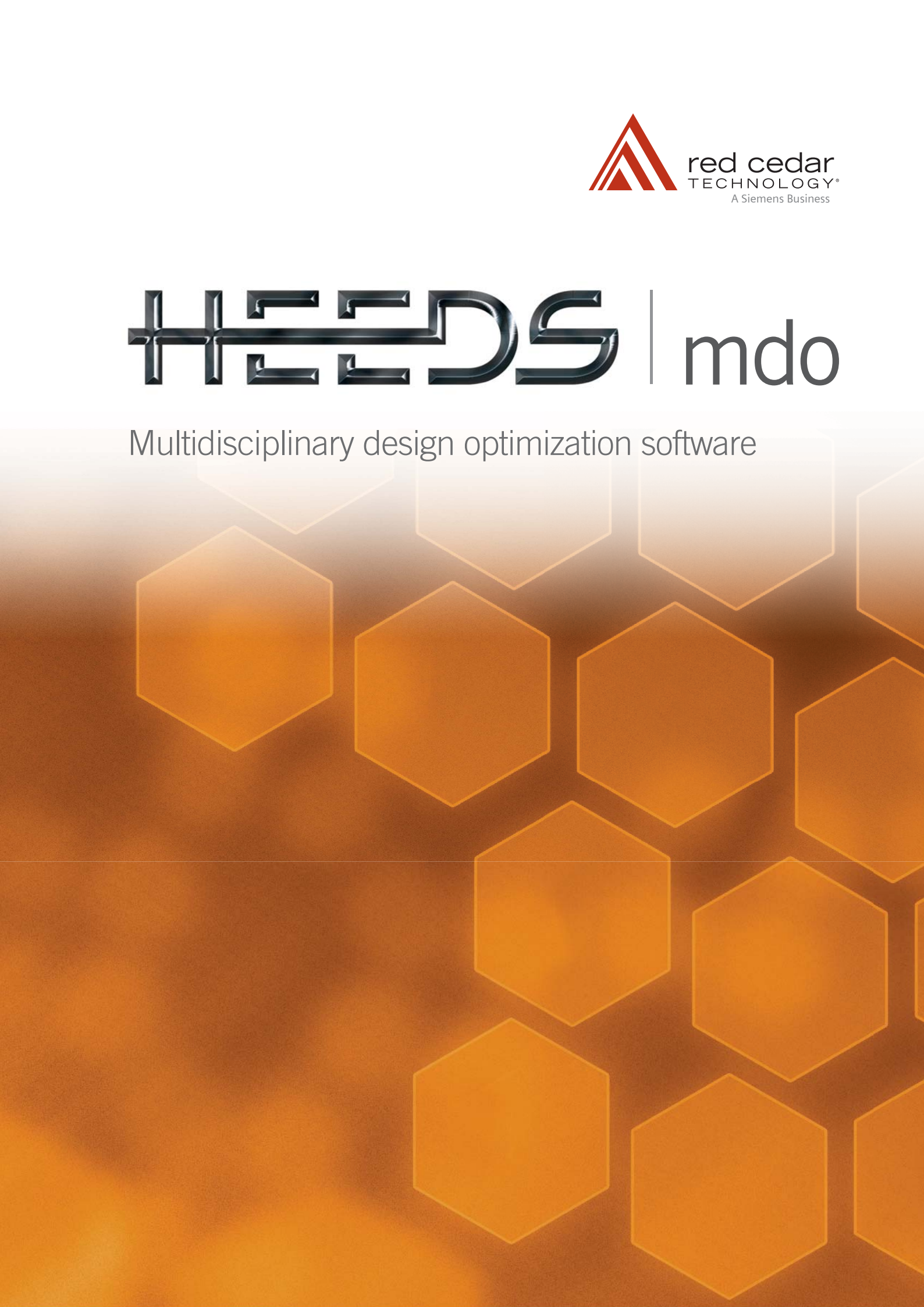
red cedar TECHNOLOGY®
A Siemens Business

HEEDS | mdo

Multidisciplinary design optimization software



HEEDS | mdo

Multidisciplinary design optimization software

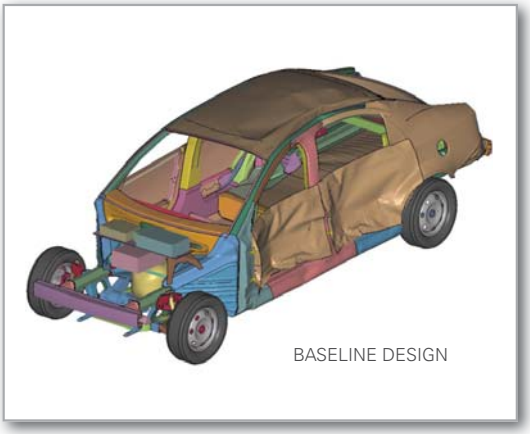
Discover better designs, *faster*

HEEDS® MDO automates and accelerates the engineering design exploration process. Whether you need to improve the design of a simple component or engineer complex multidisciplinary systems, HEEDS MDO is flexible enough to find the values of design parameters that best satisfy your design criteria.

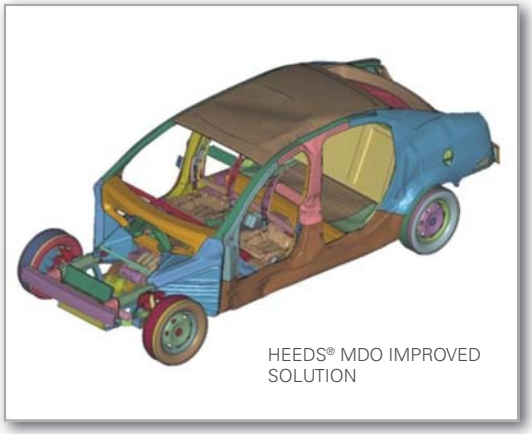
"Using HEEDS, we are able to discover much better designs than we could when we used a manual FEA approach. Also, we are able to rule out concepts that are not feasible, because we are confident that HEEDS has thoroughly explored the design space for each concept."

Arun Nair, Project Engineer, Corporate CAE Group, BD

HEEDS MDO can be easily integrated into your current workflow with the design and analysis tools you prefer to use. Then, it automatically explores the design space to quickly identify solutions that meet your goals, such as reducing product cost and/or mass while improving performance.



BASELINE DESIGN



HEEDS® MDO IMPROVED SOLUTION

The optimization reduced the mass of the designed parts by 33.5kg. This resulted in a reduction of 22% over the baseline design (from 152 to 118.5kg). The relative cost measure was also reduced by 19%.

Benefits and Features

Benefits of Using HEEDS MDO

- **Reduces development costs and improves product performance**
  With revolutionary optimization methods available only in HEEDS, you can uncover new design concepts that improve products and significantly reduce development, manufacturing, warranty and distribution costs.
- **Unlocks the power of your CAE tools**
  HEEDS MDO plays well with all popular CAE applications to automate and expedite design optimization. It can integrate multiple software tools to handle pre- and post-processing, simulation, and multidisciplinary optimization.
- **Lets you focus on innovative design**
  There's no need to experiment with different optimization algorithms and confusing tuning parameters for each new problem. The HEEDS SHERPA algorithm adapts itself to your problem automatically, finding better solutions faster, the first time.
- **Is easy to learn and use**
  Even engineers with very little optimization experience can use HEEDS MDO to discover optimal designs, often in a fraction of the time it would take to perform a handful of manual iterations.
- **Leverages your existing knowledge and intuition**
  Only HEEDS allows engineers to suggest new design ideas both before and during an optimization study to combine math-based and intuition-based search intelligence, and to accelerate knowledge creation.

Product Features

- **Multidisciplinary, multi-objective parametric design optimization**
  Whether your problem involves structures, fluids, heat transfer, electro-magnetics, acoustics, NVH and dynamics, cost, or any combination of these, HEEDS MDO can help you understand complex design trade-offs and find optimized solutions.
- **Automated Design of Experiments (DOE)**
  When it's important to predict design sensitivities, or gain a clearer understanding of your design space, a HEEDS MDO DOE study is often the ideal approach. It allows you to extract a great deal of useful information quickly, with the least computational or experimental effort possible.
- **Sensitivity studies**
  Use HEEDS MDO to identify the variables that affect your design the most. You can then ignore variables that are not important or set them to values that are most convenient or least costly. This allows you to control quality more effectively while lowering cost.
- **Robustness and reliability assessments**
  To better understand and control the effects of variations in geometry, materials and loads, use HEEDS MDO to calculate the robustness and reliability of your design using stochastic parametric studies.

Optional Modules

Interfaces/Portals

MDO plays well with all popular CAE applications. It can work with multiple software tools to handle pre- and post-processing, simulation, and multidisciplinary optimization.

HEEDS MDO features direct input and output interfaces for the following tools:

- Abaqus
- Abaqus CAE
- Adams/Car
- Adams/Chassis
- Adams/View
- ANSA
- ANSYS Workbench
- Excel
- GT-Suite
- JMAG
- LS-DYNA
- MATLAB
- Moldflow
- Nastran
- NX
- Python
- Creo
- Ricardo SDF
- Simpack
- SolidWorks and SolidWorks Simulation
- STAR-CCM+

Additionally, HEEDS MDO offers a powerful generic interface that allows it to link to any commercial or proprietary software tool that creates input or output files in ASCII format. If you aren't sure whether your tool will work with HEEDS MDO, contact us to find out.

HEEDS PARALLEL

Parallel execution of design studies
When faster turnaround time is important, HEEDS PARALLEL speeds up your design study by submitting multiple design evaluations simultaneously to different processors. Even separate analyses within a single design evaluation can be distributed to different machines to accommodate CAD/CAE tool license availability.

HEEDS PARALLEL achieves a linear or better speed-up with added resources and optimizes your existing software and hardware resources. It interfaces directly with popular queuing applications like PBS, LSF, MS Server, and others. If you don't have a queuing system in place, you can use our job management system, HEEDS Q.

Together, HEEDS MDO and PARALLEL provide the most comprehensive control of your study, allowing you to explore the design space in significantly less time.

HEEDS POST

Data processing, visualization and discovery software
Reviewing study data is about so much more than just finding the best design.

Within HEEDS POST, you can create a variety of plots and tables, customize them to meet your needs, and view them in logical groups to best illustrate relationships among variables and design goals. With this information, you can refine future studies to find even better designs. When it's time to share your insights, you can export plots and data from HEEDS POST for presentations and reports.

VCollab

HEEDS POST uses the technology from VCTI to provide enhanced visualization capabilities. You can visualize the results from your CAE analyses directly within HEEDS POST. You can select any design(s) and study the corresponding design shape/results in the embedded viewer. Adding visualization to the HEEDS design exploration process greatly accelerates experiential learning and deepens the level of review possible for any given design.

Typical Applications by Industry for HEEDS® MDO

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Multidisciplinary design ptimization software

Aerospace
- Composite wings
- Turbine blades
- Landing gear
- Wing profile design
- Sensors
- Fuselage structures
- Composite joint layup
- Rocket propulsion

Automotive
- Body and chassis
- Suspension systems
- Crashworthiness
- Hybrid electric powertrains
- Bushings
- System and component crash and NVH
- Vehicle dynamics
- Seat systems
- Exhaust systems
- Electromagnetic sensors
- Pistons, rings and gears
- Heating and cooling systems
- Bumper systems

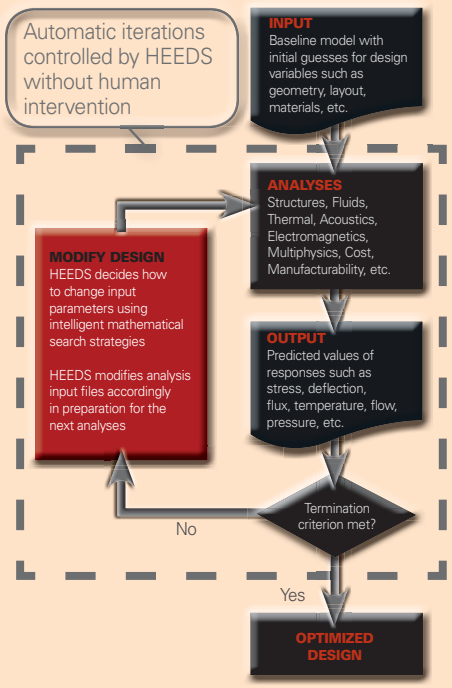
Biomedical
- Orthopedic implants
- Vascular stents
- Surgical devices
- Biomaterials modeling
- Human body model calibration
- Consumer products
- Press fits
- Racing head and neck support (HANS)

Durable Goods
- Plastic and metallic containers
- Food manufacturing equipment
- Sports equipment
- Shoe design
- Transport equipment
- Packaging

Materials
- Composite layup design
- Material selection, model calibration, identification and property optimization
- Redesign for material conversion

Manufacturing and Processing
- Injection molding
- Stamping
- Forging
- Hydroforming
- Weld design
- Chemical processing
- Die design

How HEEDS® MDO Works



For More Information

For more information about HEEDS MDO, visit www.redcedartech.com, call our headquarters at (517) 664-1137 or contact your local reseller.

Platforms

HEEDS MDO is supported on 32-bit and 64-bit Windows and Linux systems.

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