

# A fan of fuel savings

**E**ngine fans in most light and medium-duty gas and diesel trucks run continuously while the vehicle operates. This wastes power and fuel because fans can run just 10% of the time and still cool the engine adequately.

Viscous-type fan clutches provide a certain amount of fan control. Here, a bimetal strip on a fan hub senses temperature changes of air passing through the radiator. The strip connects to a valve that directs fluid to a fan clutch. High

temperatures engage the clutch and low ones disengage it — well, almost. Engaged viscous-coupled fans typically slip about 5 to 10% of shaft speed. And disengaged fans may still run at about 45% of engaged speed, especially at low engine rpm, says one SAE/DOT study. This inability of the fan to fully disengage can cause overheating and may rob about 5% of engine power.

Moreover, lowered coupler-fluid viscosity (from normal engine heating) delays clutch response

An electromagnetic fan clutch from Ogura.



which further degrades efficiency.

On-off fan controls are another, more efficient option. Such controls use a sensor to gauge engine coolant temperature and tell a fan to run only long enough to cool the engine. Otherwise the fan freewheels. Large, over-the-road rigs have used pneumatic on-off fan clutches for years. The units need compressed air to work and tend to be bulky. But electromagnetic clutches such as those from Ogura Industrial Corp., Somerset, N.J. ([www.ogura-clutch.com](http://www.ogura-clutch.com)), let smaller trucks, cargo vans, and heavy-duty pickup trucks benefit from the approach.

Like their pneumatic counterparts, electromagnetic clutches completely disengage cooling fans when not in use and fully engage them when needed. Clutches mount either on a water-pump shaft or jackshaft. Water-pump-mounted units drive the clutch rotor through a bore. Jackshaft models drive the rotor with a pulley. Engaging a 12-V coil clamps the fan hub to the driven rotor without slip.

The fuel savings can be dramatic. For example, the same SAE/DOT study cited above showed on-off control of a 20-hp fan (typical of a light truck) saves more than 200 gallons of fuel over 10,000 miles compared with the same sized direct-drive fan. It saved over 50 gallons compared with a viscous-coupled fan. And truck and bus maker Navistar says on-off cooling fans may save operators of its school buses about 5%

in fuel costs compared to buses carrying viscous-coupled fans.

Less noise and longer radiator life are other benefits. Fans running unnecessarily can draw in dust-laden air that abrades the radiator and shortens life. On-off fan clutches also help bring engines to operating temperature faster which reduces emissions and

helps truck makers meet new, more stringent emissions guidelines.

Circle 420

## WHEN TWO SPEEDS ARE BETTER THAN ONE

On-off fan controls aren't ideal for all applications. Lift trucks and skid loaders, for example, tend to cycle on-off clutches more frequently because such vehicles always need some amount of engine-fan cooling. Two-speed fan clutches work better in these applications. Such clutches have embedded permanent magnets to couple to and rotate the fan at a particular speed. Pressing a coil rotates the fan at shaft speed.