

Case Study: SJ Rail

Low emissions zones for trains too

In 1996, Environmental Zones (E-Zones) were established in three Swedish cities: Stockholm, Gothenburg and Malmo. Their aim was to improve air quality by reducing transport pollution, especially the harmful particulate matter from vehicles with large diesel engines such as buses and trucks, but also trains and later off-highway vehicles. Trains, while a small contributor to the total pollution, are a very heavy polluter in a few localised places where pollution is a real issue—such as train stations which are located close to where people live and work and where many people pass- through each day.

The three main elements of the programme were:

- The introduction of clean fuel.
- Encouraging the take-up of newer vehicles (clean engines).
- Encouraging or enforcing the use of exhaust after treatment.

Environmental Class 1 (MK1) diesel was introduced, effectively sulphur-free ($S < 10\text{ppm}$) and with a reduced aromatics content. The E-Zones put limits on the age of vehicles to encourage the use of newer, cleaner engines. And many vehicles, including trains, were fitted with Eminox CRT® systems.

The Swedish rail company, SJ Rail, purchased eight new IC3 Flexliner DMU's, manufactured by ADtranz (now Bombardier Transportation) in Rungby, Denmark. The IC3's, which subsequently became known as Y2 trains in Sweden, are three-car sets with 2 Cummins NTAA855 R7 (310kW/416bhp) or DeutzBF8L513C (265kW/355bhp) engines in each of the end cars. Working with Cummins and ABB, Eminox designed and supplied CRT® systems for the trains. The CRT® systems for each pair of engines were packaged into a single compact assembly that was easy to fit and service.

The eight Y2 trains were put into service between 1996 and 1997 on routes entering the E-zones. Their service is very typical of a DMU with frequent stops, starts and high speed operation between stations.

Since their introduction, the trains have travelled nearly 10,000,000 kilometres in total without a CRT® system failure. The only maintenance that the CRT® units have required has been routine cleaning, amounting to 10 hours work per train, every 300,000km. The catalysts and filters were replaced every 1,200,000 kilometres as planned maintenance. Running costs per train have therefore been extremely low, amounting to less than €12 per 1000km.

