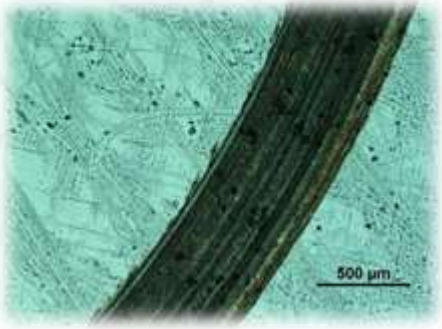

Measurement And Diagnostic Equipment

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Optical scanner REVscan

3D digitizing, inspection, dimension & shape measurement

Technical data:	
Weight	980 g
Dimensions	160 x 260 x 210 mm
Number of meas.	Up to 18 000 in second
Volume	100 x 100 x 100 mm až 1 x 1 x 1 m
Zone in depth	300 mm
Point density	0,2 mm – 2 mm, dle měřeného objemu
Accuracy	**Up to 50µm**

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Mobile 3D laser scanner Trimble CX

3D digitizing & process modeling of large objects, workshop halls, machines, buildings, cultural monuments

Technical parameters:

- Scanning range: 360° x 300°
- Radius: 50-80 m
- Max. resolution 0,002°
- Scan speed: 54000 point per second
- Length accuracy: 1,2 mm on 30 m

Application of software Trimble RealWorks

- Colouring of points cloud & areas due to photography
- Manipulation wits points cloud
- Creation of wire model
- Creation of cross section, Calculation of volume

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Coordinate Measuring Machine (CMM)

Dimension & contour measurement

A very accurate measurement is available on CMM, based on solid granite table, enabling fixation of piece. The dimensions are taken by contact probe with calibrated stylus. Data of coordinates are registered in PC and by special software decoded and processed onto required dimension information. These are transformed into text file.

Parameters :

Accuracy :	0,005 mm
Measuring range:	400x600x400 mm
Output:	*.txt file

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MicroScribe 3DX

Dimension & contour measurement

The device uses touch point, for surface capturing, located at the end of the arm. The computer precisely records location of the point at when pedal is pressed . Measuring software Rhinoceros then creates picture of the object in a form of either individual points, curves or whole areas.

Parameters:

Accuracy:	0,23 mm
Range:	60 cm
Output:	CAD data

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3 Olympus I-Speed

High-speed recording video camera
Fast event analysis

Technical parameters:

- Monochromatic sensor CMOS
- Maximal resolution 1280x1024
- Recording in full resolution up to 2000 fps
- Maximal speed of recording 100 000 fps
- Control by CDU unit or PC
- Possibility of synchronized analog data recording for video recording
- Software for video analysis

Polytec PSV 400

Vibration analysis and body movement
Laser-scanning vibrometer

Technical parameters :

- Max. measurable speed of vibrations is 10 m.s-1
- Max measurable frequency 40 kHz.
- Accepts hardware trajectory analysis and speed of scanned points (areas)
- Fully automated scanning of web of points (512x512) with automatic focus during the scanning process
- Synchronization of real video with location of measured points by video camera

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Termography FLIR – 335

Technical diagnostics

Technical parameters:

- Machine diagnostic without necessity of disassembly (bearings, cooling, electro-wiring, heat-checking)
- Usable at construction
  - Heat losses
  - Water leaks
  - Electric and water paths
- Fast evaluation, even based on visual comparison
- Possibility of dynamic event monitoring
- Temperature range -20 to 650°C

Schenck WT 190

Eddy current dynamometer

Specifications:

- Maximum power: 190 kW
- Maximum torque: 600 Nm
- Maximum speed: 10 000 min^{-1}

Schenck WT 150

Eddy current dynamometer

Specifications:

- Maximum power: 132 kW
- Maximum torque: 400 Nm
- Maximum speed: 10 000 min^{-1}

ASD 235 M250

Asynchronous dynamometer

Specifications:

- Maximum power (motor/generator): 235 / 250 kW
- Maximum torque (motor/generator): 460 / 480 Nm
- Maximum speed: 10 000 min^{-1}

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Schenck D 700

Hydraulic dynamometers

Specifications:

- Maximum power: 700 kW
- Maximum torque: 3 000 Nm
- Maximum speed: 7 500 min^{-1}

Froude Consine, Worcester, England

Cylindrical emission break

Specifications:

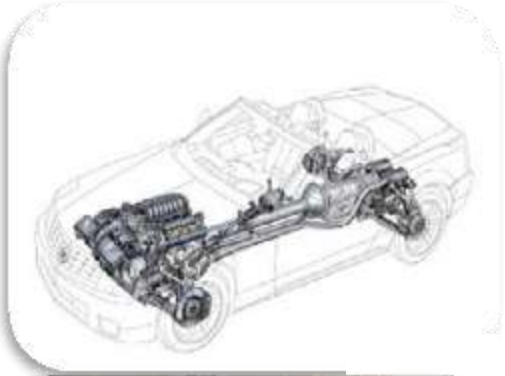
- Type: 48 inch chassis dynamometer
- Serial No.: V6000
- Max. test speed: 200 km/h
- Max. tractive force: 3000 N
- Max. absorption output: 100 kW
- Max. motor output : 100 kW
- Roller diameter: 1,219 m (48 inches)

- Basic inertia: 2995 lbs.
- Additional flywheel mass: 1980 lbs.
- Min. vehicle mass simulation: 2000 lbs.
- Max. vehicle mass simulation : 6000 lbs.

Powertrain - TES Vsetín

Engine testing

- Possibility of testing vehicle with 4x4
- Possibility of testing the entire drive train (engine - gearbox - axle drive - axle shaft - wheel)
- Front axle – 2 piece Dynamometer 136 ADG 288WP; 136kW / 500min^{-1} / 2598Nm; 120kW / 2600min^{-1} / 440Nm
- Rear axle – 2 piece Dynamometer 111 ADG 286WP; 111kW / 500min^{-1} / 2120Nm; 80kW / 2600min^{-1} / 294Nm



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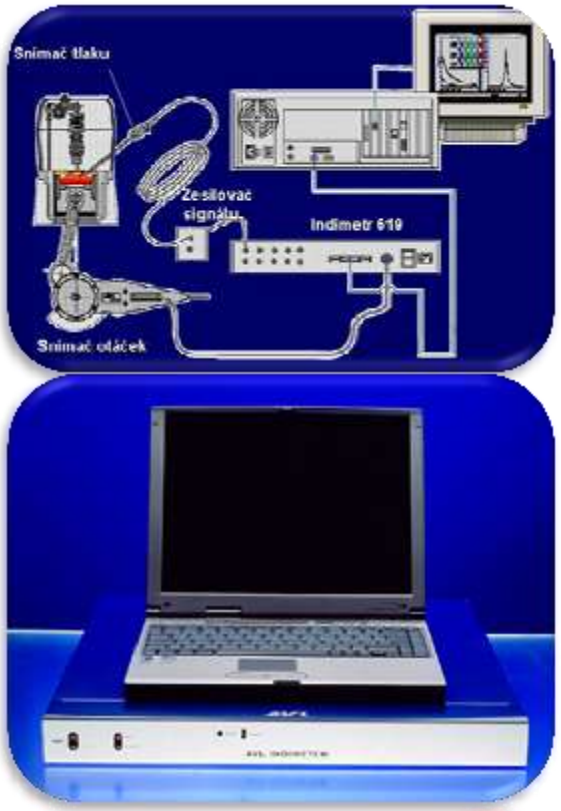
AVL Indimeter 619

Indication technology

System for indication of pressures Indimeter from the company AVL 619 AVL Graz , the device can be used to:

- Monitoring the pressure in the cylinder and combustion analysis - high indication
- Monitoring the pressure in the intake (exhaust) pipes - low pressure indication
- Possibility of using for petrol as well as diesel engines,
- To obtain the following parameters: maximum pressure, indicated mean effective pressure, burning rate, etc.
- Comparing records with different types of engines and time division
- Statistical analysis and off-line viewing results.



Measurement of elasticity and hardness

CSM Instruments

Automatic hardness and elastic modulus calculation

- Statistical analysis functions (average & std deviation)

Nanoindentation:

- Load range - 0,1-500 mN
- Berkovich diamond indenter

Microindentation :

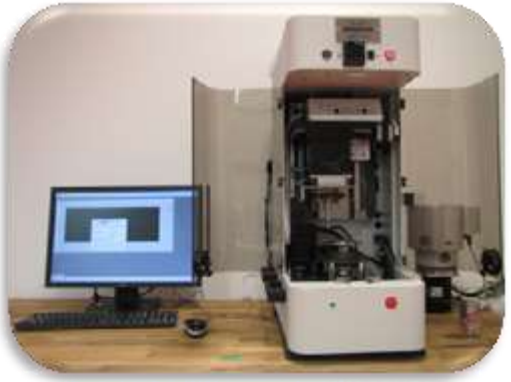
- Load range– 10 mN-10 N
- Vickers diamond indenter

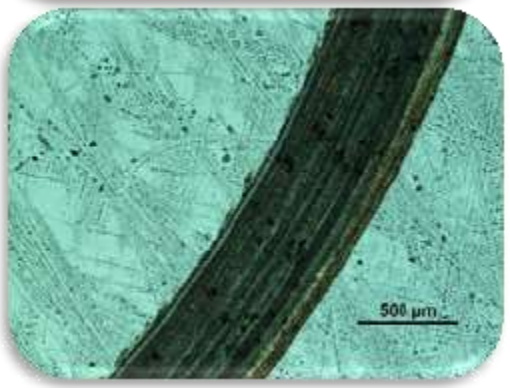
High-temperature tribometer – Bruker

Measurement of friction and wear

Automatic calculation coefficient of friction.

- Statistical analysis functions (average & std deviation).
- The depth of the pin or ball in contact with the sample could be continuously monitored during a tribometer test.





Technical parameters:

- Temperature range – up to 1000 °C
- Load range – 1 – 50 N
- Rotation speed – up to 3000 rpm
- Ball holderdiameter – 6 mm
- Pin holder diameter– 6 mm
- Chamber with inert gas

Scratch test bruker

Measurement of adhesion of thin layers

Automatic measurement of acoustic emission and coefficient of friction.

- Measurement of acoustic emissions during sample evaluation
- Measurement of friction strength and friction coefficient

Technical parameters:

- Load range – 5 mN – 240 N.
- Video microscope - optical objectives: 40x, 100x, 200x.
- Rockwell diamond indenter.

Tinius Olsen H2K5T

High-speed universal testing machine
Measuring of strength and friction attributes

Technical parameters:

- Max. capacity 2,5 kN
- Length of crosspiece 1400 mm
- Area between pillars 405 mm
- Range of speed, from 0,005 to 2500 mm/min.

Accessories:

- Sensor for strength 5 N, 100 N and 2500 N
- Tensile pneumatic parts TH108
- Noncontact extensometer 100R
- Friction factor assessment FT200

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Thermal chamber CTS T-40/100

Thermal tests of electronic modules

Technical parameters:

- Thermal range -40 to +180 °C
- Inner dimensions: 500×500×400 mm
- Temperature gradient: 6 K/min (IEC 60068-3-5)
- Operated by inner control mechanism of from the PC

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Instron Ceast 9350

Impact testing device

Technical parameters:

Max. strength pull/pressure	90 kN
Surge energy	1800 J
Max. load speed	24 m/s
System of reduced surges	pneu

Device for testing of material mechanical attributes in high speed deformation, crash tests of parts and construction sets.

Basic specification by norms EN ISO 6892-1, ISO 6603, ISO 7765, ASTM D3763, ASTM D5628, ASTM, D2444, ISO 179-1, ISO 179-2, ISO 180, ISO 8256, ISO 11343, ASTM D256, ASTM D6110 + equivalent standards

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Gleeble System 3500 Hydrawedge II

Simulator of temperature deformation of materials

Technical data:

Creation of IRA and ARA diagrams (CCT, TTT)

Testing of material weariness during increased temperature

Measurement of creep attributes up to 1300°C

Measurement of mechanical attributes up to 1300°C

Study of melting and solidification

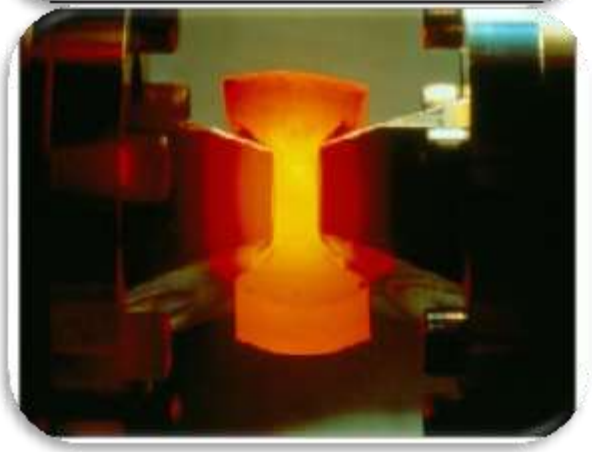
Study of recovery and crystalizattion

Simulation of temperature treatment up to 1300°C

Max. speed of heating up 10000°C/s

Max speed of cool down 6000°C/s

Max. static stress 100 kN



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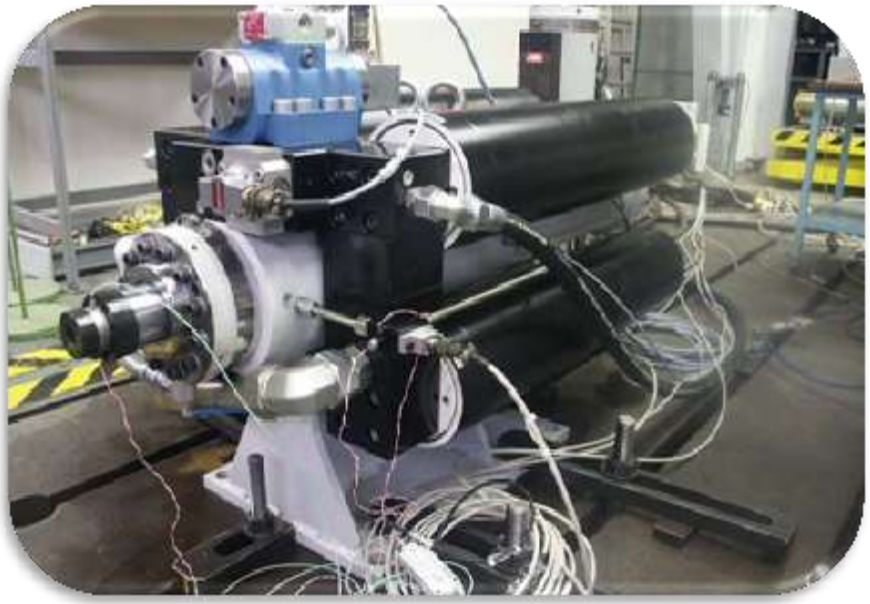
Fast event hydro-motor

One-axis high-speed stress testing

Crash test simulation

Technical data:

- Horizontally places hydro motor 6 x 4m
- Lift 400mm
- Max strength 35kN
- Max speed 15m/s on the track
- Max 170mm (according to additional mass)
- Specially placed piston with low friction
- Onaway wakeup signal



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Hexapod

Realization of general 3D movement or power vibrations

Six hydraulic motors placed in hexapod system

- Vibro-insulation of base desk
- Two universal anchoring beams

Technical parameters:

- Max lift ±70mm, max rotation ±17°
- Max acceleration 8G
- Periodic, random, real warning signals

Specially placed piston with low friction for very precise reproduction of wanted warning signals

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Shredder FU250

One-axis stress load testing

Technical parameters:

- Max lift 100mm
- Max strength 250kN
- Max speed 0,1m/s
- One-shot, periodic, random, real warning signs
- Hydraulic controlled clamping jaws
- Adjustable crosspiece

Compact testing machine with one vertical hydraulic motor

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One-axis stress device

One-axis stress load testing

Technical parameters:

- Individual anchoring groove desk 2 x 1m
- One horizontally placed hydraulic motor
- Max lift 100mm, max strength 25kN, max speed 1m/s
- One-shot, periodic, random, real warning signals

Compact device for one-axis stress testing of small components

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Air-conditioned chamber + external stress box

Realization of testing in various temperature and humidity conditions

Technical parameters:

- Standard climatic tests in the chamber 0,8 x 0,8 x 0,7m
- Temperature range -70°C to 180°C, humidity 10 to 98% for temperatures 10 to 95 °C
- Combination of stress and climatic test in external stress box
- Temperature range -45°C to 140°C, humidity 10 to 98% for temperatures 10 to 95 °C
- External box 1 x 1 x 0,5m for one or two-axes stress testing in connection with hydro motors of multitasking stress device, max strength 10kN
- External box 0,8 x 0,4 x 0,35m for general space stress testing with connection to hexapod, max strength 5kN

Electro vibration device

Electromechanical vibration device for static measurements

Technical parameters:

- Max lift 400mm, max strength 6kN, max speed 5mm/s
- Electromechanical vibration device for dynamic measurements
- Max lift 250 mm, max strength 10kN, wakeup frequency 0,5 - 25 Hz
- Electromechanical vibration device for long-life measurements
- Max lift 20 mm
- Max strength 10kN
- Wakeup frequency 1 -15 Hz

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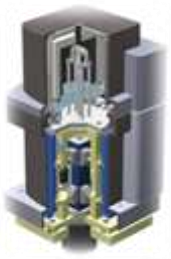
Q800

Dynamic-mechanical analyzer

- Identification of visco-elastic material attributes of polymers and composite structures
- Creep attributes of polymers



Rozsahy použití zařízení Q800	
Minimum Frequency	0.01 Hz
Minimum Dynamic Sample Displacement	+/- 0.5 µm
Temperature Range	-150 to 600°C
Cooling Rate	0.1 to 10°C/min

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Pendulum impact tester Zwick HIT50P

Measurement of impact and notch toughness according to Charpy

Technical parameters

- Non-instrumented pendulum impact tester
- Impact energy of pendulums – 0.5, 1, 5, 7.5, 15, 25 a 50J
- Impact velocity 2.9 - 3.8 m/s
- TestXpert II Standart Test Program – transmission and processing of data by marking, time, temperature and statistic evaluation

Application

- Determination of impact or notch toughness of plastics and composites according to EN ISO 179-1
- Determination of notch toughness of metals and alloys according, dimension of specimen – 4x3x27 mm
- Effect of temperature on impact or notch toughness of plastics and metal materials

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Impedance gauge

Measurement of acoustic attributes ČSN ISO 10534-2

Technical parameters:

- Sound absorption coefficient ASTM E1050–08
- Transmission loss ASTM E2611–09
- Frequency range 50 – 6400 Hz
- Circle samples with diameter of 29mm a 100mm

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Testing of hot exhaust gasses

Device for testing of cleanable filters by norm VDI/DIN 3926, ASTM D6830-02 a ISO 11057

Technical parameters:

- Intended for areal filtration materials
- Measured variables:
  - Filtration efficiency
  - Change of pressure descent
  - Ability to clean by regressive pulse
  - Resistance of material against long-term pressure pulses and temperature
  - Temperature range: 20 – 250°C
- Sample size: 100 cm^2
- Regressive pulse: 0-0,6 MPa

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MFP 1000 HEPA, PALAS GmbH

Testing of HEPA filters

Technical data:

- Intended for areal materials used for highly efficient filtration
- Norm: EN 1822
- Size of particles: 120 – 2000 nm
- Flow: 0,5 – 16 m^3/h
- Pressure descent: 10 – 2500 Pa
- Sample size: 100 cm^2

Optical scanner ATOS II 400

3D measurements and digitalization

Reverse engineering – quick and precise digitalization of real parts or hand made models, transfer to 3D CAD data for additional use.

Documentation and archiving of data, used for historical artifacts, statues and reliefs

Control of size, analysis and inspection- graphic comparison of CAD model and scanned data

Possibility of constitution choice

Output protocol of measurements (PDF, HTML).

- Digitalization of parts ranging from centimeters to meters
- Precision of measurements up to 0,03 mm
- High density of data: up to 28 points / mm^2 and 1,4 million points on 1 scan

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