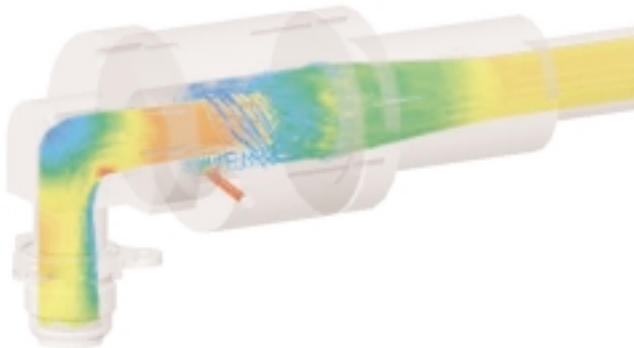




Customer Showcase



FloWorks Helps Purolator-Facet Inc. Break Mechanical Engineering Design Rules



Break the rules of mechanical design? This is what FloWorks engineering fluid dynamic (EFD) software from NIKA recently helped David Rachels and his engineering team accomplish while redesigning a cyclonic inertial separator for a major North American turbine engine manufacturer. By using FloWorks to quickly analyze multiple design iterations, Rachels' team at Purolator-Facet, Inc., also reduced the planned project length by two months and saved thousands of dollars by eliminating the need to construct multiple physical prototypes. By project's end, the analysis results had helped create a patent-pending design that Purolator-Facet expects to develop for other industrial applications and revenue opportunities.

The engine manufacturer installs the separators within its military engines as a non-mechanical way to trap and separate contaminants from the air that swirls through the engines' turbines and cools the internal bearings. Purolator-Facet already had an existing relationship with the engine maker, but the aerospace manufacturer decided in early 2000 that an improved product design would be easier to install and maintain, increase reliability and reduce overall costs.

As director of engineering for Purolator-Facet, a Greensboro, NC developer of filter related components, Rachels oversees a department of 15 that uses SolidWorks as its principal mechanical CAD system. Once the 3D models for the new separators were created, fluid analysis proved to be a critical element in the project. Purolator-Facet first turned to its existing CFD program.

"We were trying to analyze the pressure drops of the air across the unit," recalls Rachels. "We had a maximum value that we needed to show but we wanted to reduce it without building a prototype. Unfortunately, the existing software could not provide final results, even after running for two and three days at a time.



When we couldn't get a satisfactory result and our project timeline appeared at risk, we started looking for an alternative. "

Rachels downloaded a free trial version of FloWorks and within two days of discovering the potential and ease-of-use of the world's best-selling EFD tool, he began conducting complete analysis sessions in less than 90 minutes. He soon bought a license and installed it on a Dell Precision 420 Workstation. Rachels and fellow engineer Josh Kersey quickly became comfortable with the program and conducted frequent analyses of variations in blade angle, blade number, diameter at blade bottom, and outlet pipe diameter and location.

The design challenge was to maximize the rotation of the air to increase efficiency and maintain the delta P below the customer specified limit. To discover how close they were to this objective, they took specific model combinations, opened up FloWorks within SolidWorks' user window and ran fractional factorial two-level, five factor design analysis. In total, 27 variations were analyzed, including all of the axial points as well as the central point.

"What we like about FloWorks was that in addition to being very user-friendly, it did not force us to transfer geometry or generate meshes," says Rachels. "There is no doubt that FloWorks helped us to reduce our project design time on this work. When we began the project and before we discovered FloWorks, we had estimated that it would take a total of eight months. By using FloWorks as much as we did, we saved two full months of development work and delivered the project to the customer on time."

By clearly showing the swirling pattern of the iterations, FloWorks enabled Rachels and his team to build a better product. "FloWorks helped us achieve a patentable design which I don't believe we could have achieved within the allotted amount of time once we saw where we were," Rachels adds. "I'd say that we wouldn't have been able to deliver the product on time."

And what about the commonly accepted engineering rules that apply to cyclonic inertial separator design?

"As far as helping us modify the relationship between pressure drop and filtration efficiency, we used FloWorks to break some of the established paradigms and rules of cyclonic inertial separator design," he concludes.