

Integrated Pump Design Software Package

FINE/Agile™ for Pumps

FINE/Agile for Pumps is an integrated bundle of software that enables users to quickly design a pump – from preliminary sizing through final design, with full fluid dynamics. It supports designing impellers, diffusers (vaned and vaneless), volutes, return channels, continuous crossovers as well as many other pump-related flow elements.

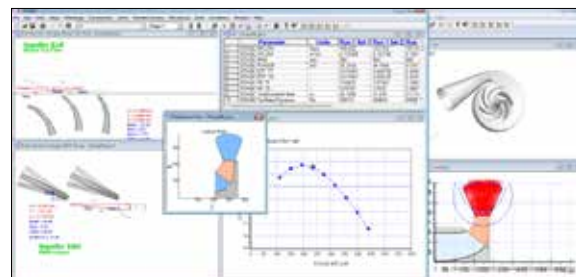


FINE/Agile for Pumps Includes:

- PUMPAL™ — delivers meanline design guidance for radial, mixed-flow, and axial pumps with single or multistage configurations.
- AxCent® — offers 3D geometry design and rapid interactive flow analysis for radial, mixed-flow, and axial single or multistage pumps.
- FINE™/Turbo — brings industry-leading computational fluid dynamics (CFD) to the engineer's desktop, including script-driven grid generation, solution and postprocessing.

Benefits

- Design wizard delivers a workable design with a few inputs and minimal clicks. The initial design can be fine-tuned to match desired performance and specific configuration.
- One-click transfer of data between modules. Any changes in one are automatically updated across all.
- Optional upgrades are available for all modules, so a solution may be customized to bring higher computer performance or more advanced modeling capability, depending on the application.
- Extremely cost-effective design system, supported with workshops and training by experts in pump software, engineering, and testing.

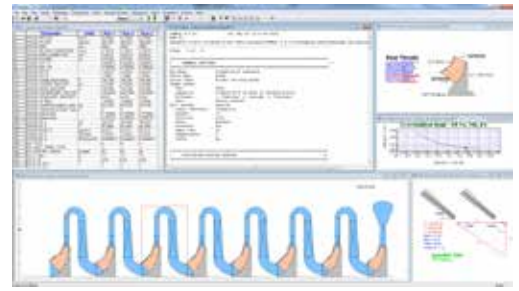


Seamless integration with AxCent

PUMPAL Features

Engineers can design the stage, analyze the performance, and reduce laboratory data for any type of pump system. Key features include:

- Interactive true-scaled meridional view of pump stage
- Integrated performance map plotting
- Time-trusted design rules to guide the user
- Calculates Real Fluid properties

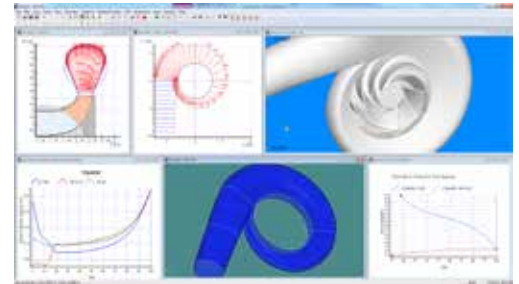


Multistage pump design example

AxCent Features

AxCent easily handles any type of blading and flow element geometry, from the simplest to the most complex. Other key features include:

- Options for real-time interactive flow analysis
- Industry-standard Inviscid Streamline Curvature Solver for radial and mixed flow pumps
- CFD-based throughflow and blade-to-blade solvers for axial pumps
- Geometry transfer with major CAD systems, enabling reverse engineering of legacy designs

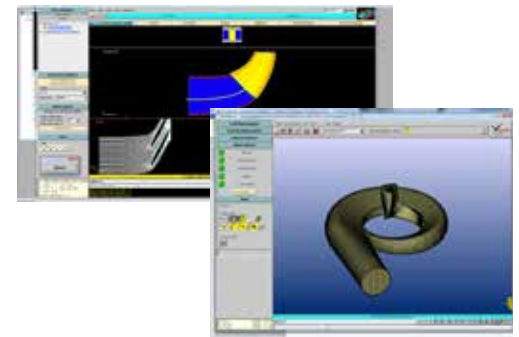


AxCent has advanced volute generation and editing capability

FINE/Turbo Features

FINE/Turbo is the fastest CFD suite for rotating machinery. Some key features include:

- All types of single or multistage radial, mixed-flow, and axial pumps are supported
- Streamlined, script-driven process flow for fast analysis
- 3D Navier-Stokes flow solver
- Acceleration of several orders of magnitude can be achieved with optional CPUBooster™ module and HPC scalability. Unsteady-flow calculations are within realistic reach with optional time-dependent NLH enhancement



Enhanced reliability of CFD simulations

Concepts NREC's Agile Engineering Design System [®]		Radial				Axial			
		Compressor	Fan	Turbine	Compressor	Fan	Turbine	Compressor	
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	Dynobal®	✓	✓	✓	✓	✓	✓	✓	✓
Gas Turbine Cycle Analysis	GasTurb®	✓					✓		✓
CAM Toolpaths									
Base Platform	MAX-PAC™	✓	✓	✓	✓	✓	✓	✓	✓
Flank Milling Option	MAX-S™	✓	✓	✓	✓	✓	✓	✓	✓
Point Milling Option	MAX-AB™	✓	✓	✓	✓	✓	✓	✓	✓
Closed Impeller Option	MAX-SI™	✓	✓	✓	✓	✓	✓	✓	✓
Single Blade Option	MAX-SB™	✓	✓	✓	✓	✓	✓	✓	✓
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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