

TurboOPT II™

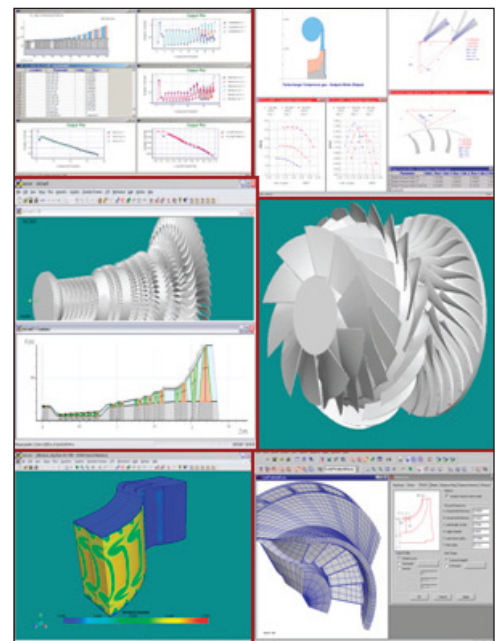
CONCEPTS NREC'S DESIGN OPTIMIZATION PROGRAM OPTIMIZES TURBOMACHINERY PERFORMANCE, as well as the design process. TurboOPT II™ interfaces with all of Concepts NREC's major software products for the design and analysis of turbomachinery. The optimal objective may be lowest cost, lightest weight, highest 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 multi-disciplinary optimization with meanline or overall design through COMPAL®, PUMPAL®, FANPAL™, RITAL™ and AXIAL™, detailed design through AxCent®, and engineering analysis through Pushbutton CFD® 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.

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).



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

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.

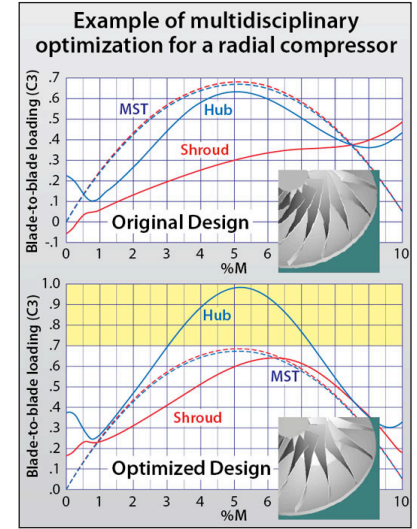
Compatibility

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., 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.



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.

Agile Engineering Design System® Applications

		Radial			Axial		
		Compressors	Pumps	Fans & blowers	Compressors	Pumps	Fans & blowers
Preliminary design	COMPAL®	✓					
	PUMPAL®		✓				✓
	RITAL™				✓		
	FANPAL™			✓			✓
	AXIAL™					✓	✓
Detailed design	AxCent®	✓	✓	✓	✓	✓	✓
CFD	Pushbutton CFD®	✓	✓	✓	✓	✓	✓
FEA	Pushbutton FEA™	✓	✓	✓	✓	✓	✓
Optimization	TurboOPT II™	✓	✓	✓	✓	✓	✓
CAM	MAX-PAC™	✓	✓	✓	✓	✓	✓

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CONCEPTS NREC

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Concepts NREC design software is compatible with all commercial design packages.