Argonne and Marathon join forces to optimize fuels and engines

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Director of Argonne’s Energy Sciences Division Don Hillebrand, left, shakes hands with Fred Walas, Fuels Technology Manager at Marathon Petroleum Corporation at the company’s Refining Analytical Development Facility in Catlettsburg, KY.

The modern internal combustion engine is a complex and finely tuned system where small changes in one area can have important ramifications on the whole. Decades of dedicated work to maximize efficiency have refined engines to the point where major improvements require innovative approaches that look at the entire system.

The U.S. Department of Energy's (DOE) Argonne National Laboratory is partnering with Marathon Petroleum Corporation (MPC) to support an ongoing effort by DOE to explore fuels and engines holistically in search of greater efficiency. By advancing on both fronts simultaneously, the researchers hope to make substantial gains that would not be possible by working on engines and fuels individually.

"This is an exciting area of exploration that we think can yield significant benefits in overall efficiency," said Thomas Wallner, Manager for Fuels, Engine and Aftertreatment Research at Argonne's Center for Transportation Research. "Co-optimization of fuels and engines has been identified as an area that is ripe for improvement."

The collaboration between Argonne and MPC is designed to support the "Co-Optimization of Fuels and Engines" initiative, which was recently launched jointly by the DOE's Vehicle Technologies Office and Bioenergy Technologies Office. The new collaboration leverages MPC's and Argonne's complementary capabilities in fuel design, analysis and production, as well as advanced engine combustion and emissions formation.

MPC and Argonne will collaborate on research projects, as well as exchanging knowledge and expertise in fuel characterization and fuel characterization equipment. The collaborators will also share information on efficiency, performance and emissions assessments of advanced combustion concepts using current and potential future fuels. This agreement builds on existing joint efforts, including MPC's support of Argonne's experimental research activities, by supplying samples of test fuel and refinery streams for research and testing at Argonne.

MPC also provided Argonne's Center for Transportation Research with a cooperative fuel research (CFR) engine, a test platform extensively used throughout the industry for testing related to the performance of fuels for internal combustion engines. MPC has been operating CFR engines for decades and has developed extensive know-how and expertise related to setup, test methods and potential improvements to this widely used testing tool. Argonne's engineers will work alongside MPC experts to ensure efficient knowledge transfer and comprehensive assessment of potential improvements to the test setup and methods.

"Automotive and fuels researchers have made

significant strides in efficiency over the past 30 years," said MPC Fuels Technology Manager Fred Walas. "As our products become more and more specialized, we realize we cannot optimize the fuel and engines independently. Instead, we must treat them as a combined system to achieve higher efficiencies economically."

Acknowledging the significant role that internal combustion engines are likely to play in the area of road transport for the foreseeable future, Argonne and MPC will use this project to advance the state-of-the-art of research in the area fuel-engine interactions and jointly disseminate research findings in the form of peer-reviewed publications, presentations and reports.

Provided by Argonne National Laboratory