

The Laboratory of Marine Engineering

**from 1976
till today**

Nikolaos P. Kyrtatos

Director LME



Laboratory of Marine Engineering – Short history I

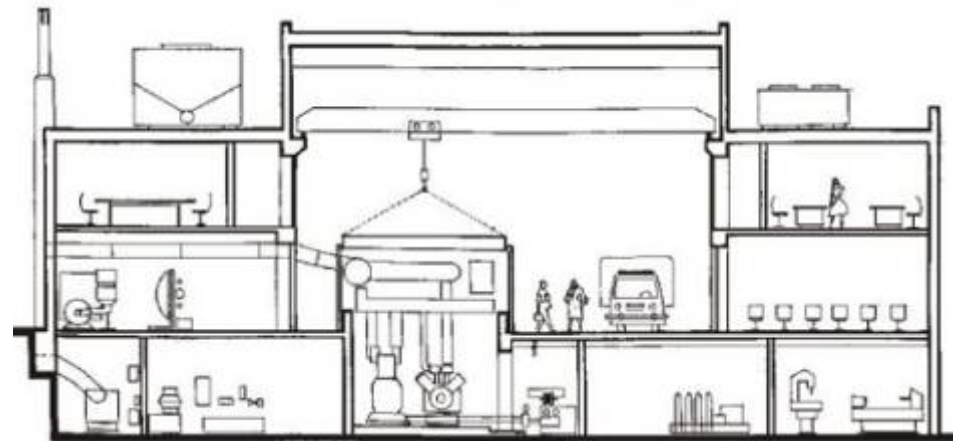
- 1976 • **1976** **Established.** First Director Prof. J. P. Ioannidis
- 1977
- 1978 • **1978** Hosted in the Aerodynamics & Naval Architecture Building, Zografou Campus
- 1979
- 1980
- 1981
- 1982
- 1983
- 1984
- 1985
- 1986
- 1987
- 1988
- 1989
- 1990
- 1991
- 1992
- 1993
- 1994
- 1995
- 1996
- 1997 • **1997** Moves to **new Building LAMBDA** – Zografou Campus
- 1998
- 1999
- 2000
- 2001 • **2001** **Infrastructure** for Marine Engine Test facility completed
- 2002
- 2003
- 2004 • **2004** First **complete performance** measurements of engines under severe transient loading
- 2005
- 2006 • **2006** First **measurements of exhaust gas** emissions of marine engines
- 2007
- 2008 • **2009** ISO 17025 : Exhaust gas measurements
- 2009



Building Construction



1994



Laboratory of Marine Engineering (LME)



1996

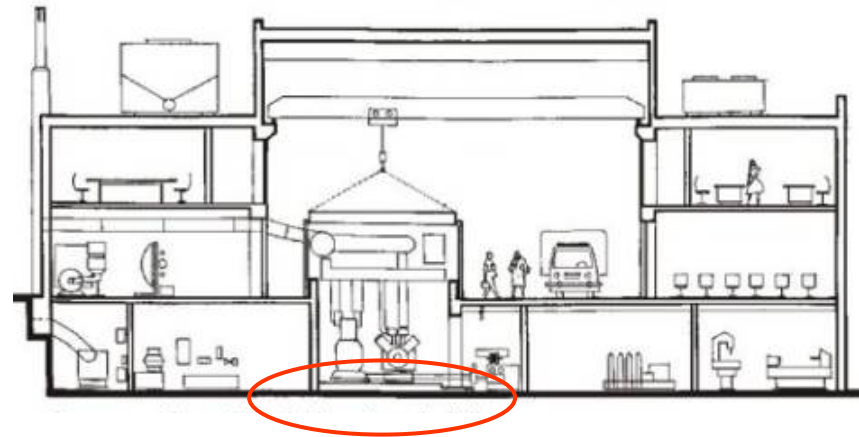
LME (Building LAMBDA)

Activities :

- **Marine engine test facility**
- **Measurements of performance and Emission**
- **Performance analysis of marine propulsion engines**
- **Modeling and control of propulsion installations**



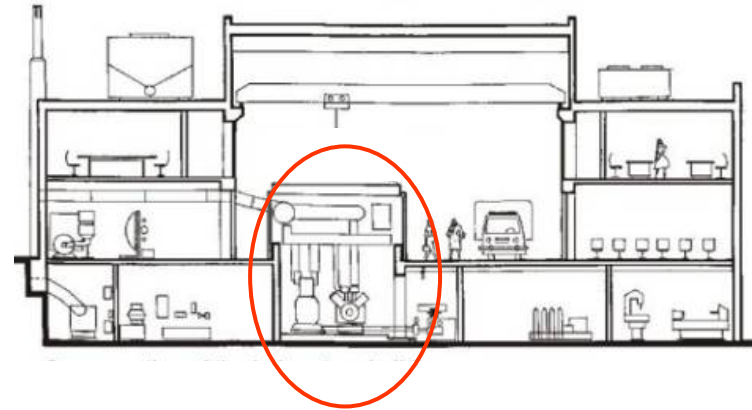
Construction



1997



Construction



1998



Installation of equipment

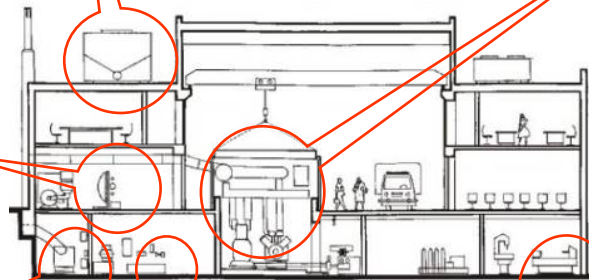


1998

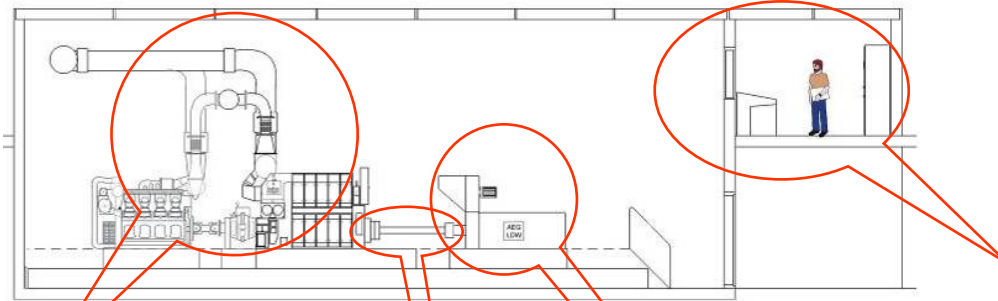


Installation of auxiliary equipment

1999



Test bed



2000



Two marine engines on test bed



• **Laboratory, Auxiliary and office spaces: 1100 m²**

• **Cost of Building infrastructure: EUR 0.6M**

• **Cost of Machinery and Equipment: EUR 2.8M**

- **Public Funds 25%**
- **Other funds (Donations, gifts) 20%**
- **Research Contract surplus 55%**

• **Research Project Funding 1994 –08: EUR 4.0M**



Target : University Laboratory of World Class

- 1976 : Establishment
- 1996 : Building construction

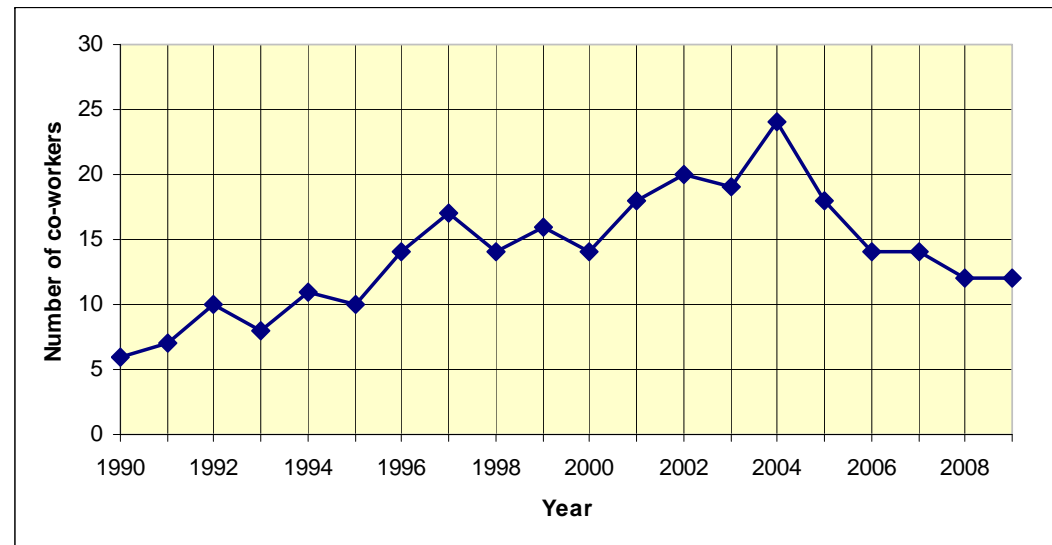
↓
8 years

- 2004: First experimental results of publishable quality

- 1990: First extensive cooperation with engine makers

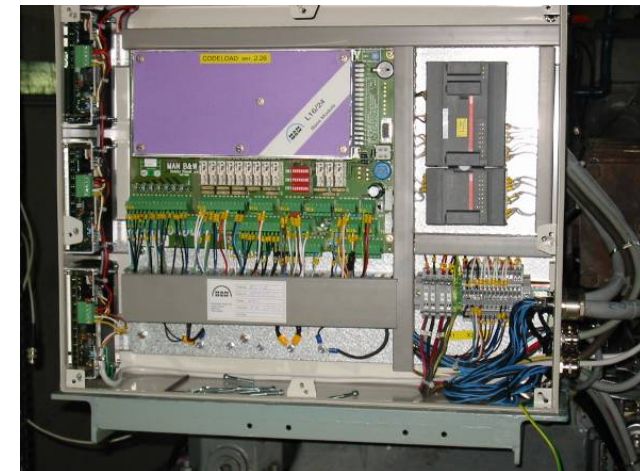
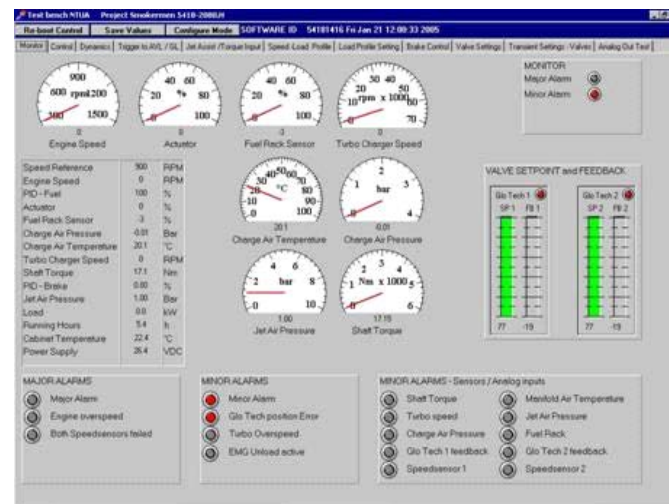
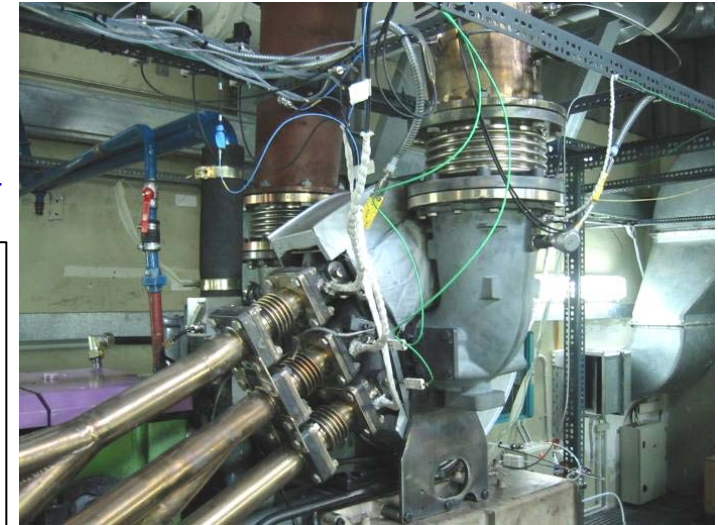
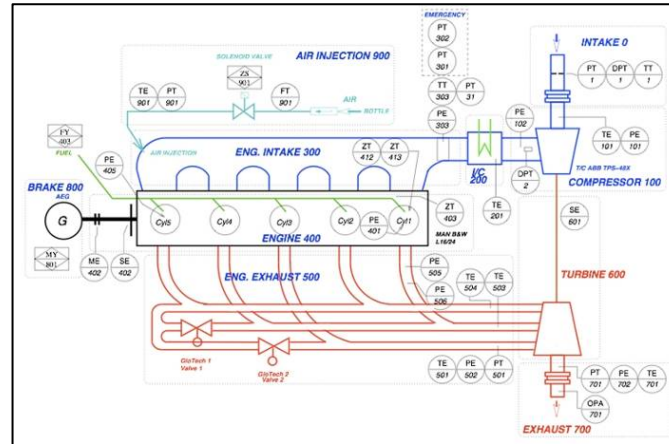
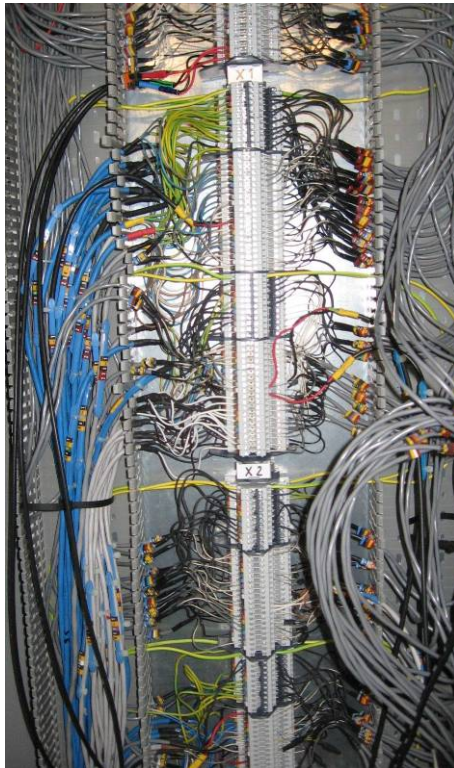
↓
16 years

- 2006: Contract experimental work on behalf of engine maker

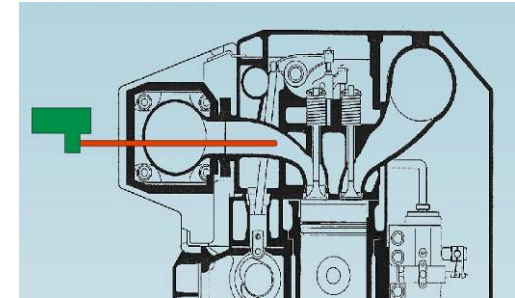
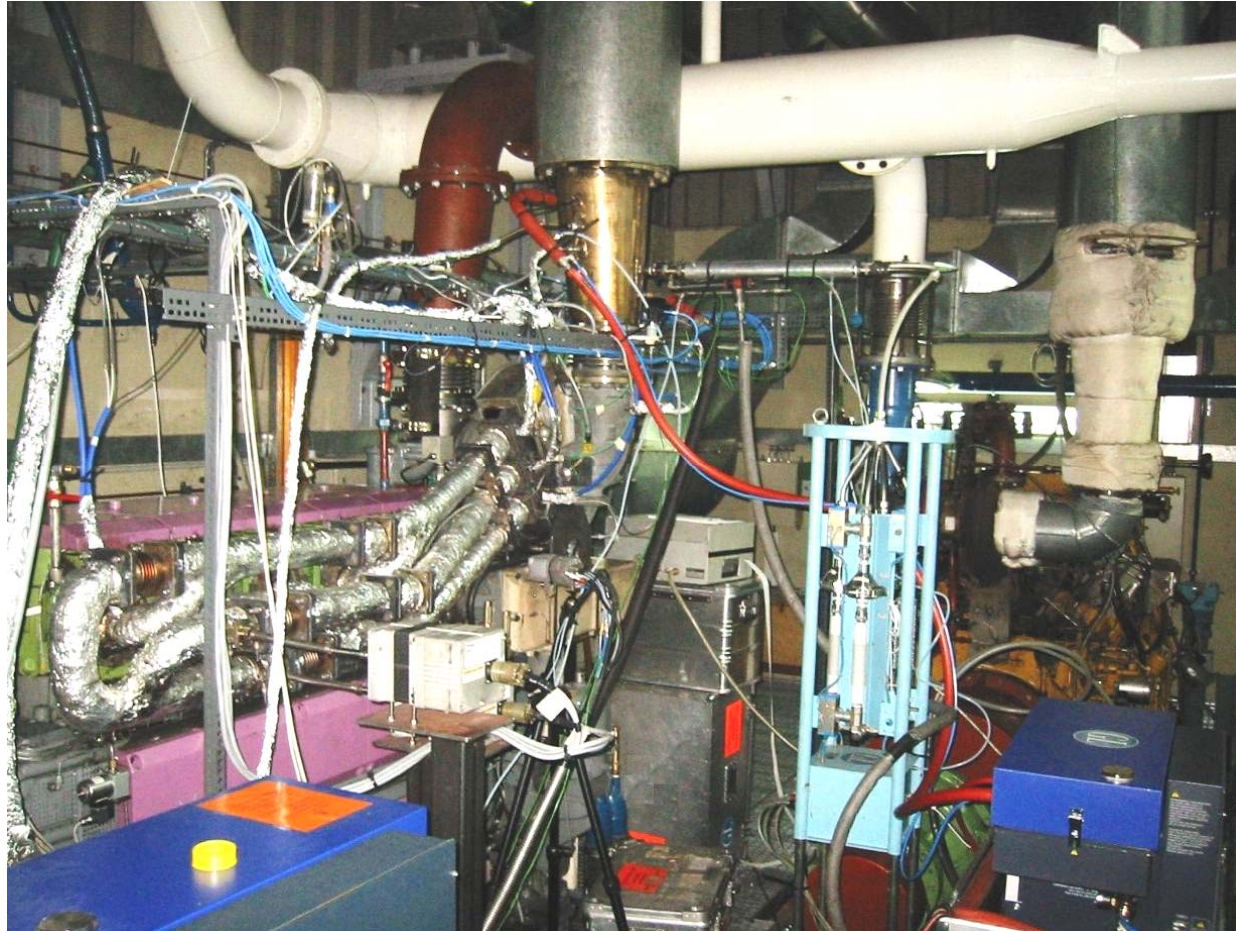
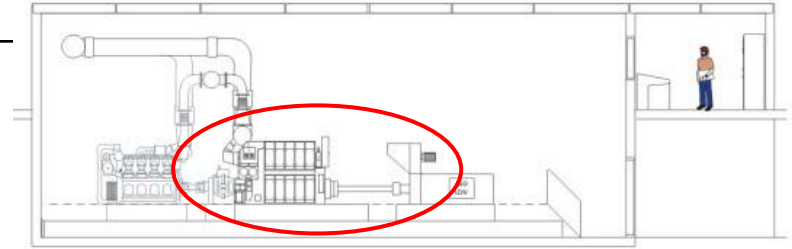


Engine performance Measurements

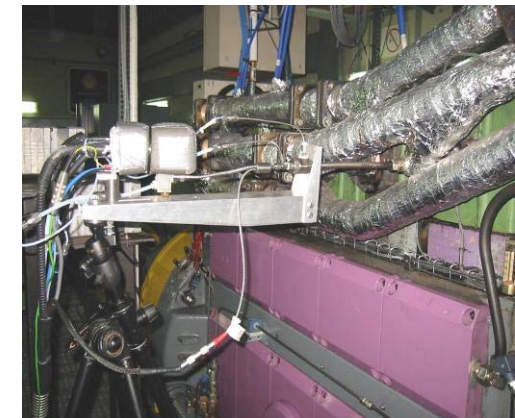
- Sensors (cylinder pressure, temperatures, airflow, fuel flow...)
- 58 measurement channels, Data acquisition software
- Brake Load control through closed loop shaft torque control, transient loading 4 quadrants



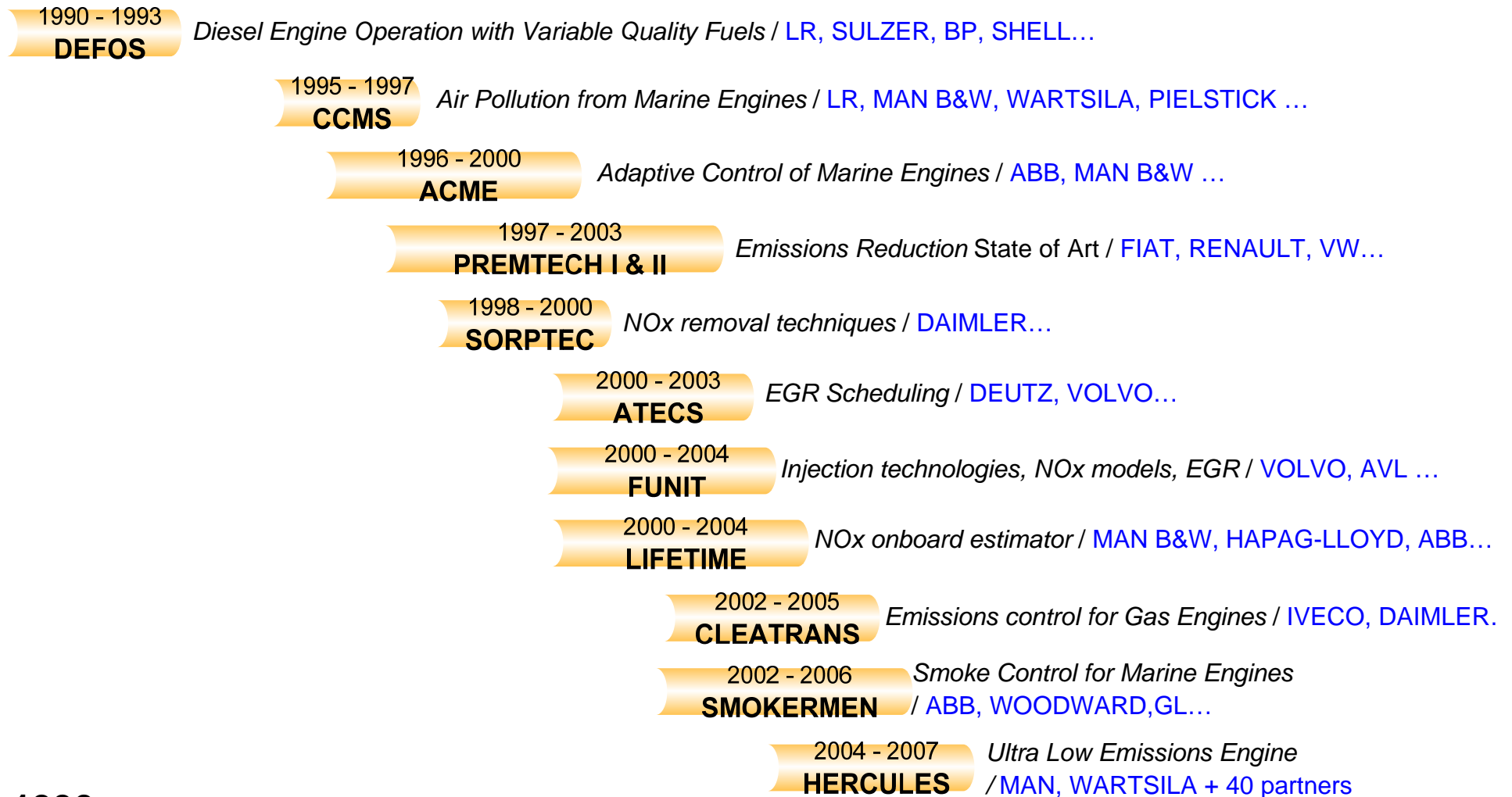
Measurements of exhaust gas species



NOx measurement via ultrafast sampling <10ms



(1990 – 2008) / Research project in exhaust gas emission

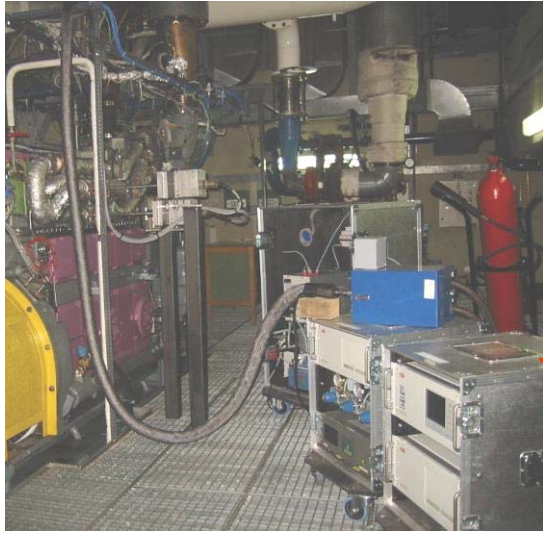


1990

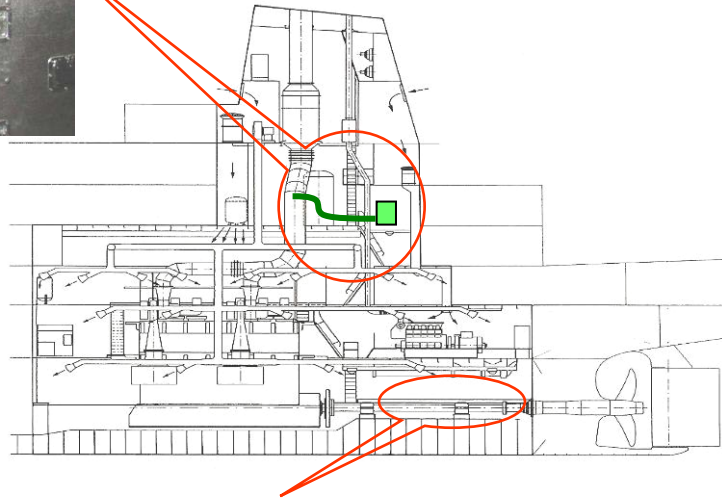
2008



On-board measurements



- Mobile unit for exhaust species measurements in marine engines:
 - NO, NO₂, NO_x, HC, CO, CO₂, SO₂
(according to IMO specs)
 - Smoke-FSN and Opacity
 - ISO 17025 Certification



Mobile unit for torque / thrust measurements in shafts



Cooperation partners



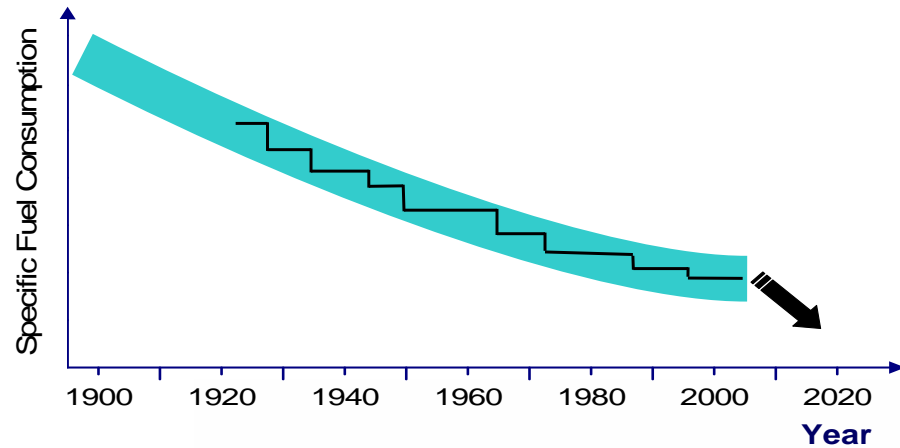
MAN Diesel



Media



The immediate Future



CO₂

Extreme value engines

Combined cycles

Tribology

Intelligent engines

Optimal operation of propulsion installation





Everest, 8850m

Amdo, Tibet, 4800m

