

Volute Module

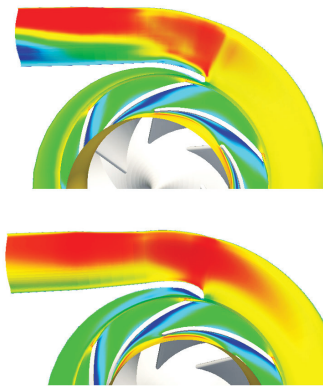
IN TODAY'S COMPETITIVE MARKET, TURBOMACHINERY DESIGNERS ARE turning to solutions that can help them thrive under increasingly restrictive time-to-market and budgetary constraints. Gone are the days of multiple physical prototypes and long term trial and error development in the test laboratory. Instead, the turbomachinery industry is investing in quickly-developed, low-cost, virtual prototypes in order to refine and optimize machinery designs faster, more accurately, and at a lower cost than physical prototype alternatives.

The Volute Module is a computer modeling tool that allows users to quickly create parameterized and advanced volute geometries. It integrates into AxCent®, Concepts NREC's CAE design tool for turbomachinery. With the

Volute Module, one only has to define the cross-section of the volute scroll profile, and AxCent assigns volute growth and automatically creates a full 3D model. The user also has additional and direct control over the tongue shape and the diffuser extension. The module shares an interface with Pushbutton CFD® and the other data analysis tools in Concepts NREC's Agile Engineering Design System®. With this single integrated interface, users quickly and accurately analyze flow behaviors and variables. They can rapidly optimize factors such as efficiency for both the volute alone and also larger interdependent turbomachinery systems developed in Ax-Cent, such as impeller-volute assemblies. Volute styles for radial pumps, blowers, compressors and turbines are available.



The Volute Module is an advanced volute design tool for those who have strict spatial and performance requirements. Applications include turbochargers, rocket turbopumps, specialized compressors, multistage pumps, and other products from industries that range from power generation and industrial equipment to aerospace and transportation.

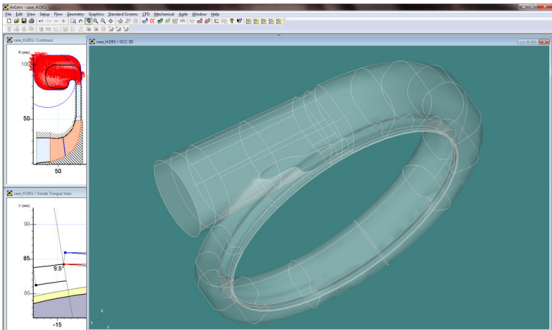


Tongue modification capabilities, combined with Pushbutton CFD analyses, allow users to eliminate recirculation and separation in the diffuser, improving performance.

Specialized optimization enables a rapid iterative approach, making this powerful system save you time and money at every step of the virtual prototyping process by allowing users to optimize volute design for spatial and operational efficiency.

Customizing for Stingent Spatial and Performance Restrictions

As a customized tool, the Volute Module puts more design control into the engineers' hands. Starting with AxCent's baseline design topologies for pump and turbocharge volute styles, the Volute Module enables further modifications of the cross-sectional profile of the volute. Users control the profile shape by interactively modifying a combination of Bezier curves, lines, and arcs. With this increased flexibility and control, users can optimize their designs to simultaneously meet strict mounting and performance requirements.



The Intuitive, Interactive, and Parametric Approach

Concepts NREC incorporates the ease-of-use and other design advantages that are already offered in the AxCent platform by building the Volute Module on top of it. Once the user defines the volute profile, AxCent automatically defines scroll growth and creates a 3D model on screen alongside the profile manipulation window. With these interactive visual tools, users can immediately identify spatial design issues, interference problems and the physical and geometric tradeoffs that result from modifications to the volute

cross-section. For users who have special spatial constraints that govern their designs, the Volute Module saves a great deal of design time simply due to its ease of use and parametric nature. Combined with Pushbutton CFD, this solution offers even further reductions in design time. The AxCent platform also allows users to export volute designs to external CAD, CAE, and CFD programs, as it would with any of the other standard AxCent designs.

Gaining Performance While Reducing Time-to-Market

Volute flow is too complex for simple analysis approaches to predict. Prototypes are costly and only provide limited information to explain how internal flow is behaving and affecting overall performance. With Pushbutton CFD, engineers and designers use computer simulation to easily identify recirculation zones in the diffuser extension, fluid behaviors and factors that drive efficiency losses, and separation after the tongue, among other details. Combined with the Volute Module control over the scroll cross-section, tongue shape and the diffuser extension, users can further take advantage of AxCent's seamless integration with Pushbutton CFD to run the CFD solver and analyze the volute performance from a single interface. Instead of having to pass the model to other external analysis tools, the process is streamlined and time is spent identifying vital design and performance improvements.

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.