Concepts NREC

The Experts in Turbomachinery

Detailed 3D Design and Rapid 2D Flow Analysis Module for Turbomachinery

AxCent®

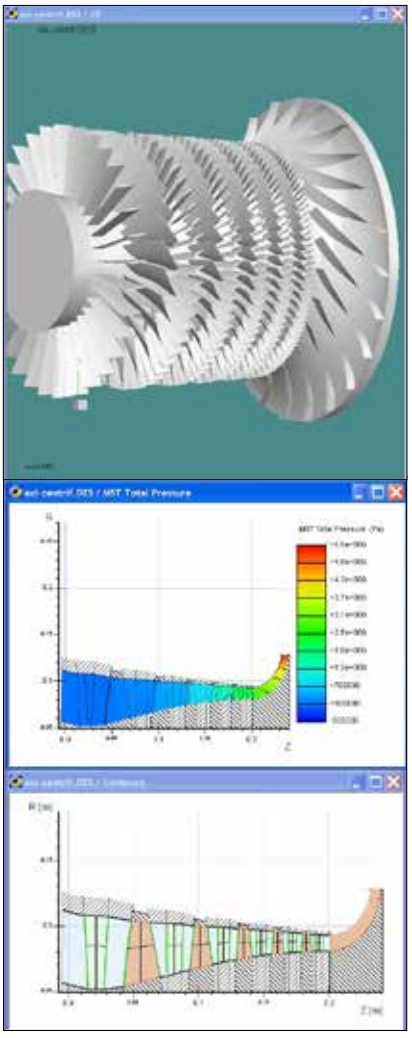
Design and analyze 3D geometries for axial, radial, mixed-flow compressors, pumps, fans, and turbines. AxCent® combines the capabilities of the most widely-used turbomachinery codes to design single-stage or multistage turbomachines. Powerful features are employed for axial, mixed-flow, and radial geometries that can be combined to design almost any type of turbomachinery.

Blade Geometry

AxCent easily handles the most complex blade geometry. A partial list of blade design features includes:

- Blade stacking of 2D cross sections
- Blade restaggering around an arbitrary axis
- Bowed blading defined by hub-to-shroud bow profiles
- Bowed or sculpted element with arbitrary number of mid-span sections
- Variable tip clearance on either end of the blade
- Flow cuts and radial trims
- Swept leading/trailing edges
- Multiple, offset, and independent splitter blades
- Irregular blade/splitter configurations for noise reduction

Other design features include: parameterized volute geometry generation, split-duct geometry, and fillets with constant or variable radius and aspect ratio. Also, cutaway views allow real-time cross sections to be viewed as the design is edited. AxCent's 3D overlays permit viewing of current, real-time changes on a transparent overlay.



A multistage axial and centrifugal compressor laid out in AxCent.

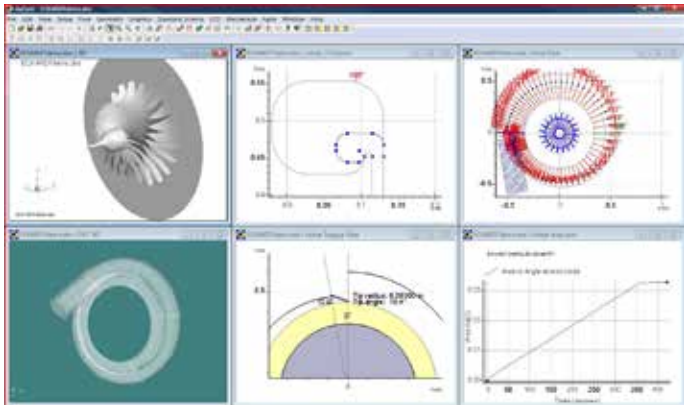
Flow Analysis

In addition to geometry design, AxCent includes several options for real-time interactive flow analysis utilizing a number of CFD solvers. Concepts NREC's inviscid streamline curvature solver is the industry standard for centrifugal pump and compressor flow analysis. Blade to blade is a powerful and rapid 2D CFD-based solver for quickly evaluating cross sections. Throughflow is an axisymmetric solver for rapid analysis of axial flow in compressors and turbines using industry standard loss and deviation models. Comprehensive analysis can be accomplished through full 3D CFD with an advanced full Navier-Stokes solver.

Direct Integration to Other Programs

AxCent works through direct links with all Concepts NREC programs, including:

- COMPAL® (radial compressors)
- PUMPAL® (radial pumps)
- RITAL™ (radial turbines)
- FANPAL™ (axial & radial fans)
- AXIAL™ (axial & radial compressors and turbines)
- FINE/pbCFD™ & FINE™/Turbo (flow analysis)
- TurboOPT II™ (optimization)



AxCent has advanced volute generation capability.

AxCent can be started from any Concepts NREC meanline program (once the geometry has been set up), and can link the AxCent geometry back to the meanline design to rerun the analysis and regenerate the performance maps. Additionally, using TurboOPT II, the AxCent geometry can be linked to an internal optimizer or to a third-party optimizer such as Isight™, VisualDOC, and IOSO. Other programs with which AxCent is compatible include: FLUENT®, OpenFOAM®, CAD systems, and import-export formats with Python® scripting.

Structural Analysis Integration

AxCent is fully integrated with Concepts NREC's FEA stress analysis program, Pushbutton FEA™. FEA stress, thermal, and modal analysis can be conducted directly through the AxCent interface.

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®	√	√	√	√	√	√	√	√
CFD Option for AxCent	FINE™/Turbo™*	√	√	√	√	√	√	√	√
Pre- & Post-Processor for AxCent	pbPost™	√	√	√	√	√	√	√	√
FEA Option for AxCent	Pushbutton FEA™	√	√	√	√	√	√	√	√
CAE Specialized Design Software									
Gas Turbine Blade Cooling	CTAADE™								√
Optimization	TurboOPT II™	√	√	√	√	√	√	√	√
Rotor Dynamics	Dynobas®	√	√	√	√	√	√	√	√
Gas Turbine Cycle Analysis	GasTurb®	√				√			√
CAM Toolpaths									
Base Platform	MAX-PAC™	√	√	√	√	√	√	√	√
Flank Milling Option	MAX-5™	√	√	√	√	√	√	√	√
Point Milling Option	MAX-AB™	√	√	√	√	√	√	√	√
Closed Impeller Option	MAX-5I™	√	√	√	√	√	√	√	√
Single Blade Option	MAX-BB™	√	√	√	√	√	√	√	√
3+2 Roughing Option	3+2 Roughing	√	√	√	√	√	√	√	√

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

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