Test Systems for a Clean and Safe Environment

AiP automotive

The Road in Your Lab

Pioneering Test Systems for Road Driving Simulation
Emission Measurement Technologies · Electromobility

aip-automotive.de

Mobility is Our DNA
Sustainability Our Claim


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Welcome to Haldenwang

Our Headquarters in the Beautiful Allgäu

Our headquarters are located in Haldenwang in the heart of the Allgäu region, approx. 120 km southwest of Munich.

The Allgäu is the southern region of Germany and one of the most popular tourist areas in the country. It is especially known for its intact and charming nature.

For more than 20 years, AIP has been developing, testing, and manufacturing future-oriented automotive testing technologies to promote a clean and safe environment.

AIP key data

Employees:	230
Total area inside:	3,000 m²
Logistics outdoor area:	1,500 m²
Max. Crane loads:	40 tons

Technology- and Service Leadership is Our Motto

AIP designs and manufactures individual test systems for development and manufacturing centers, most vehicle OEM's and their tier suppliers as well as testing institutions, locally and globally.

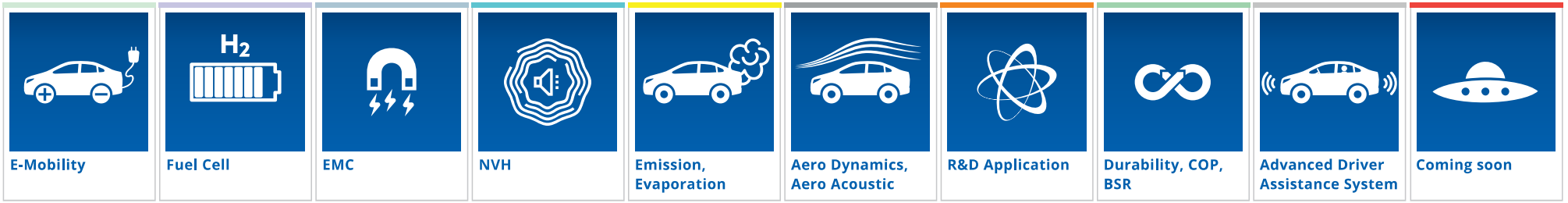
In addition to test benches for road driving simulation, AIP enjoys an excellent reputation in the areas of measurement technology, stationary and mobile exhaust gas analysis and flexible test bench automation.

For the rapidly growing electromobility sector AIP offers sophisticated products and systems.

The AIP comprehensive system solutions are modular in design and easily adaptable to various vehicle types and customer requirements.

Exciting projects for leading and future-oriented providers offer AIP a wide range of topics for innovative solutions.

High-Performance Solutions for a Wide Range of Applications



The AIP comprehensive system solutions are modular in design and easily adaptable to various vehicle types and customer requirements.

- Mobile and stationary charging stations for electromobility
- Exhaust gas and fuel consumption measurement
- Acoustic measurement (NVH)
- Endurance testing, COP
- Performance measurement, e.g. in a wind tunnel
- Functional testing, e.g. in climatic and altitude chambers
- Verification electro-magnetic compliance (EMC)
- Hydraulic road simulation testing (shaker)
- Emission measurement systems
- Test automation
- Robot driver / Throttle actuator
- Vehicle and tire cooling fans
- Test Stand Accessories
- Drivers aid systems

ISO 9001
Certification of Quality Management
AIP automotive

ISO 14001
Certification of Environmental Management
AIP automotive

DIN EN ISO/IEC 17025:2018
Accredited Testing/Calibration Competence
AIP automotive

ilac-MRA

DAkkS
Deutsche Akkreditierungsstelle
D-K-21076-01-00

Product Overview

			E-Mobility	Fuel Cell	EMC	NVH	Emission, Evaporation	Aero Dynamics, Aero Acoustic	R&D Application	Durability, COP, BSR	Adv. Driver Assist. System
Electromobility			Page								
Mobile Charger	R2DC		9	9	9	9		9	9	9	
Battery Fast Charging Station	HPDC-1000/400		10	10	10	10		10	10	10	
Mobile Battery Fast Charging Station	HPDC-1000/400 mobile		11	11	11	11		11	11	11	
Battery Simulator	HPDC-1000 BattSim		12	12	12	12		12	12	12	
Battery Cell Tester	BCT		13								
Battery Tester	HPDC-1000 BattTest		14								
E-Axle Dynamometer	E-Mot		15								
Battery Shaker	PTS-4-L-E-EMOB		16								
Chassis Dynamometers	**Roller dia.**										
Exhaust Measurement of Motorcycles / ATV	21”	CDM 21 MC	27				27		27	27	
EMC Measurement	37,5”	CDM 37.5 EMC			36						
Emission Measurement of Cars	48”	CDM 48 XWD	28				28	28	28	28	
Mileage Accumulation	62,6”	CDM MA			34			34	34	34	
Emission Measurement of Commercial Vehicles	72 - 125”	CDM 72 XWD	30				30	30	30	30	
Noise, Vibration and Harshness Measurement	75”	CDM 75 NVH				35					
Wind Tunnel, Climatic and Altitude Chamber	75”	CDM 75 WT / CL / ALT	32					32	32		
Flat Road Dynamometers	**Roller dia.**										
NewtonFinder	20”	FRDM / NewtonFinder					37		37		
Wind Tunnel Balance	20”	FRDM WTB						39	39		
Pulsed Flat Road Dynamometer	12”	FRDM NVH				38			38		
Powertrain Dynamometers											
Powertrain Dynamometer	PTD		49	49					49	49	
E-Axle Dynamometer	E-Mot		15								
Road Simulation (Shaker)											
Road Simulatior	PLS-HYD - PuLSer (hydraulisch)					45			45	45	
E-Shaker	PLS-E - PuLSer (elektrisch)					46			46	46	
Turn Key											
E-Mobility Test Cell, Fuel Cell Test Cell			X								
Emission Test Cell							X				
Mileage Test Cell									X	X	

		E-Mobility	Fuel Cell	EMC	NVH	Emission, Evaporation	Aero Dynamics, Aero Acoustic	R&D Application	Durability, COP, BSR	Adv. Driver Assist. System
Emission Measurement Technology (Hardware)		Page								
N_2O Measurement	QCL					20				
Determination of Exhaust Particles	SPC					21				
Activated Carbon Filter Conditioning	CANARY					X				
Stationary Emission Measurement	SEMS					X				
Portable Emission Measurement	PEMS					19				
Modular Emission Measurement	EMS					23				
Gas Measurement	SHED-FID THC Module					X				
Emission Measurement Technology (Software)										
Determination of Exhaust Volume	CVS					22				
Modular Emission Measurement	EMS					23				
N_2O Measurement	QCL					20				
Determination of Exhaust Particles	SPC					21				
Determination of Particle Mass	PMC					21				
Nitric Oxide Measurement	CLD					24				
Gas Analysis	FTIR					X				
Activated Carbon Filter Conditioning	CANARY					X				
Automation (Hardware)										
Air Cooling	JLO/KIM					57				
Driving Robot	JAMES	55			55	55	55	55		
Driving Robot EMC	P-JAMES			55						
Accelerator Adjuster	TA			X	X			X		
Automation (Software)										
Roller Controlling Motor-in-the-Middle	DynoServer ECD (MIM)	52		52	52	52	52	52	52	
Roller Controlling 4-Motor	DynoServer 4Motor	52		52	52	52	52	52	52	
System Controlling and Monitoring	MCS	51		51	51	51	51	51	51	
Driver Assistance	Drivers AID	X		X	X	X	X	X	X	
Integrated Test Stand Automation	MPAS					53				
Chassis Measuring Pit										
	FMG							X		

E-Mobility

Mobile Charger R2DC

DC Fast Charging of Electric Vehicles on CEE Connections or Directly on the Test Stand During Preconditioning

The DC charging station is used to charge e-vehicles with a DC voltage connection to a CEE connection. It consists of a charging column, which is set up in the immediate vicinity of the vehicle to be charged, and the power unit is built into the charging column.

The CEE connection side is variable from CEE 125 to CEE 32.
Depending on the available input power, there is a maximum output power.

The charging station can be equipped with the four international charging standards CCS1, CCS2, CHAdeMO and GB / T, which are changeable.

Charging Times

BMW IX3
80 kWh
46 minutes

VW ID3
77 kWh
50 minutes

Audi e-tron
95 kWh
48 minutes

Mercedes EQS 580
108 kWh
54 minutes

Porsche Taycan
93,4 kWh
50 minutes

Tesla Model 3
75 kWh
40 minutes

All charging times relate to a charge of 10% to 80% of the battery capacity.

Technical Specifications

Dimensions (L x W x H)	1,000 x 835 x 1,020	mm
Weight	approx. 190	kg
Ambient temperature	-20 ... +40	°C
Degree of protection	IP54	
AC input data	3x125	A
	400 ± 10 %	V
	50 ... 60 ± 10 %	Hz
DC output data	90/60/30	kW
	max. 250	A
	150 ... 1,000	V
AC connector type	CEE125, CEE63 and CEE32	
DC connector type	CCS Type 2, CCS Type 1, CHAdeMO, GB/T	
Power factor	0.99	
Charging standard	DIN70121, ISO15118 CHAdeMO Ver. 2.0 GB/T-27930-2015	
Conformity and safety	CE, 2014/30/EU 2014/35 / EU IEC 61851-1, -23 IEC 61000-6-1, -2, -3, -4 IEC 61000-3-12 EN 60529	
Operation	7" touch display	

Applications

E-Mobility | **Fuel Cell** | **EMC** | **NVH** | **Aero Dynamics, Aero Acoustic** | **R&D Application** | **Durability, COP, BSR**

Fast Charging Station HPDC 1000/400

DC Fast Charging of Electric Vehicles on the Chassis Dynamometer or During the Preconditioning

The DC charging station serves as a high-speed charging solution for electric vehicles with a DC voltage connection directly at an existing stationary road drive simulation test bench.

The HPDC charging station can be equipped with the 4 international charging standards CCS1, CCS2, CHAdeMO and GB/T. It is possible, to use the two combined charging systems (CCS1+2) as uncooled charging lines or as liquid cooled charging lines for the High Power Charging (HPC) with current to realize up to 400 kW charging power.

Advantages of the HPDC 1000 Charging Technology

- Easy integration into existing test bench safety chains
- No additional energy supply necessary
- Compact, flexible system structure
- Energy recovery capability (controlled energy return into the network, if supported by the test vehicle). This enables, for example:
  - the preparation of the transport for relocation by means of a transport vehicle
  - automated charging / discharging cycles with plugged-in charging plugs (optional)
- Optimized cable lengths, thereby
  - reduced risk of accidents due to tripping hazards
  - improved handling in tight spaces and
  - Improved handling with different positions of the charging sockets on the test vehicles
  - reduced acquisition and maintenance costs
- Direct coupling with the electrical feed of the test stand
- Can be implemented modularly from 100 kW … 400 kW
- High-performance charging up to 400 kW
- Implementation of several charging points with just one power electronics
- Optional extended operating temperature range for use in air conditioning cells / wind tunnels
- Future-proof retrofittable, e.g. for:
  - power expansions
  - new charging connector standards, e.g. ChaoJi
- Integration into the existing software environment / automation of the test bench
- Software for setting performance parameters
- Implementation of all current charging standards in just one product
- Vehicle communication data logging
- Loading of defined SOCs
- Supply of up to 4 charging points in 100 kW steps
- High quality charging plug (from the market leader), can be repaired by the customer if necessary

Applications

- The charging system can be used, for example, as an upgrade to the following test bench systems:
  - Chassis dynamometers (Mileage accumulation)
  - Powertrain dynamometers
  - EMC Chassis dynamometers (optionally)
  - Flat road dynamometers
- Charge / discharge cycles of complete vehicles in climatic chambers

Technical Specifications

Power range	100 ... 400	kW
Max. charging power per charging point	400	kW
Output voltage range	50 ... 1,000	V
Charging current max.	500	A
Efficiency	94	%
Functionality		
Plug types	CCS1, CCS2, CHAdeMO, GB/T	
Number of charging options	4	
Temperature range	-35 ... +50	°C
Protection class	IP 54	
Operation	Control via test bench computer	
Optional	7" touch display	
Dimensions		
Dimensions charging station (W x D x H)	500 x 500 x 1,500	mm
Dimensions charging unit (W x D x H)	on request	mm
Weight of charging station	ca. 240	kg
Material	Powder-coated sheet steel	
Housing of power electronics (W x D x H)	2,200 x 600 x 2,400	mm

Applications

E-Mobility | Fuel Cell | EMC | NVH | Aero Dynamics, Aero Acoustic | R&D Application | Durability, COP, BSR

Fast Charging Station HPDC 1000/400 mobile

Can be Flexibly Positioned and Allows Maximum Proximity to the Vehicle Charging Socket

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The HPDC charging station can be equipped with the 4 international charging standards CCS1, CCS2, CHAdeMO and GB/T. It is possible, to use the two combined charging systems (CCS1+2) as uncooled charging lines or as liquid cooled charging lines for the High Power Charging (HPC) with current to realize up to 400 kW charging power.

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- No additional energy supply necessary
- Compact, flexible system structure
- Energy recovery capability (controlled energy return into the network, if supported by the test vehicle). This enables, for example:
  - the preparation of the transport for relocation by means of a transport vehicle
  - automated charging / discharging cycles with plugged-in charging plugs (optional)
- Optimized cable lengths, thereby
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  - improved handling in tight spaces and
  - Improved handling with different positions of the charging sockets on the test vehicles
  - reduced acquisition and maintenance costs
- Direct coupling with the electrical feed of the test stand
- Can be implemented modularly from 100 kW … 400 kW
- High-performance charging up to 400 kW
- Implementation of several charging points with just one power electronics
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- Future-proof retrofittable, e.g. for:
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  - new charging connector standards, e.g. ChaoJi
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- Vehicle communication data logging
- Loading of defined SOCs
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- High quality charging plug (from the market leader), can be repaired by the customer if necessary

Applications

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  - Chassis dynamometers (Mileage accumulation)
  - Powertrain dynamometers
  - EMC Chassis dynamometers (optionally)
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Number of charging options	4	
Temperature range	-35 ... +50	°C
Protection class	IP 54	
Operation	Control via test bench computer	
Optional	7" touch display	
Dimensions		
Dimensions charging station (W x D x H)	500 x 500 x 1,500	mm
Dimensions charging unit (W x D x H)	on request	mm
Weight of charging station	ca. 240	kg
Material	Powder-coated sheet steel	
Housing of power electronics (W x D x H)	2,200 x 600 x 2,400	mm

Applications

E-Mobility | Fuel Cell | EMC | NVH | Aero Dynamics, Aero Acoustic | R&D Application | Durability, COP, BSR

Battery Simulator HPDC 1000 BattSim

As a Replacement for High-voltage Vehicle Batteries. For the Operation of Vehicles under Nearly Real Conditions on Test Stands.

Applications

- Simulation of the vehicle battery, e.g. for
  - Endurance tests
  - Performance tests for the entire vehicle
- Highly dynamic performance/load tests of electric drive systems

Advantages

- Modular, expandable power range from 200… 1,200 kW
- Connection to the existing intermediate circuit of the motor converter of the test bench
  - no additional feed necessary
- Highly dynamic and precisely regulated power electronics
- High efficiency
- Very compact design (300 kW per power field)
- Integration into the existing security matrix

Technical Specifications

Performance classes	200 ... 1,200	kW
Output voltage range	20 ... 1,200	V
Current	300 ... 1,800	A
Overload capacity for 30 s	150	%
Real-time control system	10	kHz
Current rise time	<1 (with setpoint jump 0% ... 90%)	ms
Current accuracy	0.05	% MW
Voltage rise time	<5 (with setpoint jump 10% ... 90% with 500 uF load)	ms
Voltage accuracy	0.05	% MW
Dimensions (W x D x H)	2,200 ... 5,400 x 2,200 x 600	mm

The DC battery simulator serves as a replacement for the high-voltage vehicle battery for operating the vehicle under nearly real conditions on vehicle test benches (reproducible road driving simulation). The system is operated in 2-quadrant operation (source/sink).

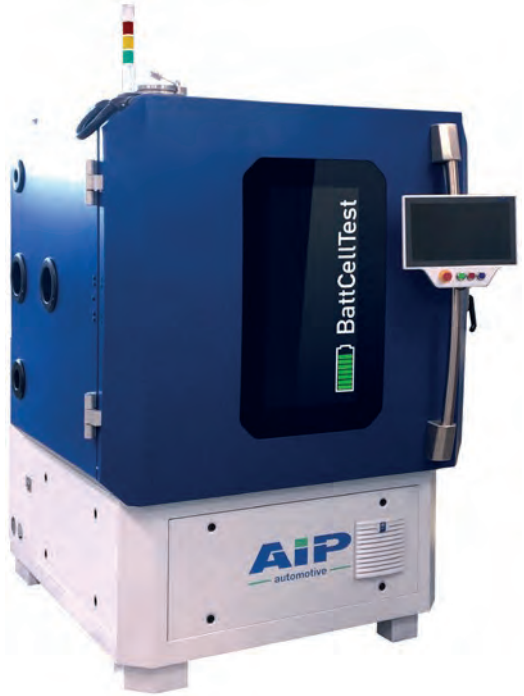
The DC battery simulator is preferably connected to the AFE converter (energy control cabinet) of an existing test bench system. By integrating (expanding) the DC battery simulator into the existing test bench infrastructure, costs can be saved accordingly. If the connection to an existing system is not possible, an extra DC link feed unit can also be supplied.

Applications

E-Mobility | Fuel Cell | EMC | NVH | Aero Dynamics, Aero Acoustic | R&D Application | Durability, COP, BSR

Battery Cell Tester BCT

Quality Assurance in the Development of Battery Modules or Battery Packs



The compact battery cell test system consists of a combined, dual cabinet system, consisting of a temperature test cabinet with cooling / heating unit and an LE cabinet (power electronics). The LE cabinet is attached to the rear of the temperature test cabinet. An intermediate zone is used for thermal separation and for routing cables up to the through-hole plating in the temperature chamber. The system is suitable for battery cells up to 1,000 mm and a maximum weight of 80 kg / layer.

The temperature control cabinet is equipped with 5 layers, whereby the layers can be individually removed for external equipment. The contact with the power electronics takes place automatically at the end position of the layer.

Advantages

- Very compact design
  - power unit and temperature control cabinet from a single source
- Suitable for battery cells with a length of up to 1,000 mm
- Tests of several large cells per layer
  - max. Weight 80 kg / layer
- High-current tests per test item of 960 A duration and 1500 A peak
- Modular configurable channels
  - Adaptation to changing requirements is possible at any time

Applications

- Exact testing of battery cells to ensure quality and performance
- Reproducible, realistic function, performance and aging tests

Technical Specifications

Temperature Control Cabinet		
Temperature range	-30 … +60	°C
Outside dimensions W x H x D	on request	mm
Inside dimensions W x H x D	1,200 x 1,000 x 600	mm
Layer for test item	5 (individually removable for external equipping)	layer
Loading per layer	80	kg
Test item dimensions W x H x D	1,125 x 160 x 560 (Standard layer for max. 6 test items)	mm
Heating speed (IEC 60068-3-5)	3 (empty cell)	K/min
	2 (200 kg DUT)	
Cooling speed (IEC 60068-3-5)	2 (empty cell)	K/min
	1 (200 kg DUT)	
Heat compensation	2 (at -30°C)	kW
	5 (at +20°C)	
Ambient temperature	+10 … +35	°C
LE Cabinet		
Outside dimensions W x H x D	on request	mm
DC Power channels	30	channels
Channels per layer	6 (suitable for series and parallel operation)	channels
Current per channel	I nominal ± 160	A
	Overload ± 250 – S6 (60s)	
Voltage	0 ... ±10	V

Applications

E-Mobility | **Fuel Cell** | **EMC** | **NVH** | **Aero Dynamics, Aero Acoustic** | **R&D Application** | **Durability, COP, BSR**

Battery Tester

Function Test System for Vehicle Batteries

The HPDC BattTest consists of a feed / feedback unit, the power fields, a control unit and a heat exchanger unit. The feed unit is used to provide the required supply power for the power modules. A control cabinet panel is equipped with 2 power modules of 100 kW each.

Applications

- Execution of reproducible function and life cycle tests of complete battery systems

Advantages

- Modular system structure
- Highly dynamic and precisely regulated power electronics

Technical Specifications

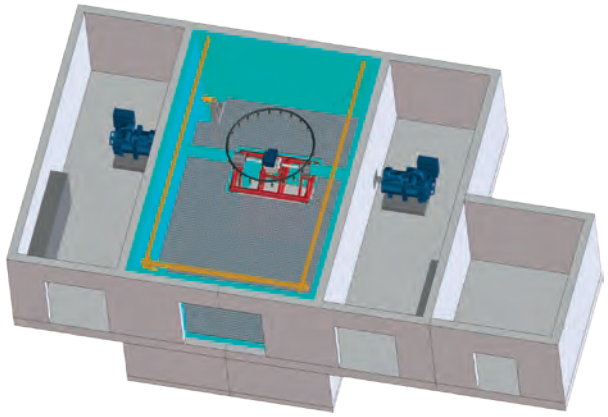
Specifications per Control Cabinet Panel		
Dimensions per control cabinet field (W x H x D)	on request	mm
Dimensions of basic module including heat exchanger (W x H x D)	on request	mm
Number of modules	2	pcs.
Power	200	kW
Overload	300	kW/30s
Electricity	320 (serial) / 640 (parallel)	A
Overload	500 (serial) / 1,000 (parallel)	A/30s
Voltage	20 ... 1,000 (serial)	V
	20 ... 500 (parallel)	
Voltage measurement, Reproducibility	± 0.1	% of EW
Current measurement, Reproducibility	± 0.1	% of EW
Voltage accuracy	0.05	% MW

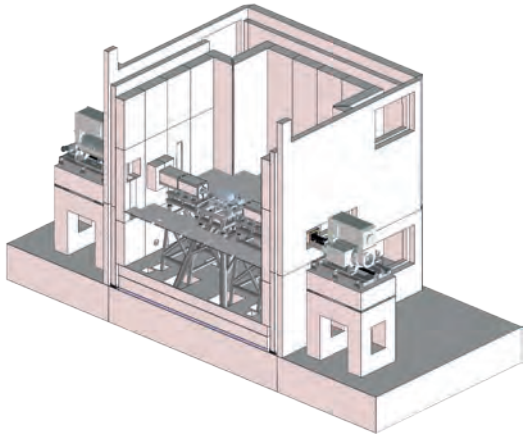
Applications

E-Mobility | Fuel Cell | EMC | NVH | Aero Dynamics, Aero Acoustic | R&D Application | Durability, COP, BSR

E-Axle Dynamometer Emot

Function Test Stand for E-Axles





The e-axis test stand is equipped with two highly dynamic load units, which introduce the required torques to the components to be tested. Both an air and a water-cooled version can be implemented. The torque detection is guaranteed by an HBM T12 (alternatively HBM T40) measuring flange each. The entire steel construction substructure is designed in a vibrati-on-optimized form.

A movable base is installed to hold the test item, on which the motor pallet is placed.

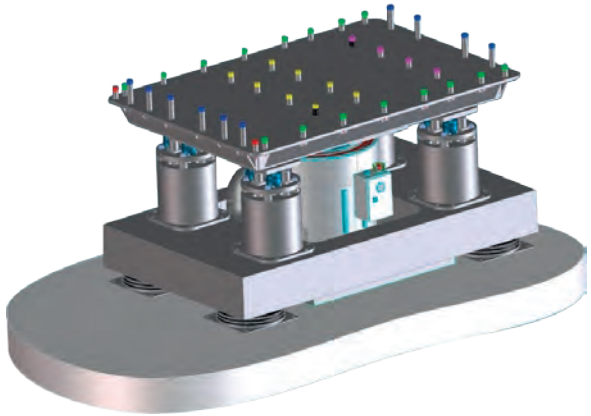
Applications
Testing of components of the electric drive train

Applications

- E-Mobility
- Fuel Cell
- EMC
- NVH
- Aero Dynamics, Aero Acoustic
- R&D Application
- Durability, COP, BSR

Battery Shaker

Stress Tests of Vehicle Battery Systems



The shaker test stand consists of the following components:

- Wingblock - air spring mounted < 2 Hz
- Shaker actuator system with preload compensation
- Additional lateral guides with preload compensation
- One test object fixation – according to customer specifications
- Control cabinet for controlling the test stand, measured value processing and shaker regulation

The test object is excited by simulating noise profiles or artificially generated vibration profiles, such as sine, rectangular, triangular or other excitation profiles.

Applications

- Stress tests of vehicle battery systems

Technical Specifications

Test object dimensions max. (L x W)	2,300 x 1,600	mm
Shaker hub pk-pk (SIN / Random)	63.5	mm
Frequency range shaker (without clamping)	5 ... 3,000	Hz
Shaker force static	15 (preload compensation)	kN
Shaker force dynamic	22	kN

Applications

E-Mobility | **Fuel Cell** | **EMC** | **NVH** | **Aero Dynamics, Aero Acoustic** | **R&D Application** | **Durability, COP, BSR**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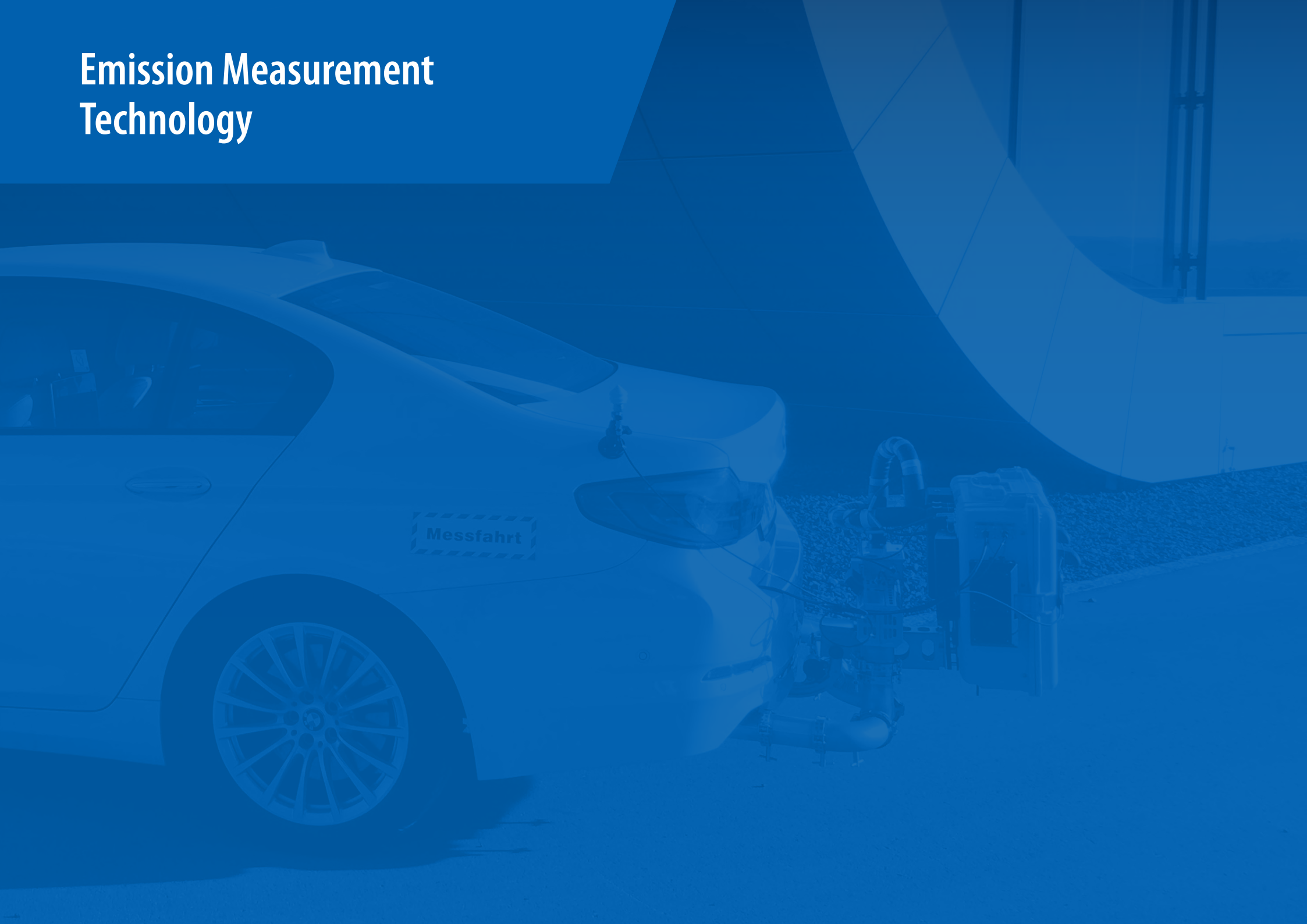
eStation

Emission Measurement Technology



Portable Emission Measurement PEMS Gen2 / RDE

Compact Systems for Measuring Emissions During a Real Road Trip

PEMS Gen2 is a compact and mobile emission measurement system for real driving emissions (RDE) with focus on the legal vehicle type test in Europe. Sampling can be done at the exhaust or via the EFM (Exhaust Flow Meter). High priority was given to robust and precise measurement technology as well as intuitive assembly and handling.

Advantages

- Very compact device to facilitate assembly
- Easy and flexible vehicle assembly to minimize set-up times
- Low weight to facilitate handling and enable use for small cars
- High robustness and suitability for all weather conditions, so that outdoor installation is possible
- Simple operating concept and handling to shorten the individual test steps and minimize errors
- Precise measurement even under changing test conditions (NVH, temperature, pressure)

Applications

- RDE measurement according to:
  - (EU) 2017/1151 with the additions 2017/1154, 2017/1347 resp. regulation (EU) 2018/1832
  - China C6, GB 18352.6-2016
  - Korea MOE notification
  - Indien Bharat 6
  - UN ECE R49
  - Non-road Stage V
- Measurement of CO_2, CO, NO, NO_2 directly at the exhaust or via sample taking at the EFM
- Measurement of THC, CH_4, NH_3 and N_2O with additional hardware
- Developement rides and 'Road-to-Rig' rides

Options

- PEMS-GAS for gaseous emissions from diesel- and gasoline engines
- PEMS-GAS/PN for gaseous emissions from diesel- and gasoline engines as well as particle numbers

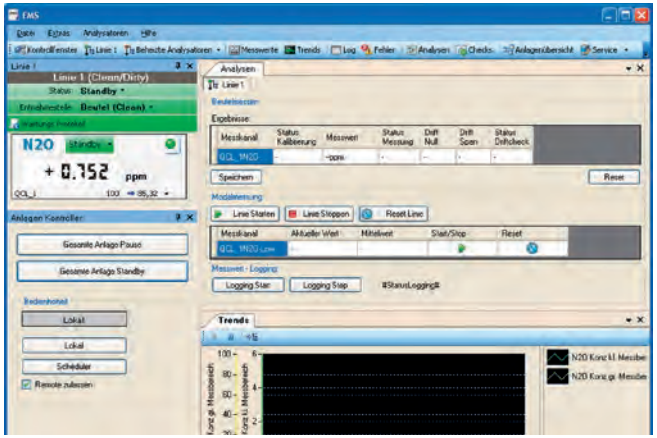
- PEMS-EFM (Exhaust Flow Meter)
- PEMS Mobile App

Applications

Emission, Evaporation

N_2O Measurement QCL

Reproducible N_2O Measurement



Measurement of the nitrous oxide levels in vehicle emissions is becoming increasingly important because N_2O with 298 CO_2 equivalent possesses a very high global warming potential.

Advantages

- Compact stand-alone or 19” rack-mount analyzer module
  - High selectivity and sensitivity
- No cross sensitivity to CO, CO_2, H_2O, NO_X, C_XH_X
- Easy operation and calibration
- Short rise times T90: < 2 sec.
- Low detection limit: < 10 ppb
- No LN_2 cooling required

Application

- Certification of cars and internal combustion engines in accordance with future emissions legislation, e. g.
  - EPA 40 CFR 1065
  - EPA 40 CFR 1066, WLTP GTR
  - Matches the requirements in terms of EURO VI
- Universal application in research, development and quality assurance

Measuring Principle

The QCL laser module is designed to emit laser light to measure N_2O in the MIR range. The advantage of using a Quantum Cascade Laser is the extremely narrow band width of the emitted laser light, where a very high selectivity to the desired measurement component can be achieved. When measured over a long path gas-flow cell the coupled laser light is partially absorbed. The absorption rate determined by the analyzer software is a measure of the concentration of the component gas.

Applications

Emission, Evaporation

Particle Measurement SPC / HFID / PMC

Count Solid Exhaust Particles, Particulate Mass Determination, Measurement of THC

SPC Solid Particle Counter

For determining the number concentration of solid exhaust particles in combustion engines.

Sampling is from a full or partial flow dilution system or even directly possible from the raw exhaust gas sample. An optimized sampling system for raw exhaust protects the particle counter from excessive particulate and temperature stress.

Designed in accordance with European regulations and beyond the specifications of the German Automotive Industry (ECE R83, PMP Group). Certified by AEA Energy & Environment.

Features

- Compact design (19”/6U)
- Ease of service
- Optional TSI or Grimm CPC
- Automated procedures for startup and maintenance
- Aerodynamic raw exhaust exhaust diluter (optional)
- HFID Heated Flame Ionisation Detector

HFID Heated Flame Ionisation Detector

For continuous measurement of THC in the dilution tunnel.

- Heated sampling probe
- Heating pipe
- Analyzer – quick snap-in technology
- 19” rack design

PMC Particle Mass Controller

For the gravimetric determination of particulate mass solid exhaust particles from internal combustion engines. Provides space for the integration of a heated analyzer e. g. for THC measurement of diesel vehicles.

Features

- Design in accordance with worldwide requirements (UNECE R83, EPA 40 CFR 86, TRIAS Att. 42 WLTP)
- Very compact (19”/6U)
- On request also available as a separate desktop unit
- Up to 4 filter paths
- Mass Flow – regulated to 80 Nl/min.
- Automatic self-calibration with 2 integrated venturi nozzles

Applications

Emission, Evaporation

Emission Volume Identification CVS

Exhaust Dilution System Using Critical Flow Venturis with Volume Flow Measurement and Sampling Taking for the Exhaust Gas Analysis

CVS (Constant Volume Sampler) for the certification of vehicles and combustion engines according to the latest emission regulations, such as: UNECE R83, EPA 40 CFR 86, WLTP TRIAS Att 42

Advantages

- Most compact CVS system on the market
- Consistently straight exhaust system
- Tandem blowers
- Components networking via EtherCAT
- 3x probe sampling venturi
- Max. flow 30 m³/min.

Features

- Shared cabinet design, with very easy access for maintenance and service work
- Standard industrial hardware avoids high replacement costs
- Low switching time for 15 flow levels (< 250 ms)
- Simultaneous filling, analyzing, rinsing and evacuation ensures maximum efficiency
- High-capacity vacuum pump for high-speed rinse/evacuation of the bag
- Modular expansion (e.g. dilution air treatment, dilution path control)

Applications

Emission, Evaporation

Emission Measurement System EMS

Integral Exhaust Gas Measurement System for Flexible and Scalable Operations

Modular exhaust measuring system for determining a limited and non-limited exhaust gas components from diluted and undiluted vehicle exhaust.

In the development of AIP EMS were the requirements/compliance to global legislation in the foreground (UNECE R83, EPA 40 CFR 86 & 1065, TRIAS Att. 42, WLTP).

CO / CO_2	ABB Uras (NDIR)
O_2	ABB Magnos (PMD)
THC	ABB Fidas (FID)
THC / NMHC	ABB Fidas (Cutter - FID)
NO_X / NO / NO_2	AIP CLD or ABB Limas
N_2O	AIP QCL

Further components on request.

Application

- On a chassis dynamometer in conjunction with a CVS system for vehicle certification
- On engine test beds
- On a chassis dynamometer in conjunction with a raw exhaust gas sampling system for research and development of catalysts

Features

- Compact cabinet design, easy accessibility for maintenance and service work. The back wall of the cabinet can be placed directly against the wall of the test cell
- Components networking via EtherCAT
- Reduced operating costs
- Standard industrial hardware avoids high cost of spare parts
- Mobile using a pump truck, the unit can be pulled out during operation
- 2 lines in a 19” cabinet (1+ tracer/EGR)
- Components quick-change concept ('snap-in' principle) ensures maximum system availability
- 'Snap-in' principle: Plug-in modules with locking mechanism allows quick docking of measurement modules from the front of the system cabinet. The gas connections are separated by undocking while the electrical supply remains wired. Advantage: Servicing of the analyzer modules during normal operating condition.

Applications

Emission, Evaporation

Nitric Oxide Measurement CLD

Chemiluminescence Detector

For the reproducible measurement of high concentrations of gaseous nitrogen oxides (NO or NO_X) in the ppb range from vehicle emission.

The compact 19" CLD-measuring system is suitable for integration into the AIP emission measurement system, as well as in existing systems from other manufacturers.

Application Examples

- Development tool for complete vehicles, engines and drive trains
- Development tool for ECU, fuel injection systems, etc.
- Quality inspection

Applications

Emission, Evaporation

Nitride Measurement LAS NH_3

Nitride Compounds in Raw and Diluted Exhaust Gas

The Laser Absorption Spectroscopy (LAS) modules from AIP are used to measure nitride compounds in raw and diluted exhaust gas. The modules are available in both a mobile and a stationary version for exhaust gas measurement. Different sampling systems can be used in combination.

Advantages

- Highly precise measuring method in the ppb and ppt range and thus a wider dynamic measuring range
- No chip calibration necessary
- High selectivity and low cross-sensitivity
- High and small sampling flows possible for a wide variety of applications
- High reliability and long-term stability through differential measurement and thus a high measurement quality
- Robust against dirt and aging of the optics and thus minimization of failure and maintenance intervals
- No further operating media required
- High variability in the measurement setup with compact dimensions

Applications

- Measurement of NH_3, NO, N_2O in raw and diluted exhaust gas
- Certification of cars and combustion engines in accordance with exhaust gas legislation such as
  - 40 CFR US §1065/66
  - EU 2019/1151
- Used as an additional module for PEMS, as a multi-line exhaust gas measurement system on the roller or engine test bench
- Integration into existing test stand systems
- Development of new NO_X aftertreatment systems such as Urea SCR, CRTs, and LNTs

Applications

Emission, Evaporation

Test Stands

Emission Measurement
Research & Development
Function, Performance, Brakes
Road Simulation
Powertrain Dynamometers

Chassis Dyno for Motorcycles / ATV CDM 21 MC

For Motorcycles, Trikes, Scooters and ATV

Designed for use in research and development centers, manufacturing plants of motorcycle OEM's and their tier suppliers.

Rolling road for measurements according to the US Specification "EPA RFP C1000081 T1" and also the valid Japanese and European guidelines and standards.

Advantages

- Emission measurement
- Temperature tests (climate chamber)
- Preconditioning
- Production quality control (COP)
- 75 FTP / SFTP (US06)
- EPA Fuel consumption tests
- ECE + EUDC
- Japan 10 ... 15 mode
- Mileage accumulation

Features

- Electrical mass simulation 200 ... 1,600 lbs (electric)
- Single roller with 400 mm diameter (other roll diameters available upon request)
- AC motor 50 kW or larger
- Wear and maintenance-free design for multi-shift operation
- Fast data availability through simple, user-friendly setup and clear operation
- A modular test concept for a variety of development stages, requirements and budgets

Optional Accessory Packages

- E. g. for the expansion of power, the test speed and e. g. the temperature range (e. g. -30 °C ... +45 °C)
- Vehicle cooling fans in different versions

Applications

E-Mobility | Fuel Cell | NVH | Emission, Evaporation | Aero Dynamics, Aero Acoustic | R&D Application | Durability, COP, BSR

Chassis Dyno for Cars CDM 48 XWD

For All Rear-, Front-or All-Wheel-Driven Vehicles

Chassis Dynos for rear-, front-or all-wheel-driven vehicles and motorcycles, etc. Conforms to the US-spec 'EPA RFP C100081 T1' as well as to the requirements of the current European and Japanese Guidelines.

Applications

In research, development centers, car manufacturers and their suppliers (two-wheel- or all-wheel drive).

Advantages

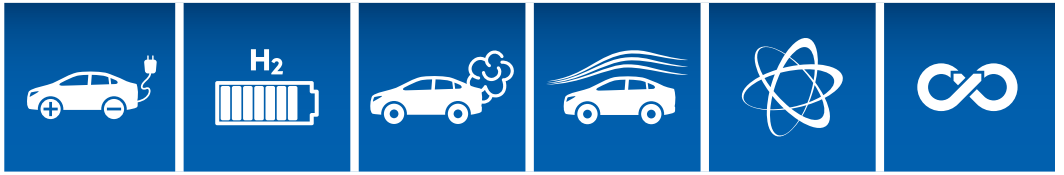
- Emission tests
  - WLTP
  - FTP 75 / SFTP (US06)
  - EPA
  - ECE + EUDC
  - Japan 10 ... 15 mode
- Temperature tests (climate chambers)
- Pre-conditioning
- Production quality control (COP)
- FTP 75 / SFTP (US06)
- EPA Fuel consumption tests
- ECE + EUDC
- Mileage accumulation
- Electric vehicle tests

Features

- 48" (1,219 mm) Roller set with AC motor for LDV and MDV
- Precise, reproducible mass simulation
- Accuracy exceeds EPA's requirements
- Extremely compact design
  - Slim pit dimensions
- Excellent 4WD synchronization with high dynamic regulation between the front- and rear roller set
  - Max. speed diff. = 0.01 mph (0.02 km/h)
  - Max. angular deviation roller set FA to RA = 0.2 °
- Low wear and low maintenance construction for multiple shift-operation
- Intelligent bearing concept
  - No test stand warm-up required
- Modular test stand concept for various applications and budgets
- Fast data availability
- Simple, intuitive test stand setup and operation
- Interface to standard emission measurement systems

ECDM-References Since 1998: More than 586 48" Emission Chassis Dynos Systems installed – worldwide!

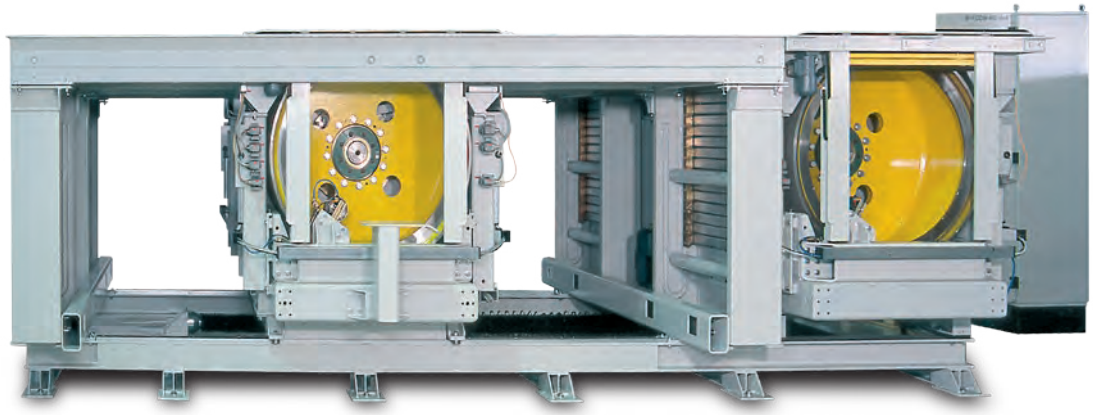
Applications



E-Mobility | **Fuel Cell** | **Emission, Evaporation** | **Aero Dynamics, Aero Acoustic** | **R&D Application** | **Durability, COP, BSR**

Chassis Dyno for Cars CDM 48 XWD

More than 850 installed Systems Worldwide!



AUDI	Ingolstadt, Neckarsulm, D
APL	Landau
APS	Bietigheim Bissingen
Akrapovic	Slovenia
APL / APS	Germany
ARTC	Taiwan
Autovaz	Russia
Beijing Emission	China
Bentley	England
BMW	Aschheim, Muc (FIZ / EVZ), Dingolfing, D Steyr, A
BOSCH	Abstatt, Feuerbach, Schwieberdingen, D Australia, China, France, Italy, India, Japan, Korea
CARB	USA, CA
CATARC	China
CAERI	China
CAPSA (PSA)	China
DPCA (PSA)	China
Changan Visteon	China
Continental	Germany
PSA (Citr. / Peug.)	France
Daimler AG	Bremen, Sindelfingen, Untertürkheim, D, USA
Delphi	France, Korea, China
Dekra	Lausitzring, D
Denso	Germany
DINEX	Danmark
DLG	Germany
DLR	Stuttgart, D
Dongfeng Nissan	China
DPCA	China
d2T	France
EETI	China
ENGIE	D
EPA	USA, MI
FAKT,	Germany
FAURECIA	Germany
FAW	China
FAW Volkswagen	China
FEV / RWTH	Germany
Ford	Germany, Mexico
Fraunhofer Institut	Germany
Fujian Daimler	China
GAZ	Russia
Geely	China
GHIC	China
Gillet	Edenkoben, D
Greatwall	China
Guangzhou Auto	China
Harbin Dongan	China
Head Acoustics	Herzogenrath, D
Hitachi	China
Honda	Japan, USA
HORIBA	Oberursel (Testcenter), D
Hubai Dong Feng	China
Hyundai	Germany
IAV	Berlin, Ingolstadt, D
INA	Herzogenaurach, D
Instituto Nacional del Agua	Argentina
ITRI	Taiwan
IVP	D
Johnson Matthew	Taiwan
JRC	Italy
ISP Salzbergen	Germany
Kefico	Korea
KFE	Germany
KIER	Korea
Kingdom Vehicle	Taiwan
Lamborghini	Italy
Magna Steyr	Graz, A
Maruti Suzuki	India
Mazda	Japan, Germany, Thailand
MBUSI	USA
MBtech	Germany
Min. of Transport	Chile
Min. of Transport	Equador
Mitsubishi Electric	Netherlands
Mitsubishi Motors	USA
NIER	Korea
NISSAN	China, Japan, Spain, USA, Mexico
PATAC (GM)	China
Porsche	Germany
RAR	Romania
Renault	France, Romania, Spain
SABS	Republic of Southafrica
SAIC	China
Shell	England
Skoda	CZ
SMVIC	China
SIEMENS VDO	China
SSanyong	Korea
Subaru	Japan, USA
Songz	China
Suzuki	Japan, Hungary
TAI	Thailand
Technogerma	Germany
Tenneco	D
Tesla	USA
Toyota	Czech Republic, Japan, Republic of Southafrica USA (MI, TX, CA), China
TÜV Nord	Germany
TÜV Süd	Germany
UAES	China (Wuhu, Shanghai)
Uni Chongqing	China
Uni Ulm	Germany
Uni Bucarest	Romania
Uni Ostfalia	Germany
Uni Karlsruhe	Germany
UTAC	France
Vicom	Singapore
Volvo	Sweden, China
VW	Wolfsburg, Kassel, Salzgitter D, USA, Southafrica
Wuxi Weifu	China
Weifu Diesel	China
Yamaha	Japan
Yutong	China
ZMZ	Russia

* Extract, Stand 05 / 2018

Chassis Dyno for Commercial Vehicles CDM 72 XWD

2WD/4WD for Trucks, Busses and Special Vehicles

Single axis- or all-wheel-driven test stands for trucks, busses and special vehicles. Conforms to the US-spec "EPA RFP C100081 T1" as well as to the requirements of the current European and Japanese Guidelines.

Features

- 72" (1,828 mm) Roller set with AC motor for measurement of heavy trucks, busses, etc. (MIM, inline principle or multi-motor principle)
- Precise, reproducible mass simulation
- Accuracy exceeds EPA's requirements
- Extremely compact design
- Narrow pit dimensions
- Excellent 4WD synchronization
  – High dynamic regulation
- Interface to common emission measurement systems
- Variety of performance classes available

Optional Accessories

- Hydraulic tie-down device
- Automatic centering device
- Automatic lowering of test stand decking plates for tandem axle (dual axle) operation
- Service central pit between rolls, including height-adjustable service platform

Applications

Chassis Dyno for Commercial Vehicles CDM 72 XWD

Heavy Duty Dynamometers

Chassis Dyno for Climatic Chambers, Wind Tunnels CDM 75 WT / CL / ALC

For Climatic Chambers, Altitude Chambers and Wind Tunnels

Chassis Dynamometer for use in wind tunnels and climatic chambers to measure e.g. vehicle aerodynamics. Various designs for 2WD and 4WD applications available.

Advantages

- Service aisle with integrated lifting platform to access the underbody of the test vehicle
- The service platform is used as service pit cover when lifted up in test cell floor position
- Optionally expandable for water management with rain-/snowfall simulation in wind tunnels

Features

- Multi-motor principle, each roll has an individual motor
- Inline-principle
- Motor-in-the-middle design (MIM)
- Special thermal isolated test stand design, water-cooled drives
- Roller dia. 75” (1,905 mm)
- AC-motor per roll, e. g. 300 kW
- Test speed, e. g. 300 km/h
- Temperature range, e. g.: -40 °C ... +60 °C

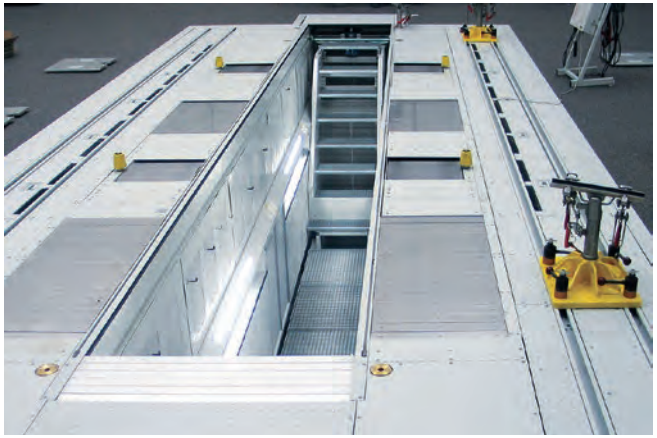
Applications

Aero Dynamics, Aero Acoustic

R&D Application

Multi-Motor Chassis Dyno CDM FRP

Function- and Performance Tests



Front-, rear- and 4-wheel driven vehicles can be tested under load on the test stand with repeatable road load simulation, force, speed, etc. Each roll is equipped with an individual drive. This modular drive concept is suitable especially for 'single wheel measurement' (hybrid vehicles, wheel motors, etc.) and extends the testing capabilities immensely over traditional MIM motor design chassis dynos.

Reliable Test Results Under All Conditions. Various test configurations are available for individual budgets and applications, for example:

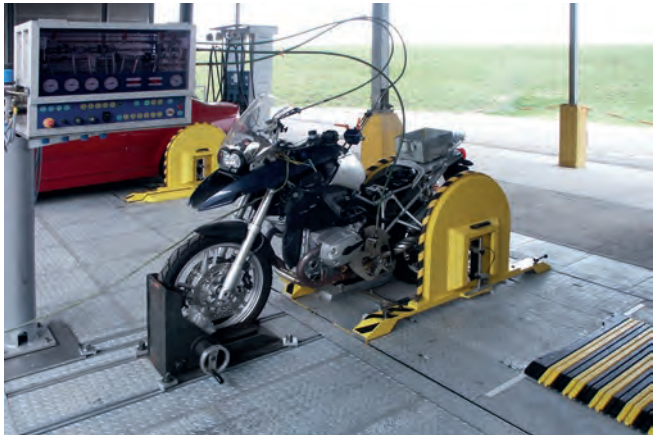
- in a wind tunnel
- in a climate chamber
- in EMC chambers with turn table
- for acoustic measurements
- in an altitude chamber

Applications

R&D Application

Mileage Accumulation Chassis Dyno CDM 48 MA and CDM 62.6 MA

Endurance Measurements for Strength Tests and for Quality Assurance



Reproducible, automated endurance measurements in a test cell or outdoors for simulating life cycles for a complete vehicle, vehicle components and lubricants, etc.

Features

- Roller diameter 48” or 62,6”
- Motor-in-the-middle (MIM) design for compact pit dimensions
- Robust system design, low maintenance
- Easy to acess with optional sub-systems
  - Throttle actuator or automatic driving robot
  - Data collection / data processing systems
  - Vehicle cooling fan
  - Automatic refueling
- Prüfgeschwindigkeiten up to 350 km/h (optional)
- Test speeds up to 350 km/h (optional)
- Optional: Various performance packages as well as noise reduction modifications available, e. g. to reduce tire noise

Motorcycle Adaptation Kit

for two-wheeled cycle test in conjunction with a 48” or 62.6” chassis dynamometer.

- Reduced mechanical base inertia
- Noise absorbing safety barriers and roller coating (optional)
- Vehicle positioning sensors, integrated in the test stand safety loop

Applications

Durability, COP, BSR

NVH Chassis Dyno CDM 75 NVH

Noise, Vibration and Harshness (NVH) Measurements

For the measurement and analysis of exterior noise (pass-by measurement) and internal noise (comfort measurement).

Features

- Roller diameter 75” (1,905 mm)
- 4-motor design
- Motor 'inline' principle
- Various road surface simulation shells for the simulation of different road surface conditions (e. g. rough asphalt, small cobbled streets, etc.)
- Soundproofed rolls for preventing the 'bell effect'
- Water-cooled drive motors
- Integrated service center pit with height adjustable service platform

Advantages

- Special vehicle restraining systems (e. g. wheel hub fixation) available
- Drive motors, rolls and test stand decking are sound-absorbing insulated to reduce the noise to test e. g. 41 dB(A) at 50 km/h
- Test speed to 250 km/h
- Optional various performance and climatic packages available

Applications

NVH

EMC Chassis Dyno CDM 37.5 EMC

Electromagnetic Compliance (EMC) Measurements

Road trip simulation test stand for reproducible measurements of electro-magnetic compatibility (EM influence of the vehicle on the environment or EM effects on the vehicle from the outside) in an EMC test cell in the fields of development and certification.

The AIP Chassis Dynamometer design has no detectable RF-radiation in the frequency range between 30 kHz ... 3 GHz!

Features

- Roll Diameter 37.5” (953 mm)
- Special AIP motor design to avoid emission of electromagnetic disturbance
- Multi-motor-design (individual drive motors for each roll)
- Rolls can be controlled individually, e.g. for ABS tests, traction control tests or other vehicle tests
- Nominal driving power 146 HP (109 kW) per motor (other power packages available)

Options

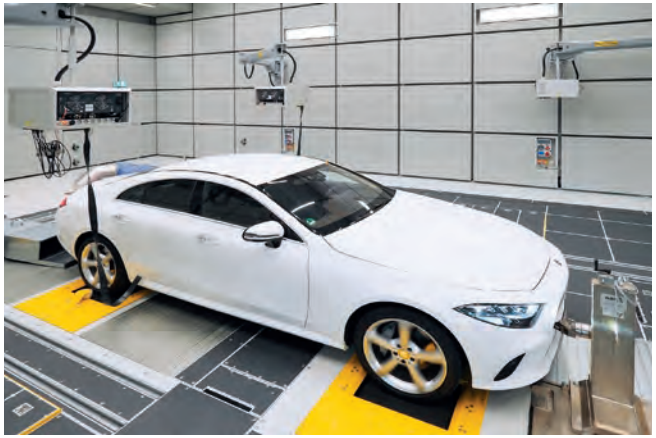
- P-JAMES EMC Drive Robot pneumatic brake- clutch actuator as well as steering wheel actuator designed for EMC test
- Rotary actuator (E. g. 9 m in diameter), ground-level integrated into the test cell, for the automatic positioning ±190° of the test vehicle to the EM radiation source
- In the turntable built-in extinguisher systems (water fog or CO_2)

Applications

EMC

Flat Road Dyno FRDM NewtonFinder

Designed for the Study of Very Small Frictional Losses in the Drive Train



The new testing method 'Newton Finder' enables high-precision measurement of the traction forces (Fx-forces). Each Newton, initiated by the vehicle, is measured accurately.

Application

- Exact reproducibility of measurement conditions to reduce fuel consumption and CO_2 emissions
- Verbatim following of driving cycles with cornering, incl. steering operations

Features

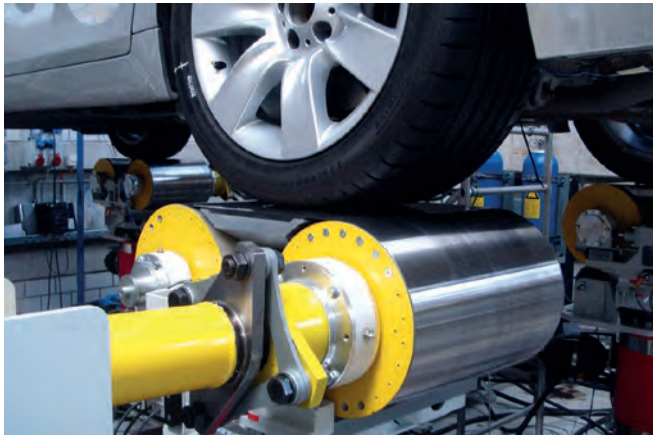
- Very compact, ergonomic design
- Highly dynamic built-in drive unit available
- Precise determination of the drag losses in simulated real driving conditions
- Maximum 0.4 mm deviation of the lateral band position during a steering operation
- Optional: 4-belt system with center belt for additional simulation of the road surface under the vehicle between the wheels

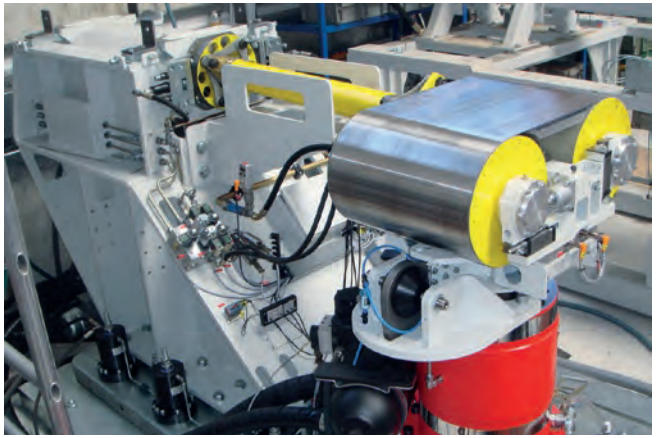
Applications

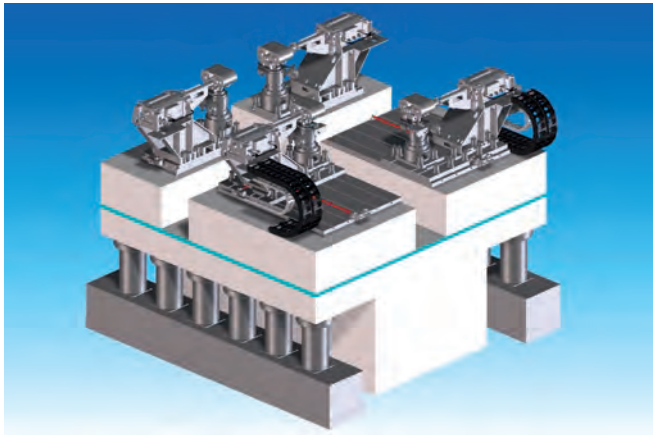
R&D Application

Pulsed Flat Road Dyno FRDM PLS/HYD NVH

Research and Development in the Field of Acoustics and Vibration Control







The pulsed flat road dynamometer provides highly dynamic excitation of the individual wheels in the vertical and horizontal direction during a road drive simulation. The excitation of the vehicle wheels in the vertical direction provides realistic simulation of various road surfaces (i.e. pot holes, gaps, cobblestone streets, bridge joints, etc.).

The use of an automatic driving robot allows a continuous operation.

Application

- Study of the long-term stability / fatigue
- Noise analysis of complete systems and individual vehicle components
- Durability analysis
- Optimization of spring and damping behavior

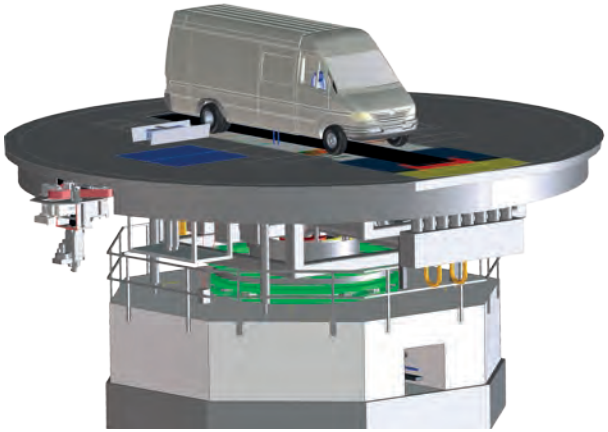
Applications

NVH

R&D Application

Wind Tunnel Balance with Integrated 4WD Flat Road Dyno FRDM XWD WTB

Aerodynamic Studies



For the development and basic research in the field of aerodynamic research on cars, delivery vans and racing cars in an aero-acoustic wind tunnel.

Test Stand Design (Example)
In order to come as close as possible to the real wind conditions which impacts a vehicle during a road trip, those conditions are simulated on a wind tunnel balance with an integrated flat track dyno ('rolling road').

The test project shown (example) includes, e. g. a 5-belt system, consisting of a driven belt unit (WDU – wheel drive unit) per wheel and a Center Belt (CB) for the simulation of the road surface under the test vehicle.

The AIP-5 belt system allows versatile use for reproducible aerodynamic and aero-acoustic measurement tasks (example: Cd value optimization, component strength test, ...). For measurements with inclusion of cross-wind effects on the test vehicle, the flat track dyno is built into a turntable (e. g. 12 m diameter), which is combined with a high-resolution balance system.

This wind tunnel balance is primarily used for the reproducible determination of the forces introduced by the vehicle in x-y-z direction as well as for the precise measurement of induced roll-, pitchand yaw moments. In addition, e. g. a sill-stacker cranes (SHE) to the horizontal fixing of the vehicle when turning wheels (wheels are driven by the WDU, vehicle's engine is not active) is included.

Test Bench Key Data (Example)

- Application for 2WD and 4WD vehicles
- Axle load max.: 2,000 kg
- Test speed max.: 265 km/h
- Wheelbase: min. 1,750 mm ... max. 3,750 mm
- Total weight (including turntable / wind tunnel balance): approximately 80 tons
- Total height of the test stand combination: approx. 5 m

For optional service accessibility, the center belt can be raised using the integrated lifting equipment.

Applications

Aero Dynamics, Aero Acoustic

R&D Application

Function-Performance Roller Test Stand for Commercial Vehicles FRP 8x8

Modular System Concept for Various Expansion Levels, Requirements and Budgets

The FRP 8x8 has been specially designed for conducting end of line quality and final check-out tests on commercial vehicles with 2-, 3- and 4 axles. The system has multifunctional capabilities for conducting a wide variety of test procedures from simple driving tests up to special function tests such as TCS or differential lock functions.

Features

- Automatic vehicle-specific test stand preset (vehicle types database)
- Automatic test program run
- Independent design way of the test program by the operator, e. g. input of new test steps, adapting the program (test order step), etc.
- Testing with active vehicle diagnosis possible

Operating Modes

- Test program for engine power determination
- Load simulation controlled by speed, traction or engine RPM
- Simulation of road resistance
- Speed tracing of the non-driven vehicle axle(s)

Test Program

- Vehicle component diagnosis by using a variety of selectable test programs
- Warm-up, through all gear steps in either speed- or traction regulation
- ABS tests
- Speedometer test 57 b, 57 d
- Retarder- and intarder tests
- Standard- and automatic transmission
- Converter gear clutch
- Distribution gear box
- ASR-, TCS tests
- Differential locking tests
- Emergency steering pump tests
- Grinding of the vehicle brakes
- Speed-/cruise control tests
- Braking performance test
- Speed test
- Test the emergency steering pump, steering wheel position, axle ratio

Applications

Quality Management

Testlane for Traktors FRP / BPS

Specially Designed for End-Line Quality- and Check-Out Tests

Two vehicles can be tested simultaneously on the combination "two-axle function roller test stand and brake roller test stand". The short cycle times result in significant time and cost savings.

The automatic test program uses a vehicle model database. All test relevant target data and equipment specifications for individual vehicles are filed in this database. The testing instructions are displayed on two large color screens and can be individually paged through and evaluated by using a cable free infrared remote control. The test results are documented on a protocol printer and filed in a test result database.

Function Roller Test Stand

Vehicle model database
- With model specific equipment characteristics

Automatic test program
- Vehicle specific program procedure based on the data from the vehicle model database
- Check of all gear steps, forward/reverse
- Check of highest speed
- Stop watch for acceleration measurement
- Check turnover gear
- Determination of idle RPM, peak RPM, parking brake

Test protocol
- Documentation of measurements
- Filing of test results

Brake Roller Test Stand

Test Program
- Determination of brake values of the rear axle, front axle and parking brake
- Check of the differential lock
- Steering brake functional test
- Print-out of the test protocol

Options
- Modular test stand concept for various extension steps, applications and budgets
- Extendet versions, e. g. with higher axle load, wider rollers, etc.
- Optional packages, e. g. to extend the performance, test speed or temperature range
- Different vehicle restraint systems
- Hydraulic support rollers, etc.

Applications

Quality Management

Chassis Dyno for Forklifts BL

Function- and Quality Tests of 3- and 4-Wheel Forklifts

The BL test stand is a combined brake-performance roller test stand especially designed for model-, quality tests (DVT).

Brake tests

- Service brakes, parking brakes
- Single wheel switch
- Measurement values: brake force left/right imbalance
- Roller resistance
- Pedal force left/right

Performance tests

- In driving mode (reference input speed and traction)
- In standstill mode (measurement of starting torque)
- Measurement values: speed, traction with force direction, wheel power, driving direction, traction current, lift force, etc.
- Documentation of measured values via print and in a database
- Display of test operations on the monitor

Features

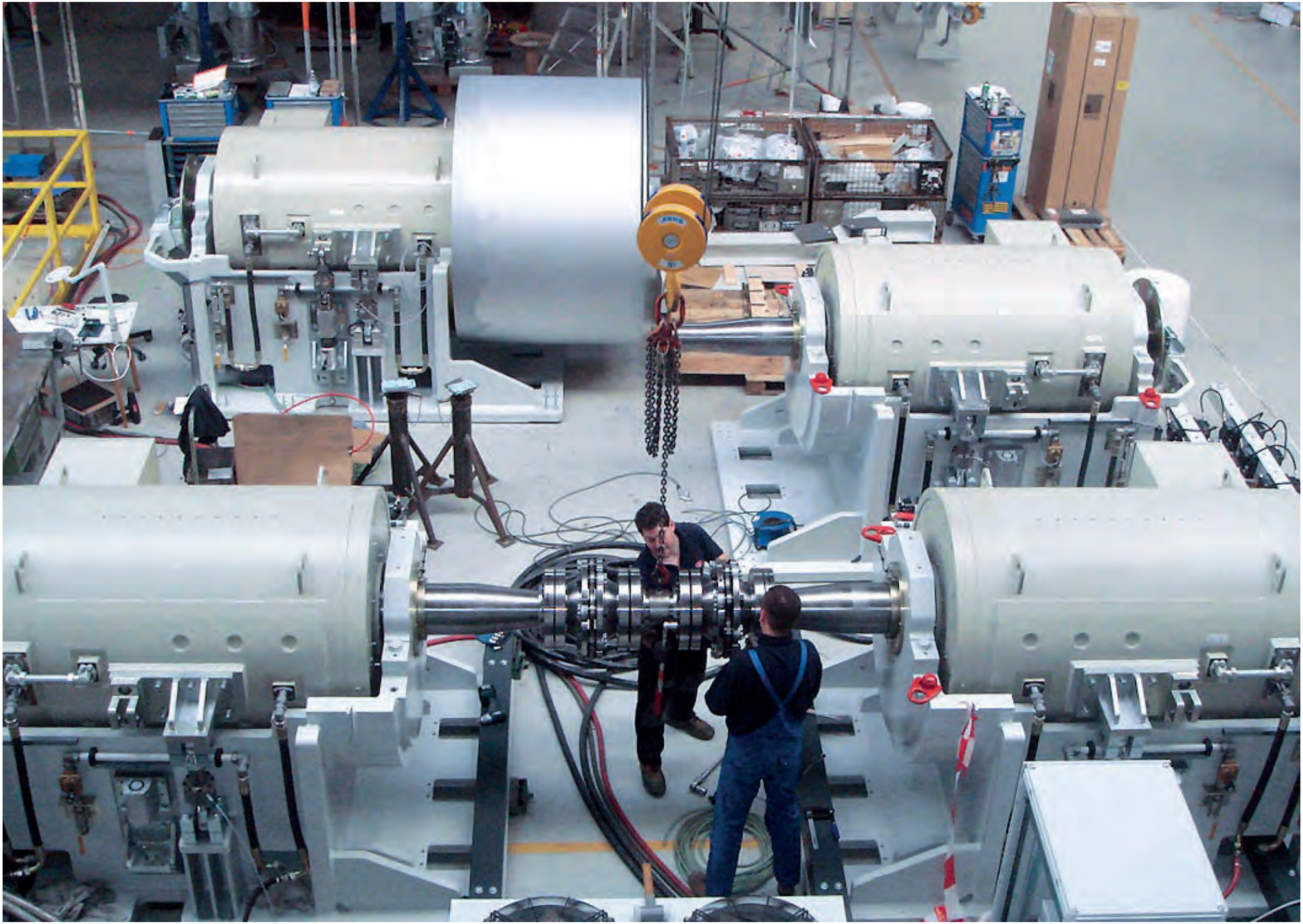
- Double roller set in asymmetric version, suitable for 3- and 4-wheel forklifts
- Two drive machines for the brake test (disengaging)
- Eddy-roller brake for conducting performance tests
- Lifting bar between the rollers with integrated sensor. Roller for slip recognition
- Rollers connected via tooth belts
- Color monitor for the clearly visualizing the easy to handle, menu driven test program
- Swivel operation console for keyboard, protocol-strip printer, pedal force meter and traction current measurement pliers
- Test protocol for documentation of test results
- PC with database for filing measurement results

Options

- Modular test stand concept for various extension steps, applications and budgets
- Extendet versions, e. g. with higher axle load, wider rollers, etc.
- Optional packages, e. g. to extend the performance, test speed or temperature range
- Automatic roller cover for high safety level
- Weight simulator with integrated lift force measurement
- Pull-down device for battery weight simulation, adjustable load

Applications

Quality Management



Road Simulation

Hydraulic Road Simulation Test Stand PLS-HYD

Precise Examinations of Noise Sources, Endurance Tests, Component Tests, Fatigue Tests, etc. under Dynamic Loads

Real or synthetically generated road profiles can be used on road simulators to test vehicles. That enable precise analysis of noise sources, continuous testing, component testing, fatigue testing, etc. under dynamic loads.

Quality Benefits

Critical driving ranges can be driven repeatedly, modified and or reinforced without limits using dynamic road simulators. An exact analysis can be presented in detail concerning possible sources of disturbances and influencing variables.

Cost Advantages

Road simulators are used in conjunction with climate chambers and solar systems to achieve a substantial reduction in costs and time when compared to conventional testing involving real road driving under variable climatic conditions.

Application Examples

- Research of endurance stability / signs of fatigue
- Noise analysis of total systems and individual components
- Serviceability analysis
- Optimization of spring and damping properties

Generally

Depending on the application, hydraulic simulation test stands can be one-poster system up to multi-post systems.

- One poster system (shock absorber, component test, etc.)
- Multi-poster system (road simulator, exhaust line test, etc.)
- Multi-poster system (fender test, shaker, movements with 6 degrees of motion)

Applications

R&D Application

Road Simulation Test Stand E-Shaker PLS-E

For Reproducible Simulations of Road Trips

Designed for development, research and quality assurance facilities.

Application

- Research into the long-term stability and fatigue of vehicle components or the entire vehicle (lifecycle test)
- Noise analysis (squeak & rattle test)
- Fatigue analysis

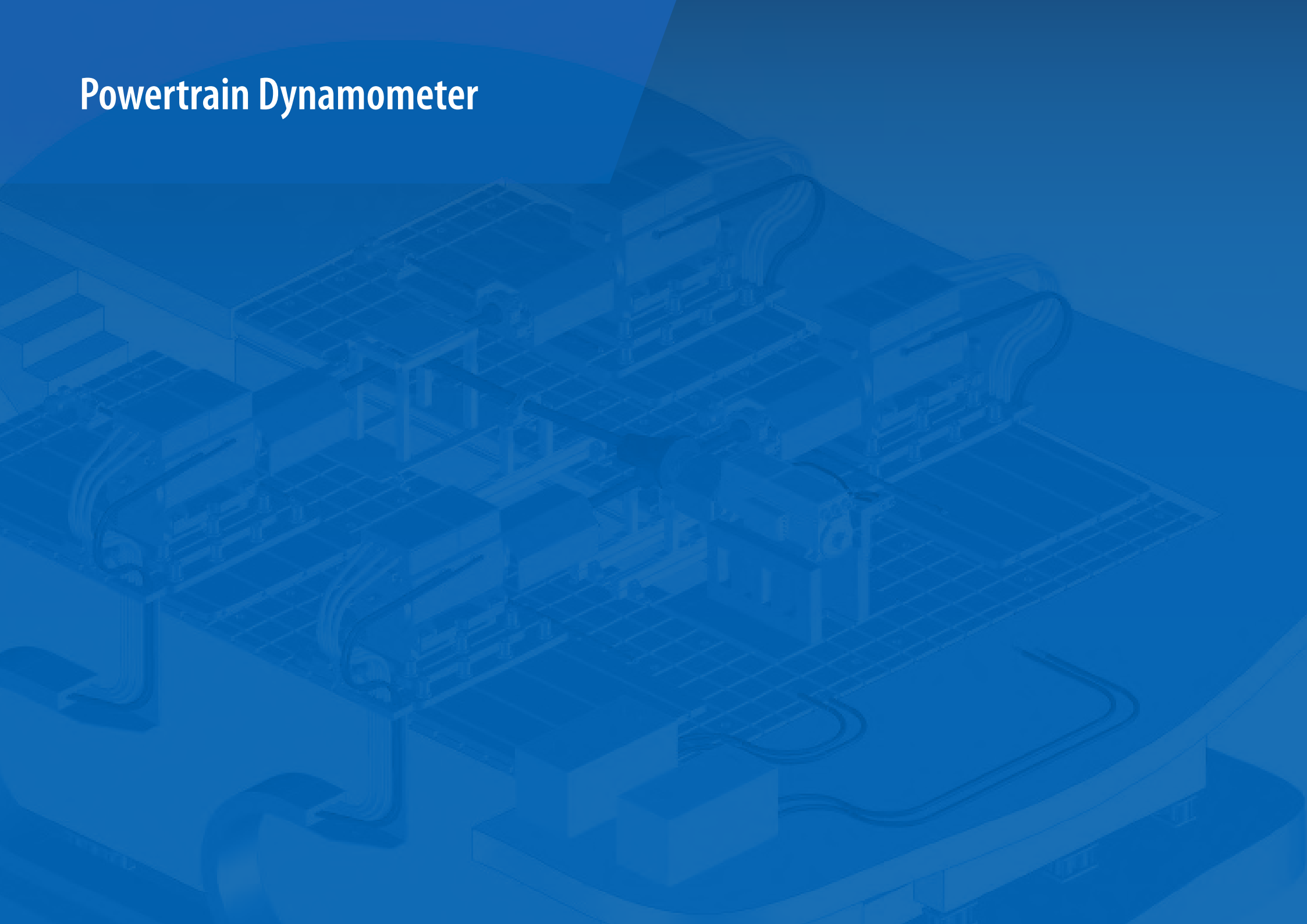
Features

- Compact design, low mass
- Low noise, no fans
- Low heat generation
- Special designs available upon request

Applications

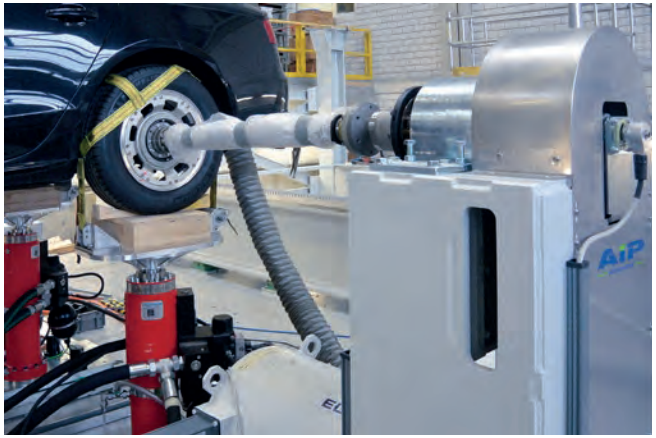
R&D Application

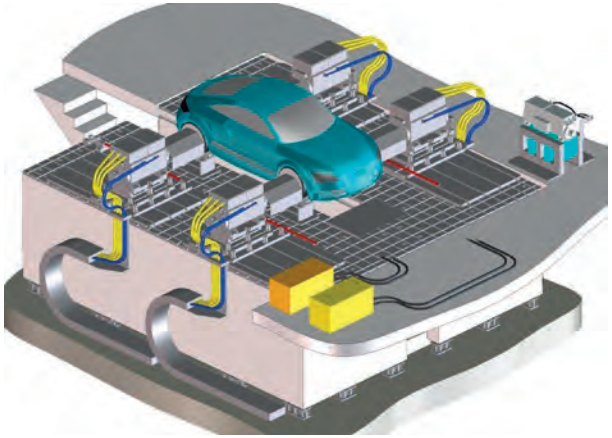
Powertrain Dynamometer

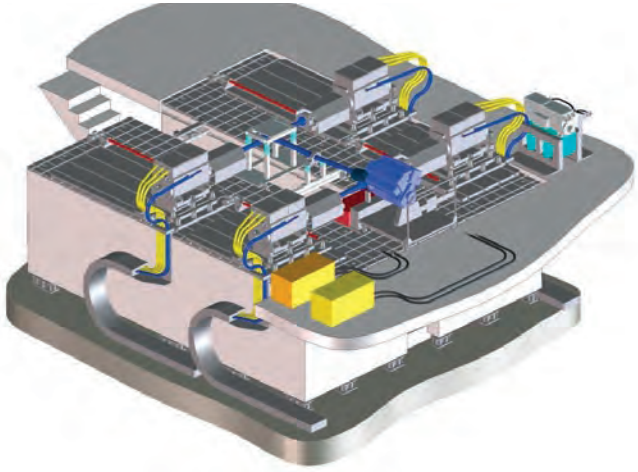


Powertrain Dynamometer PTD

Testing of the Complete Drivetrain in the Entire Vehicle or as an Aggregate Setup with Bus Simulation







Powertrain or engine test rig for analysis of the entire vehicle, the complete vehicle drivetrain or the components.

Depending on the test requirements, the test stand configuration is setup for static- or dynamic tests.

Highly dynamic drives are used to derive torques in the test setup or to obtain them. Optionally, additional stimulations, such as the road surface simulation can be integrated by using hydraulic actuators in the test procedure.

Application Examples

- Realistic road driving simulation by tracing predetermined driving cycles or road profiles
- Evaluation of energy efficiency
- Fuel consumption measurement
- CO_2 emissions determination
- Range detection
- Exhaust gas measurement

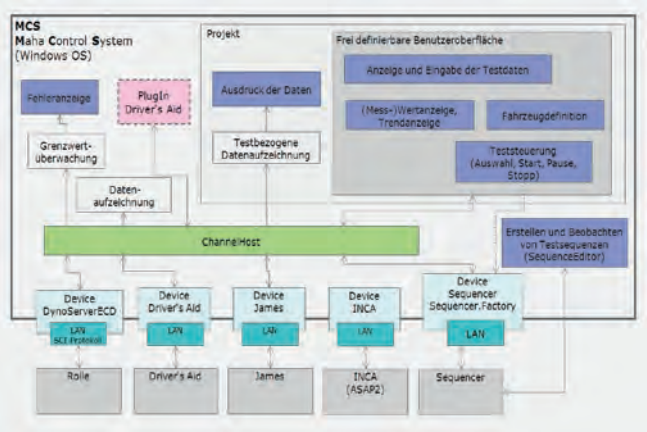
Applications

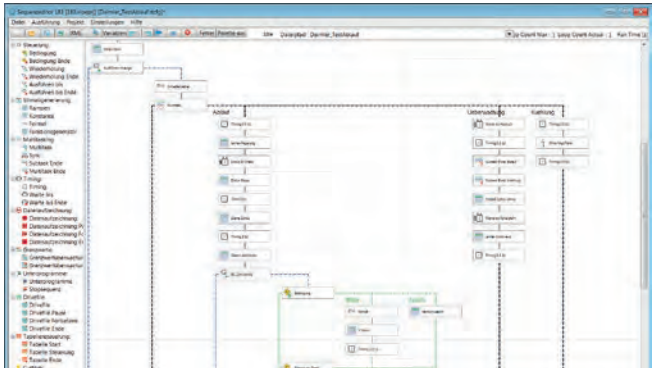
E-Mobility | Fuel Cell | R&D Application | Durability, COP, BSR

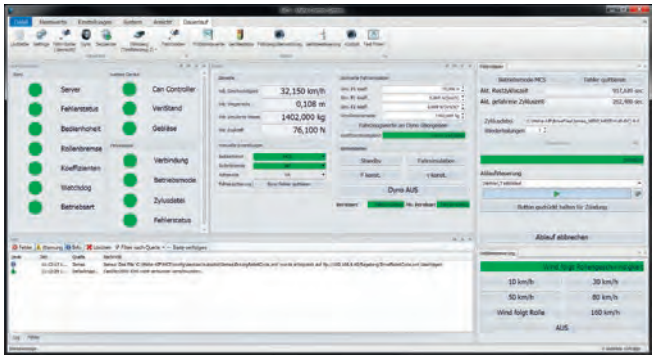
Automation

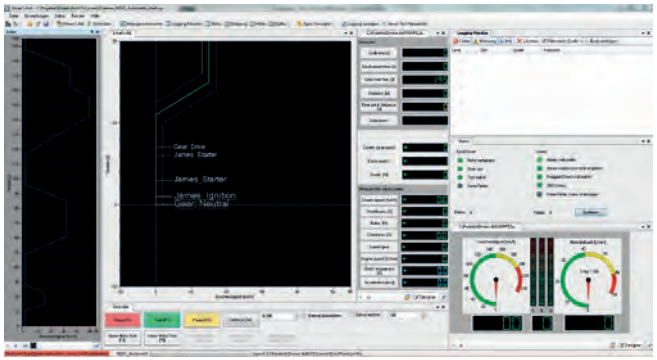
Control System MCS

Software for System Control and Monitoring









Integral controlling and monitoring of comprehensive test stand systems and configurations.

- Project management
- Test stand management
- Vehicle management
- PlugIn administration
- Creating and monitoring of test sequences
- Data recording
- Limit value monitoring
- Reporting

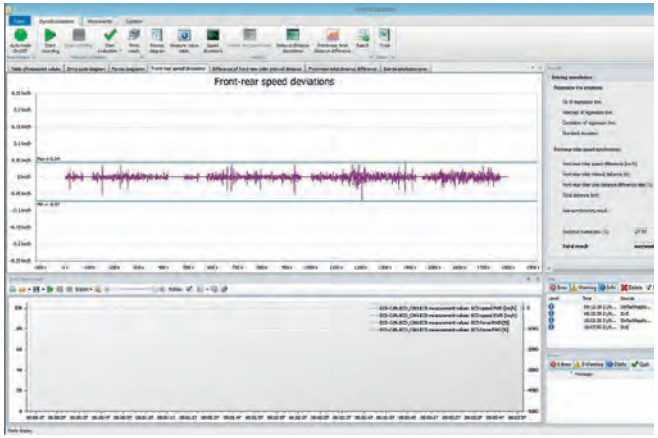
AdBlue · KVM · JAMES · Drivers Aid · CVS · PMC · EMS · MCS · Dyno · Dyno · Dyno · Dyno · ECR · Dyno · PEMS · Wind · Hydro · SPC · eStation · Charge Unit

Applications

- E-Mobility
- Fuel Cell
- EMC
- NVH
- Emission, Evaporation
- Aero Dynamics, Aero Acoustic
- R&D Application
- Durability, COP, BSR
- Advanced Driver Assistance System

Dynamometer Control Software DynoServer

Software for the Detection and Evaluation of Various Vehicle Test Values



Dynamometer Control Software module, including basic functions (V constant, constant F, road load simulation).

- Incl. AK-interface (Ethernet) for the connection to external control systems
- Incl. diagnostic test functions/integrated oscilloscope
- Incl. test stand diagnostic tests, based on the following regulations: GTR15, 40 CFR 1066, AAMA

Optional software modules for different measuring applications, e. g.:

GTR15
Latest standard for vehicle exhaust gas tests worldwide, including automatic adaptation of the road load parameters on the test stand. For performing exhaust measurements without a Host control system.

40 CFR 1066
Latest standard for vehicle emission tests in the United States, including automatic adaptation of the road load parameters on test stands, according to SAE J2264 (2014). For performing exhaust measurements without a Host control system.

MULTIPOINT
(Incl. street load vehicle adaptation)
Vehicle testing under special road load conditions. The road load and customized test stand parameters are determined by speed/power points. The driving resistance curve results in a cubic spline. This procedure is also allowed by GTR15. For performing vehicle tests without a Host control system.

Single-axle load simulation with synchronized towing role
Simulation of the driving resistance forces on a roller axle with the second axle speed-synchronized.

Power Measurement
Indirect measurement of vehicle engine power. The engine performance is calculated based on current environmental conditions and relevant regulations. Also requires suitable hardware (interface box, not included) to capture ambient conditions and the vehicle speed.

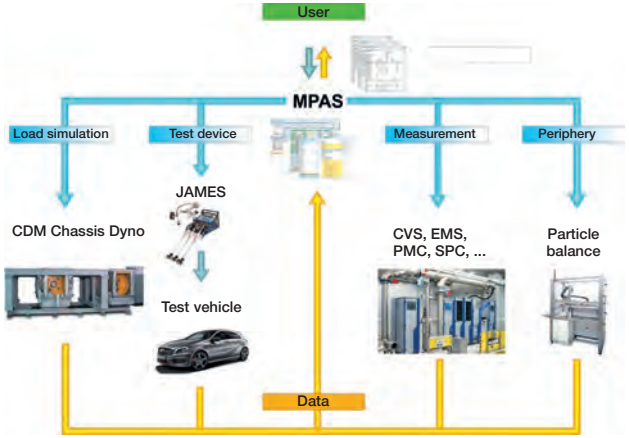
DynoEvaluation (DyE)
Evaluation of the test stand performance, based on the following legislation:
JASO E011:2011
GTR 15 – Annex 5 Paragraph 2.3 (4WD mode)

Applications

E-Mobility | Fuel Cell | NVH | Emission, Evaporation | Aero Dynamics, Aero Acoustic | R&D Application | Durability, COP, BSR | Advanced Driver Assistance System

Integrated Test Stand Automation MPAS

Integrated Dynamometer Solution



The overarching automation software MPAS was developed for single operating test rigs as well as complete test facilities with central data or configuration management requirements.

Features
- MPAS supports all national and international legal requirements for exhaust emission tests (light duty)
- Independent test data management, parameterization
- Analysis, recalculation and test analysis

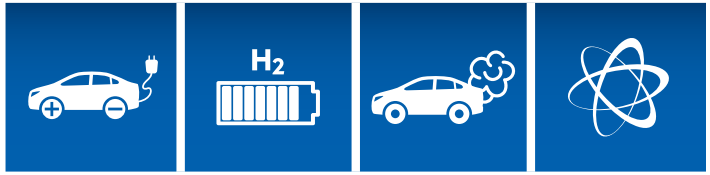
Efficient
- Customer-optimized process flow
- Drag & Drop parameterization
- Easy operation
- Verifiable processes

Modular
- Manufacturer-independent device integration
- Easy integration of new drivers through add-in
- Open programming

Flexible
- Operating screens, processes, operating curves, calculations, reports, easily adaptable
- Integration of customer specific databases

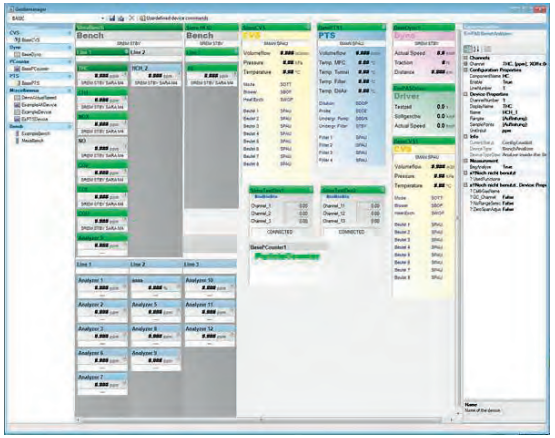
Open Minded
- Non-proprietary standard hardware
- Drivers reference via third party

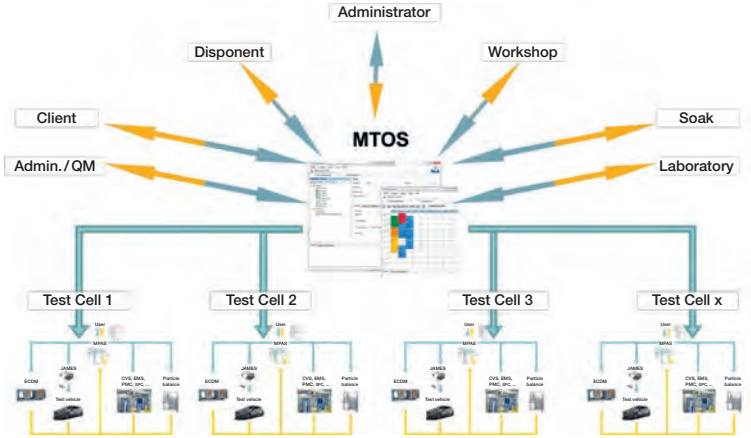
Applications



Test Bay Management MTOS

Integrated Test Facility Management





Perform easy scheduling of the respective test cell occupancy and capacity planning.

Features

- Maximum test availability through plausibility checks during parameterization
- Easy to understand graphical test procedure parameterization
- Consistent documentation of the test sequence
- Rapid migration of individual test benches to complete test facilities (test fields)
- Evaluation Excel-based (without macros)
- Drivers-aid software module for performing reproducible road drive simulations in combination with a chassis dynamometer
- Incl. pre-installed, common driving cycles from Europe, USA, Japan, China
- Incl. 'drive cycle' editor function to create customized driving cycles

Applications

E-Mobility | Fuel Cell | Emission, Evaporation | R&D Application

Automatic Driving Robot JAMES

Highly Reproducible Drive Cycles Over Long Periods of Time

The automatic driving robot JAMES was developed with the view to an intelligent and modular system design. This allows extremely short setup/installation times and a simple, menu-driven operation. The application is usually in automated road driving simulations on a chassis dyno or on flat track dyno, requiring a high degree of reproducibility and accuracy.

Application Examples

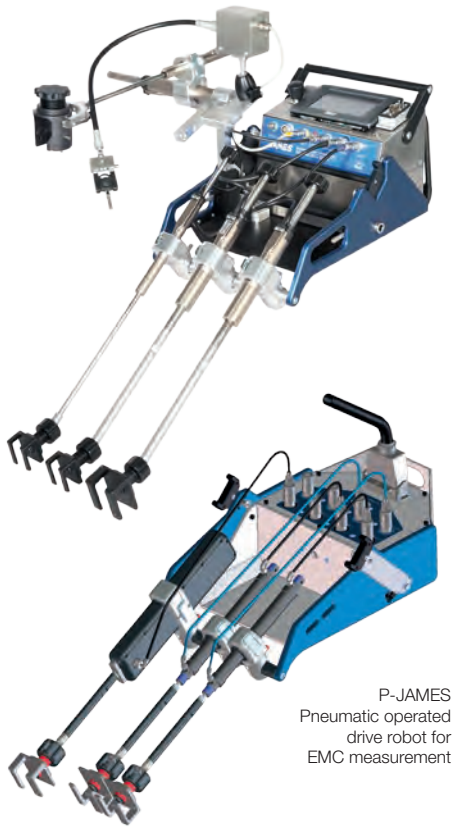
- Emission tests
- Mileage accumulation tests
- Non-stop trips (24 hours/7 days)
- Reprocible road drive simulation in NVH-, altitude- or climatic chambers
- Automated driving under adverse or hazardous environmental conditions

Features

- Fuel consumption optimized (energy optimized)
- Emission optimized
- Compact, modular design
- Rugged design, low wear and minimal service
- Threaded spindle free driven linear-actuators (pending patent) for a high dynamic control of the pedals and the gear shift assembly
- Weight saving design
- Simple, fast installation (< 8 min.)
- Simple, menu driven setup (teach-in)

P-JAMES

EMC neutral pneumatic operated drive robot for EMC measurement



P-JAMES
Pneumatic operated
drive robot for
EMC measurement

Applications

E-Mobility | Fuel Cell | NVH | Emission, Evaporation | Aero Dynamics, Aero Acoustic | R&D Application | Durability, COP, BSR

Test Stand Accessories

Vehicle Cooling Fan AIR Compact

Vehicle Engine Cooling During a Simulated Road Drive

The AIP Compact AIR vehicle cooling fans are used for vehicle engine cooling during a simulated road drive on a chassis dynamometer or flat belt system, in accordance with specified driving cycles (e. g. WLTP cycle conform).

Two different fan types are available:

Type 40.500 – 135
- Air volume 40,500 m³/h
- Air speed max. 135 km/h

Type 48.000 – 160
- Air volume 48,000 m³/h
- Air speed max. 160 km/h

Optional Accessories
- Electric height adjustment
- Electric moving system 'easy-to-move' for easy fan positioning in front of the test vehicle
- Ultrasonic distance sensor
- Optical center alignment sensor
- Extended temperature range

Applications

Fuel Cell

Emission, Evaporation

R&D Application

Durability, COP, BSR

Expansion Components

Optional Test Stand Accessories

Modular expansion components for chassis dynamometers.

Examples

- Vehicle cooling fans (radial / axial)
- Cooling fans for tires, vehicle components, catalysts, etc.
- Drivers aid system
- 2WD / 4WD Vehicle restraint systems
- Custom pit decking available
- Automatic driving robot

Applications

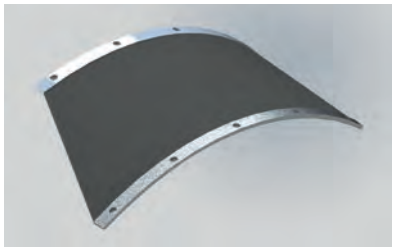
- E-Mobility
- Fuel Cell
- EMC
- NVH
- Emission, Evaporation
- Aero Dynamics, Aero Acoustic
- R&D Application
- Durability, COP, BSR
- Advanced Driver Assistance System

Roll Surface Plates

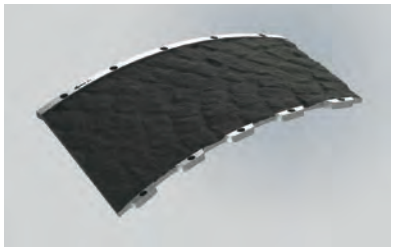
For the Simulation of Road Surfaces

Available Surface Textures

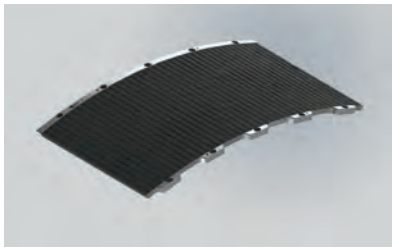
ISO Rough Asphalt
(Reference: Heimertingen)



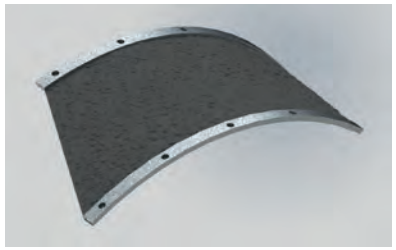
Ingolstädter Cobblestone
(Reference: Test road Ehra)



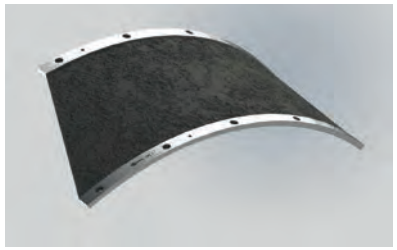
Chinese Concrete Road
(Reference: China)



Noise Road
(Reference: Test road Aschheim)



Hot-Rolled-Road
(Reference: Test road Aschheim)



Acoustic Measurement

Features

- Reproducible surface structures
  (ensure replacement after wear and tear or damage)
- Minimal gap dimensions between the roll surface plates
  (acoustically barely resolvable)
- Easy assembly

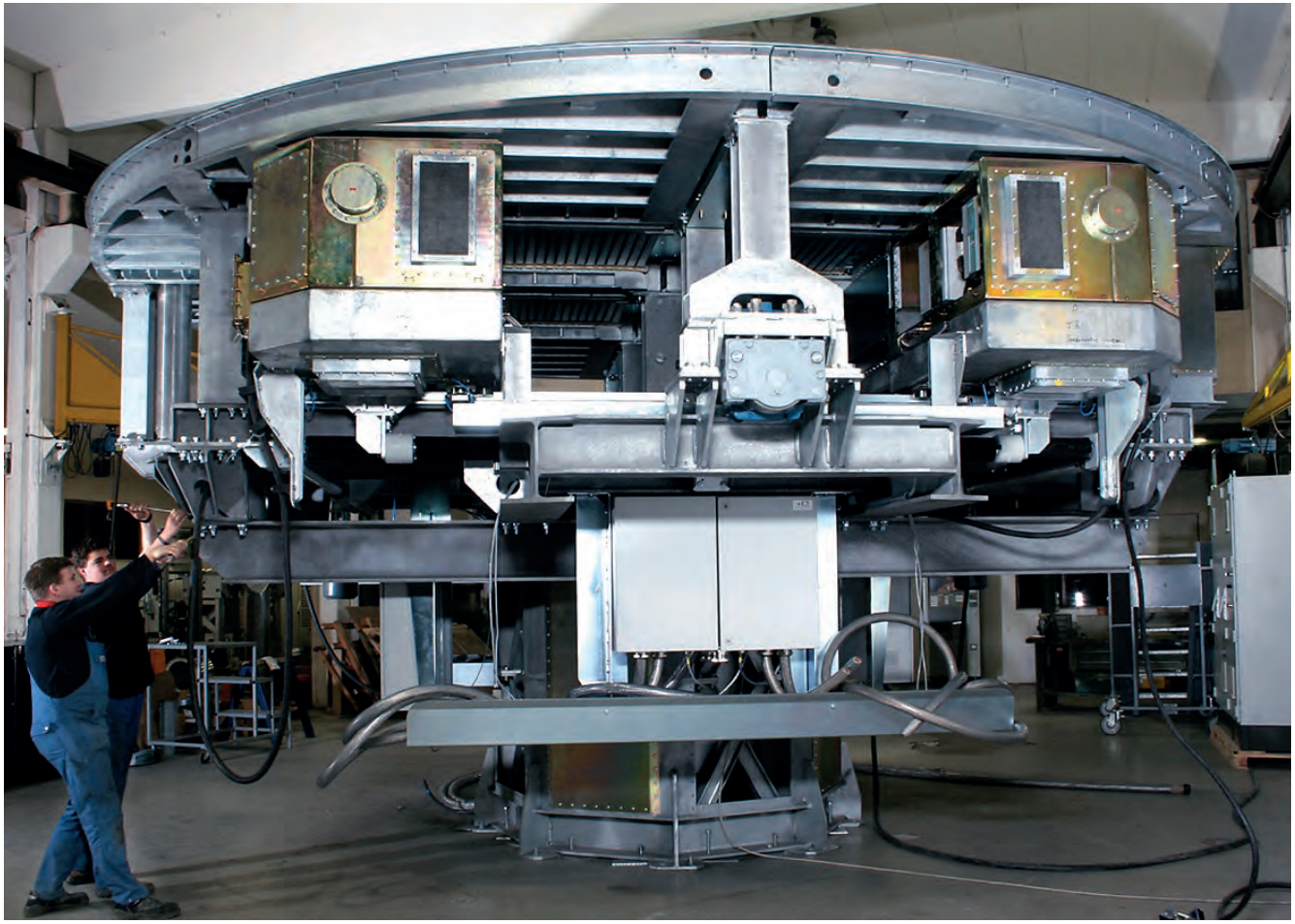
Technical Data

- Roll diameter: 1910 mm (6 m circumference)
- Roll width: 400 to 800 mm
- Roller speed with surface plates: max. 120 km/h
- Number of plates: 5 - 8 pieces per roll
- Plate thickness: max 25 mm
- Optional with basic support base plate (GFRP, CFRP)
- Tensile forces on the circumference: approx. 10 kN

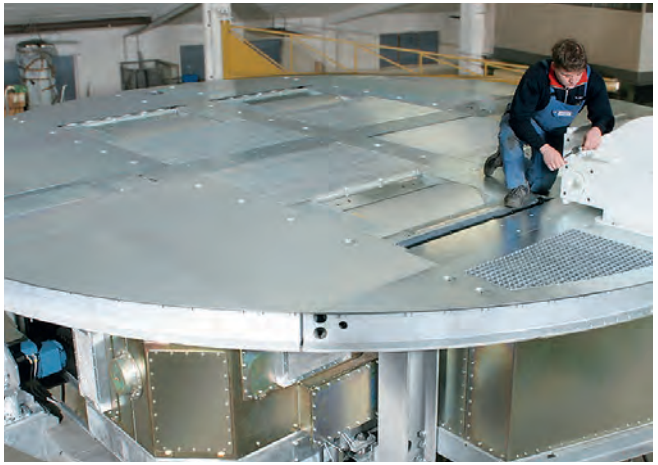
Applications

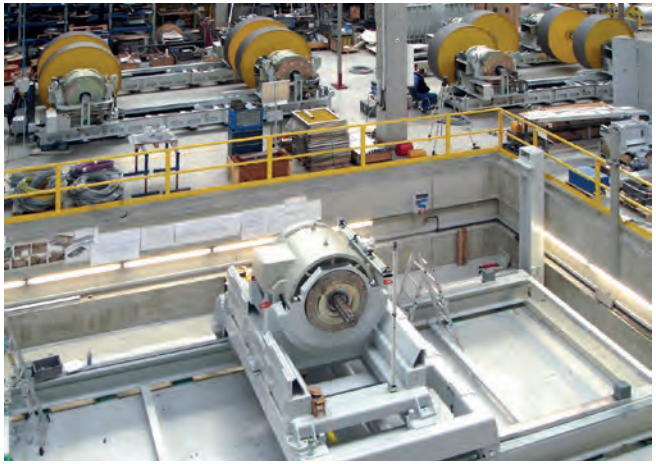
AIP Custom Solutions

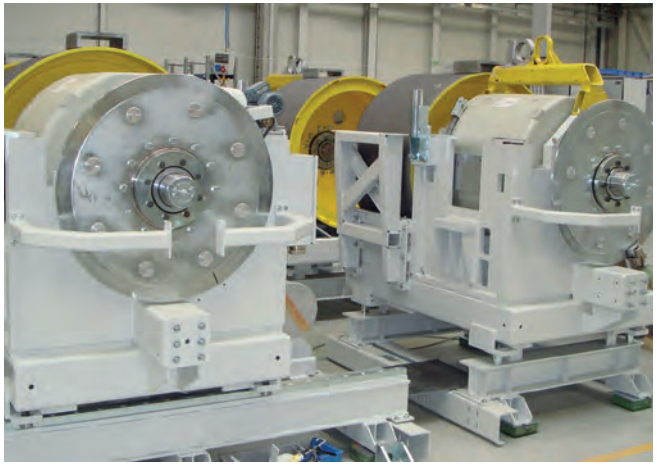
We Face Special Challenges with a High Level of Competence, Experience and Passion



Custom requirement EMC test stand







Custom requirement 4Mot test stand

AIP Automotive, a Member of the APL Group

7 Locations, 1400 Employees, 240 Testbenches

AIP Automotive complements the APL Group's product line with premium-class special vehicle testing technology.

APL, located in Landau (Germany), is one of the leading engineering companies supporting the automotive service industry with a technological focus on automotive drive development and testing.

The APL-Group includes, in addition to APL GmbH, IAVF Antriebstechnik GmbH, APS-technology GmbH, the MOT a research and development company for engine technology, optics, and thermodynamics mbH, the IAVF-Volke group audit center for combustion engines (IVP) and AIP Automotive.

www.apl-landau.de

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