HyperWorks®

A Platform for Innovation™

Altair® OptiStruct®

Meet Today's Complex Product Development Challenges with Award-Winning Concept Design and Optimization Technology

HyperWorks is a division of Altair

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Altair® OptiStruct® is an award-winning, finite-element-based software for concept design and optimization. OptiStruct assists engineers and designers in developing lightweight, structurally efficient designs in a timely manner. Using OptiStruct, they can deliver dramatic improvements in design performance and achieve product and business objectives faster.

Benefits

Design

- Cuts development time and costs by providing clear design direction early in the design cycle
- Employs powerful optimization techniques to achieve significant weight reduction
- Creates unique, high-performance designs that satisfy performance requirements
- Generates competing design themes

Optimization

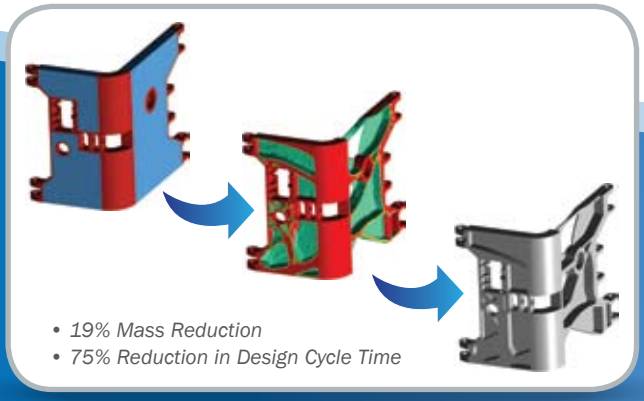
- Increases competitiveness through product innovation.
- Provides an easy-to-use graphical user interface and tight application integration that cut training time and maximize end-user efficiency.
- Leads the industry with the ability to solve the largest, most complex optimization problems.

Capabilities

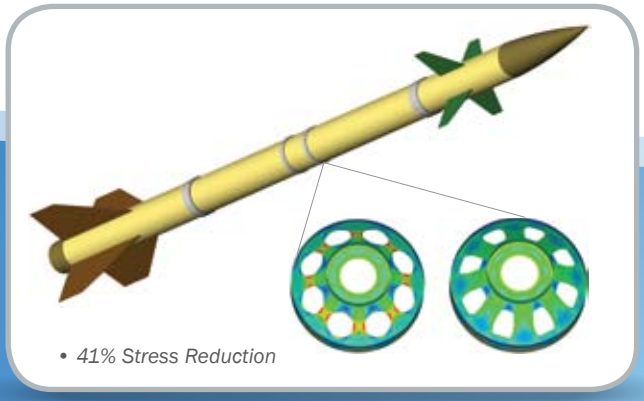
Design

OptiStruct's award-winning design-synthesis technology uses the topology optimization approach to generate innovative concept-design proposals. In the initial phase of the development process, the user enters the package space information, design targets and manufacturing process parameters. OptiStruct then generates a manufacturable design proposal that is optimized for the given design targets. The manufacturing process parameters are important in achieving interpretable, feasible designs.

In sheet metal parts, beads are often used to reinforce structures. For given allowable bead dimensions, OptiStruct's topography optimization technology will generate an innovative design proposal for the ideal bead pattern of reinforcement.



Aircraft Door Hinge Design and Optimization Using Topology and Shape Optimization



Missile Support Structure Design Using Free-Shape Optimization

Composite Optimization
OptiStruct's new comprehensive composite design and optimization package streamlines composite structure design work for both the designer and the analyst. This ply-based approach simplifies the interpretation of the concept design results from free-size optimization. OptiStruct also considers manufacturing requirements early in the design process to achieve practical designs and proposes a lay-up sequence that meets these requirements.

Multi-Disciplinary Structural Optimization
Analyzing the performance of structures is only one of the many steps in the product development process. Based on the analysis results, product engineers make part modification proposals in order to meet stress, weight or stiffness requirements. OptiStruct's seamless integration of state-of-the-art, gradient-based optimization methods makes multi-disciplinary size and shape optimization easy.

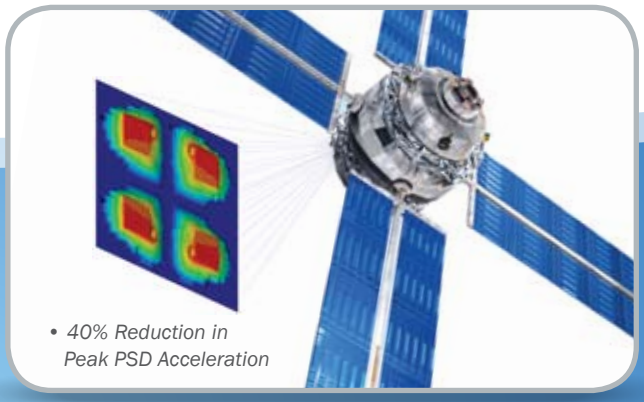
Size optimization defines ideal component parameters, such as material values, cross-section dimensions and thicknesses. Shape optimization is applied on existing product components. OptiStruct's free-shape optimization can be used to reduce high-stress concentrations. OptiStruct can also use HyperMesh's morphing technology to update finite-element meshes during optimization. As a result, OptiStruct can easily propose design modifications without a need for underlying CAD data and with a minimum of user interaction. Within the OptiStruct environment, optimization parameters can be defined with only a few mouse clicks.

OptiStruct can use responses from many different disciplines in the optimization process such as static, buckling, frequency response, random response, thermo-mechanical, heat transfer, acoustic analysis. OptiStruct's iterative solver for static analysis and SPMD version for multiple-static, linear-buckling and direct frequency response reduce the CPU time significantly. Surface-to-surface contact has been introduced. Tied interfaces for linear analysis can be modeled with the FREEZE option of a contact. In addition to these capabilities, OptiStruct has innovative methods for system-level optimization and fatigue optimization.

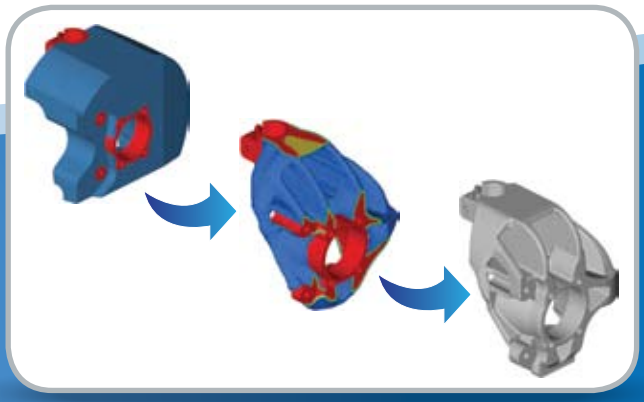
System-Level Design Optimization
Equivalent Static Load Method (ESLM) is an innovative method implemented for optimization of both flexible bodies and rigid bodies simultaneously. This first-in-industry, innovative method, allows for the optimization of system-level multi-body dynamic models. Additionally ESLM can be applied to concept design synthesis and design fine-tuning.

Fatigue-Based Concept Design and Optimization
OptiStruct's fatigue optimization capabilities allow concept design synthesis (topology, topography, free-size) and design fine-tuning (size, shape, free-shape) based on fatigue performance. Damage and life from either stress-life or strain-life fatigue analysis can be used as design criteria. This capability allows concept design using fatigue responses and is computationally efficient compared to fatigue-based optimization using third-party applications.

Easy Model Set-up, Post-Processing and Automation
OptiStruct is tightly integrated into the HyperWorks® environment, enabling fast and easy model set-up in HyperMesh®. Animations, contour plots and charts can be generated using the post-processing tools in HyperView®. Moreover, jobs can be easily automated by using the powerful automation and data-management layer available in HyperWorks.



Bead Design of Satellite Panel Using Topography Optimization



Automobile Knuckle Design Using Manufacturing Constraints

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