FIRE IN THE HOLE!

Buses are operating in the UK while fitted with a system that has been branded as a potential fire hazard. But how real is the danger? Richard Simpson asks questions

An unknown number of buses fitted with an approved aftermarket emissions reduction system have been flagged up as a potential fire hazard by DVSA. Operators with vehicles equipped with the retrofitted Baumot system have been advised to pay attention to the condition of the electrical equipment that controls it, after three minor vehicle fires were reported.

WHAT'S THE SYSTEM?

The Baumot system was designed to reduce the NOx emissions of older buses with Cummins and Scania engines to meet Euro VI limits by using selective catalyst reduction and AdBlue. Problems caused by retrofitting conventional SCR systems to buses not designed for the technology had included urea crystallisation in the injection nozzle upstream of the catalyst when the engine idled or was operated at low loads, which is frequent in a typical city bus duty cycle.

Baumot sought to address this by creating the B-NOx generator (pictured), which uses a 24V electrical heater and waste heat from the turbocharger to boil ammonia from part of the AdBlue dose. This was then added to the exhaust gas stream, which passed through an otherwise conventional SCR system and particulate filter. The system was said to be highly effective at reducing NOx emissions, with reductions of 99% in NOx being claimed: enough to get Euro V or earlier engines to meet Euro VI limits in service, after tests at Millbrook. Reduction in PM of 97% were also reportedly achieved.

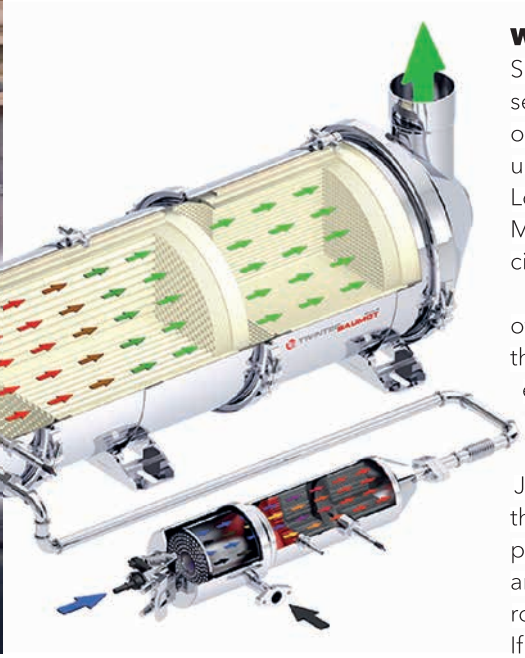
WHAT'S THE ISSUE?

An independent engineer who has investigated the system after the fires were reported, but who spoke on condition of anonymity, says that the basic design is sound. But he has identified an issue with the electrical controls for the ammonia generator's heating unit, which he believes may have been caused by errors when the system was installed by subcontractors.

He says: "The fires were all experienced by the same operator, with the first occurring two years ago. Baumot's own engineers attended, rectified the issue and left without giving an explanation to the operator as to what had occurred or why. The second fire happened last summer, and the third last winter. All three vehicles were Cummins-engined double-deckers." (They are not pictured in the generic image above.)

"After the third fire, I examined the vehicle. There is a relay which controls the heating element, which is switched in and out as required. The relay is protected by Mega Blade 100Amp fuses on both sides, and has wiring of about 8mm diameter…about the same as you would expect to see on a car battery, so it's clearly designed to cope with quite a heavy load. The ammonia generator itself is a bit like an electric kettle, with a heating element in a vessel.

"Reportedly, DVSA's view was the problem was in the element itself. But on the vehicle I saw it looked more like a wiring issue. The fuses had blown, but had failed to stop the wires overheating. Wires of that size are secured by nut and stud fittings, not push-on spade connectors, but heat damage meant



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that I couldn't really discern whether the overheating had been caused by something as simple as an incorrectly-torqued nut. Or it could have been a routing issue.

"The damaged wiring was adjacent to the relay, not the element, so I'm not convinced by the DVSA explanation that the wires had overheated, because the amperage drawn by the element was gradually creeping up and overheating the wiring. All the damage was around the relay, and not directly upstream or downstream of the element."

WHY CAN'T BAUMOT FIX THE PROBLEM?

The Silverstone-based UK company went into administration in January owing more than £4.5m. The firm appointed Cowgills as administrator after its core markets of the UK, Israel and Italy were affected by the COVID lockdown, which prevented it from accessing customers' vehicles and its own workshops.

A report from the administrators reveals that, after incurring heavy R&D and start-up costs supported by German parent Baumot AG, the company signed stock finance invoice agreement with Seneca Trade Partners in 2018. By the start of 2020, Baumot UK was showing a profit, but rapidly reverted to substantial losses during lockdown. In October 2020, after lending Baumot UK £3 million, the German parent company abandoned further support. Administrators from Cowgills say that Seneca's preference was for Baumot UK to continue to trade. And the UK management team assured Seneca that there was a healthy order book, that a 'significant' R&D tax claim had been filed, and that stock could fulfil orders.

Seneca agreed to continue funding the firm on the proviso that its German parent would invest further funds and to help with trading. No such agreement was forthcoming, and the company has closed. Its records of which vehicles were fitted with its systems, when and who by, are now lost, which makes it impossible for DVSA to organise a conventional recall to rectify the problem.

In Germany, Baumot Group and its subsidiaries have filed for bankruptcy protection as the company restructures.

WHAT HAPPENS NEXT?

Some of the systems have been in service for five years, and most have operated safely and reliably: there are understood to be about 300 in use in London and other major conurbations. Many were paid for by public funds as cities rushed to clean their air.

The independent engineer knows of a large fleet that has scanned the systems using thermal imaging equipment and noted no abnormal heat in the problem area.

Transport solicitors Backhouse Jones has advised operators to be sure that their managers and maintenance providers are aware of the issue, and pay particular attention to 'the robustness of the electrical parts.' If necessary, independent advice should be sought from professional bodies, they say. If signs of potential fire are found during maintenance or examinations, operators are obliged to inform DVSA.

CAN THE SYSTEM BE REMOVED?

One solution is to remove the equipment and revert to the standard exhaust system. But this will obviously return the vehicle to its original emissions rating, and which must be reported to the relevant authorities. Doing so will obviously place constraints and penalties on use of the vehicles in CAV, LEZ and ULEZ areas.

It is worth bearing in mind that the number of actual incidents has been relatively small; no-one has been injured and no vehicle has been written off as a result, although the independent expert said that wiring issues in other vehicles may have been identified and addressed before a fire could start. Operators have an obvious duty of care to ensure that a regime of necessary checks is introduced and adhered to.

DVSA said it was continuing to work with operators on the issue. TE