Maintenance Matters

On the Cutting Edge

Posted: December 18th, 2006 03:50 PM EDT

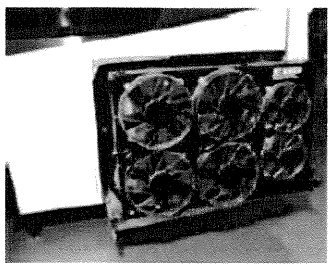

Photo courtesy of TriMet

Many transit districts across the country faced a double whammy during the recent recession - increased costs, including diesel prices, and decreased tax income. The Portland metro area's transit district, TriMet, was no exception. As the recession deepened, we began a concerted effort to wring every bit of mileage out of every gallon we used to power our bus fleet. As fuel is the single largest line item in any transit district materials and service budget, it was the largest target to aim at.

While we had what we considered to be a good record of fleet economy at 4.2 mpg, we needed to do more as prices continued to rise unabated. Installing new, more effi cient transmission control software provided by Voith Transmission, intensifying our tire air checks, front-end alignment checks and reducing idling were among the efforts. These raised the fleet fuel economy to approximately 4.7 mpg - a considerable increase.

We were not satisfied with our existing efforts and began to look at other options. One idea was to begin looking for technology that existed or might be developed to reduce the parasitic load on the diesel engine. Parasitic load is energy consumed by power systems not directly involved in producing motive power to the wheels. The cooling system, HVAC system and air compressor were obvious targets. Of these, the cooling system appeared to be the largest and most logical place to start.

TriMet became aware that a company heavily involved in cooling systems for auto racing and military applications may have just what we were looking for. We partnered with Engineered Machine Products (EMP) of Escanaba, Mich., to develop a prototype specifi cally engineered for transit buses using our experience of what was necessary for successful operation in our application. We were also interested in having a cooling system that would be retrofitable on existing buses so we wouldn't have to wait for new bus purchases to reap the benefits of such a system. EMP already had expertise in thermal management systems producing fans, pumps and other cooling system components for Nascar racecars and the Department of Defense. The system it produced was elegant and effective, using advanced engineering and a clean sheet approach to cooling a diesel bus engine, just as it did for its Nascar and military projects.

The prototype system it developed uses more efficient radiator and charge air cooler cores, a variable-speed electric coolant pump, variable electric mixing valves (to replace the existing thermostats) and electric variable-speed cooling fans for the radiator and charge air cooler (CAC). The fans are reversible to clean the cores to eliminate fin plugging.

A computer monitors the engine, transmission and CAC temperature and adjusts the system to provide necessary cooling system performance with the least power consumption. The radiator fans and CAC fans operate separately, which aids in efficiency. The computer control system assists with troubleshooting and provides real-time monitoring of system performance.

To power this new cooling system it settled on a new, high efficiency aircooled alternator that was easy to install (in the existing alternator mounting bracket), robust and provided higher amperage output than the existing OEM unit. It has been in field and test cell operations for about two months and has operated flawlessly.

Our experience to date has been that fuel economy over the summer increased about 10 percent. Now that the weather is cooler we expect that to decrease, although a 6 to 7 percent reduction overall seems a reasonable expectation.

Based on our successful prototype system test and the universal acceptance of the need for such a system, EMP is now commercializing a simplified radiator/fan pack with the high efficiency alternator for purchase and installation. TriMet is working to procure a handful of the new commercial units for further testing and analysis.

We believe this system will be in all transit buses within the next five years. The system is simple, reliable and effective. It fits into all existing transit bus drivetrain technologies, including hybrid and CNG, allowing universal application in all new and existing buses. In addition, it is capable of being engineered into every heavy-duty vehicle, on or off-road in this country or around the world. We are proud to have had a hand in developing this new and innovative technology that achieves the ultimate goal of any sustainable project - a smaller environmental footprint and lower operating costs.