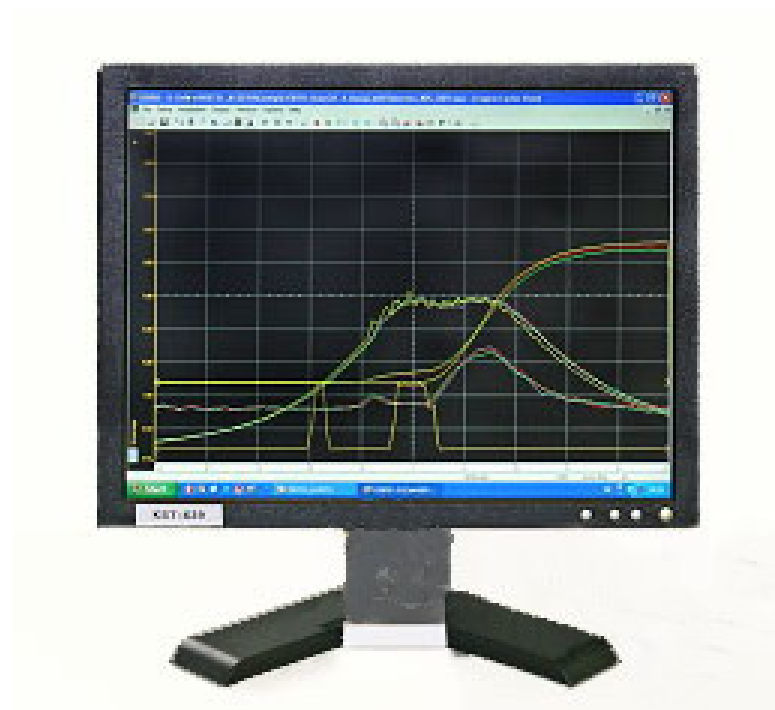


Special Measuring Equipment



Contents



- Exhaust Gas Analysis
- Vibration Analysis
- Indicating System
- Oil Consumption / Dilution (Tracer Method)
- RNT Wear Measurement
- Thermal Imaging
- Automation System
- Asynchronous Machines
- Non-Destructive Testing (NDT)
- Further Systems

- AVL FTIR (Sesam 4)
- AVL i60 2-Line
- Horiba Mexa 7170 D
- Horiba Mexa 7100H
- Pierburg (AVL) 4000
- Horiba Mexa 1170 NH₃-, NO₂-Analyzers
- LDS 6 (Siemens) NH₃ and H₂O In Situ Measurement
- EGR CO₂-Measurement
- Partial Dilution Tunnel
 - AVL Smart-Sampler SPC 472
 - Control Sistem PSS-20
- AVL Opacimeter 439
- AVL Smoke Meter 415S, -HD
- AVL 483 Micro Soot Sensor
- Particle Measurement Cabinet (PMC)

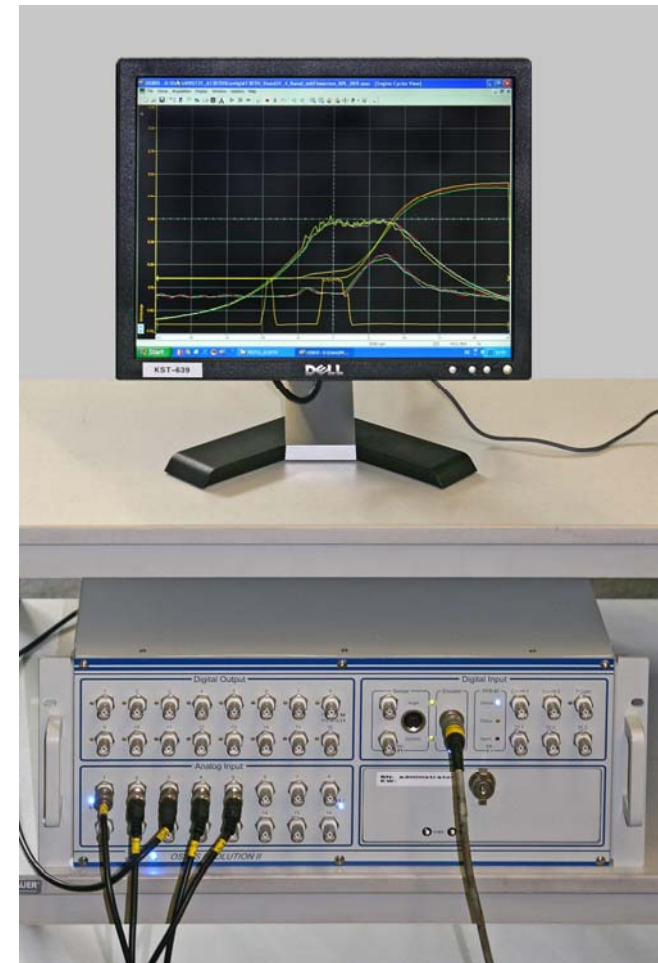


- Metrology Müller-BBM
- Up to 160 channels simultaneously
- Vibration, strain, acoustics, temperature, analog variables
- 3 measurement systems for 220 V and 12 V operation



Indicating Systems

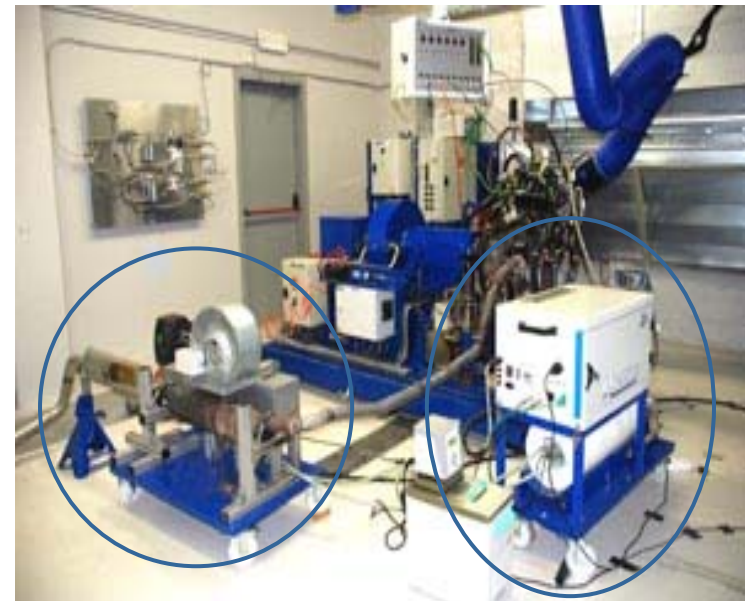
- D2T Osiris (up to 16 channels)
- AVL Indicating Module (8 channels)
- AVL Indicating Set (4 channels)
- Kistler P_{max}-Meter (4 channels), Peak-pressure control including statistic evaluation
- D2T FFRM electric speed trigger via sprocket (60-2 impulse)



Oil Consumption / Dilution

(Radiotracer Measuring Method)

- Real-time data logging
- High resolution:
consumption measurement $< 1 \text{ mg/h}$
dilution measurement $> 0.01 \text{ \%/h}$
- Tracer embedded in oil molecules,
(contamination-free test sample after
test / directly re-usable)



Oil Consumption

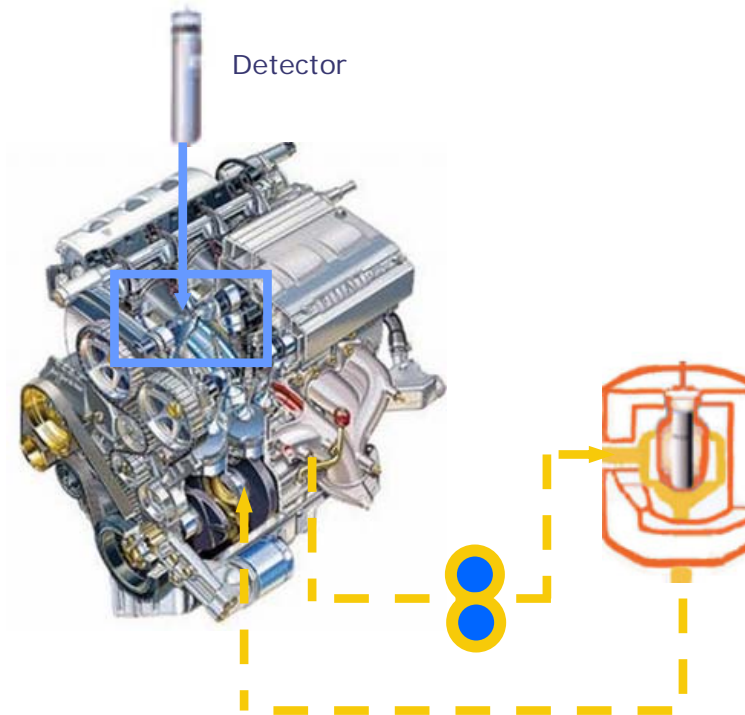
Oil Dilution

Use Field

- Cylinder : liner wear at TDC
- Piston : piston ring
ring groove
- Bearing : connecting rod
crankshaft
camshaft
- Valve : seat, stem, guide
- Cam lobe, bucket tappets

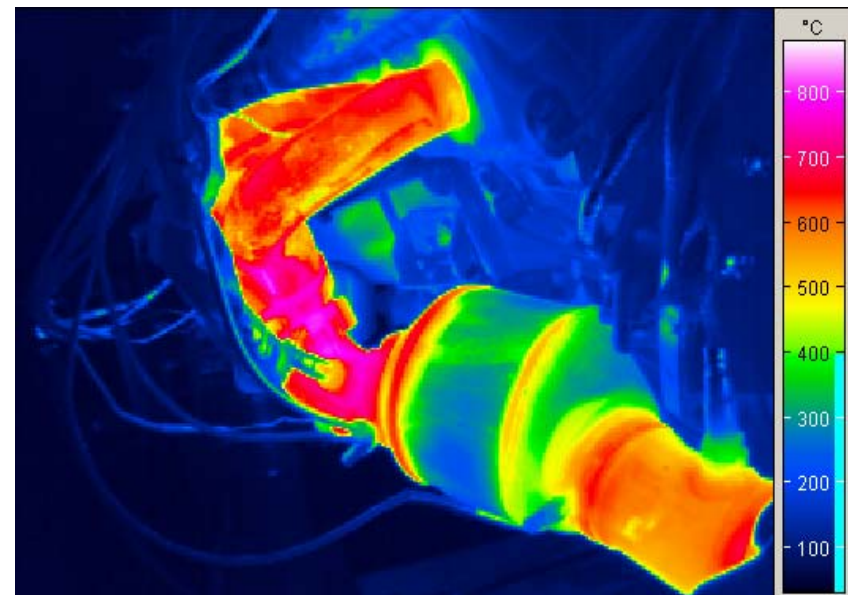
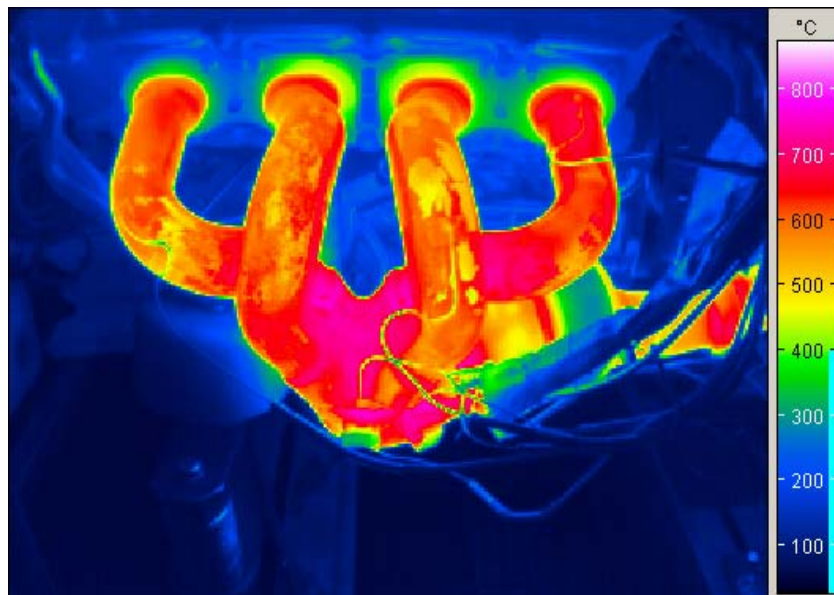
Combination of Blowby Measurement,
external oil pressure control

Thin Layer Differential Metrology
measurement directly on component, e.g. valve



Concentration Metrology
measurement within oil circuit, e.g. crankshaft

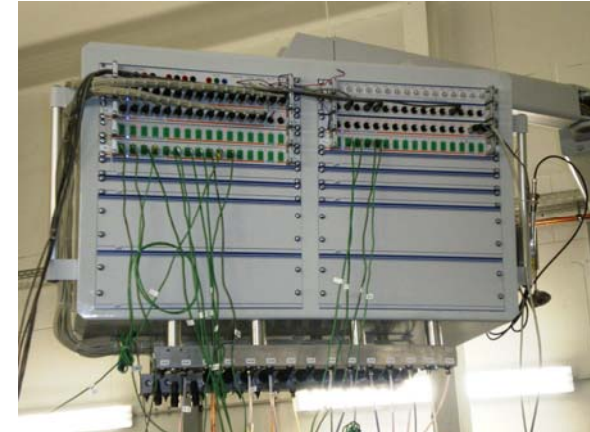
Thermal Imaging of Exhaust Gas Components



Temperatures at Nominal Output

Automation System Morphée / D2T

- Data acquisition max. 20 Hz / measurand
special design max. 1 kHz / measurand
- Driving cycles at any size
Program set point max. 50 Hz
- Integration of any external measurement instruments via all established bus systems
- Measuring boom for 92 measurands and 6 control variables (arbitrarily expandable)
- All customer formulas and descriptions directly available at test bench



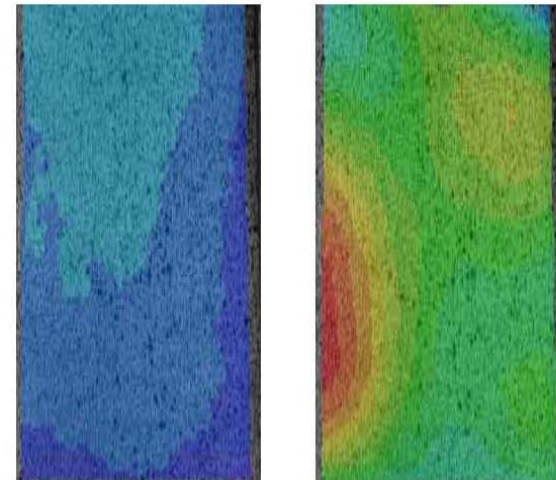
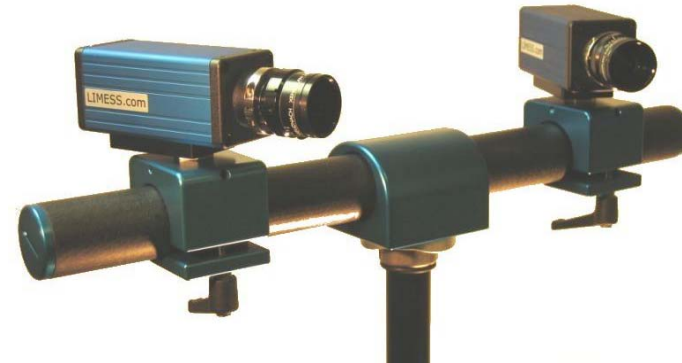
Asynchronous Maschines (choise)



Type	Power [kW]	Torque [Nm]	Speed _{max} [rpm]	Inertia [kgm ²]
Dynas ₃ LI 145	145	308	10000	0.20
Dynas ₂ 210	210	385	9000	0.60
Dynas ₂ 220	220	450	9000	0.55
Dynas ₃ LI 250	250	480	10000	0.30
Dynas ₂ 280	280	580	8500	0.80
Dynas ₃ LI 350	350	750	10000	0.60
Dynas ₃ LI 460	460	1000	10000	0.90
Dynas ₃ HT 460	460	1450	8000	1.76
Dynas ₃ HD 460	460	2700	5000	6.10
Dynas ₃ HD 800 LC	800	5000	3500	10.00
Dynas _G G 260	260	3200	3000	10.55
HD 800 LC	800	5.000	3.500	10,00
Dynas _G 260	260	3.200	3.000	10,55

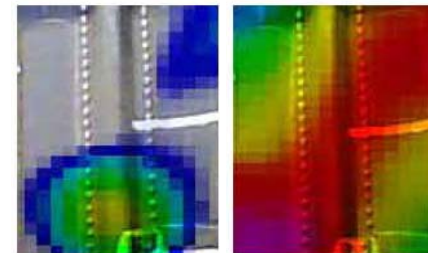
Optical 3D-Deformation and Motion Measuring Method

- Recording via 3D-high-speed cameras
- Analysing software delivers 3D-deformation and motion analyses
- Value of measuring field from 10 mm² to 10 m²



Acoustic Measuring Method (Acoustic Camera)

- Circular array with 48 symmetrically arranged microphones
- Coupling with 2D or 3D video camera
 - Acoustic photos and movies (dB(C), dB(A))
 - Acoustic real time viewfinder
 - Real time localization of imperfections, delamination and fractures in fiber composite and light-weight structures



High Temperature Strain Gauges

- Ceramics (bonded) max. 980 °C
- Metal (welded) max. 950 °C
- with temperature compensation



Telemetrics

- 8 channel temperatures and strain gauges
- Sample rate max. 5 kHz
- Max. 40,000 rpm



- Fuel Consumption Measurements : AVL, Pierburg, Tannhäuser, Rheonik
measurement range: 1 to 1200 kg/h
- Oil Conditioning : AVL, KST
in-house development:
e.g. turbocharger lubrication
- Air Mass Flow Measurement : Sensyflow, Venturi
- Gas Content Measurement : (TMT, Flucon, DSi)
- (Hot) Shaker : up to 57 kN,
vertical and horizontal + climate
- Blowby Measurement : KST 80 / 150 l/min
Natec 350 / 500 / 1500 l/min

Locations



KST.



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