

The Diesel Emission Control Group



**DIESEL
EMISSION
CONTROL**



DE-TRONIC
DIESEL EMISSION CONTROL



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Activities of the Diesel Emission Control Group

Diesel Emission Control Division (DEC) is a designer and supplier of Diesel exhaust emission reduction control technology and systems for the **automotive on and off road market sectors**.

Multronic Division (MTC) is a designer and supplier of Diesel exhaust emission reduction control technology and systems for the **marine, rail and stationary engine market sectors**.

MTC is also an official distributor for the KUS range of diesel and AdBlue sensing and gauging products for on and off road applications.

The DE-Tronic diesel dosing system for active DPF regeneration and urea dosing system for SCR are used by OEM and retrofit customers worldwide.

The Group has a small core of 30 key personnel and is supported by an international consortium of associates and partners, world leaders in their respective fields. Production is outsourced.

TORONTO, CANADA

Sales office



CHONGQING, CHINA

Sales and technical support office



EUROPEAN OPERATIONS

TIENEN, BELGIUM

Facility for technology development, engineering, development, and validation system testing



SCANDINAVIA

Sales offices Bergen and Göteborg

ROTTERDAM

Service and support marine operations



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LONDON, UK

Administration office handling the commercial activities of the company



CHERASCO, ITALY

Software development and production



UHERSKE HRADISTE, CZECH REPUBLIC

Engineering, Project management and technical support office



Fields of Application



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Milestones

- 2001 DE-Tronic** ECU system development started for in-house applications
- 2005** An industrialization agreement for software development and hardware production was signed with **Fuel System Solutions/BRC** in Cherasco, Italy
- 2007** OES agreement signed with **Scania Benelux** for all DPF SYSTEMS EURO III=> EURO V for PM
- 2010** Licensing agreement with **TU Graz** for their SCR dosing technology
- 2011** Licensing agreement with **CDTI** for their **airless urea injection technology**
- 2012** OEM agreement signed with **ZETOR Tractors** for **Stage IV** and **TIER 4F** for **turn key** solution
- 2013** OEM agreement signed with **YAMZ** for **Euro V turn key** solution
- 2014** OEM agreement signed with **LIAZ/MAZ/URALAZ/YAMZ** for **EURO V turn key** solution
- 2014** Agreement signed with **European Commission** and **TNO/TUV** to develop **OBD MARINE** standard for **marine Stage V**
- 2016** Supply to **ZETOR Tractors** of the Stage IV system begins
- 2016** Supply to **LIAZ, MAZ, URALAZ, KRAZ** begins
- 2017 DE-Tronic & DEC technology selected** for SCR control for different powerplants throughout the U.K
- 2017** OEM agreement signed with **Sokon Donfeng** for **China 5** DPF active regeneration management DCU
- 2017** OEM agreement signed with **major Indian OEM** for BS6 program

The following important licences are held by DEC:

- DEC has been granted worldwide licences to practice the following methods for **airless urea injection**:
 - ❖ Patent 5,976,475 (and worldwide equivalents); Return flow injection system for urea using reagent for injector cooling.
 - ❖ U.S. Patent 6,063,350 (and worldwide equivalents); Method to operate and control the return flow system.
 - ❖ U.S. Patent 6,279,603 (and worldwide equivalents); Fluid cooled injector
- An exclusive worldwide licence from The Institute of Internal Combustion Engines and Thermodynamics, Graz for their SCR dosing and control strategies.

DE-Tronic enables all engine architectures

- With the functionalities of DE-Tronic **all diesel engines** can be compliant with **EURO IV/ V / VI, Stages III/IV/V, TIER 3/4i/4F**

PM reduction > 95%

NOX reduction >95%

DPF Monitoring

EGR Control

DPF Active regeneration

SCR control

DHCPI
(Diesel
Hydrocarbon Post
Injection)

E-Heaters

**Throttle
valve***

Urea Dosing

**Ammonia
Dosing**

**Tank/line
Pump heating**

DE-Tronic additional features

OBD

DM1 – DM4 diagnostics

Data logging

Dash board communication

J1939 CANbus network

Component integrity

PC interface

15 standard access level

254 available

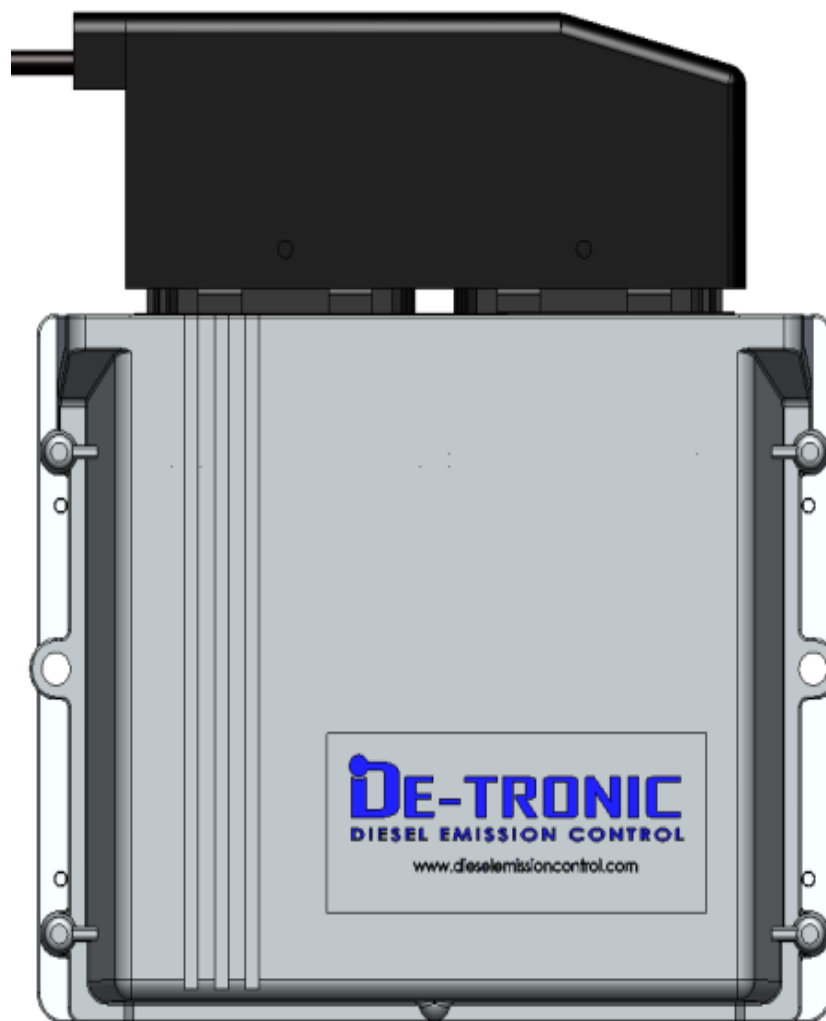
Preprogramed default universal settings

Telemetry

Graphic data analysis

Retrofit

OEM



Heavy Duty

Light Duty

Off Road

Marine

Rail

Possible to use in combination with mechanical and common rail diesel engines

Durability

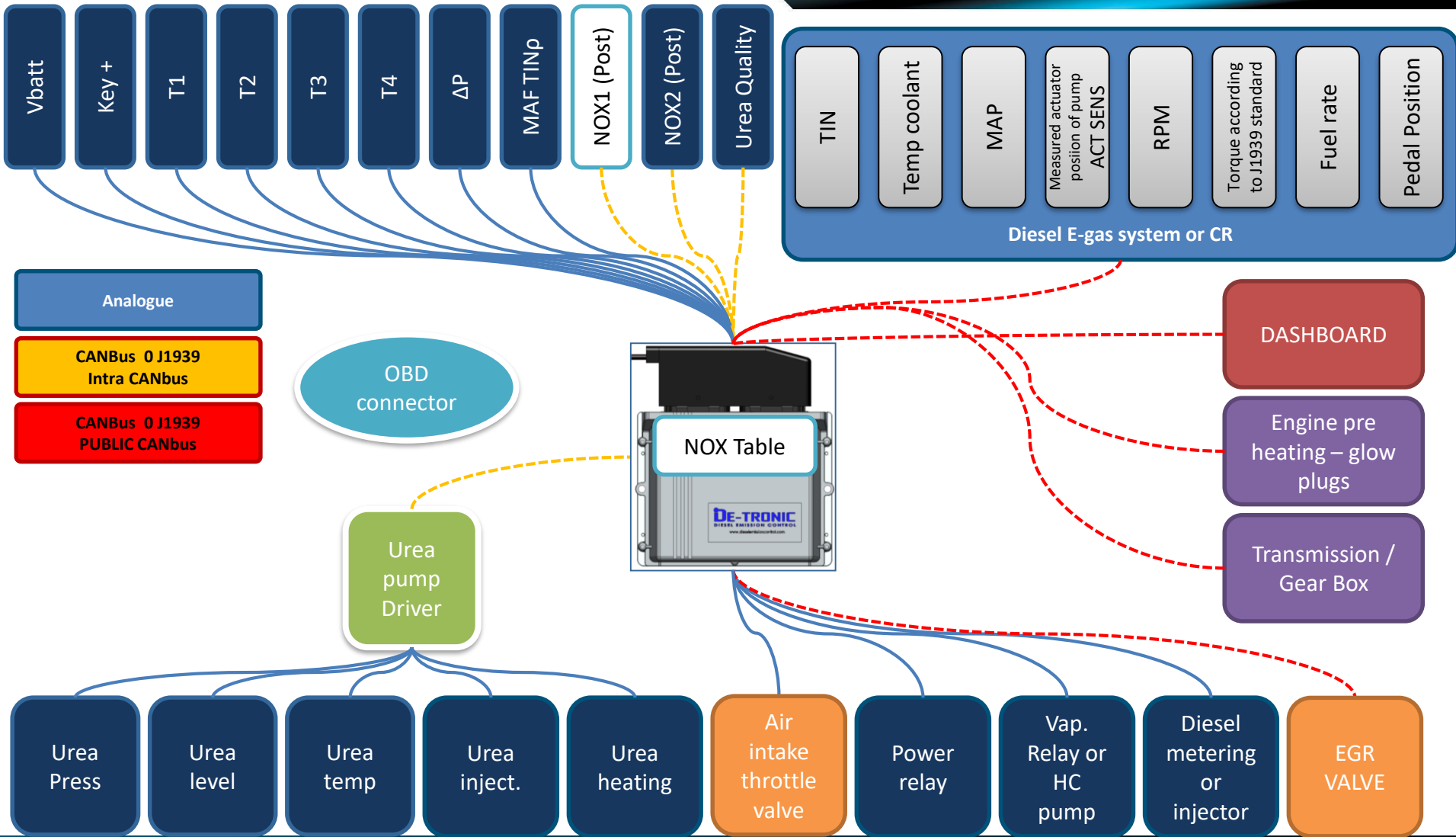
Competitive

Application specific

Flexible

Competitive development fee

Example of an electronic layout



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DEC has supplied its DE-Tronic diesel dosing system for DPF active regeneration and its urea dosing system for SCR to numerous system integrators worldwide:

- **Belgium** Bus fleet Brussels
- **China** Bus, gensets
- **Germany** Truck
- **Holland** Bus and truck fleets
- **Italy** Gensets
- **Hong Kong** Kowloon bus fleet
- **U.K.** Bus fleets London, Manchester, Liverpool etc
- **USA, California** Truck operators
- **USA, Chicago** Chicago Transit Authority school bus fleet
- **U.K.**Powerplants throughout the country

Current OEM Programs

- **Czech Republic Zetor Tractors,**
Development and supply of Stage IV/Tier 4F aftertreatment technology (DPF + SCR)
- **Belarus Minsk Engine Works (MMZ)**
Development of Stage V aftertreatment technology (DPF + SCR)
- **Belarus Maz Trucks**
Implementation of Euro V aftertreatment technology (SCR)
- **Russia Liaz Bus**
Implementation of Euro V aftertreatment technology (SCR)
- **Russia Uralaz**
Implementation of Euro V aftertreatment technology (SCR)
- **Russia Yaroslavl Motor Works (YaMZ)**
Development of Euro V aftertreatment technology (SCR)
- **China Sokon/Dongfeng**
Development of China 5/6 aftertreatment technology (SCR)
- **India Ashok Leyland**
Development of BS6 aftertreatment technology (DPF + SCR)



Stage IV / V & Tier 4 Final Technology



Application Overview

Engine Description	
Engine type	4 cylinder Diesel engine with mechanical inline fuel pump (DI)
Engine displacement [L]	4,16
Power rate [kW]	70 – 110
NOx Engine out [g/kWh]	7,5
PM Engine out [g/kWh]	0,2
PN Engine out [g/kWh]	Not available

Requirements	
NOx Reduction	96 %
PM Reduction	95%

DOC/DPF Volume [L]

DOC	3,113
DPF	6,255

Emissions

PM [g/kWh]	0,002
PN [# /kWh]	3,315e10

Compliance

Stage IV	Yes
Tier 4F	Yes
Stage V	Yes



SCR/ASC Volume [L]

SCR	12,3
ASC	2,9

Emissions

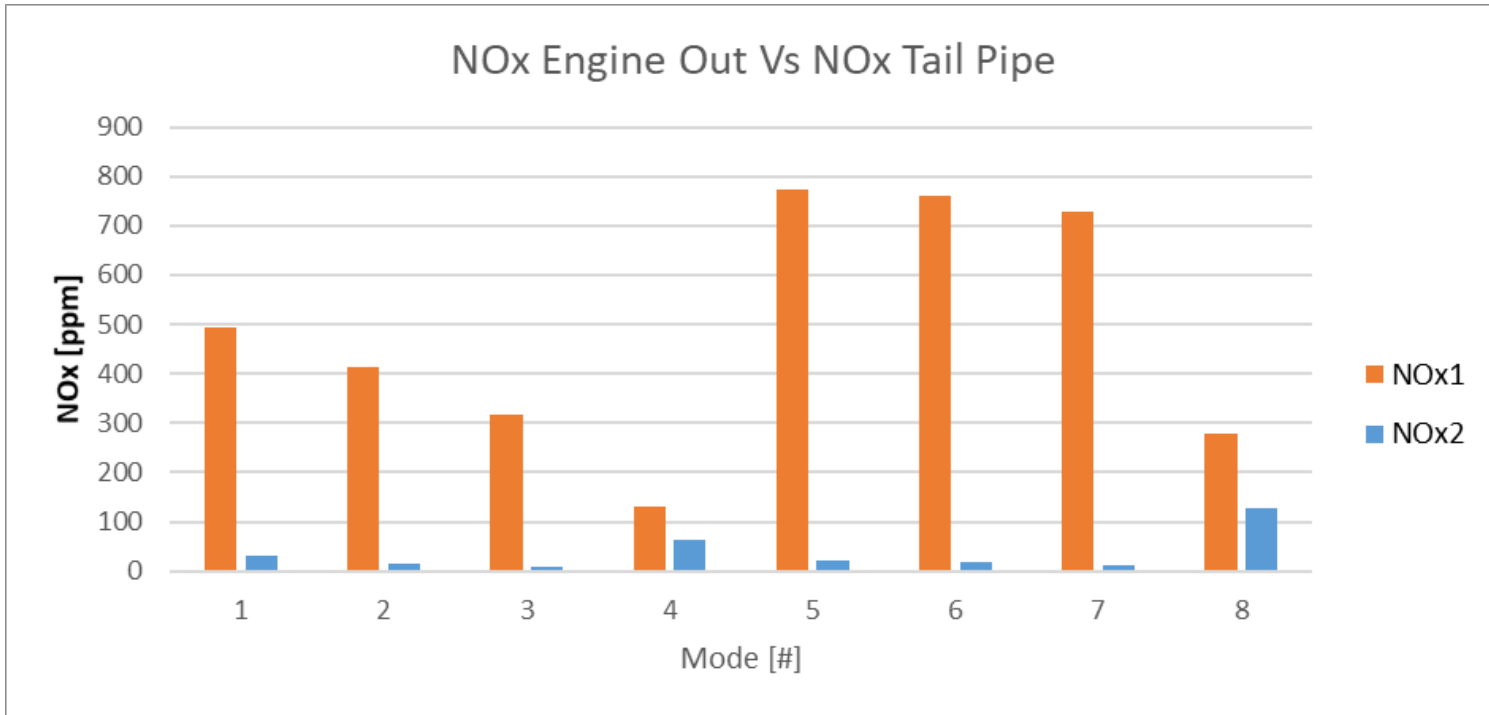
NOx [g/kWh]	0,26
NH3 [ppm]	<7

Compliance

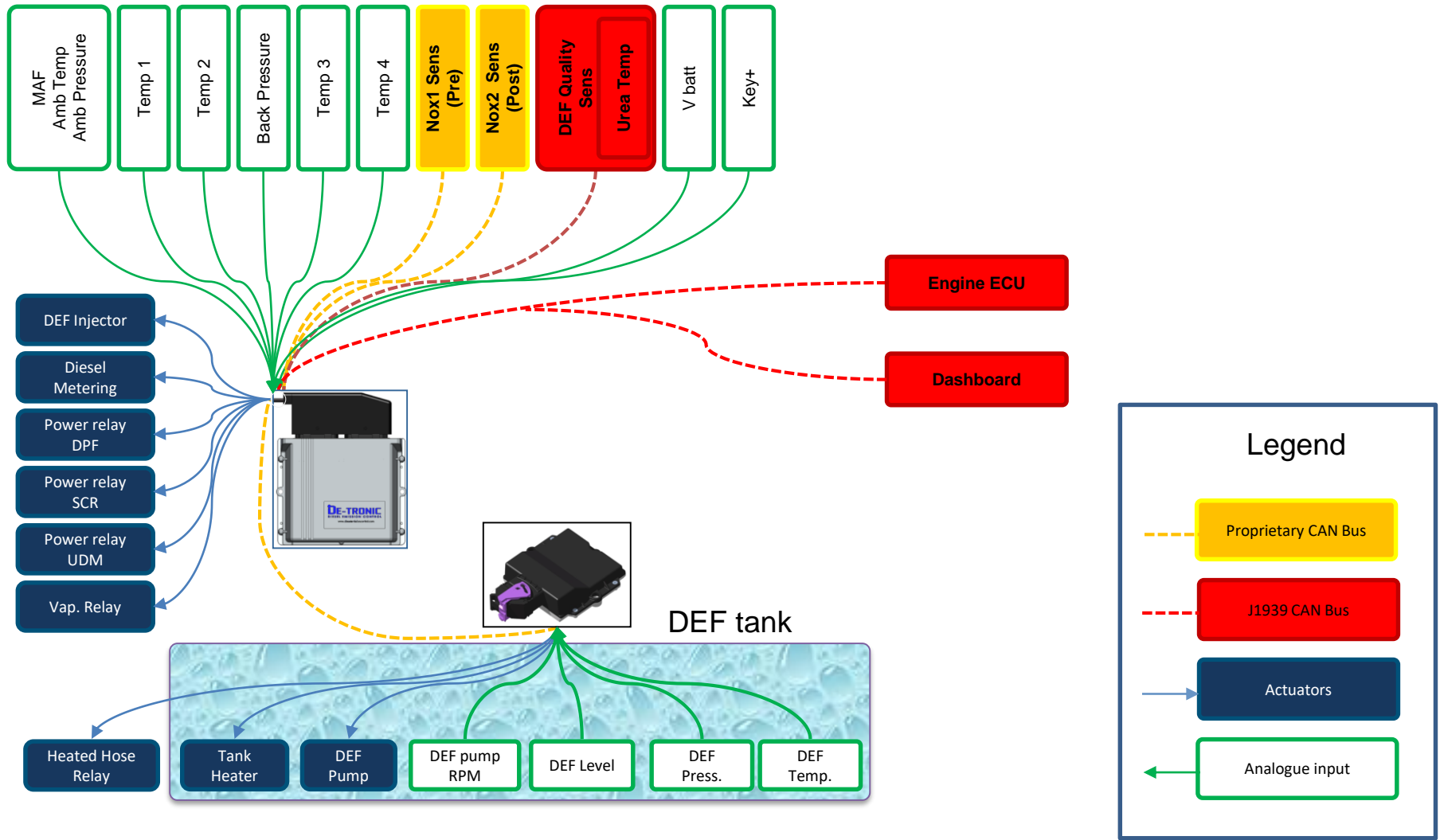
Stage IV	Yes
Tier 4F	Yes
Stage V	Yes



NOx reduction in the NRSC:



Electronic Layout Overview



Euro VI & Bharat stage VI Technology

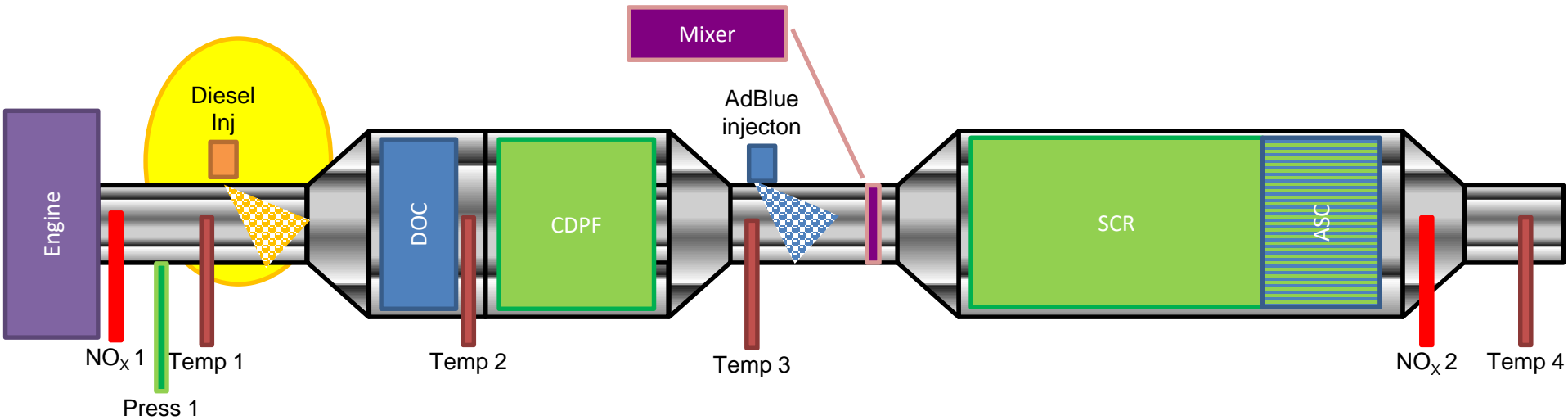


Application Overview

Engine Description	
Engine type	6 cylinder Diesel engine with mechanical inline fuel pump (DI)
Engine displacement [L]	5,7
Power rate [kW]	148
NOx Engine out [g/kWh]	6,5
PM Engine out [g/kWh]	0,1
PN Engine out [g/kWh]	Not available

Requirements	
NOx Reduction	95%
PM Reduction	94%

System layout



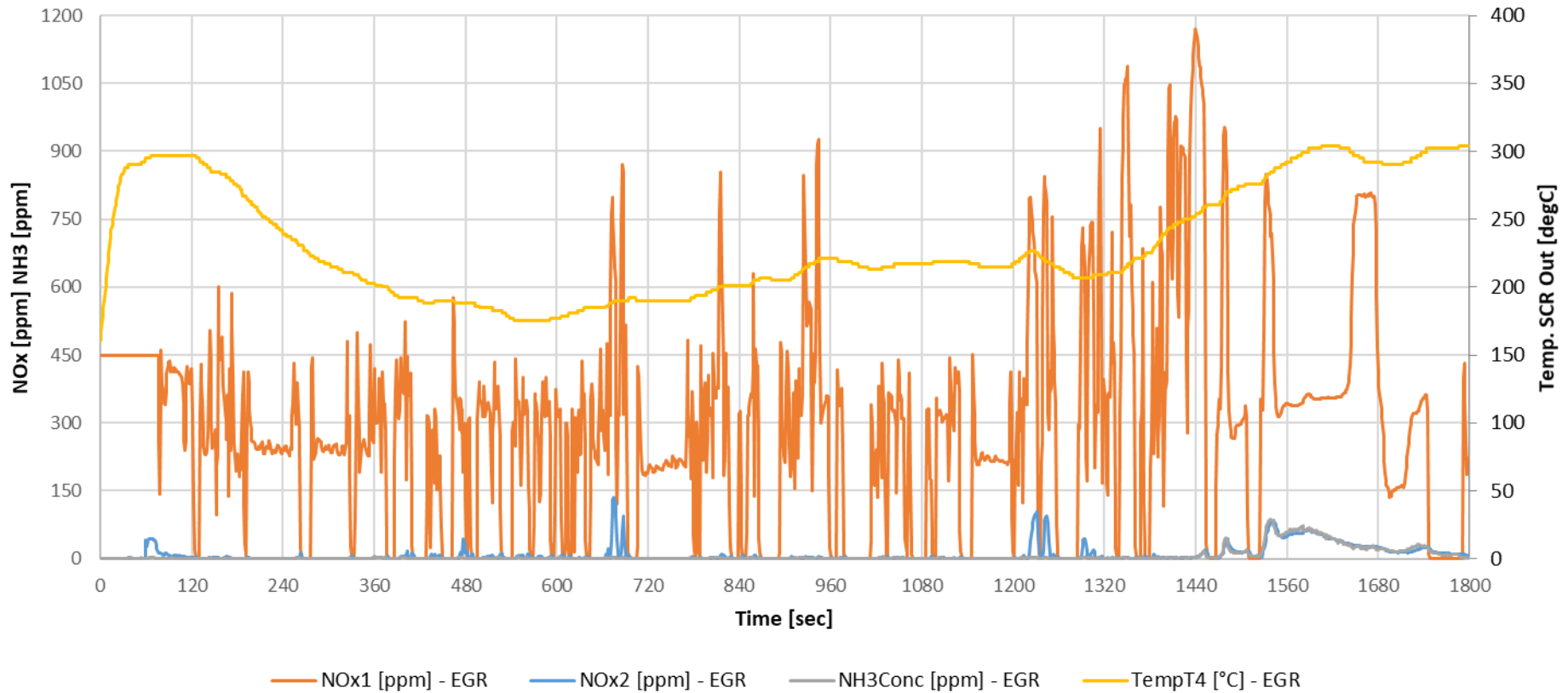
WHTC cold NOx Reduction and NH3

WHTC Cold - NOx and NH3



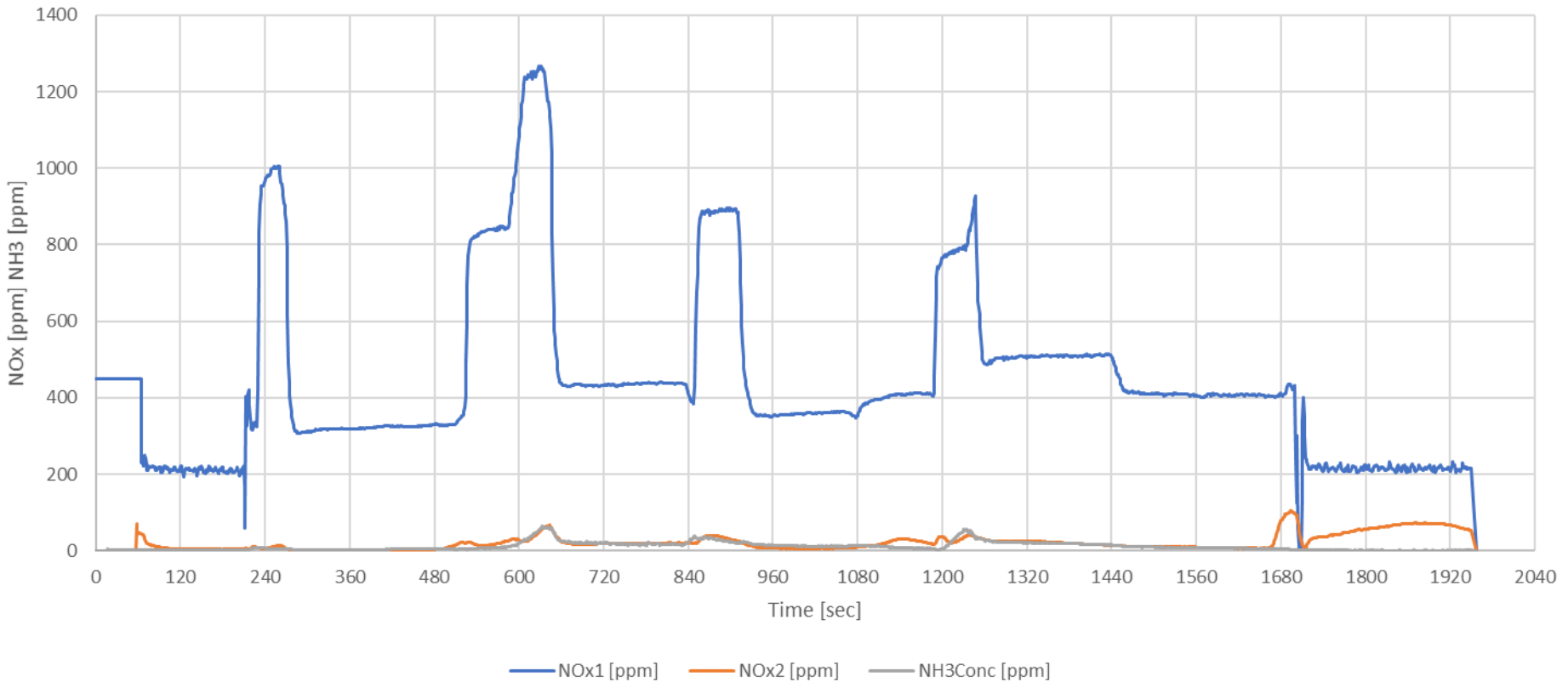
WHTC Hot NOx Reduction and NH3

WHTC Hot - NOx and NH3

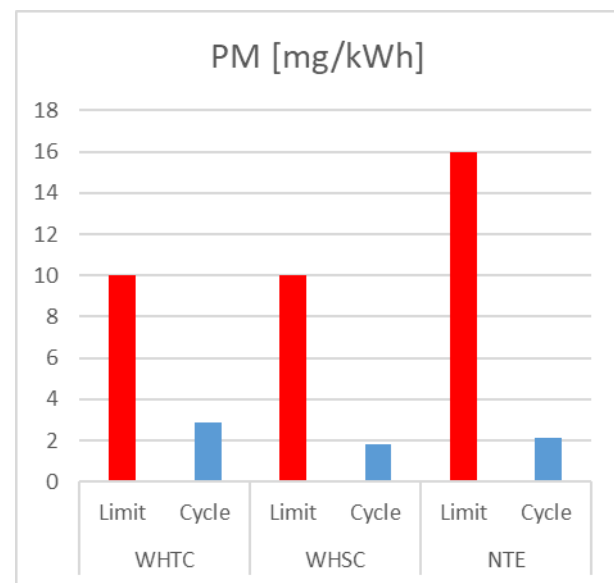
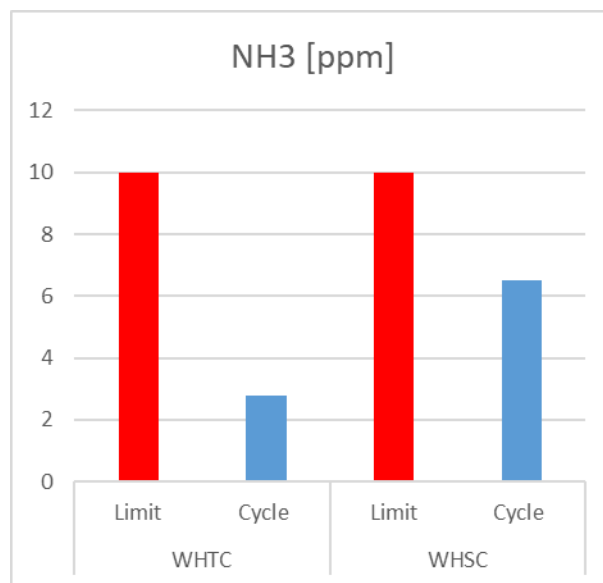
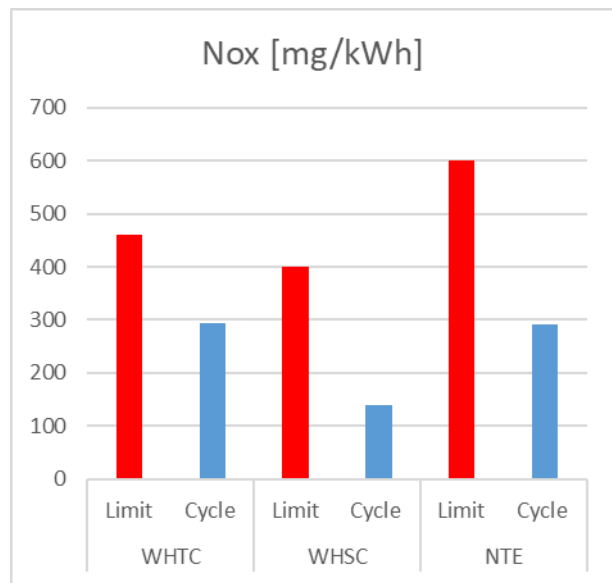


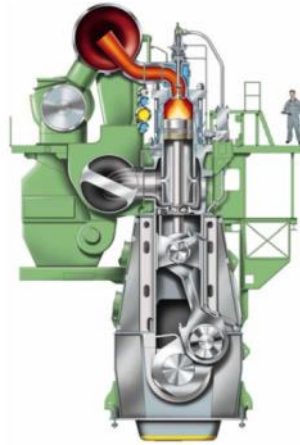
WHSC NOx Reduction and NH3

WHTC NOx and NH3

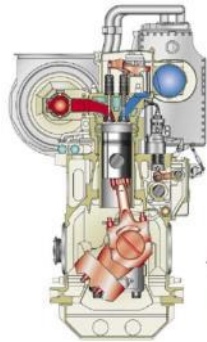


	WHTC		WHSC		NTE	
	Limit	Cycle Emissions	Limit	Cycle Emissions	Limit	Cycle Emissions
Nox [mg/kWh]	460	295	400	140	600	291
NH3 [ppm]	10	2,8	10	6,5	N/A	N/A
PM [mg/kWh]	10	2,9	10	1,8	16	2,1





Multronic scope



Name	Low speed	Medium Speed	High Speed		
Displacement (l/cyl)	200 - 2000	16-120	5 - 16	0,8 - 3	< 0,8
Power range (kW)	4000 – 100000	800 - 40000 kW	Up to 10000 kW	Up to 800 kW	Up to 300 kW
Combustion type	2-stroke & 4 stroke	2-stroke & 4 stroke	2-stroke & 4 stroke	4 stroke	4 stroke
Rotation speed (rpm)	70-300	350 - 850	600 - 2200	600 - 3000	>3000

Marine retrofit programs

Barge

Engine: Scania V8 16 liter 450 kW



Police Patrol ship

Engine : 2 x MTU V2000-01 600 kW



**1 x Caterpillar 3516
1590 kW - SCR and DPF**



**2 x Caterpillar 3512
1130 kW - SCR**





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Genset installation: China



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Thank you for your attention



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