SmartDO
A Smart Design Optimization System

Compact. Versatile. Cost-Effective
Engineering Lifecycle Integration
- Integrate your FEA/CAE/CAD/CFD/CAx design evaluation process.
- Parameterize the modeling and the characteristic of product digital contents.

World-Leading Smart Global Optimization Technology
- Capable of performing Concurrent Sizing, Shaping and Topology Optimization.
- With both Gradient-Based Nonlinear Programming (NLP) for differentiable problems, and Non-gradient-based approach (like Robust Genetic Algorithms, RGA) for non-differentiable problems.

Powerful Yet User-Friendly Interface
- Control Panel GUI acts as the wizard/template of design optimization process and setup. Modeling and execution is just few clicks away.
- SmartScripting for generating Tcl/Tk scripts through dialog box.
- Built-in Tcl/Tk engine for flexible programming and customization.

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Structural Optimization

CFD Optimization

Concurrent Sizing/Shaping/Topology Optimization

Specialized, Customized, Optimized CAE Solution Provider
Product Technical Specification

Gradient-Based Nonlinear Programming (NLP)
- Conjugate Feasible Direction Method (CFDM)\(^1\), Recursive Feasible Direction Method (RFDM)\(^1\) and Recursive Conjugate Feasible Direction Method (RCFDM)\(^1\)
- World-Leading Response Smoothing Technology\(^1\), detecting noise caused by package integration or uncertainty in discretized numerical method (like FEA or CFD) automatically
- Capable of Global Optimization\(^1,2\)
- Suitable for differentiable optimization. Can handle response with smooth or noisy behavior\(^1,2\)

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\(^1\)
- Capable of performing Concurrent Sizing, Shaping and Topology Optimization
- Capable of Global Optimization
- Capable of Combinatory Optimization
- Suitable for differentiable and non-differentiable problems
- Support Design Space Sweep

Smart Particle Swarm (SPS)
- Same Sampling Approach as GA/RGA\(^1\)
- Semi-Gradient Approach. More efficient than Gradient-Based Approach. More accurate than GA\(^1\)
- Automatic Population and Generation Number Calculation\(^1\)
- Absolute Descent\(^1\)
- Capable of Global Optimization \(^1\)
- Suitable for differentiable problems \(^1\)
- Support Design Space Sweep

User Interface and Platform
- Control Panel : The wizard/template of design optimization process and setup. Modeling and execution is just few clicks away
- SmartScripting : Generating Tcl/Tk scripts through dialog box
- Main Menu : Integrated interface. Pull-down menu for invoking actions
- Command Console : Interact command and/or batch mode execution
- Editor Canvas : Text editor with functionality specific to SmartDO
- Programming Interface : Built-in Tcl/Tk engine for flexible programming and customization
- Couple with any CAE/CAD/CAX package. No need to modify the source code of the third-party software

NOTE
1. Proprietary algorithms.
2. Dealing with functions with local and minor to medium noise

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Software Products and Services

- **SmartDO**: A Smart Design Optimization System and Services
- **System Integration and Design Automation**
- **CAE Analysis Consultancy Services**:
  - Structural reliability: stress, vibration, deformation, buckling, lifing/fatigue, stability, fracture mechanics, creep, plasticity, nonlinear, contact, dynamics, crashworthiness/impact.
  - Structural/heat/CFD/electrical coupled-field analysis
  - CFD/Heat Transfer/Heat Flow/Conjugate Heat Transfer

**The Virtual Lab Technology**
- Full Engine Module Fan blade-out and hub-burst simulation
- Full car crash simulation
- 3C product drop test
- Weaponry ballistic and impact analysis

Software Distribution, Support and Services

- **ADINA**: The finite element system for structures, heat transfer and CFD, Taiwan area distributor
- **DyRoBeS**: Rotor dynamics software, Taiwan area distributor

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