Specialized 3D FEA Analysis with Highly Automated Pre- and Postprocessing

Pushbutton FEA™

Producing designs that meet both performance and product life criteria is a fundamental component of today's advanced turbomachinery marketplace. Pushbutton FEA™ is designed to both extend and integrate into your design environment. This enables aerodynamic and structural design to be performed concurrently within AxCent® utilizing the integrated FEA tools. Since this can be done as soon as you have initial blade definition, structural analysis and life assessment can be performed earlier in the design process than ever before.

Modeling

Complex radial and axial geometries can be easily modeled with the parametric tools available within Pushbutton FEA. It blends the power of the STRESSPREP and AXISTRESS products with a powerful and accurate linear finite element solver. Above all, Pushbutton FEA is designed to be simple and intuitive for the non-FEA professional while still providing the necessary power and flexibility for the structural design professional.

FEA Solver

Both quadratic and linear elements are available for all analysis types. The available solvers are the thermal, static and modal. Cut faces can be modeled using both cyclic and coupled DOF boundary conditions. All of the load information is created from the previously calculated aerodynamic conditions using Rapid Loading, MST or CFD. These aerodynamic loads are applied to the FEA model elements as convective heat transfers and pressures applied to the external element faces.
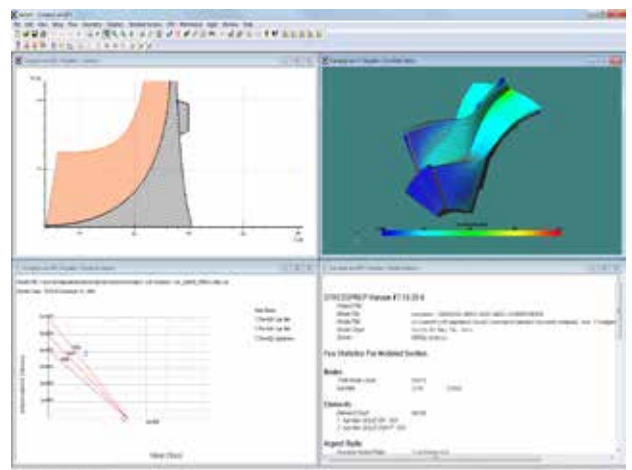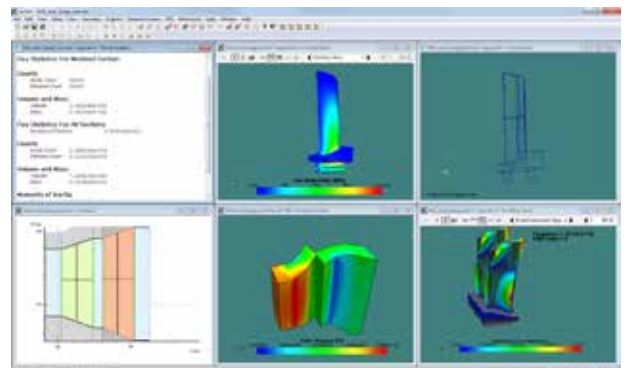
Both axial and radial analyses are integrated within the AxCent® software.
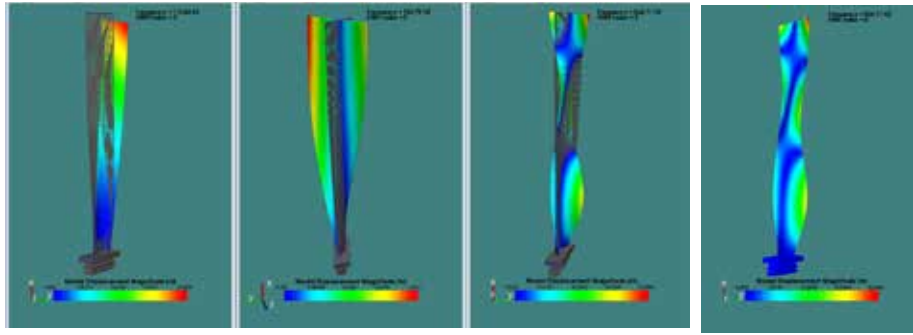
Modal analysis results can be animated.

Thermal stresses can be included in the static analysis and the static stresses can also be incorporated as a prestress condition for the modal solver. Spin or centrifugal softening is available as is the use of a lumped mass matrix instead of the default consistent mass matrix.

Support of Other Solvers

In addition to its own solver, Pushbutton FEA maintains its links with other FEA solvers such as ANSYS, COSMOS, NASTRAN and ABAQUS, so that it can also be utilized with your existing tools. Using a 3rd party solver means that the Pushbutton FEA product becomes a powerful and intuitive geometry design tool with grid generation. Some post-processing capability is also available such as the Goodman, Campbell and Interference diagrams.

Closely Coupled

There are no files involved in the transfer of information from the aero to the mechanical design, so modifications to the aero definitions are immediately updated into the mechanical design. This reduces the likelihood of the two processes becoming desynchronized due to outdated definition files.

Postprocessing

For the Concepts NREC Pushbutton FEA solver, full 3D postprocessing is available. Displaced geometry color surface contour plots of temperature, displacement and stresses can be overlayed with undisplaced wireframes, making it easier to visualize the effects of the load conditions. There is also modal displacement-based animation which can be used to view the mode shapes. This is particularly useful for those who are unaccustomed to visualizing the typical modal displaced shapes.

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	CTAADS™								✓
Optimization	TurboOPT II™	✓	✓	✓	✓	✓	✓	✓	✓
Rotor Dynamics	Dyrobes®	✓	✓	✓	✓	✓		✓	✓
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-SI™	✓	✓	✓	✓	✓	✓	✓	✓
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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