



## Case Study: Hitachi Selects Eminox Exhaust System

Hitachi Rail Europe has selected Eminox as its preferred partner to develop a complete exhaust and pipework system for the new bi-mode trains for the Department for Transport's £5.7bn InterCity Express Programme (IEP).

Latest bi-mode trains have diesel and electric propulsion and can travel at up to 125 mph, in various formations from five to ten cars.

As well as meeting the stringent EU exhaust emissions for diesel engines, rail quality standards and Hitachi specific requirements, the project required Eminox to provide design, verification, testing and inspection to Notified Body requirements.

Eminox demonstrated a detailed technical understanding of the requirements and was able to convey this through the investment it has made in design software and FEA structural analysis. The solution proved to be an intelligently designed exhaust system that delivers on all levels.

The InterCity Express Programme (IEP) is a £5.7bn project to replace the Intercity 125 and Intercity 225 trains on the East Coast and Great Western Main Lines. As part of the programme, Hitachi Rail Europe (HRE) will provide the design, build, finance, maintenance and service delivery of the 122 trains over a 27.5-year period. The trains are a combination of fully electric and bi-mode.

Eminox was set the challenge of developing a bespoke exhaust system to transfer gas from the after treatment system located underfloor next to the engine, through the car body to the rear, and ensure safe discharge from the top of the train. The system had to fit a narrow space envelope with a complex routing through the structure.

The solution incorporates 16 metres of pipework from Ø5.5" to Ø8" (140 x 200mm) and which is manufactured entirely from stainless steel. The design incorporated insulated pipes, convolutes, bellows and mounting brackets.

To ensure the system was structurally safe and durable and the 27.5-year design life is achieved, the exhaust pipe has been designed using the latest CATIA V5 CAD software. FEA structural analysis has also been undertaken against BS EN 12663 - 1:2010 and other applicable standards to identify areas of high stress within the system.

The design has now been agreed with Hitachi as meeting all the requirements. The whole system has been designed for efficient manufacture throughout the development and the formal industrialisation process has now begun.

Eminox continues to be innovative in exhaust systems and has an ongoing research and development programme that is focussed on ensuring its technology delivers in the real world. The new bi-mode trains are the latest example of how this adds value to the customer proposition by being able to package the exhaust system efficiently in a restricted space envelope.

The first trains will be introduced on the Great Western Main Line in 2017, the family of new Class 800/801 trains will constitute a step change in capacity, improved reliability and reduced environmental impact on every train journey.

