

VisualDoc for ANSYS Mechanical



Overview

- Seamless couple ANSYS Workbench simulation modules with VisualDOC MDO options. Simulation modules include mechanical and fluids. Main MDO options available are DOE, RSA, Reliability and Optimization
- Design parameters in ANSYS Workbench can be utilized as design variables in VisualDOC
- ANSYS simulation results can be used as objective and/or constraints in VisualDOC
- Data exchange between ANSYS Workbench and VisualDOC is performed automatically
- Optimization results can be concurrently plotted or used after optimization is finished

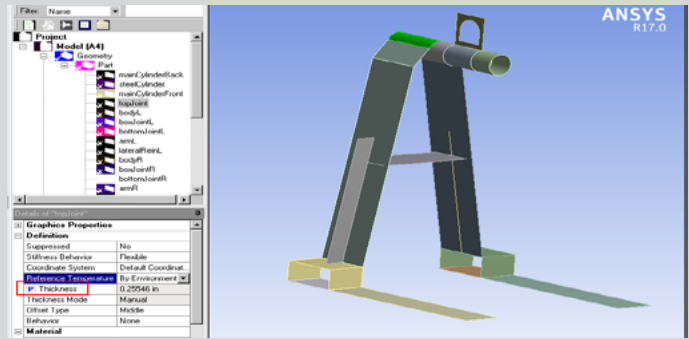
Optimization Case Study

- Objective: Minimize the total mass
- Constraints: stress and displacement
- Design variables: the thickness of all of the components except the Fixation support

Optimization Result

- The total mass reduction was approximately 28.5%
- All constraints were satisfied within tolerance
- Optimization process took 12 design iterations

Pallet Lifter Optimization



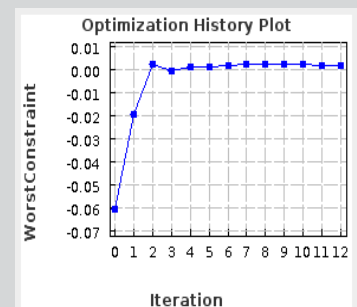
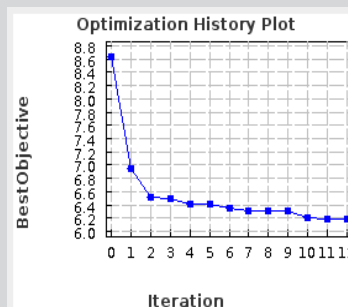
	A	B	C	D
	ID	Parameter Name	Value	Unit
1				
2	Input Parameters			
3	Static Structural (A1)			
4	P1	mainCylinderBack Thickness	0.1875	in
5	P3	topjoint Thickness	0.25546	in
6	P5	bodyL Thickness	0.22886	in
7	P7	boxjointL Thickness	0.1875	in
8	P9	bottomjointL Thickness	0.37601	in
9	P11	armR Thickness	0.37706	in
10	P13	lateralReinL Thickness	0.19163	in
11	P15	bodyR Thickness	0.22886	in
12	P17	boxjointR Thickness	0.1875	in
13	P19	bottomjointR Thickness	0.37601	in
14	P21	armL Thickness	0.37706	in
15	P23	lateralReinR Thickness	0.19163	in
16	P25	stabilizer Thickness	0.1875	in
17	P29	mainCylinderFront Thickness	0.1875	in
18	New input parameter			
19	Output Parameters			
20	Static Structural (A1)			
21	P27	max Displacement	0.10135	in
22	P28	max Stress	3638.5	psi
23	P30	total Mass	6.2017	lbn
24	New output parameter			
25	Charts			

Problem Setup & Parametrization in ANSYS Workbench

Parsed Input Data			
Name	Value	Use	
mainCylinderBack_Thickness	0.1875	<input checked="" type="checkbox"/>	
topjoint_Thickness	0.5825	<input checked="" type="checkbox"/>	
bodyL_Thickness	0.375	<input checked="" type="checkbox"/>	
boxjointL_Thickness	0.1875	<input checked="" type="checkbox"/>	
bottomjointL_Thickness	0.6875	<input checked="" type="checkbox"/>	
armL_Thickness	0.5	<input checked="" type="checkbox"/>	

Parsed Output Data			
Name	Value	Use	
total Mass	0.641970369241	<input checked="" type="checkbox"/>	
max_Displacement	0.039363728724	<input checked="" type="checkbox"/>	
max_Stress	2063.974412497494	<input checked="" type="checkbox"/>	

VisualDOC Workflow and Data Exchange



Optimization History

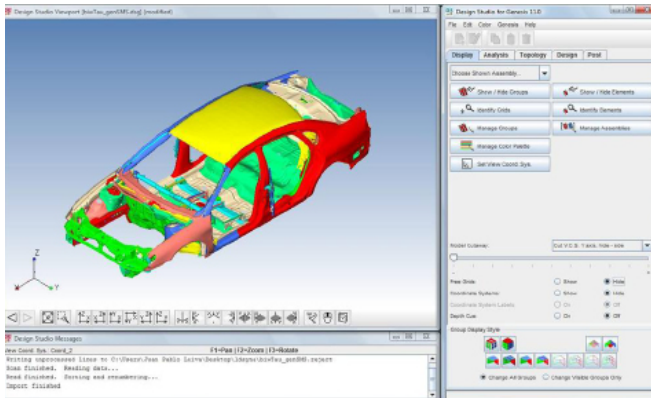
Other VR&D Products

GENESIS - Structural Analysis & Optimization

GENESIS is a fully integrated finite element analysis and design optimization software package. Analyses include static, normal modes, direct and modal frequency analysis, random response, heat transfer and system buckling. Design optimization is based on the advanced approximation concepts approach to find an optimum design efficiently and reliably. Actual optimization is performed by the well established DOT and BIGDOT optimizers, also from VR&D. Design capabilities include: topology, shape, sizing, topography, topometry, and freeform optimization. Typically the optimization requires less than ten detailed finite element analyses, even for large and complex design tasks.

Design Studio for GENESIS

Design Studio for GENESIS is a design oriented pre- and post-processor graphical interface for the GENESIS program. It features built-in and easy-to-use trails for setting up the optimization problem and running GENESIS from the interface. It also supports post-processing of the optimization results with contour plots, deformed plots, animations, etc.



Design Studio for GENESIS

GSAM - GENESIS Structural Optimization for ANSYS Mechanical

GENESIS Structural Optimization for ANSYS Mechanical (GSAM) is an integrated extension that adds topology, topography, freeform, sizing, and topometry optimization to the ANSYS environment. Designers benefit by automatically generating innovative designs in a reliable, robust and easy-to-use interface. The extension allows the user to setup the structural optimization problem, optimize, post-process, export optimized geometry all within the ANSYS environ-

GTAM - GENESIS Topology for ANSYS Mechanical

GENESIS Topology for ANSYS Mechanical (GTAM) is an integrated extension that adds topology optimization to the ANSYS environment. GTAM is a subset of GSAM. GTAM is limited to topology only.

About Vanderplaats Research & Development, Inc.

Vanderplaats Research & Development, Inc. (VR&D) mission is to provide the best technology, software, staff of experts and client support in the optimization world. The company was founded by Dr. Garret Vanderplaats, one of the best known experts in the optimization world. VR&D has a track record for consistently delivering a competitive advantage to customers in a broad range of industries.

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VisualDOC - Multidiscipline Design Optimization

VisualDOC is a software system that simplifies adding optimization to almost any design task. It uses a powerful intuitive graphical interface, along with gradient based and non-gradient based optimization, response surface (RS) approximate optimization, and design of experiments (DOE) methods. VisualDOC interfaces easily to your own code or third-party analysis program. For example, VisualDOC can be easily coupled with ANSYS Workbench.

DOT - Design Optimization Tools

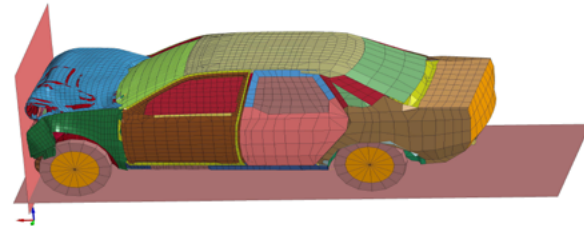
DOT is a general purpose numerical optimization software library which can be used to solve a wide variety of nonlinear optimization problems. If you require only an optimization engine to incorporate into your design software, DOT will serve that purpose.

BIGDOT

BIGDOT is intended to solve very large, nonlinear, constrained problems where gradient information is available, and function and gradient evaluation is efficient. BIGDOT is capable of solving continuous, discrete/integer or mixed variable problems. Problems in excess of three million variables have been solved by BIGDOT.

ESLDYNA - Optimization Software for LS-DYNA

ESLDYNA is based on the Equivalent Static Loads (ESL) method to perform optimization based on a nonlinear finite element analysis with GENESIS as the structural optimization program. ESLDYNA takes advantage of the capability of GENESIS, a linear structural optimization program, to solve large scale optimization problems based on the responses from a LSdyna nonlinear finite element analysis. It also helps to significantly reduce the design time by identifying high performance designs with five to ten nonlinear analyses.



Topometry Optimization to Minimize Firewall Intrusion

SMS Fast Eigensolver

The SMS eigensolver may be added to existing NASTRAN installations to offer significant performance advantages over the default method when a large number of eigenmodes are required for a system with many degrees of freedom. Benchmark studies and user experience show 2-10 times speedup. SMS may also be embedded into your product/software.

