



Flow Analysis of Rotating Equipment Using CFD

Computational Fluid Dynamics (CFD) is a useful tool for analysis and visualization of fluid flow. CFD has generated impressive results in predicting the performance of flow equipment such as fans, blowers, turbines, and impellers. Typical applications for rotating equipment include:

- Fan curve generation
- Fluid horsepower determination
- Detection of eddies, back flow and no flow regions
- Blade design optimization, including surface pressure distribution, entering/exiting blade velocity components, and lift and drag
- Mixing analysis (for two or more components)

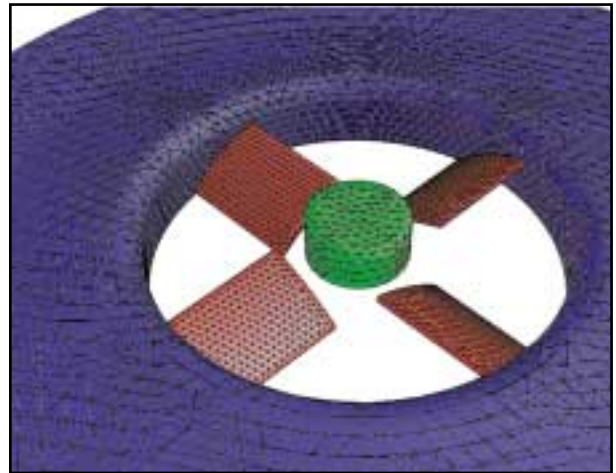


Figure 1. Analysis model for a shrouded four-blade fan.



Figure 2. Fan model analysis results. Colors represent pressure distribution on the suction side of the blades.

In addition to rotating equipment, CFD analysis is a versatile tool with a broad range of applications that include:

- Process Equipment
- Filters
- Perforated Plates
- Fluidized Beds
- Packed Columns
- Tube Bundles
- Wicking Materials
- Soil, Sand and Rock
- Liquids Filling

Using CFD to Solve Engineering Design Problems

Figure 3 shows results from an analysis of flow through a shrouded fan. The velocity vectors are plotted on a plane cutting through the fan blades. This plot illustrates a central core of upward flowing air beneath the fan surrounded by a layer of downward flow. The effect of the shroud is also seen as it directs flow downward from the end of the fan blade.

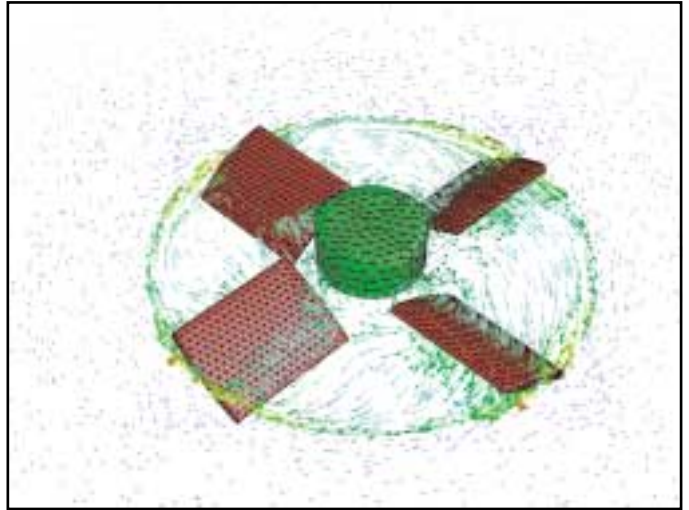


Figure 3. Velocity vectors on a plane through the fan blades.

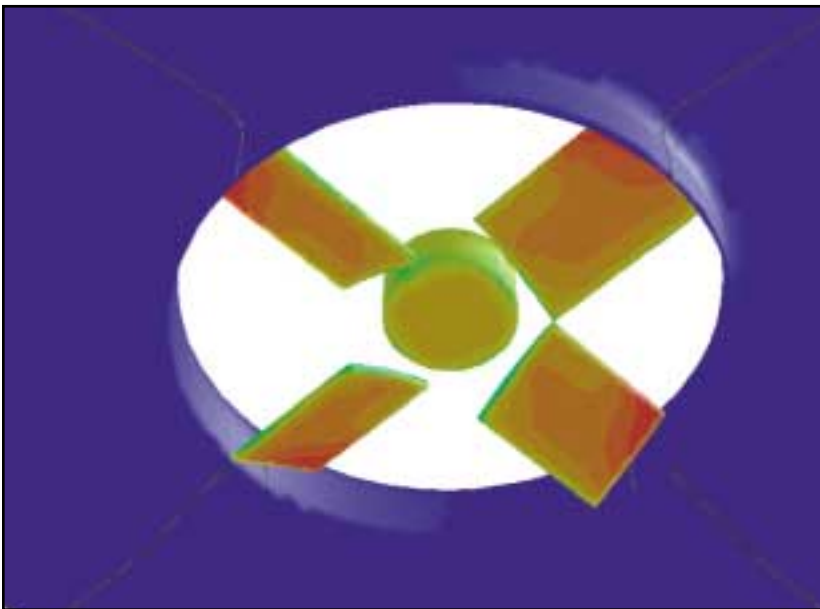


Figure 4. Pressure contours on the discharge side of a fan

The resulting pressure distribution for this particular flow is shown in Figures 2 and 4. It shows the characteristic low pressure along the top of the fan blade with a high pressure zone directly beneath the blade. By altering the pressure change across the fan and determining the air throughput, a fan performance curve can be generated from these analysis results.

The SES Process Technology Group has a team of CFD professionals ready to assist you in systems design. For more information call the SES office nearest you today

...Or visit our web site at <http://stress.com>

Houston 281-955-2900 • Cincinnati 513-336-6701 • New Orleans 504-828-4066