

Phoenix Analysis & Design Technologies



Automotive – Fuel Cells

U.S.A.

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ANSYS® CFX®

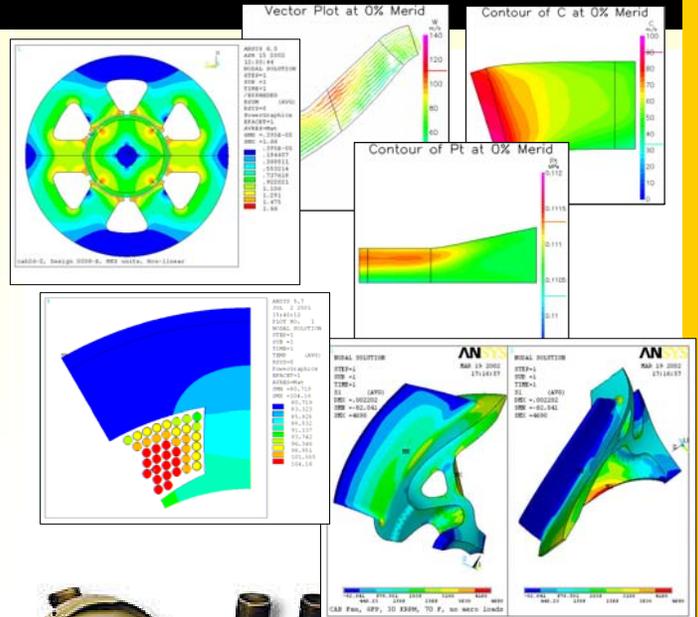
Overview

When the world's leading developers of hydrogen fuel cell systems need a custom solution for air or hydrogen pumping, they often turn to PADT to provide a blower. A key to PADT's success is the integration of simulation into every aspect of the product development process.

The blowers designed by PADT are high-speed rotating machines with custom motors and high-efficiency pump heads. Simulation is used to avoid overheating, fatigue and vibration problems. The technology is leveraged to optimize the configuration for greater system efficiency.

The types of analysis conducted on these systems include:

- Preliminary system aerodynamic design
- Detailed inlet and outlet aerodynamic simulation
- Detailed aerodynamic optimization of rotor geometry
- Motor electromagnetic field optimization
- Motor and system cooling solutions
- System and component vibration
- Rotor high-speed centrifugal stresses
- Rotor dynamics of rotating assembly
- Stress evaluation of all components under internal and external loading



Testimonial

"As the fuel cell industry matures, the efficiency and robustness of peripheral devices such as blowers must improve. We use the full suite of ANSYS products because they integrate with our CAD directly, are integrated with each other and simulate the full range of problems we encounter. These tools allow us to make analysis an integrated part of our process, which in turn enables us to eliminate a significant amount of testing and redesign and to get to the test bench (and therefore the customer) faster and with fewer redesigns. The most important things to our customers are performance, robustness and schedule. The ANSYS tools play an important role in delivering on all three."

Mark Johnson, Ph.D., P.E.
 Director, R&D Business & Technology Development



Challenge

Develop custom hydrogen and air pumping solutions for stationary and automotive hydrogen fuel cells. When developing such systems, considerable challenges arise, including:

- Compressed development schedules
- Aggressive efficiency goals
- Harsh operating environment
- Aggressive cost goals
- High rotating speed
- High internal temperatures

Solution

- Use ANSYS CFX, BladeGen and other ANSYS tools as part of every aspect of the product development process including conceptual design, detailed design and testing.
- Integrate these tools directly with PADT's parametric CAD via ANSYS Workbench.
- Leverage automation through scripting and automatic report generation.

Benefits

- Allows development team to make intelligent design decisions based on accurate and timely simulation results
- Make decisions and find problems much earlier in the design process
- Obtain aggressive efficiency and robustness goals with less testing
- Save engineering time and overhead cost by having to purchase and learn only one suite of tools