

NEi Nastran

NEi Advanced Optimization (Optimization Analysis)

Overview

The NEi Advanced Optimization software (HEEDS MDO - Hierarchical Evolutionary Engineering Design System Multi-Disciplinary Optimization) by Red Cedar Technology is a package for design automation. It performs process integration, automated design of experiments and optimization, sensitivity studies, reliability and robustness assessments on engineered products and processes. The software can be used to improve any engineering system (structural, thermal, fluid, acoustic, electrical). In structural design applications, for example, it can evolve designs that simultaneously satisfy objectives and meet constraints targets for durability, crashworthiness, stiffness, noise and vibration, mass and cost, manufacturability and reliability.

Capabilities:

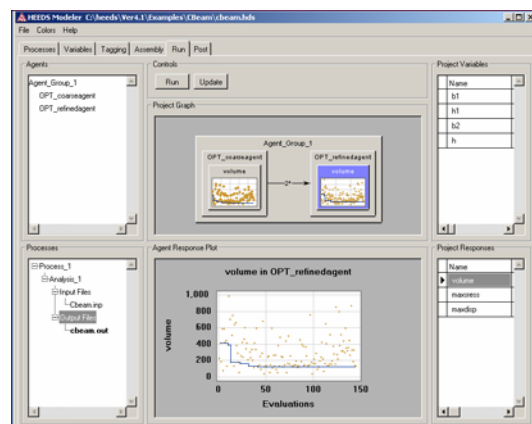
Parameter Optimization Methods and Strategies:

- SHERPA: Automated hybrid adaptive search that uses multiple search tools concurrently
- Multi-objective SHERPA (Pareto/tradeoff optimization)
- Global search methods
 - Genetic algorithm (hybrid, hierarchical, heterogeneous, mixed-variable)
 - Advanced proprietary evolutionary search algorithm
 - Simulated annealing
- Multi-start local search methods
- Surrogate-based methods (linear and quadratic response surfaces)
- User-defined methods via application programming interface (API)

Process Integration and Automation:

- Direct portals to common CAE tools for data extraction
 - Output portals for Nastran and ANSYS Workbench

- Input portals for Nastran, Abaqus, ANSYS Workbench and LS-DYNA
- Enhanced MoldFlow portal
- Time is available in output portals, which makes material calibration problems easy to set up
- Simplified coupling of simulation
- Automated execution of multiple simulation and analysis tools within a design evaluation process
- Integration and sharing of data among separate simulations
- Support for parallel processing on networks, clusters, and multiprocessors



- HEEDS PARALLEL (formerly MPD) allows to run HEEDS MDO optimization studies faster and make more efficient use of your hardware and software resources
- HEEDS PARALLEL offers support for interfacing with external queuing systems
- HEEDS internal queuing (now called HEEDS Q) offers the ability to copy files across computers
- New Evaluation Agent – allows the use of the process automation capabilities in HEEDS MDO to evaluate specific designs without performing a complete study

- Forming Limit Diagram (FLD) criteria
 - Allows the definition of a FLD in HEEDS MDO for use as a failure criterion in manufacturing and structural performance design studies
 - Eliminates the need for complex post-processing scripts to use a FLD

Design of Experiments:

- Full factorial designs (2-level and 3-level)
- Fractional factorial designs (2-level and 3-level)
- Taguchi orthogonal arrays
- Plackett-Burman designs
- Latin hypercube designs
- Central composite designs
- D-optimal designs
- Taguchi robust parameter design (RPD)
- User-defined arrays
- User-defined response data

Quality Design Tools:

- Taguchi robust parameter design (RPD)
- Structured sampling
- Random (Monte Carlo) sampling

Response Surfaces:

- Linear and quadratic
- Multivariate adaptive regression splines (MARS)

Solution Monitoring:

- Process control and run-time adjustment capability
- Real-time solution monitoring with user-controlled graphs and tables
- User-specified termination criteria

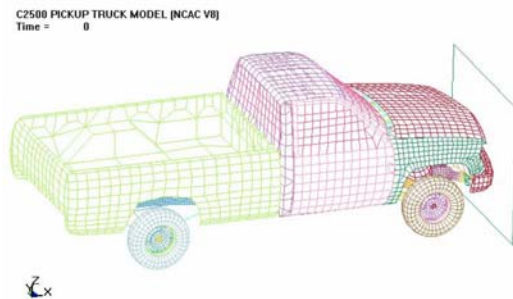


Figure 1. System Level Model (pickup truck)

Unique Features and Capabilities:

- SHERPA: Simultaneous Hybrid Exploration that is Robust, Progressive, and Adaptive
 - Finds better solutions the first time, identifying the best method or tuning parameters for each problem
 - Enables non-experts to successfully apply automated optimization
 - Performs direct optimization based on actual model evaluations, rather than using approximate response surface models
 - Uses multiple strategies concurrently to effectively and efficiently search even the most complex design spaces
 - Adapts itself to each problem, eliminating the need for user-specified tuning parameters
 - Achieves both global and local search simultaneously
- MO-SHERPA: Multi-Objective SHERPA
 - Performs multi-objective Pareto search using a modified version of the SHERPA algorithm
 - Handles multiple objectives independently to provide a set of optimized solutions that represent trade-offs among the objectives
 - Uses multiple search strategies simultaneously to more effectively explore the Pareto front
 - Contains no tuning parameters, so non-experts can achieve success every time

Analysis Manager:

- Analysis success check – eliminates the need to define additional responses to determine analysis success
- Analysis completion criteria – eliminates the need to create special scripts to check for completion of an analysis
- Unique folder for each analysis – reduces clutter, improves files organization, prevents overwriting of output files with the same names, and allows simultaneous execution of multiple analyses

User Interface:

Graphical User Interface:

- Intuitive graphical interface:
 - Pre-processing
 - Run-time monitoring
 - Post-processing
- Simplified coupling of simulation and analysis tools
- Guided problem set-up procedure
- Detailed and global views of problem statement
- Platform independent

Platforms:

Supported Platforms:

- Windows x86-32 (2000, XP, Vista)
- Windows x86-64 (XP, Vista)
- Linux x86-32 or x86-64 (RedHat Enterprise Linux v4 and v5, SuSE Linux Enterprise v9 and v10)

Support:

Unparalleled support:

- Leader in outstanding customer support
- Onsite and offsite training courses taught by experienced professional engineers
- Phone and email support staffed by a team of FEA specialists
- Optional consulting services available

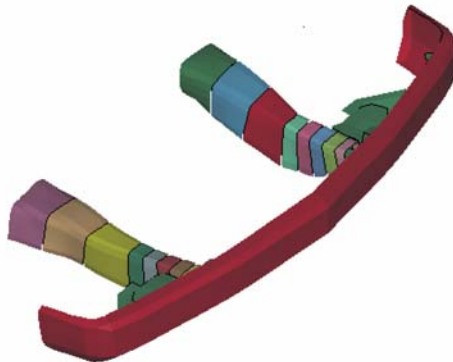


Figure 2. Reduced Subsystem Level Model

NEi Software, Inc. is aggressively focused on commitment to the customer. Detailed documentation, customized on-site training, and comprehensive technical support ensures that you will see immediate return on your investment.

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NEi Nastran *for Windows*
From NEi Software, Inc.