Fluid Performance

Afton Chemical simulates fuel, lubricant characteristics

From wind turbines to motorcycles, Virginia-based Afton Chemical Corporation produces fuel and lubricant additives to increase performance and efficiency such as fuel economy. To stay on the cutting edge of fluid performance, as well as industry standards, Afton's scientists have to create new additives and formulations. Simulation is an integral component to this and is partially powered by the Ohio Supercomputer Center's computing resources.

Lubricant components include solutions such as dispersants and detergents that help prevent sludge and deposits from forming on critical surfaces and friction modifiers that help prevent scoring and reduce wear and micropitting. Afton Senior Research and Development Engineer Joshua Moore models these new molecules and examines their characteristics relating to oil performance—which takes a lot of computing power.

"We're trying to design new molecules to improve performance," Moore said. "As an example, for an engine oil, we want to design new additives, new molecules which improve engine performance in terms of friction/fuel economy, wear, or fatigue."

Moore and Afton engineers teamed up with AweSim at the Ohio Supercomputer Center for molecular modeling, molecular dynamics of additive components as well as system-level modeling using computational fluid dynamics (CFD). AweSim levels the playing field for companies such as Afton, that can benefit from modeling and simulation but may not wish to host it in-house.

"Afton is a great example of how AweSim can provide services to a company outside of Ohio to increase awareness our state's great resources for businesses, in the hope of attracting them to Ohio," said Alan Chalker, director of strategic programs at OSC. "This helps fulfill OSC's role as a technology-based economic development entity for the state."

Simulation-driven design with modeling and simulation on HPC supplements physical product prototyping and allows researchers to take a deeper, mechanistic look at materials such as chemicals, polymers and surfactants.

"We knew our local resources would benefit greatly by working with a supercomputing center. I was looking for an external computer resource with the latest hardware capabilities… and finally found that OSC had the best resources for the best price." •

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— *Joshua Moore, Afton Senior Research and Development Engineer*

PROJECT LEAD // Afton Chemical Corporation RESEARCH TITLE // Molecular CFD modeling for engine lubricants and fuel additives FUNDING SOURCE // Afton Chemical Corporation WEBSITE // aftonchemical.com

PHOTO // Afton Chemical headquarters located in Richmond, Va.