

Federal-Mogul Corporation Collaborates with Japanese University to Develop Power Cylinder System Technology, Reduce CO₂ Emissions

Federal-Mogul has entered year four of a contractual arrangement with Tokyo City University, formerly Musashi Institute of Technology, a widely recognized world leader in tribology technology for internal combustion engines. The technical collaboration enables Federal-Mogul Corporation to provide vehicle manufacturers with power cylinder systems (pistons and piston rings) specifically designed to reduce CO₂ emissions.

Tribology is the study of the mechanisms of friction, lubrication and wear of interacting surfaces that are in relative motion. The collaborative arrangement provides Federal-Mogul's Technical Center in Plymouth, Michigan, with a trained graduate student from Japan to support Federal-Mogul's floating liner engine (FLE). This provides a valuable analysis function in the company's efforts to reduce CO₂ emissions and improve fuel economy.

"The FLE method allows us to evaluate engine frictional losses associated with the piston and piston ring components – a functional requirement in our pursuit to reduce CO₂ emissions," said Francis Kim, application engineering manager, and one of the original architects of the arrangement.

The collaborative program and friction evaluation method was the foundation for a Federal-Mogul proprietary technology, called EconoMiser™, a comprehensive computer aided engineering and set-based test methodology allowing reduction in piston friction losses by up to 35 percent.

"Four consecutive years of university collaboration have contributed to a steady growth in applied knowledge," said Steve Krause, director, automotive applications engineering, North America. "The Floating Liner Engine is integral to EconoMiser™. Floating liner technology alone is not a unique approach to friction study. However, structuring the FLE tool directly within our analysis, applications and technology teams has led to innovative advances in the method, and product- specific advantages."

Examples of F-M technology improvements include: optimization of piston design for friction and fuel economy improvement applied to production pistons in 2008 model year; advanced development of piston ring design features and coatings for a 50 percent reduction in ringpack tangential forces resulting in improved fuel economy; and validation of in-house predictive simulation tools.

Tokyo City University also benefits from the arrangement, according to Kim, through a rotational program whereas one student every six months has the opportunity to work at the Federal-Mogul's Plymouth Technical Center as a test engineer.

"To come to Federal-Mogul in the United States is especially attractive to young Japanese graduate students, and is an incentive to attend Tokyo City University," Kim added.