

DOE-funded Research Leads to Quick Commercialization of Reel Clean Filtration System

Background

Engineered Machined Products (EMP), Inc., has introduced the Reel Clean Filtration System, which utilizes high-capacity fine filtration (two-micron filtering) to super-clean engine oil and to dramatically extend oil change intervals on diesel engines. The Reel Clean greatly reduces oil and filter use, saving money for truck owners. The system research was funded in part by the U.S. Department of Energy's FreedomCAR and Vehicle Technologies Program.

The Technology

The Reel Clean Filtration System is an auxiliary advanced engine filtration system consisting of an electric oil transfer pump, a replaceable filter cartridge, and a self-indexing system to continuously advance clean filter media. This system operates independently of an engine's main lubrication system and applies a continuous filtering method to the engine oil. The reel-to-reel configuration enables the filtration device to automatically replace used or dirty filter media in a controlled and continuous fashion. The Reel Clean provides greatly expanded oil filtration and contaminant retention over a set service interval. As a result, the



*The Reel Clean Filtration System from EMP (electric transfer pump and filter). United States Patent Number 6,736,965 B2, granted May 18, 2004
Design News 2003 "Excellence in Design" Award (Design News, March 15, 2004)*

filtering operation can remove the large amount of soot introduced to the lube oil by exhaust gas recirculation (EGR), a pollution reduction technique used in many heavy-duty truck engines.

The reel-to-reel principle is based upon the monitoring of the pressure differential between the upstream side and the downstream side of the filter media. When a high pressure differential exists as a result of the build-up of contaminants on the filter media, the system sends signals

to the oil transfer pump and the self-indexing system to cease oil flow to the filter and to advance clean filter media from the supply reel. Simultaneously, the self-indexing system ejects the dirty filter media to the take-up reel. The oil transfer pump then resumes oil flow to the filtering device. The process repeats until a desirable pressure differential is achieved. When the recommended service interval is reached, the filter cartridge can be removed and replaced with a new cartridge. There are two key features that



distinguish the Reel Clean from similar products. First, it uses an electric transfer pump to take oil from the engine sump and transfer it to the filtration device. This allows the Reel Clean system to function independently of the lubrication system it is protecting, unlike conventional secondary filtration devices, preventing parasitic losses to the engine's lube pressure. Second, the system's unique "reel-to-reel" filtering method automatically exchanges plugged filter media for clean filter media as needed. This filtering method allows for an unlimited supply of filter media as well as more efficient use of the filter media.

Commercialization

The research behind the Reel Clean Filtration System was performed under a subcontract from Argonne National Laboratory, funded in part by the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy, FreedomCAR and Vehicle Technologies Program. The EMP-DOE-Argonne effort was particularly

notable for its quick concept-to-commercialization time of less than three years. EMP has formed commercial partnerships with two major filtration media manufacturers to develop filter media specifically designed to meet the Reel Clean Filtration System's specifications. Field testing is currently under way utilizing class 8 over-the-road trucks and heavy duty construction equipment. Production launch for the Reel Clean Filtration System is scheduled for 2006.

Benefits

- High efficiency, high capacity, two-micron fine filtration
- Increased oil and full flow filter life by 5 to 6 times
- Reduced engine wear (70%)
- Reduced maintenance costs
- Reduced waste handling and disposal costs
- Better utilization of the filtering media
- Off-line filtering capability

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