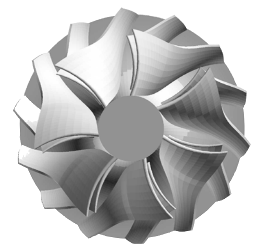
Concepts NREC

The Experts in Turbomachinery

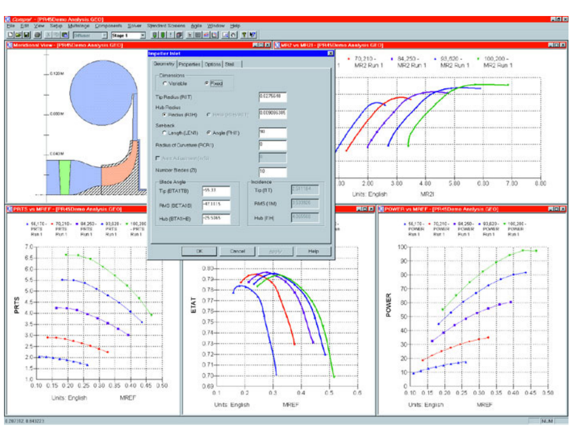


Preliminary Design Module for Radial and Mixed-Flow Compressors

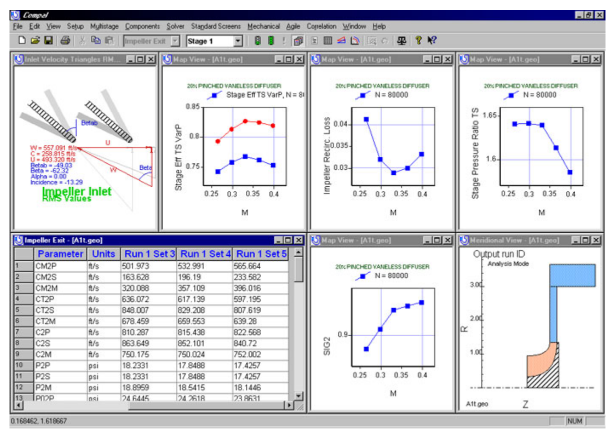
COMPAL®

Perform meanline design optimization for radial and mixed-flow compressors with COMPAL® Computer-Aided Engineering (CAE) software from Concepts NREC. The meanline approach can be used to rapidly design and analyze radial and mixed-flow compressors for single or multiple stages. COMPAL is used to design the compressor stage, analyze performance, refine parameters with data reduction, and model the machine according to a number of performance models.

The user will have a maximum degree of flexibility in modeling the performance of a machine, according to a variety of different but qualified performance modeling approaches. Using COMPAL's unique Design Wizard, the user is guided through the necessary steps for design, analysis, and data reduction. The meanline compressor design can easily be sent to AxCent® for further blade design and fluid dynamic analysis.



Multiple speed line performance map with IGV and volute.



A single-stage compressor analysis.

Components Supported by COMPAL

- Upstream/downstream elements
- Radial or axial inlet guide vanes
- Open or closed, 2D or 3D impellers
- Front and rear seals
- Diffusers, including: Arbitrary Vaned; Vaneless; Wedge/Channel; Cascade; Conical; 90/180 degree bends
- Exit elements, including: Collector; Volute; Return channel; Deswirl; Continuous Crossover
- Various leakage paths
- Multistage compressors

Modeling

COMPAL supports Two-Elements-in-Series (TEIS) rotor diffusion modeling, two-zone loss modeling, single-zone rotor loss modeling, disk friction, exit mixing, radial and axial stator diffusion/losses, volutes, inducer choke, stall, thrust, and other fluid dynamic aspects of compressor performance. Many alternative models are also available.

Integrated Performance Map Plotting

Review design performance, analysis, and test data with flexibly-plotted performance maps, updated automatically with each geometric change.

Easy Editing

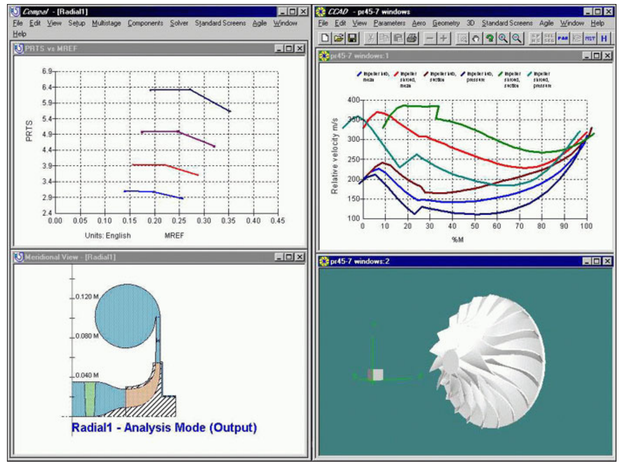
View the compressor stage in an active, true-scale meridional view. Edit the parameters by double clicking on the component in the meridional view. Also, edit parameters using a single text input/output file, a feature especially useful for optimization.

Axial View with Velocity Triangles

View blades and velocity triangles at the impeller inlet and exit in a window view. Inlet velocity triangles for the hub, tip, or RMS radius, and exit velocity triangles, can be viewed for the primary and secondary zones, and mixed-out state.

Multistage Capability

COMPAL supports multistage analysis and data reduction, and provides many multistage performance maps.



Seamless integration with AxCent.

Preliminary Mechanical Analysis

COMPAL provides the user with an initial calculation of the design's mechanical properties. It also rapidly estimates stress, vibration, and fatigue limit and accesses a wide database of customizable material properties.

A Real Fluid Program

COMPAL calculates real fluid properties using optional D.B. Robinson Real Fluid Properties, NIST, or ASME steam routines. Users can also incorporate their own proprietary fluid property routines.

Direct Integration with AxCent®

AxCent can start automatically from within COMPAL, with the initial geometry transferred automatically. Changes in AxCent that affect the meanline analysis will cause the meanline analysis to be rerun and all performance maps to be regenerated.

Concepts NREC's Agile Engineering Design System®

		Radial Compressors	Radial Fans	Radial Pumps	Radial Turbines	Axial Compressors	Axial Fans	Axial Pumps	Axial 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.

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