

Flow Modeling Helps Fan Engineering Company Save \$150,000 in Prototyping & Testing Costs

AcoustiFLO LLC is a privately held company based in Boulder, Colorado, U.S.A, that specializes in custom fan application engineering. Customers generally have efficiency and acoustic performance requirements that cannot be met with off-the-shelf systems. AcoustiFLO has worked with most major semiconductor manufacturers and has hundreds of fan installations around the world.

TECHNOLOGY USED

FLUENT® CFD Software

CHALLENGE

The commercial fan market has moved away from large custom-designed fan systems to more standard, factory-manufactured units. AcoustiFLO needed to develop an efficient small centrifugal fan that could be marketed as a standardized, modular component suitable for these so-called packaged air handlers.

AcoustiFLO's small fan concept consisted of a centrifugal impeller housed in a vaneless diffuser. Optimizing the static pressure efficiency of the unit requires simultaneous optimization of both the impeller and the diffuser because of the interaction between the two. Engineers at AcoustiFLO found that physical testing was cost prohibitive and did not give the insight to the airflow necessary for design improvement. Less powerful CFD software used at AcoustiFLO for simpler design tasks did not have the power to analyze the turbulence and rotational dynamics in the impeller.

SOLUTION

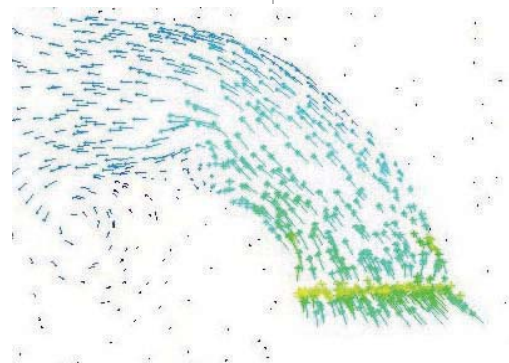
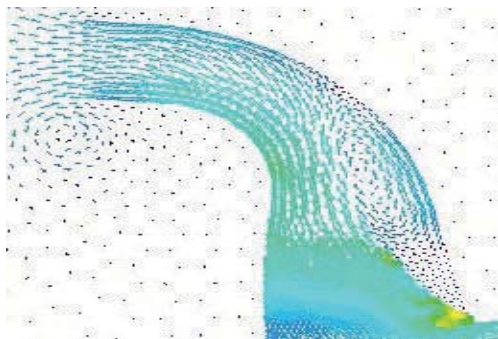
Using FLUENT CFD software, engineers at AcoustiFLO:

- Systematically evaluated a large number of design changes before testing a prototype
- Verified that FLUENT model predictions were sufficiently close to prototype test results
- Discovered unexpected interactions between the diffuser and the impeller that would have been difficult to assess with physical testing only
- Developed a prototype design with optimum performance

RESULTS

- Gained insight into the airflow inside the impeller and diffuser that would not have been possible with a testing-based approach
- Increased the peak efficiency of the unit by 13 percent
- Saved an estimated \$150,000 in prototyping and testing costs while shortening the overall development time

© 2009 ANSYS, Inc. All Rights Reserved.



The original fan impeller housing (left) shows significant areas of flow recirculation; the improved housing design shows no evidence of recirculation and much higher efficiency than the original design

COMPANY INFORMATION

Country: U.S.A.

Industry: Building ventilation fans



www.acousticflo.com

KEY IMPACTS

- Increased static efficiency by 13 percent
- Reduced prototyping and testing expenses by at least \$150,000
- Cut 6-12 months from development cycle