Concepts NREC

The Experts in Turbomachinery

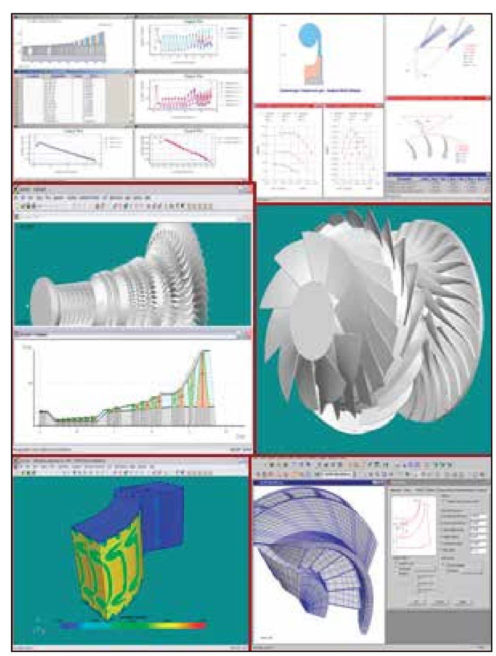
Holistic Optimizer for Stress Analysis

TurboOPT II™

Concepts NREC's design optimization program optimizes turbomachinery performance, as well as the design process. TurboOPT II™ interfaces with all of Concepts NREC's major software products for the design and analysis of turbomachinery. The optimal objective may be lowest cost, lightest weight, highest performance, longest life, or any combination of these attributes.

Complete Integration with the Agile Engineering Design System®

TurboOPT II has been designed for ease of use and integrates multidisciplinary optimization with meanline or overall design through COMPAL®, PUMPAL®, FANPAL™, RITAL™ and AXIAL™, detailed design through AxCent®, and engineering analysis through FINE/pbCFD™, FINE™/Turbo and Pushbutton FEA™. It addresses compressors, pumps, fans, and turbines, including radial, mixed-flow, and axial machinery, or any combination thereof, with access to all major input and output variables of the various codes through Python® scripting. TurboOPT II is intended to allow an engineer to achieve an optimal design in less time and at a lower cost.

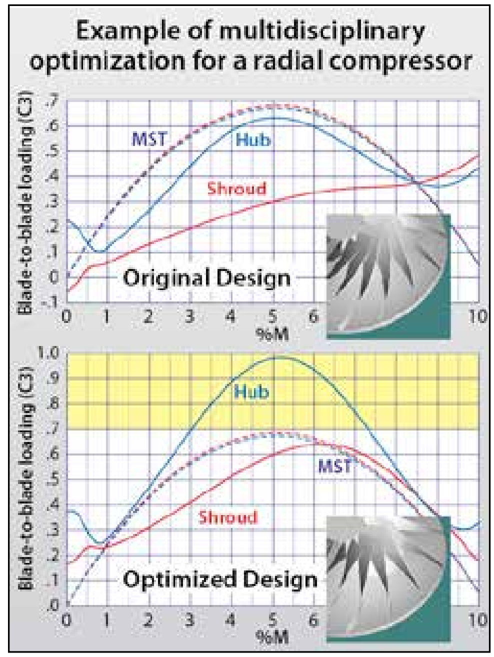


A sample of the Agile Engineering Design System® software suite of products.

Multilevel Optimization Approaches

In all applications, TurboOPT II offers a multilevel approach to explore the design space in an effective and efficient manner. The software enables sequential optimization (a new task begins after the prior task completes), coupled optimization (two or more tasks are performed for each optimization iteration), nested optimization (a separate optimization is run before or after every iteration of an outer optimization loop), and combined optimization (an arbitrary combination of sequential, coupled, and/or nested optimizations).

The Summary page of TurboOPT II is where the optimization layout is defined and the target programs are chosen. The Variables page of TurboOPT II is where the design variables are selected using a pull-down list from each program. Variable baseline values, minimum range, and maximum range are input, along with any optimization constraints that may apply. The Objective page of TurboOPT II is where the output variables of the calculating programs are selected from a pull-down list. For a given optimization block, the weighting for each variable in the objective function is then defined. Several optimization schemes such as simulated annealing, design of experiments, local optimization, global optimization, and combined schemes can be set. Even more selections can be made using the accompanying optimization program.



Impeller variables include hub blade-angle distribution, shroud blade-angle distribution, hub contour distribution, and thickness scaling. Design targets include loading curve and stress level.

Compatibility

TurboOPT II is compatible with the Isight optimization solver by SIMULIA®, as well as IOSO from Sigma Technology, the VisualDOC optimization solver by Vanderplaats Research & Development, Inc., modeFRONTIER® by ESTECO, and potentially, any other optimization engine. Additionally, Concepts NREC also offers its own optimization engine to work with TurboOPT II.

Performance Features

TurboOPT II's flexible user interface, with performance maps for each variable, allows users to customize settings for any number of performance maps.

- Perform single and multidisciplinary optimizations using existing Agile links during multidisciplinary optimizations.
- Explore design space using a multilevel optimization approach (methods include sequential, coupled, and nested).
- Constrain input and output variables according to baseline values, design ranges, weight of priority, and more.
- Link any number of different variables among different optimization tasks.
- Define general optimization schemes, including global, local, and combined.
- Save performance map configurations when using the internal optimizer.

Concepts NREC's Agile Engineering Design System®

Concepts NREC's Agile Engineering Design System®		Radial				Axial			
		Compressors	Fans	Pumps	Turbines	Compressors	Fans	Pumps	Turbines
CAE Preliminary Design									
Meanline Approach	AXIAL™					✓			✓
Meanline Approach	COMPAL®	✓							
Meanline Approach	FANPAL™		✓				✓		
Meanline Approach	PUMPAL®			✓				✓	
Meanline Approach	RITAL™				✓				
CAE Detailed Design									
3D Geometric Design	AxCent®	✓	✓	✓	✓	✓	✓	✓	✓
Basic CFD Option for AxCent	FINE™/pbCFD®	✓	✓	✓	✓	✓	✓	✓	✓
CFD Option for AxCent	FINE™/Turbo™*	✓	✓	✓	✓	✓	✓	✓	✓
FEA Option for AxCent	Pushbutton FEA™	✓	✓	✓	✓	✓	✓	✓	✓
CAE Specialized Design Software									
Gas Turbine Blade Cooling	CTAADS™								✓
Optimization	TurboOPT II™	✓	✓	✓	✓	✓	✓	✓	✓
Rotordynamics	Dyrobes®	✓	✓	✓	✓	✓	✓	✓	✓
Gas Turbine Cycle Analysis	Gas Turb®	✓				✓			✓
CAM Toolpaths									
Base Platform	MAX-PAC™	✓	✓	✓	✓	✓	✓	✓	✓
Flank Milling Option	MAX-5™	✓	✓	✓	✓	✓	✓	✓	✓
Point Milling Option	MAX-AB™	✓	✓	✓	✓	✓	✓	✓	✓
Closed Impeller Option	MAX-SI™	✓	✓	✓	✓	✓	✓	✓	✓
Single Blade Option	MAX-SB™	✓	✓	✓	✓	✓	✓	✓	✓

*Offered in partnership with NUMECA International as part of the FINE/Agile™ integrated suite.

Concepts NREC

CORPORATE HEADQUARTERS
217 Billings Farm Road
White River Junction, VT 05001-9486 USA
Phone (802) 296-2321 • Fax (802) 296-2325
E-mail: sales@ConceptsNREC.com
Web: www.ConceptsNREC.com