Ansys + FDX Fluid Dynamix

"Designing custom OsciJet nozzles is essential for our business. With Ansys Workbench and CFX, we were able to speed up and improve our design process for higher accuracy while delivering our products to market faster and at competitive prices."

Dr. Oliver Krüger
CTO / FDX Fluid Dynamix

Nozzles are used in numerous industrial applications. For some applications, it is possible to offer commercial, off-the-shelf products. However, some applications demand a customized solution to provide the best performance. In this case, we need to design a nozzle specifically tailored to our customers' needs. Flow simulations are crucial in designing and optimizing our products quickly and precisely, and the Ansys Startup Program gave us easy access to Ansys simulation solutions.

FDX Predicts Reliable Instabilities for the Design Process of OsciJet Nozzles with Ansys Workbench and Ansys CFX

/ Company Description

The vision of FDX is to save resources by optimizing flow processes. To accomplish this, FDX produces OsciJet nozzles that emit a sweeping or pulsating jet stream of fluid without any moving parts. These nozzles take advantage of dynamic jets without sacrificing the durability and reliability of the overall system. Dynamic jets increase the mixing, cooling and cleaning performance of fluid-driven processes.

/ Challenges

Manufacturing and testing prototypes of nozzles was a bottleneck in our process. We needed simulation software to reduce these time- and cost-intensive operations. The software had to be able to autonomously generate, mesh and simulate different designs, which are defined by a couple of parameters. For special nozzle designs, pressure-based fatigue simulations were also necessary to meet safety regulations.

/ Technology Used

- Ansys Workbench
- Ansys CFX
- Ansys Mechanical

/ Engineering Solution

- Automatic parameterized geometry, mesh generation and simulation minimized the design team's manual work significantly.
- Fast, accurate simulations helped in identifying optimal designs and decreased the number of necessary prototypes.
- FEM analysis based on the pressure field simulated with Ansys CFX helped in identifying locations susceptible to fatigue.
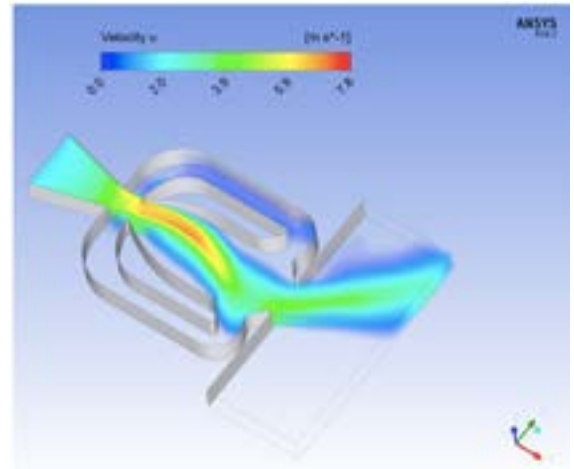
Flow simulation of an OsciJet nozzle. The complete domain is filled with water, but to simplify this figure, only a volume rendering of the main jet is shown.

High-speed image of the OsciJet HPX-MS nozzle used for oil injection in a commercial gas turbine. The jet dynamic can be observed at the tip of the nozzle.

/ Benefits

Every product design starts with an automatically conducted series of simulations to find the optimal design. We use a parameterized geometry with Ansys Workbench and CFX (obtained through the Ansys Startup Program) to create the design points. Using the automatic process accelerated our design by a factor of 360 and removed manual errors from the equation. Moreover, simulation enabled our engineers to work on multiple projects simultaneously and minimized the need to build prototypes between iterations. Thus, Ansys simulation solutions enabled us to significantly decrease the time-to-market.

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