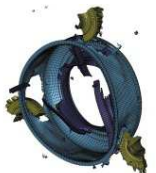
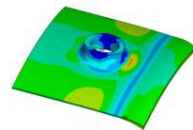
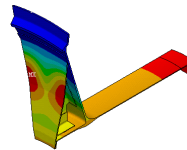
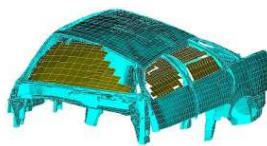
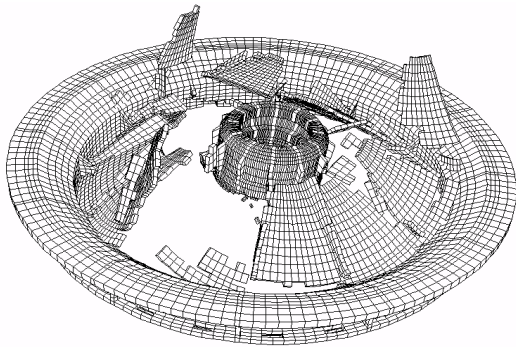


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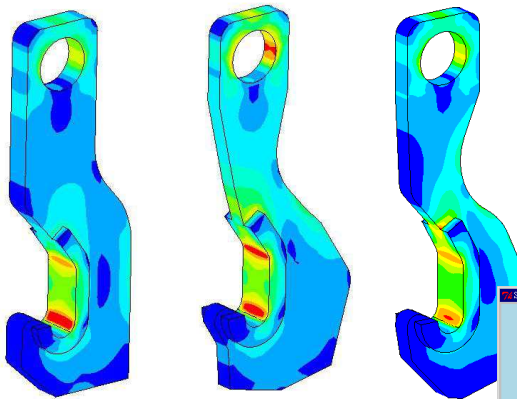
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Optimize Your Product. Make The Most Profit Out Of Your CAE Investment

SmartDO was applied on the real-world industrial design since 1992. With its robust and stable optimization solver, SmartDO has been used on different physics and disciplines to optimize the design, such as

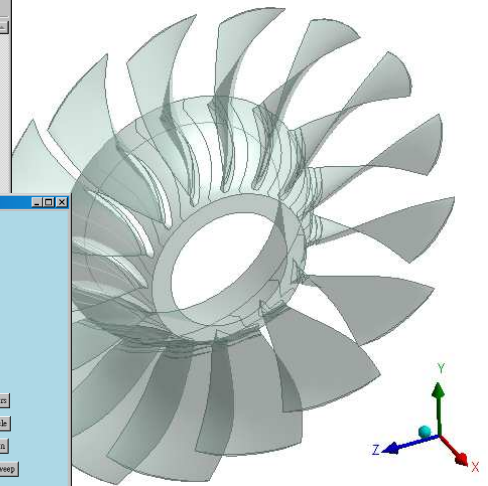
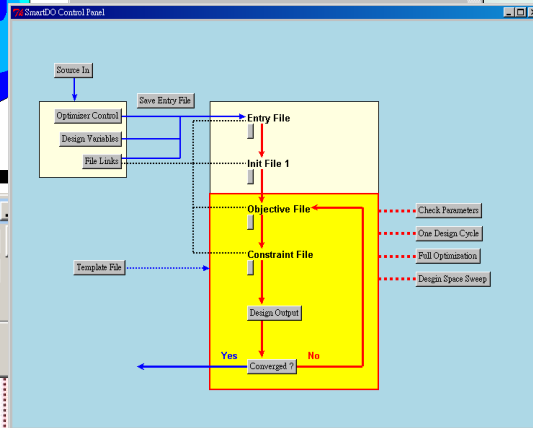
Structure/ Crashworthiness/ CFD/ Heat Flow/ Heat Transfer
Structural/Thermal/Electronic Coupled
Automatic Control

Gas Turbine Engines/ Fluid Power System/ Nuclear Energy
Civil Structure and Resident Roof (Sizing, Shaping and Topology)
Air Cargo Deck/ Thermoelectric Generator/ A-Arm of the Armored Tank
Keyboard Rubber Dome/ Connectors/ Composite Structure/ Circulation Water Pump
Wave Energy Converter/ Jet nozzle/ O-Ring Seal/ Golf Club Head
Semi-Conductor/ Keratotomy Surgeries/ Shock Absorbing

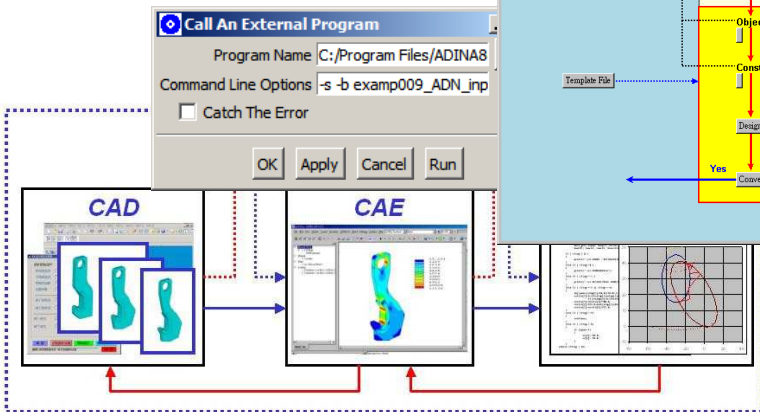


Structural Optimization

Variable Name	Lower Bound	Initial Value	Upper Bound
smartdo_x(1)	-0.07	0.00	0.07
smartdo_x(2)	-0.03	0.00	0.03
smartdo_x(3)	-0.07	0.00	0.07
smartdo_x(4)	-0.03	0.00	0.03



Multi-physics



Engineering Lifecycle Integration



Concurrent Sizing/Shaping/Topology Optimization

Optimizer

- **All optimizer with Global Optimization capabilities, using Direct Global Search**
- **Gradient-Based Direct Global Optimization**
 - Tunneling and Hill Climbing
 - Local Optimizer with DV Normalized [1]
 - Conjugate Feasible Direction Method (CFDM)[1], Recursive Feasible Direction Method (RFDM)[1], Recursive Conjugate Feasible Direction Method (RCFDM)[1]
 - Smart Dynamic Search(SMDS)[1]
 - Applicable for differentiable problem. Also for both smooth problems or with noise [1,2]
- **The Robust Genetic Algorithms (RGA)**
 - Adaptive Penalty Function[1]
 - Automatic Schema Representation[1]
 - Automatic Population and Generation Number Calculation[1]
 - Adaptive and Automatic Cross-Over Probability Calculation[1]
 - Absolute Descent[1]
 - Concurrent Sizing, Shaping and Topology Optimization
 - Applicable for Binary(0/1) and Combinatory Optimization
 - Applicable for differentiable and non-differentiable problems
- **No limitation on number of Design Variables and/or Constraints.**
- **Accept infeasible design for the initial design and starting points. SmartDO will resolve the infeasibility before optimization.**
- **Support multi-thread computation[3].**

Parametric Modeling

- Modifying the parameters third party packages (CAD, CAE, CAx) without access to its source code, Generally do not need additional package or module either.

User Interface and Platform

- Main Menu : with pull-down menu interface
- Command Console : interactive command and/or batch mode
- Editor Canvas : Text editor and SmartDO specific functionality
- Control Panel : Execution flow control with visual flow charts and buttons
- Open Architecture. User-Programmable, built-in Tcl/Tk core
 - SmartScripting : Smart Tcl/Tk script generator.
 - SmartPET and PET (Preprocessor for Embedded Tcl/Tk) : Embedding Tcl/Tk scripting into any text input file on the preprocessing level
 - Supporting Objective Oriented Tcl/Tk scripting (after SmartDO version 6)
- SmartLink : Direct link with other packages. Import the parameters of third-party packages, arbitrarily cross-link with Design Variables, Objective Function and/or Constraint in SmartDO
 - ANSYS Workbench :
 - NX CAE

NOTE

1. Proprietary algorithms.
2. Dealing with functions with local and minor to medium noise.
3. For specific software only.