Proving fuel savings

Recent years have witnessed the emergence of a number of technologies that 'promise' to save fuel and therefore expenditure. For operators with a large vehicle fleet, anything that helps achieve even a slight drop in fuel consumed can save thousands of pounds, so it is not surprising that many find solace in these 'solutions'.

But are operators placing too much faith in these devices; do they actually work? Neil Fulton, manager of powertrain engineering at Millbrook Proving Ground, is unconvinced – but part of his job is to test whether their claims can be justified. He and his team at the Bedfordshire facility have trialled fuel saving devices with a wide range of vehicles, from light vans, through medium trucks and 4x2 rigids, right up to 44 tonne six-axle trucks. His work has been conducted both in the lab, using a chassis dynamometer, and also out on the tracks at the facility – predominantly occupying the high-speed bowl, to best replicate the motorway environment, but also Millbrook's legendary hill route.

"In my view, it is very unlikely that a particular technology can save operators large amounts of money and they shouldn't have too much confidence in their findings, if they are taking data from driving on the public road," warns Fulton. "A short route can be greatly affected by traffic conditions, the driver, the test route itself and the vehicle's weight," he observes, before explaining what Millbrook tries to achieve. "We endeavour to eliminate these variables, to produce the repeatability and accurately demonstrate the differences between one [fuel saving] product and another."

Fulton explains that Millbrook's facilities are used to build a repeatable route, with the high-speed bowl even simulating low-speed work. "Our drivers are experienced in maximising fuel economy and understand the importance of where to change gear, and the different speeds they should be driving at," he says. And that's important: Fulton points to the fact that the days of going for 20% improvements in fuel consumption from, for example, turbocharging arrangements are long gone.

Despite many operators talking positively about fuel saving devices, others are not convinced. Neil Fulton, manager of powertrain engineering at Millbrook Proving Ground, tells John Challen why he is sceptical

"So fleet operators are looking for very small percentage improvements that can, in turn, add up to a massive difference overall," he states. That's where assessing the validity of claims gets a little more tricky. "Someone who markets a product that preserves fuel, and has done some testing on a fleet of trucks, may claim to achieve a 10% fuel saving. Our role is to identify a comprehensive test procedure to test such claims."

Fulton reveals that as much as 75% of Millbrook's fuel economy testing to date has been done on the high-speed circuit. "Very rarely is the work steady-state," he confirms. "In the real world, we can't typically travel 200 miles in one gear and use cruise control. The duty cycles we follow are trying to be representative, so have a mix of steady state and high-speed. So hills are pretty important when it comes to fuel economy, too, and ours can be used as part of the programme in a repeatable and controlled way."

How repeatable? Fulton points to the fact that often two vehicles are run simultaneously in opposite directions to compensate for wind conditions. He also explains that testing stops when the wind is above a certain speed and in wet conditions, as both of these can have a significant and detrimental effect on the test results.

So what can Millbrook offer operators? "We put a lot of time with customers into understanding the mode or operation for their vehicles, which differs from vehicle to vehicle and operator to operator," explains Fulton. "Every fleet has a specific style of operation and we try to replicate that style."

And it's not just operators. Millbrook's client list also includes government departments, as well as fuel and lubricant manufacturers that need to substantiate claims for their products. Again, he says, it's about using the facility to replicate realistic duty cycles and provide independent verification, or otherwise, with statistically viable and repeatable findings.

That said, Fulton admits that fleet managers often surprise him when it comes to analysing fuel consumption. "They claim to take it seriously, but they don't go into enough detail," he says. "They claim to understand the fuel consumption of their fleet, but I don't think they understand how it can be improved. For example, too many just look generically at a vehicle's fuel consumption and not at how it is driven or the route it follows."

Measurement matters

Measurement is the main issue and Fulton believes that a visit to Bedfordshire would open eyes for many fleet managers. "For example, on the track we steer clear of doing measurements based on tank refills, simply because of inaccuracies caused by factors such as ambient temperature and the amount of fuel returned to tank during the test," he says. "People may think that is the best way to measure fuel consumption, because you can see exactly how much fuel is being used, but, in fact, it is probably the least accurate technique."

In the absence of tank refills, Millbrook offers two much better measurement techniques. "First, we have calibrated fuel flowmeters that are very accurate and repeatable," explains Fulton. And given that operators are looking for low percentage improvements, those points matter. What's more, these meters are fitted to the vehicle by breaking into the fuel supply line, and are designed to compensate for temperature changes and the amount of fuel returned to the tank.

The second method Fulton describes uses Lysanda's Eco-Log system. The unit takes a feed from the engine management system through the diagnostic port, making it

Millbrook and the LowCVP

Neil Fulton plays an active part for Millbrook in the LowCVP test programme, predominantly looking at the effect of aerodynamic aids on vehicle performance and fuel economy.

Although no figures have been released, our Millbrook man says he expects some "real surprises". He expands: "Some of the technologies that you would expect to provide improvements did come up with the goods. But some claims simply weren't there." As a teaser, he adds that low rolling resistance tyres proved very good at fuel economy improvements.

"There is probably some caution as to how these results will be announced, as we only used a small selection of vehicles and technologies," suggests Fulton. "With those numbers in mind, you have to be pretty careful in interpreting the findings. However, the purpose of our involvement was to see if there was a robust test methodology, rather than simply putting vehicles out on the public road, which is invariably inaccurate."

relatively easy to fit. “It is vehicle-specific, so you have to ensure it is set up right. We can always fit fuel flowmeters, too, if we need to.”

However – and as an example of the lengths the organisation goes to – in order to prove the reliability of its batch of Eco-Log instruments, Millbrook engineers ran a correlation exercise with a range of vehicles – its own and others from customers. “Even if they aren’t 100% accurate, they are very repeatable,” insists Fulton. “If you are getting 10mpg on one vehicle, you might only get 9.6mpg with carbon balance [greenhouse gas emissions related to energy use, based on the mass of fuel consumed and emissions coefficients], but you are getting those figures consistently.” And Fulton adds that both systems allow a second-by-second breakdown, so fleet engineers can see exactly where in the cycle the biggest improvements are being made.

“The results of our evaluations confirm that some improvements depend on the vehicle and others on its duty cycle,” he confirms. “Clearly, there are some aerodynamic aids that have made some big improvements.” But Fulton also acknowledges the importance of driver training, which, he agrees, can have big benefits for some drivers and some fleets. “This is not our main focus, though. The way we can help is for customers to bring their vehicles or products to us, and then we can demonstrate the differences between one and another – and fuel economy claims that can be proven.”

Interested in getting help? Fulton says that, in theory, a fully repeatable test programme can be completed in one or two days. “The standard setup is to use two vehicles on each test; one is the control vehicle and the other the test vehicle,” he explains. “The latter is run at its baseline condition, and then the fuel saving product is introduced, activated or attached before repeating the test.”

Fulton concedes that Millbrook’s own systems are not perfect and that refinement is always needed. “We need to make sure we’re not just repeatable to just one per cent. From my point of view, we should be aiming for much better than that.” And how will improvements be realised? “More training for our fleet of drivers and greater experience with the people responsible for preparation of the vehicles,” he answers. TE

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