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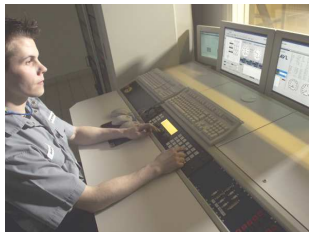
EMISSION & ENGINE TECHNOLOGY

Engine test center overview

March 2023

Engine test laboratory

A wide range of services



- Three engine test cells
- Diesel, petrol or alcohol engines
- 47 M3 Fuel storage capacity
- 24 hours operation possible
- In depth engine analysis
- Engine tuning and calibration
- Engine and system ageing and durability testing
- Catalyst ageing and durability testing
- Possibility to perform special tests, high altitude simulations, hot/cold cycling tests and transmission tests
- Fully equipped workshop for test object preparation.
- Secure facility and guest offices.
- Accredited according to SS-EN ISO/IEC 17025:2018

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Test Cell # 1

General description

- Capacity: 2 000 Nm, 500 kW and a maximum speed of 8 000 rpm
- Eddy current dynamometer with torque and speed control
- Recording capability with up to 50 kHz sampling frequency
- Emission measurement on raw exhaust

Test Cell # 1

Specifications

Dynamometer	AVL eddy current with AVL Emcon 300 control system Max. 500kW @ 2400-8000 rpm Max 2000 Nm @ 1100-2400 rpm
Test cell environmental sensor	Vaisala HMI 33 Ambient humidity and temperature measurement
Data acquisition system	Delphin data sampler 53 input channels for temperature, pressure, voltage , current and resistance measurements. 8 input channels for indicating measurements @ 50kHz 4 input channels for speed, frequency and period measurements.
Opacimeter	AVL 439 Opacimeter
Fuel consumption	AVL 735 dynamic flow meter Coriolis principle 0-125 kg/h
Air mass flow meter	Hot film anemometer 0-2400 kg/h (other range available on request)

Emission measurement	One channel emission measurement system and FTIR

Additional equipment and measurement systems

Additional measurement systems and equipment for special test setups are available for any of the test cells. Refer to the table on page 10 for more specifications.

The test cells are subject to a constant upgrade to meet future testing demands. If something is missing for your specific needs please contact us for further information.

Test Cell # 2

General description

- Capacity 2 000 Nm, 500 kW and a maximum speed of 8 000 rpm
- Eddy current dynamometer with torque and speed control
- 2 X Emission bench for exhaust gas measurements
- PM sampling in partial flow dilution system
- Transient testing without motoring possible.

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Test Cell # 2

Specifications

Dynamometer	AVL eddy current with AVL Emcon 300 control system Max. 500kW @ 2400-8000 rpm Max 2000 Nm @ 1100-2400 rpm
Test cell environmental sensor	Vaisala HMI 33 Ambient humidity and temperature measurement
Data acquisition system	AVL Puma V5.6 (with 100Hz recorder) 32 input channels for temperature, voltage, current and resistance measurements. 16 pressure sensors. 4 input channels for speed, frequency and period measurements. 16 digital and 12 analogue outputs. Additional input modules available on request.
Opacimeter	AVL 439 Opacimeter
Fuel consumption	AVL 733s dynamic flow meter Gravimetric principle 0-150 kg/h
Air mass flow meter	Hot film anemometer 0-2400 kg/h (other range available on request)

Emission measurement	2 X emission benches for exhaust gas measurement CO, THC, NO/NOx, CO2, and O2
Particulate measurement	Control Sistem Pss-20 Mini dilute tunnel (Euro VI compliant)

Additional equipment and measurement systems

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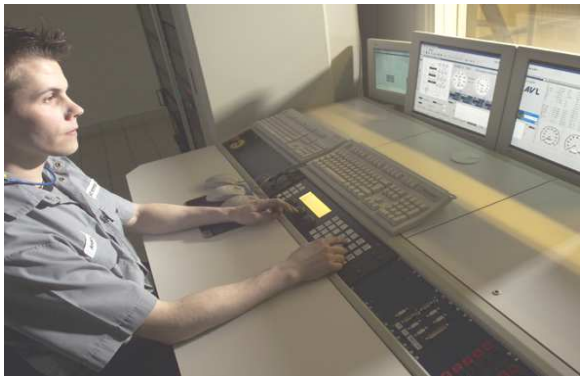
Test Cell # 3

General description



- Capacity 4 400 Nm, 660 kW and a maximum speed of 3 500 rpm (826 kW and 5 500 Nm short term)
- Asynchronous AC dynamometer for transient operation
- 2 channel emission bench for exhaust gas measurements
- Full flow CVS with PM sampling system
- High altitude simulations

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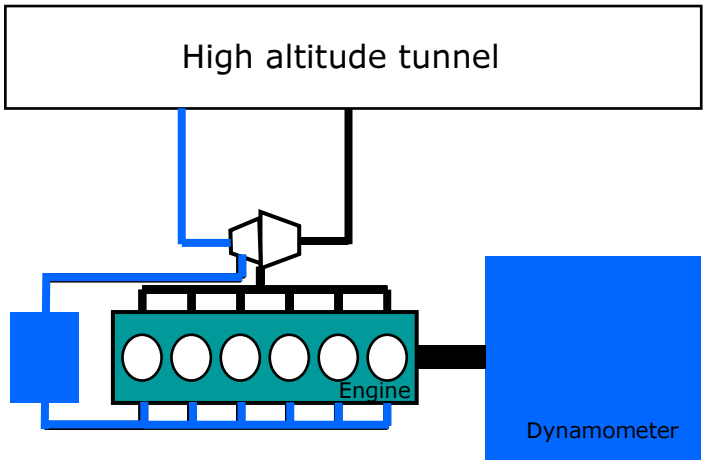
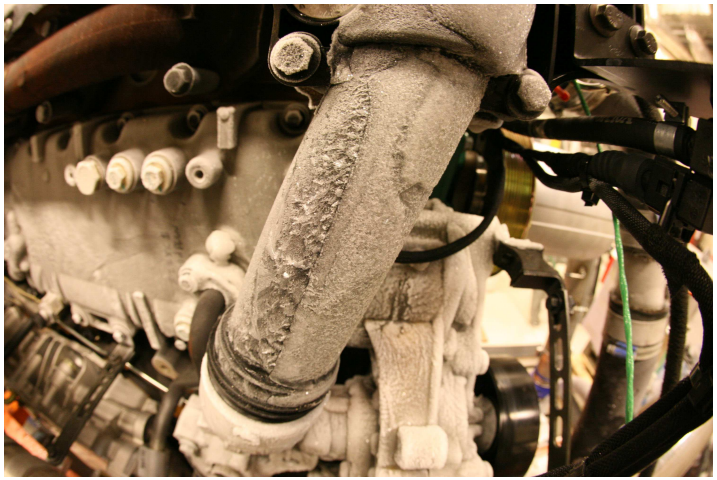
Test Cell # 3

Specifications

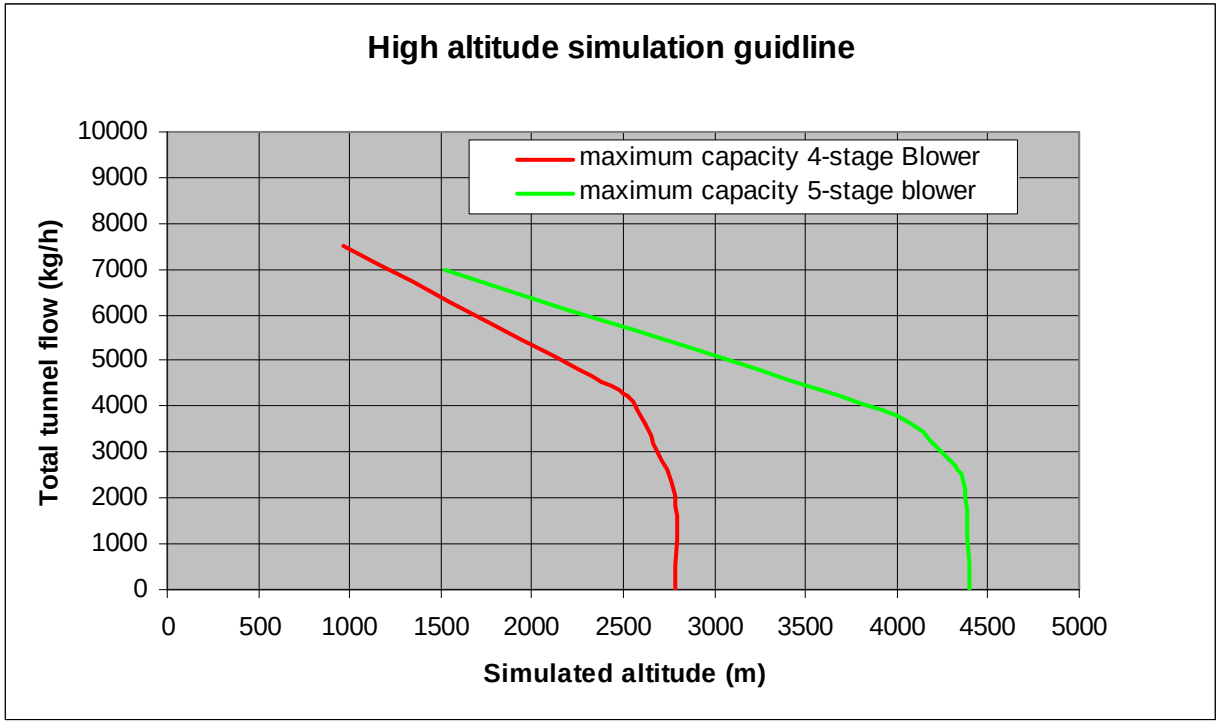
High altitude simulations	Engines inlet and exhaust system connected to a high altitude tunnel. Up to 4 400 meter simulated altitude possible depending on tunnel flow demands (engine size)
Non standard conditions for intake air temperature	Test setup for cooled or sub zero intake air possible by adding dryer and coolers to the inlet air flow and intercooler. Cold start simulations. Can be combined with high altitude simulation.





Test Cell # 3

High altitude simulation capacity



- A minimum total tunnel flow 2 times higher than the exhaust flow is recommended.
- Diluted exhaust temperature before the exhaust gas cooler (situated upstream exhaust blower) should not exceed 191 degC
- The temperature after the exhaust cooler and before the blower must not exceed 50 degC

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Test Cell # 3

Specifications

Dynamometer	AVL Asynchronous transient dynamometer Max. 660kW @ 1500-3500 rpm (826 kW short term) Max 4400 Nm @ 1100-2400 rpm (5 500 Nm Short term)
Test cell environmental sensor	Vaisala HMI 33 Ambient humidity and temperature measurement
Data acquisition system	AVL Puma V5.6 (with 100Hz recorder) 112 input channels for temperature, voltage, current and resistance measurements. 30 pressure sensors. 4 input channels for speed, frequency and period measurements. 16 digital and 8 analogue outputs. Additional input modules available on request.
Opacimeter	AVL 439 Opacimeter
Fuel consumption	AVL 735 dynamic flow meter with AVL 753C fuel conditioning system Coriolis principle 0-125 kg/h

Air mass flow meter	Hot film anemometer 0-5500 kg/h (other range available on request)
Emission measurement	Two channel Horiba MEXA-ONE-D2 emission measurement system CO, THC, CH4, NO/NOx, CO2, CO2 EGR and O2
Particulate measurement	AVL HD CVS system (CECU-T140-D) with triple venturi system to cover a flow range of 20-140M3/min Heat exchanger 70/47mm particulate filter holders with filter switch

Additional equipment and measurement systems

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Additional equipment

Specifications

Additional equipment available for any test cell

Particle counter	AVL APCP PLUS
Particulate measurement	Control Sistem Pss-20 Mini dilute tunnel (Euro VI Compliant)
Transient soot measurement	AVL MSS 483
Particulate weighing camber	Temperature and humidity control Mettler Toledo XP2U electronic microgram scale
Analyzers	Additional stand alone gas analyzers (NOx, HC)
NH3 measurement	NEO laser for NH3 measurements
FTIR	GASMET CX4000
Urea injection and control systems	Air assisted atomization. PWM and frequency controlled dosing.
HC injection and control systems	Air assisted atomization. PWM and frequency controlled dosing.
Exhaust gas cooler	Tubular heat exchanger.
Custom interface and control	Custom and one off electronic control and interface between test object and test- and measurement equipment available