

Input for the annual report of the CCEM

Investment Project: "Transient Heavy Duty Engine Facility for Engine up to 4000 Nm Peak Torque"

1) Current state of the project

The project has successfully been finished in the year 2009.

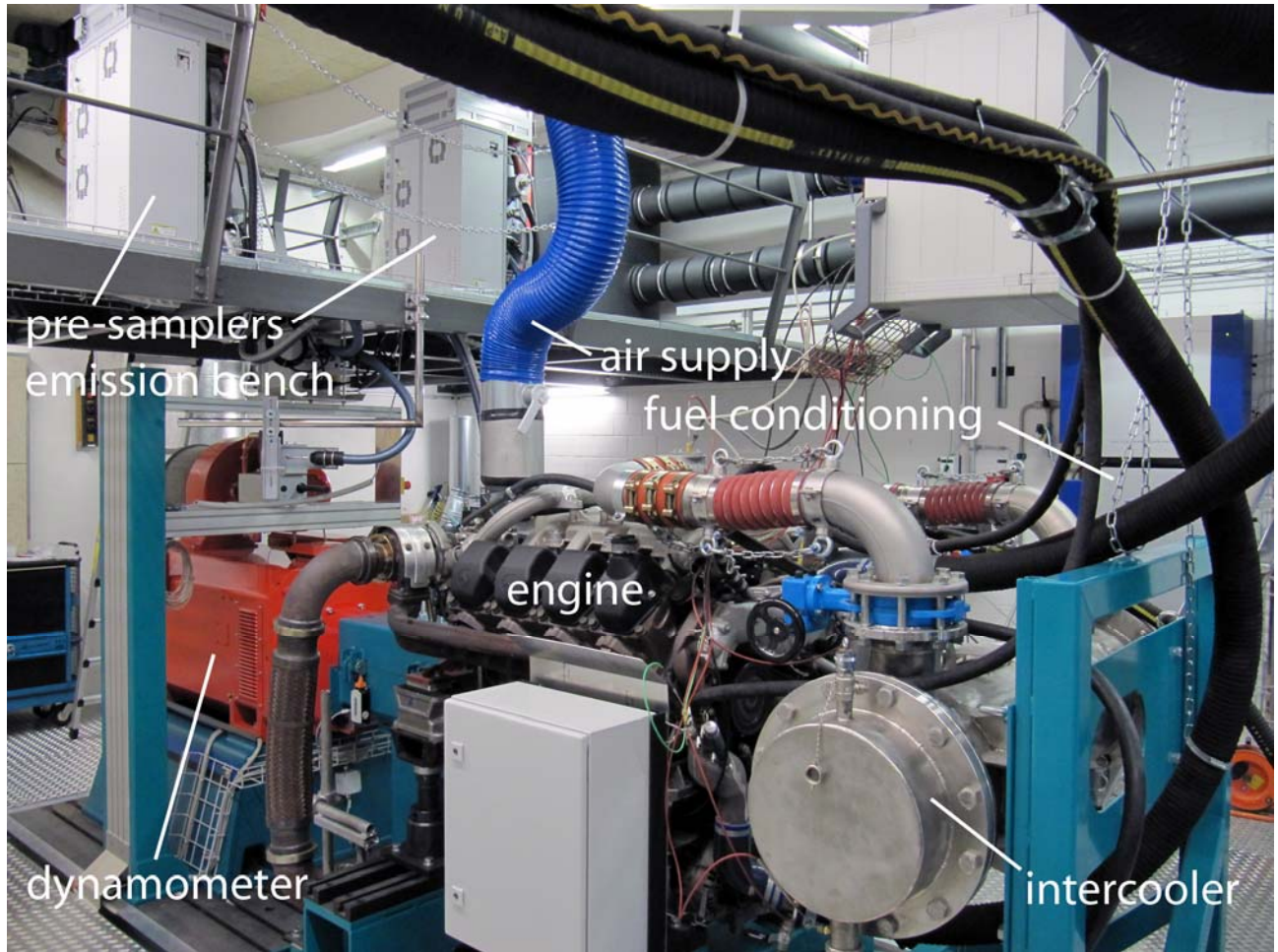
2) Main achievements

The goal was to build a new engine test stand in Empa's engine laboratory in Dübendorf with CCEM seed money. This dynamometer enables experimental research on heavy duty engines with peak torques up to 4000 Nm. To do so, it was necessary to upgrade the corresponding building and media infrastructure. The "Motorenhaus" building at Empa has been enlarged in the years 2007-2008 to accommodate the new test stand with the entire peripheral infrastructure. In the year 2009, the assembly of the test stand and the background infrastructure (controlled heating/cooling of engine and its intercooler, cooling of the test cell, suction of exhaust gases, fuel supply and conditioning) has been finished. The new test stand has been inaugurated with a ceremony on February 23, 2009. In Summer 2009, the test stand has been equipped with a emission bench. First experiments (for the CCEM CELaDE project) have been performed afterwards. The main parameters of the test stand and its periphery are:

- Dynamometer Horiba Dynas3 HD600, rated power 600 kW, rated torque 3'957 Nm
- Test stand automation system SRH STARS
- Torque measurement with a HBM T12 transducer (accuracy class 0.03)
- Combustion air conditioned from 20...30 °C and 30%...65% relative humidity
- Engine cooling system with water temperatures flowing to the engine (controlled) from 70...125 °C)
- Water flowing to the Intercooler controlled to 20...30 °C
- Emission test bench Horiba 7500 DEGR, 2 lines for CO, CO₂, NO_x, THC, CH₄, O₂ measurement, 1 line for CO₂ measurement (EGR line)
- Automatic fuelling infrastructure from large main diesel tanks and fuel containers
- Fuel mass flow measurement and conditioning system (AVL mass flow meter and temperature control)
- Combustion air flow measurement with an ABB Sensyflow P DN200 sensor
- Particle partial dilution system AVL SPC472
- Opacimeter AVL439
- Smokemeter AVL415s
- Blow-by meter TGS 1302/450



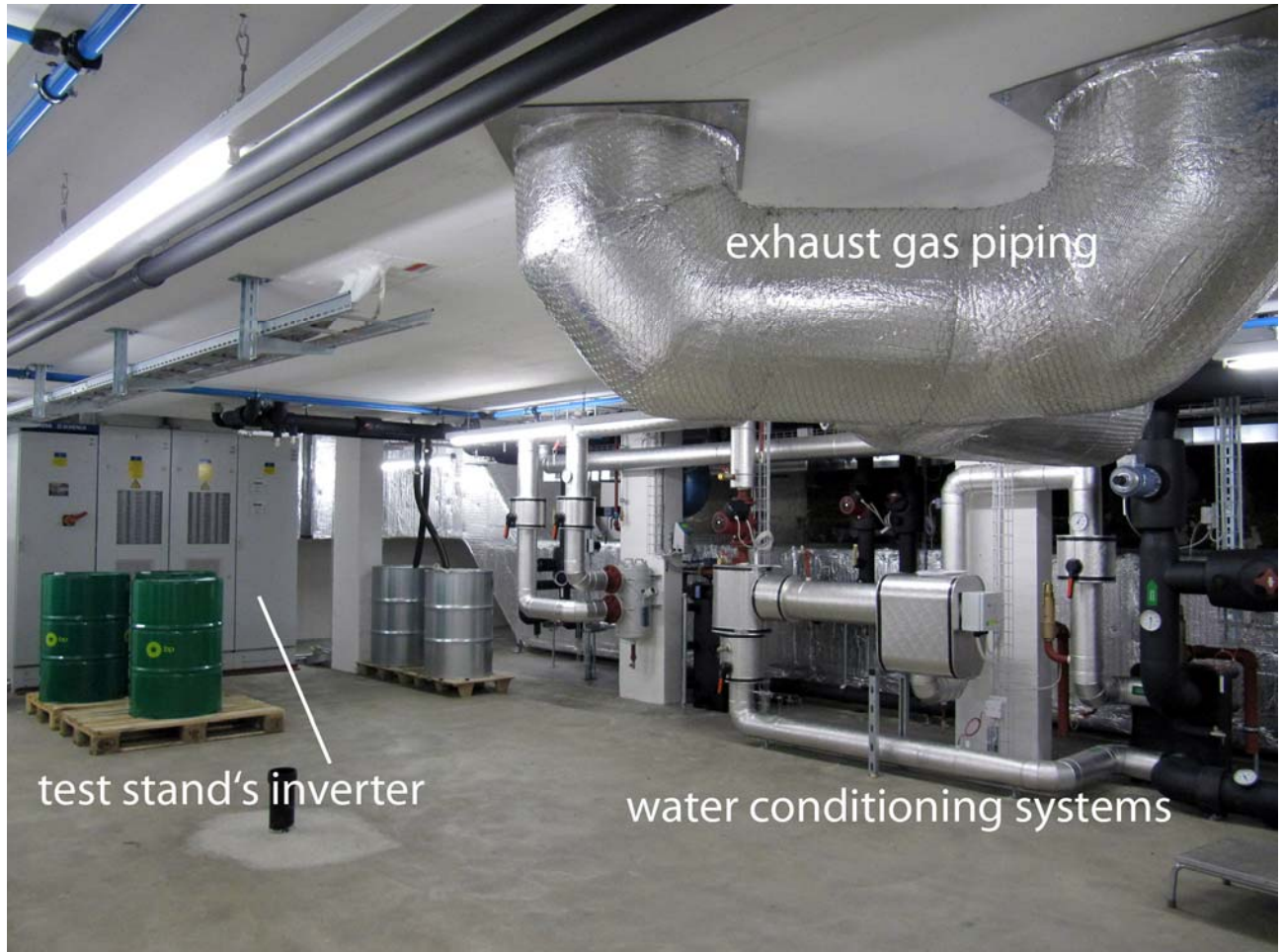
Picture 1: A Swiss national TV team filmed the new test stand for a contribution in the evening news (SF1, TSR and TSI)



Picture 2: Test stand in operation



Picture 3: Technique room above test cell



Picture 4: Technique room below test cell



Picture 5: Inauguration event (February 23, 2009)

3) Publications/patents

None

4) Activities such as events, talks,..

An inauguration event with 120 external guest and 6 talks was held on February 23, 2009. The Swiss national TV reported about the new test stand in the main evening news.

5) Industrial and institutional partners

The main financing of the infrastructure has been provided by Empa. Daimler AG provided hardware support (test engine for the commissioning phase).

08.12.2009, Patrik Soltic, Empa

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