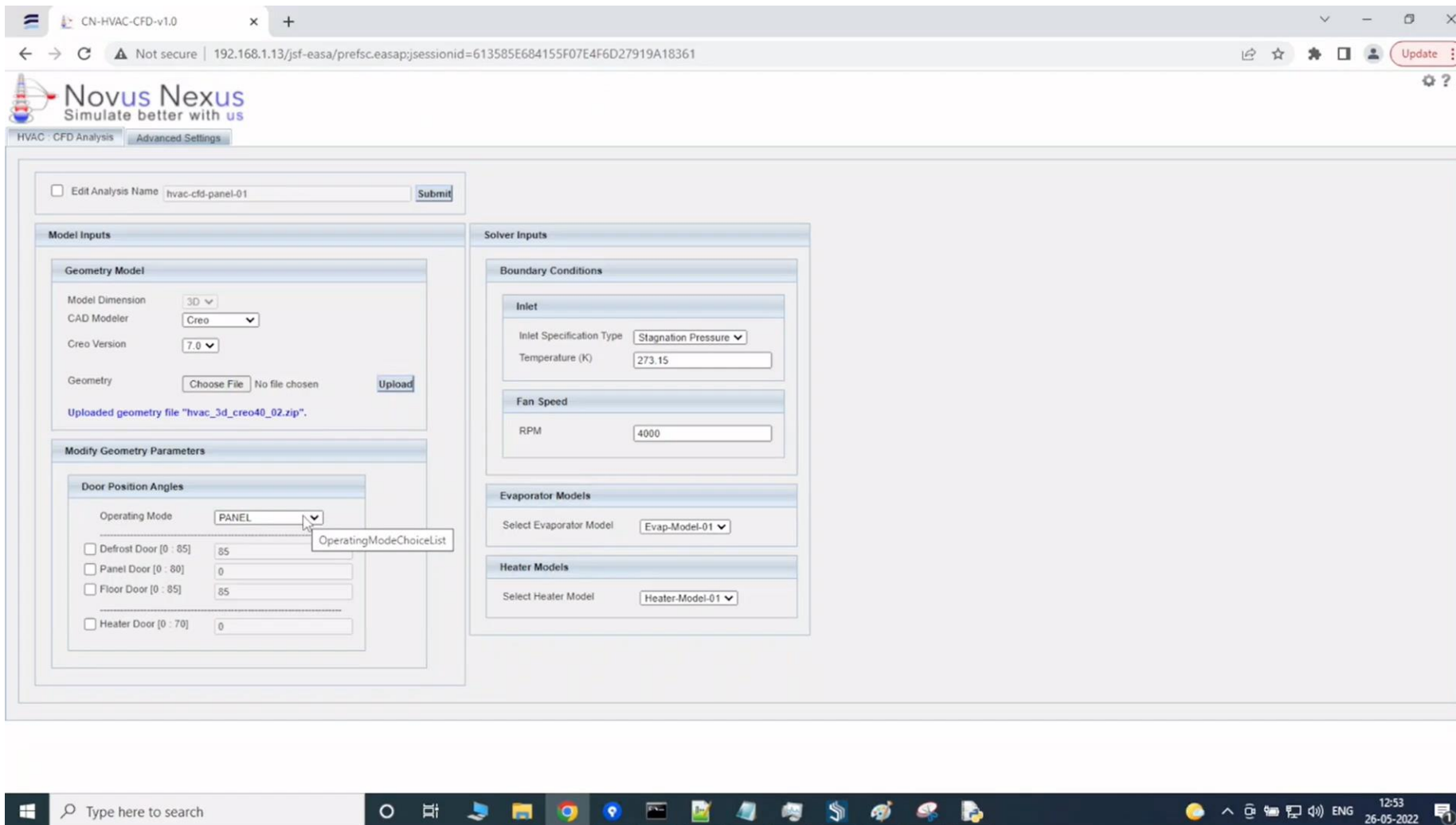
Use Case Automotive HVAC Systems

Automation of HVAC CFD Simulation Process

Customer Challenges



- Requirement to significantly increase the number of simulations
 - Customers (OEMs) now want product performance insights already at time of proposal
 - Not enough analysts available
 - Impossible to always perform dependable simulations in time with existing approach
- No in-house resources nor know how to create a robust automated simulation process
 - Complex geometries and simulation/physics
- Need to ensure that simulation results are always comparable
 - Independent of who, when, and where
- Want ability to preserve simulation know how when analyst leaves



GUI

- ▶ Browser based
 - ▶ No client installation necessary
 - ▶ Configured using standard EASA functionality

Implementation Effort

- ▶ Extra CAD effort (tagging)
 - ▶ 1 hr. initial model, 0 to some minutes follow on models
- ▶ Abstract model configuration
 - ▶ Pre-processing – 1 day*
 - ▶ Report – 1 day*

* if AM is authored from scratch; starting from similar existing models can reduce time to less than one hour.
- ▶ GUI configuration – 1 day
- ▶ Workflow configuration
 - ▶ Misc. scripts, macros, batch commands – 1 ½ days
- ▶ Additional testing – 1 day
- ▶ Total effort < 6 person days (implementation only, does not include time needed for requirement definition, simulation validation, and other planning/coordination tasks)



Summary

- ▶ The right combination of Low Code Tools allows practical and economical automation of simulation processes and simulation democratization
 - ▶ Significantly reduces both, initial effort and maintenance
- ▶ Geometry independence is the key
 - ▶ “Abstract Models”, reusable, geometry independent simulation templates, facilitate automating without extra effort
- ▶ Automation is affordable for any size company





Thank You!
Questions?

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