Case Study: Go Ahead

Bus Retrofit to improve London's Air Quality

Go Ahead is one of the UK's leading providers of quality public transport, carrying over 1.8 million bus travellers each day. By upgrading its older Euro III buses with a new variant of Eminox SCRT® technology, it has achieved proven significant emissions reductions of 88% NO_x (Oxides of Nitrogen) and more than 50% NO_2 (Nitrogen Dioxide). The process has taken Go Ahead beyond even today's most stringent Euro V emissions standard, at a fraction of the cost of having to purchase new vehicles.

Public health implications arising from the UK's poor air quality are a cause for major concern, with most areas remaining in breach of EU limits for NO_2 emissions. London is unsurprisingly the city with the biggest problem to address and buses are responsible for 10% of all NO_2 emissions in the capital, even more in central areas.

Transport for London (TfL) therefore set retrofit manufacturers and bus operators with ambitious targets to cut NO_2 emissions from their vehicles while maintaining other reductions. The systems would need to be proven to meet primary NO_2 targets both on specific test cycles and in real world operation, something not even newly manufactured buses are required to do.

Consequently, expert engineers from both Eminox and Go Ahead London worked closely together on the design and validation of a retrofit system that would enable its older diesel vehicles to meet this challenge.

"We have a long-standing working relationship with Eminox and knew they had the unrivalled engineering expertise to take an appropriate solution from concept to supply," says Richard Harrington, Engineering Director, Go Ahead London. *"It was no surprise that they were able to bring the first system to market that exceeded TfL's requirements.*

The task of specifically targeting NO_2 emissions while maintaining other reductions required a combination of SCR (Selective Catalytic Reduction) and CRT® (Continuously regenerating trap) exhaust after treatment solutions. The project therefore presented new challenges and drove the development of a new generation of SCRT® technology, which required new catalyst formulations and extensive system calibration.

Eminox first worked with catalyst experts at Johnson Matthey and then with Go Ahead to optimise the SCRT® technology and perfect product design and durability. To validate the system independent tests were initially carried out on the MLTB test cycle, which simulates London operating conditions and is based on a London bus working on Route 159 from Streatham to Baker Street via Whitehall and Oxford Street. The results showed reductions of 88% NO_x and 55% of NO_2, indicating the SCRT system was operating close to Euro VI emissions levels.

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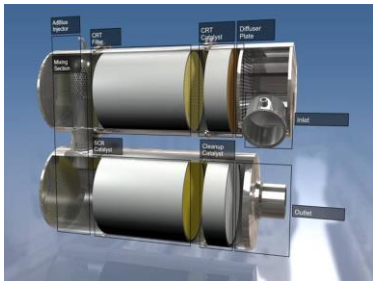
As part of a pilot programme, the technology was then incorporated onto one of Go Ahead London's Euro III buses operating on Putney High Street. This is a known NO_2 black spot and provided the opportunity to authenticate the SCRT® system's performance in real world operations. The vehicle was fitted with two NO_x sensors measuring engine out and tailpipe NO_x levels so that emissions before and after the SCRT® system could be compared in real time. Average NO_x reduction data taken over one month showed an 87% decrease, equivalent to an impressive annual NO_x reduction of more than 700kg per bus per year.

"Cutting NO_2 saves lives so it was imperative our technology be proven to be effective out on the streets in which we live and breathe," says Mike Galey, Marketing Director, Eminox. *"Go Ahead London has been instrumental in enabling us to rise to this challenge."*

As a result of the successful pilot programme, Go Ahead is working with Eminox to upgrade 259 buses at a rate of 30 vehicles per month. This includes 12 Dennis Dart buses that were upgraded ahead of the 2012 Olympics for operation during the Games. Specialist Eminox fitting teams are working at Go Ahead's depots to carry out the fitting programme around the operational requirements of the bus fleet.

"Fitting Eminox's SCRT® technology is the fastest and most cost effective way of tackling our exhaust emissions," concludes Richard Harrington. *"It provides us with a practical way of simultaneously meeting TfL's requirements and delivering major improvements to public health."*



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