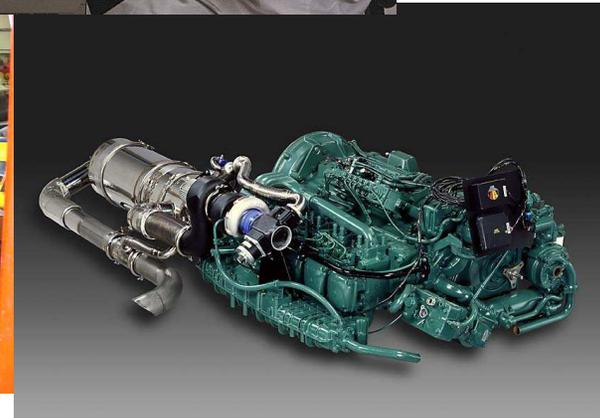
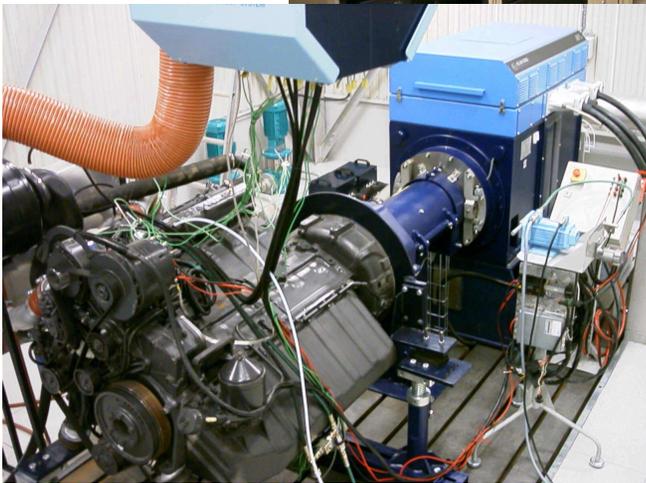
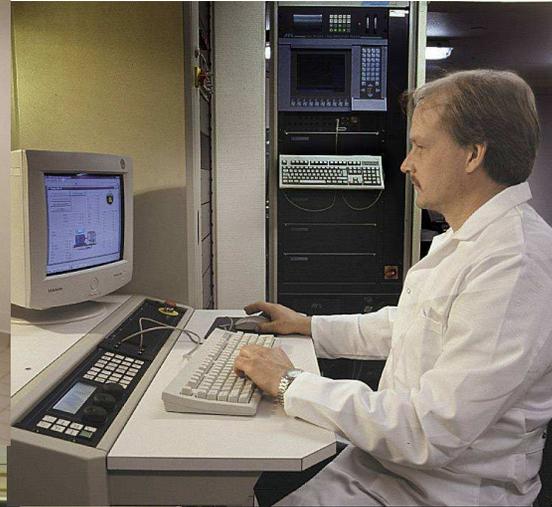


DNOx® System For Diesel NOx & PM Control



By Alex Gorel

 **stt emtec**
EMISSION & ENGINE TECHNOLOGY

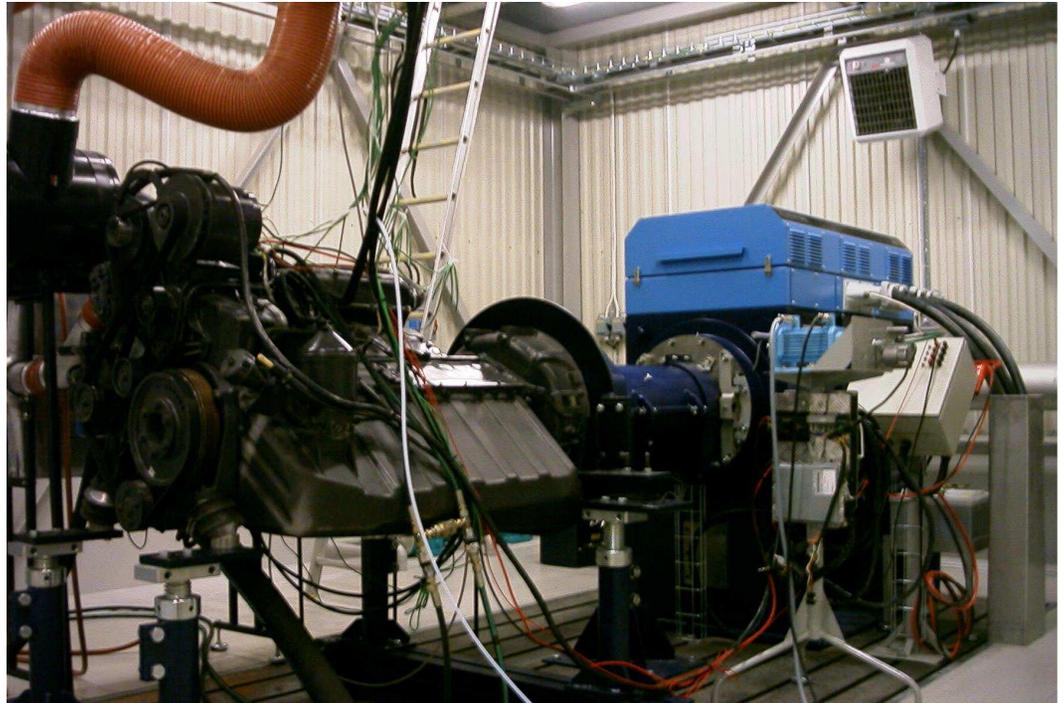
Company Overview

- Established in 1981 in Njurunda, Sweden
- Headquarters in Sundsvall, R&D in Njurunda, Sales and Tech Support operations in Sweden, USA, and UK
- Publicly owned
- Initially business - developing turbo systems for Mercedes Benz and consulting services to Volvo, Mazda, Toyota, Shell Research, SsangYong Motor Company, etc.
- Current products:
 - DNOx emissions control system for diesels
 - Performance enhancement kits for Mitsubishi trucks
 - Urea handling system for SCR
 - Active regeneration system for DPF

Major Activities

(A full scope of product and application development)

- Application feasibility study
- Full scale R&D
- Design of all mechanical and electronic component
- Small scale manufacturing
- Field testing
- Customer support
- Lab emissions testing



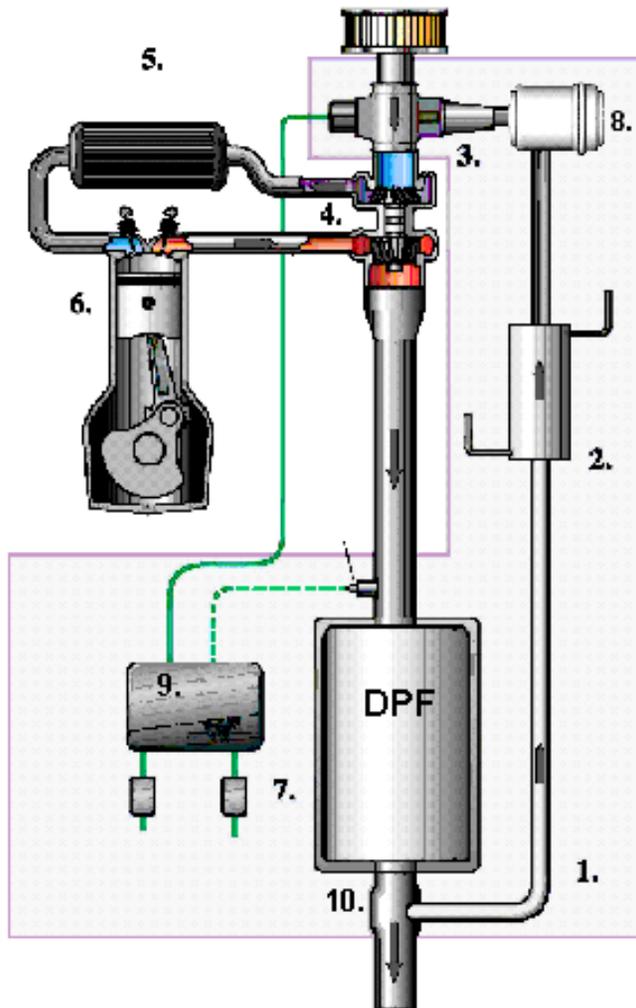
How EGR Works?

- EGR reduces peak combustion temperature by means of:
 - Reduced O₂ supply (the main reason)
 - High heating capacity of the exhaust gases (the secondary reason)
- 16% reduction of peak combustion temperature will result in approximately 80% reduction in NO emission

General Description

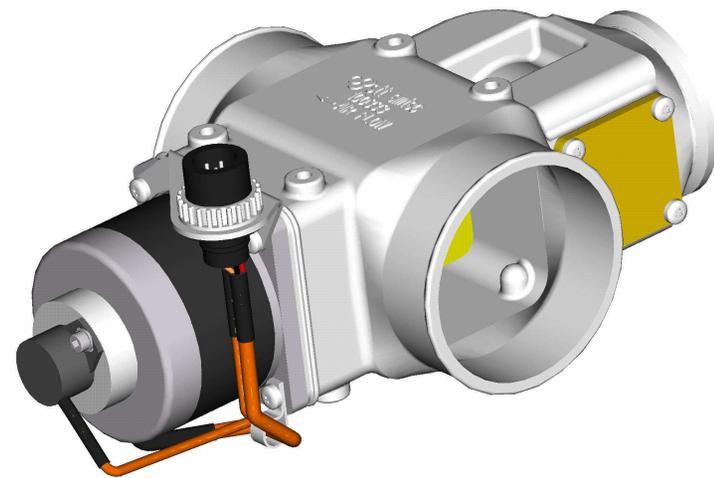
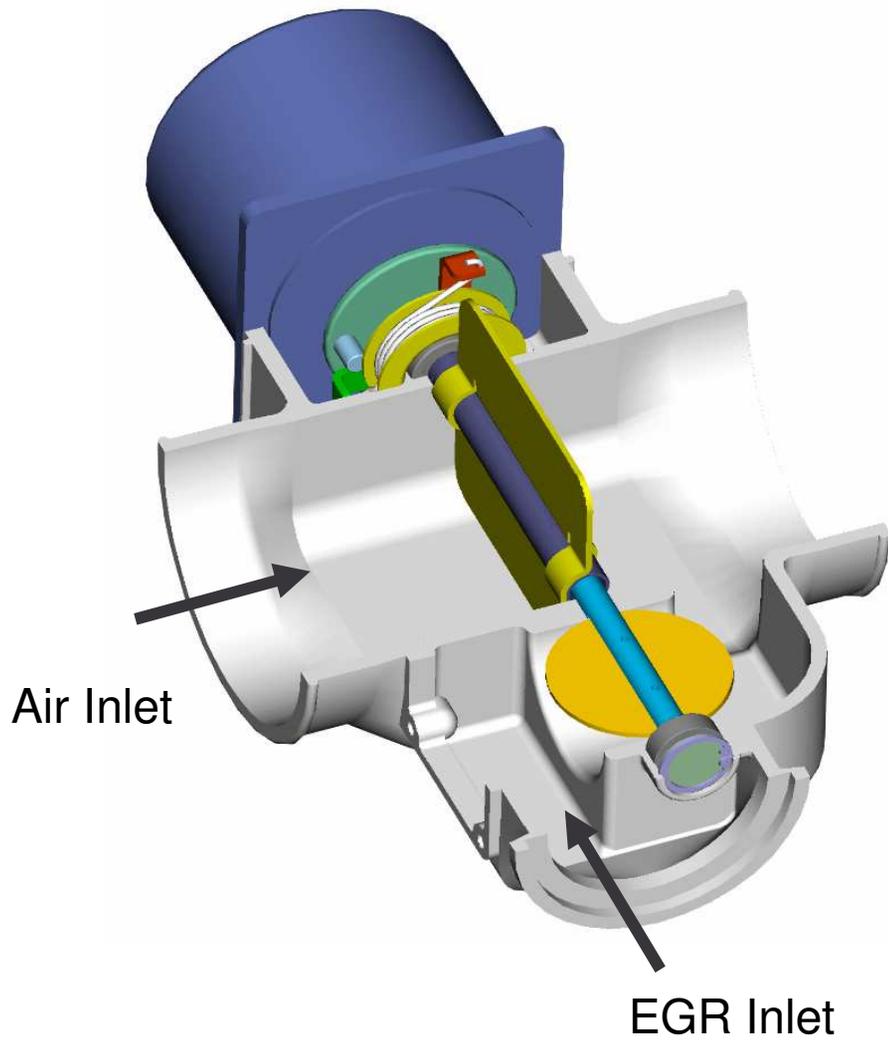
- DNOx is a combination of low-pressure EGR and DPF. It allows for simultaneous control of NOx and PM
- Emissions Reduction:
 - PM > 80 % (Typically around 90%)
 - NOx > 40 % (Typically around 50%)
- Re-circulates particulate-free cooled exhaust gas into the turbocharger inlet
- Electronically controlled
- Incorporates OBD and various safety features for engine and DPF protection
- Easy to retrofit
- Can be used with regular US fuel or ULSF

DNOx® System General Layout

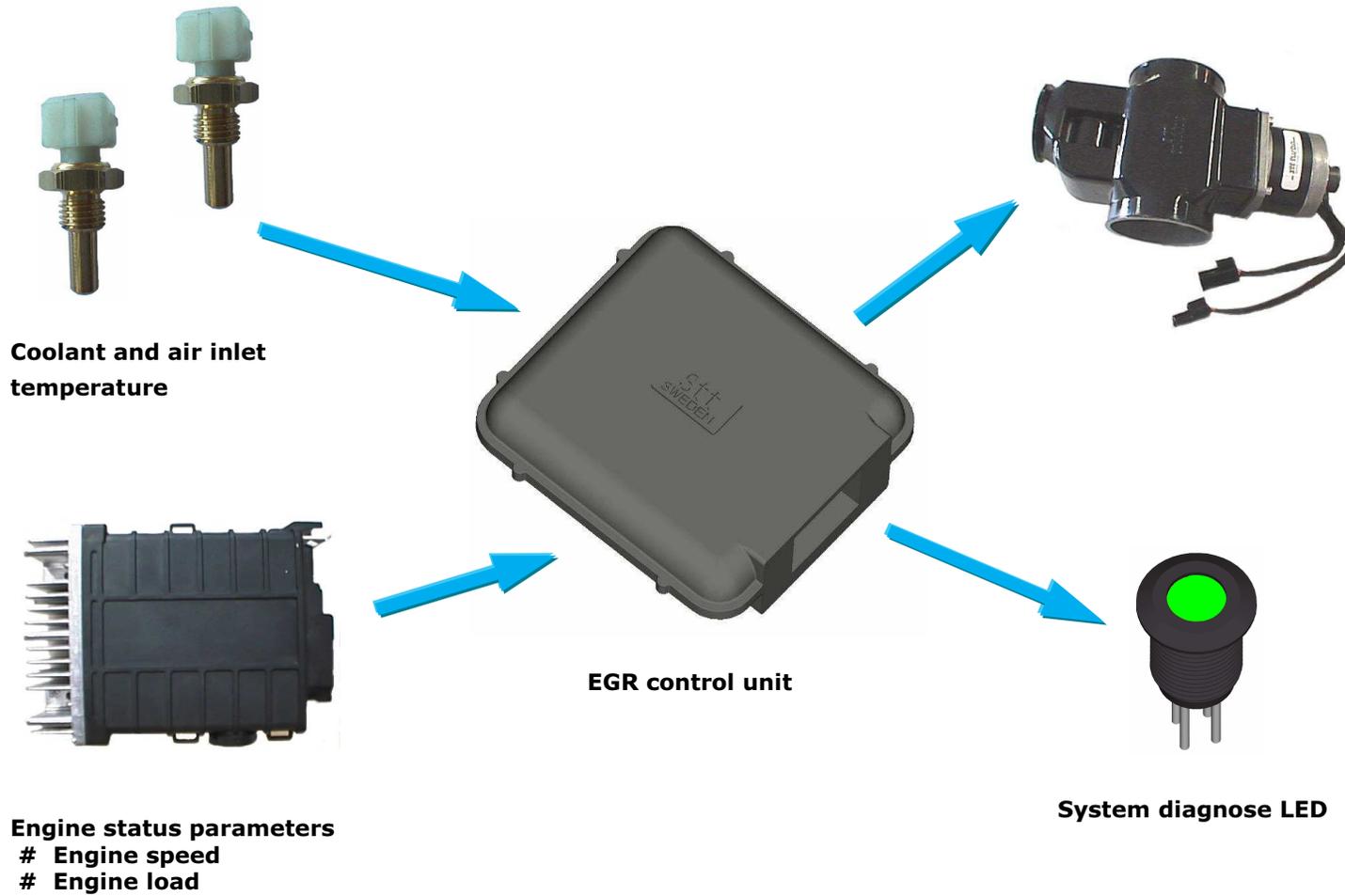


- 1 EGR Line
- 2 EGR Cooler
- 3 EGR Valve
- 4 Turbocharger
- 5 Air Intercooler
- 6 Engine
- 7 DPF
- 8 Emergency Filter
- 9 EGR ECU
- 10 Dynamic Pick-up Unit

EGR Valve



EGR Control System



DNOx Safety Features

- EGR turns off and activates alarm if any of the following parameters are out-of-spec:
 - Coolant Temp
 - Boost Air Temp
 - Exhaust Back Pressure
 - EGR Valve Position
- OBD system continuously monitors 10 electrical and mechanical parameters to:
 - Alert the operator
 - Prevent engine failure
 - Assist in problem debugging
- Emergency filter protects an engine from being contaminated in the case of DPF failure

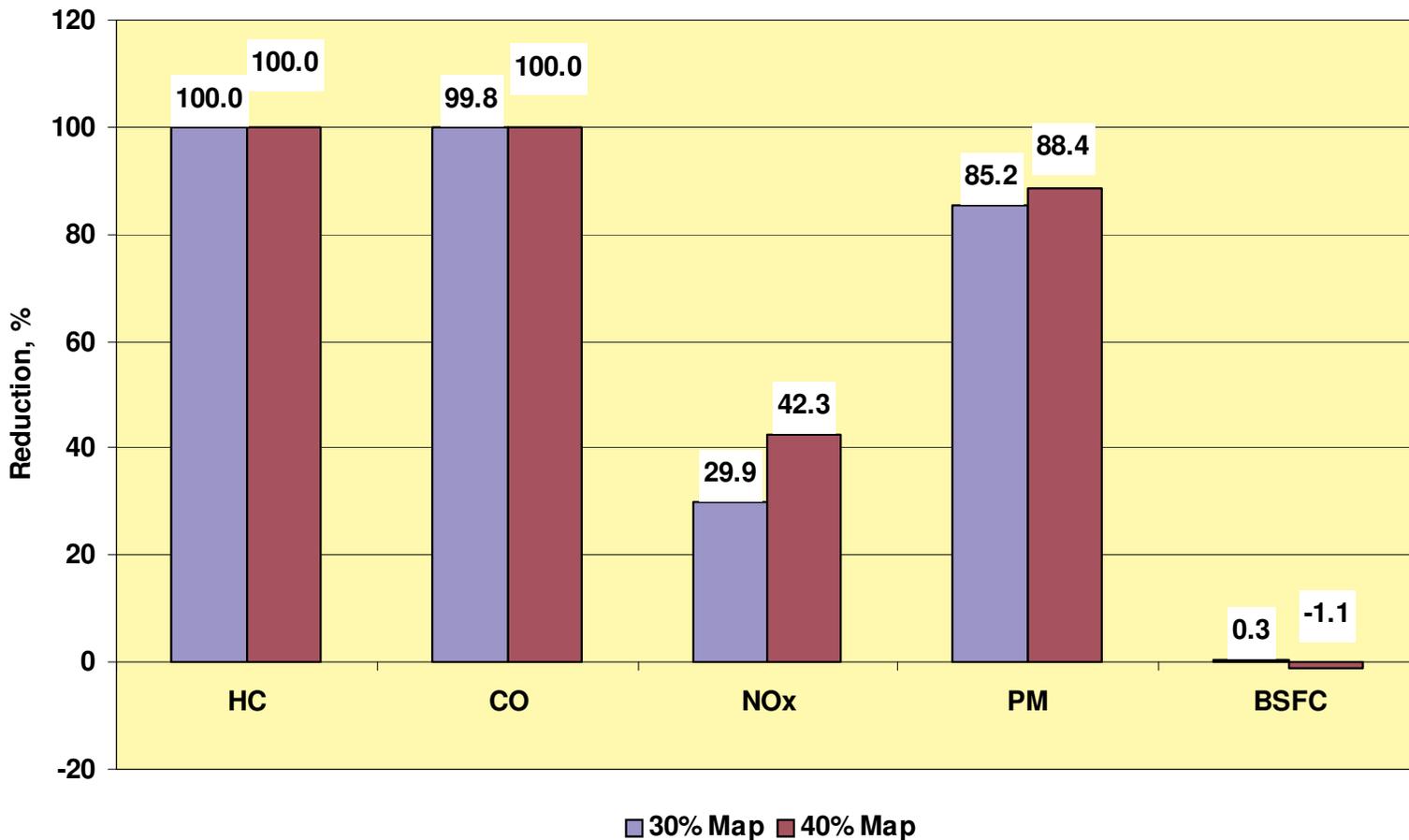
Maintenance Requirements

- Daily Service
 - Passive observation of the Diagnostic Light on the control dash
 - Time required – less than 1 minute
- Regular Service
 - Visual inspection of the EGR line for leakage and physical damage, emergency filter inspection, EGR valve return spring check, tightening any loose bolts, nuts, and clamps
 - Every 15,000 miles or once in 4 months
 - Time required – 45 minutes
- Main Service
 - Every 60,000 miles or once every 2 years
 - Time required – 2 hours
 - Includes regular service plus EGR valve service

DNOx Performance, DDC S50, 275 Hp Bus Engine

Map 1 – 30% NOx Reduction, Map 2 – 40% NOx Reduction

US HD FTP, SwRI, ULSF



Current DNOx Installations

Vehicle / Engine	Location / No. of Units	Product	Start Date	DPF System	NOx Reduction
Peterbuilt Garbage Truck, ISM	LA / 5	Demo	Oct-01	DPX	47%
Volvo WX, VE265	Houston / 2	Product	Oct-01	DPX	50%
Volvo WG, ISM	Houston / 2	Prototype	Oct-01	DPX	48%
NABI Bus, ISM	Oakland / 1	Demo	Feb-02	DPX	45%
NABI Bus, ISM	Oakland / 1	Demo	Mar-02	CRT	46%
Flexible Bus, ISM	Silicon Valley / 1	Demo	Mar-02	CRT	46%
International Truck / DT466	LA / 1	Demo	Feb-02	CRT	59%
Dennis Dart, B-Series	London / 8	Demo	Sep-02	DPX	40%
Dennis Trident, C-Series	London / 5	Demo	Jan-02	DPX	49%
Thomas Bus, ISB	Washington DC / 4	Prototype	Apr-03	DPX	30%
Orion-6 Bus, DDC S50	Washington DC / 3	Prototype	Nov-03	DPX	30%
Scania P94 Truck, DC904	Stockholm / 1	Demo	Jun-00	CRT	45-55%
Scania CL 94 Bus, DC905 Euro 4	Sweden / 50	Product	Jan-00	CRT	30%
APBF-DEC, C-12	SwRI / 1	Lab Demo	May-02	-	59%
Volvo B10BLE Bus, DH10A285 Euro 4	Europe / 750	Product	May-00	CRT	47%
Volvo B10TL Bus, Euro 3	Hong Kong / 450	Product	Jan-02	CRT	30%
New Flyer Bus, ISC 280	Houston / 400	Product	Feb-03	CRT	40% +
Neoplan Bus, ISL 330	Houston / 186	Product	Feb-04	CRT	40% +
Nova Bus, ISM 280	Dallas / 258	Product	Jun-03	DPX	40% +
Nova Bus, M11	Dallas / 113	Product	Feb-03	DPX	40% +

Current Status of Commercialization

- Over 2000 systems installed worldwide
- EPA & CARB approvals are expected in the near future
- The system is commercially available for many HD and MD diesel powered applications
- Ultra Low S Fuel is preferred, but not absolutely necessary
- Installation takes 16 man-hours
- STT does business through a dealer network. It affiliates with the world class technology and service providers, such as Johnson Matthey, Engelhard, FGN Emission Solutions, and others.

Customer Support

- Tech support and warranty administration through a local service provider
- Emergency tech support is available directly through STT
- Complimentary comprehensive on-site training
- Complete tech documentation – installation guide, shop manual, etc.
- Comprehensive Warranty

For Additional Information...

- Visit company website: **[WWW. STTEmtec. Com](http://WWW.STTEmtec.Com)**
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