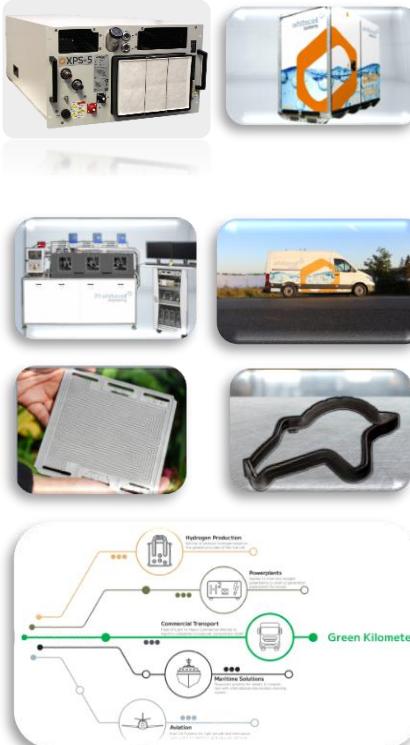




Clausthal-Zellerfeld



Whitecell Group

A total of 140 employees,
revenue approx. EUR 18 million (2025)

► **Whitecell Power AG:** Parent company.

► **Whitecell Systems:**

Development and production of systems for the green methanol and hydrogen economy, and supplier of high-quality fuel cell and electrolyzer components.

► **IFT Whitecell Engineering:**

Engineering and testing services for research and industry, offering development and testing expertise.

► **Whitecell Eisenhuth:**

Production of components and stacks for fuel cells and electrolyzers, injection molding tools, small-series plastic, silicone & rubber parts, and 3D printing. Winner of multiple innovation awards in the fields of hydrogen and fuel cells.

Profile

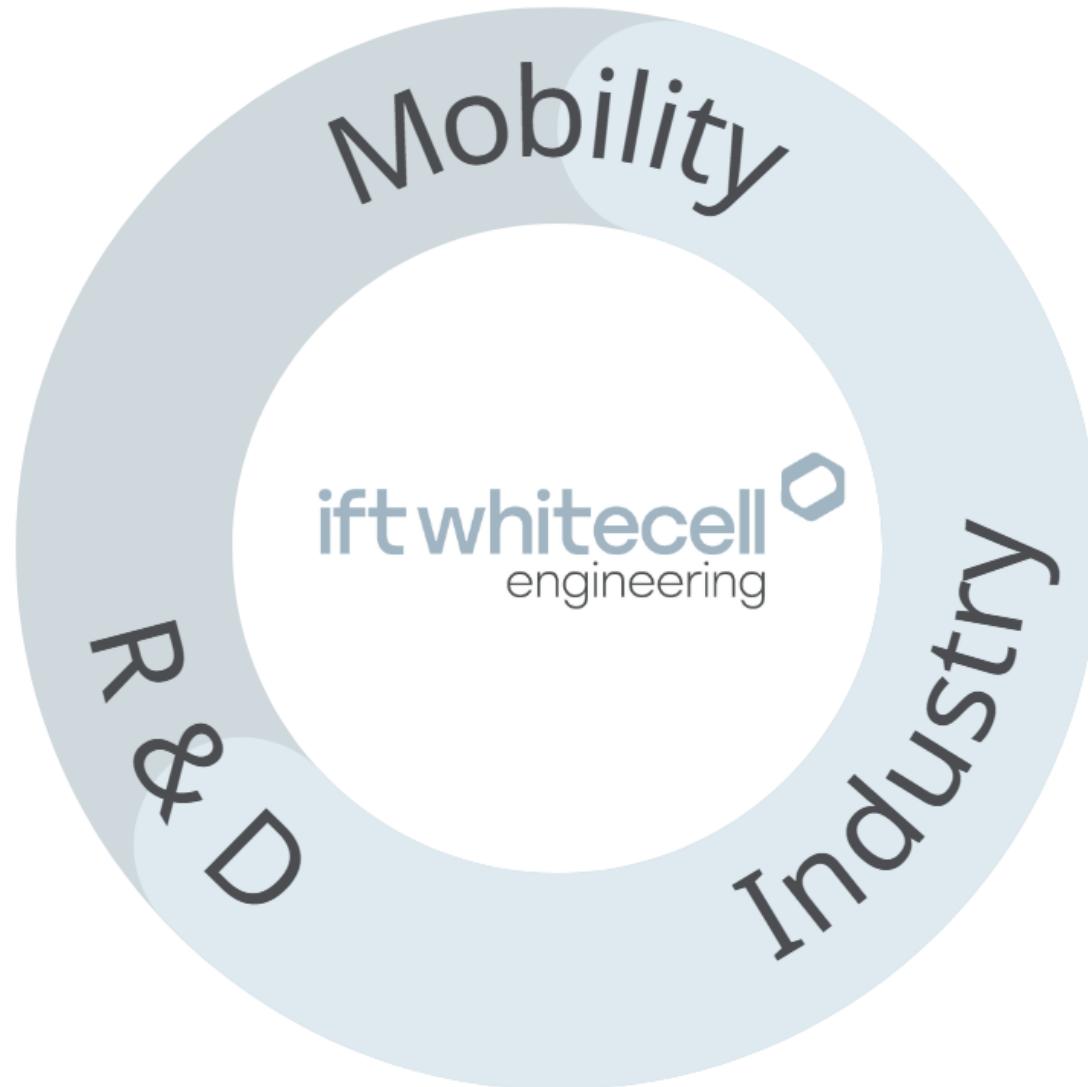
Engineering:

- ▶ **49 Employees**
- ▶ **Total area: 13.079 m²**
- ▶ **800 m² Test field with >45 Test cabins**
- ▶ **Engineering**
- ▶ **Functions test**
- ▶ **Endurance test**
- ▶ **Environmental tests**
- ▶ **Fatigue Strength tests**
- ▶ **Tribology**
- ▶ **Analysis**
- ▶ **Test Rig Construction**

Certified:

- ▶ **DIN EN ISO 9001:2015**
- ▶ **Information security TISAX® Level AL3**





Mobility:

- ▶ Internal combustion engines
- ▶ Fuel cells
- ▶ Electric motors
- ▶ Powertrains
- ▶ Components
- ▶ Assemblies
- ▶ ...

Industry:

- ▶ Robotics
- ▶ Rail transport
- ▶ Shipping
- ▶ Defense
- ▶ Medical technology
- ▶ Mechanical engineering
- ▶ Energy
- ▶ ...

R & D:

- ▶ Pre development
- ▶ Prototypes
- ▶ Samples
- ▶ Product improvement
- ▶ Analysis
- ▶ ...

Testing of:

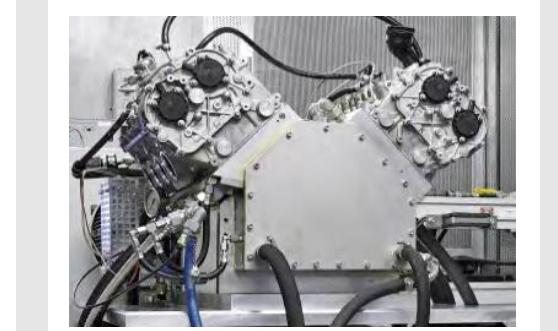
- ▶ Internal combustion engines, for example passenger cars, motorcycles, chainsaws, rail vehicles, ...
- ▶ Electric motors and power electronics
- ▶ Powertrains of all kinds
- ▶ Components and assemblies such as valve trains, control units, auxiliary units, control chains, belts
- ▶ Electromechanical actuators
- ▶ Hoses
- ▶ Cables, connectors, circuit boards
- ▶ Thermal management and cooling system components
- ▶ Pumps
- ▶ Hydraulic components
- ▶ Generators
- ▶ Solar trackers
- ▶ Gearboxes
- ▶ Power distributors
- ▶ Rotary actuators for robotics
- ▶ Clutches
- ▶ Bearings
- ▶ Lubricants
- ▶ Air conditioning compressors
- ▶ Bearings
- ▶ Fuel cells, for example for critical infrastructure, power plants, shipping, range extenders, energy storage systems
- ▶ Reformers
- ▶ Innovative electric vehicles
- ▶ And much more

Techniques	Services	Functional Test	Endurance Tests	Environment Tests	Tribology / Analysis	Engineering
Component Test Field						
High Dynamic Drives						
Radionuclide Technology						
Engine Test Field						
Powertrain Test Field						
Environment Test Field						
Wear & Friction Test Rigs						
Material & Measuring Laboratory						
Fatigue Strength Test Field						



**Range of Services
Testing & Engineering**

Techniques	Services	Functional Test	Endurance Tests	Environment Tests	Tribology / Analysis	Engineering				
Component Test Field	TECHNIQUE									
High Dynamic Drives	Equipment									
Radionuclide Technology	<ul style="list-style-type: none"> • 45 test cells • 85 component test rigs • Powered up to 100kW • Speed up to 19.000 rpm • Modular test rig concept • 24/7 operation • High dynamic rigs 									
Engine Test Field	INFRASTRUCTURE									
Powertrain Test Field	<ul style="list-style-type: none"> • Cooling circuit -44°C • Energy recovery • Battery simulation 800V / 600A / 160kW • Own test bench construction for special applications 									
Environment Test Field	SPECIAL FEATURES									
Wear & Friction Test Rigs	<table border="1"> <thead> <tr> <th>Load</th> <th>Measuring</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> • Medium contamination: dirt, soot, foaming, fuel, acid • Thermal load: -40°C up to 160°C • Mechatronic load: high-speed, speed gradient > 10.000rpm/s • Test environment like mechanical, electrical and hydraulic operation parameters (Virtual ICE) </td> <td> <ul style="list-style-type: none"> • Mechanical, thermodynamic, hydraulic, acoustic, optical and electrical measurement • Delta analyzer • 10x ROTEC Measurements Systems for torsional vibrations, temperature, acceleration, velocity and sound • Pre- and post-analysis • Wear measurement via RNT • Micro movement via laser, encoder, RNT </td> </tr> </tbody> </table>						Load	Measuring	<ul style="list-style-type: none"> • Medium contamination: dirt, soot, foaming, fuel, acid • Thermal load: -40°C up to 160°C • Mechatronic load: high-speed, speed gradient > 10.000rpm/s • Test environment like mechanical, electrical and hydraulic operation parameters (Virtual ICE) 	<ul style="list-style-type: none"> • Mechanical, thermodynamic, hydraulic, acoustic, optical and electrical measurement • Delta analyzer • 10x ROTEC Measurements Systems for torsional vibrations, temperature, acceleration, velocity and sound • Pre- and post-analysis • Wear measurement via RNT • Micro movement via laser, encoder, RNT
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Material & Measuring Laboratory										
Fatigue Strength Test Field										



Techniques	Services	Functional Test	Endurance Tests	Environment Tests	Tribology / Analysis	Engineering
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Component Test Field	TECHNIQUE
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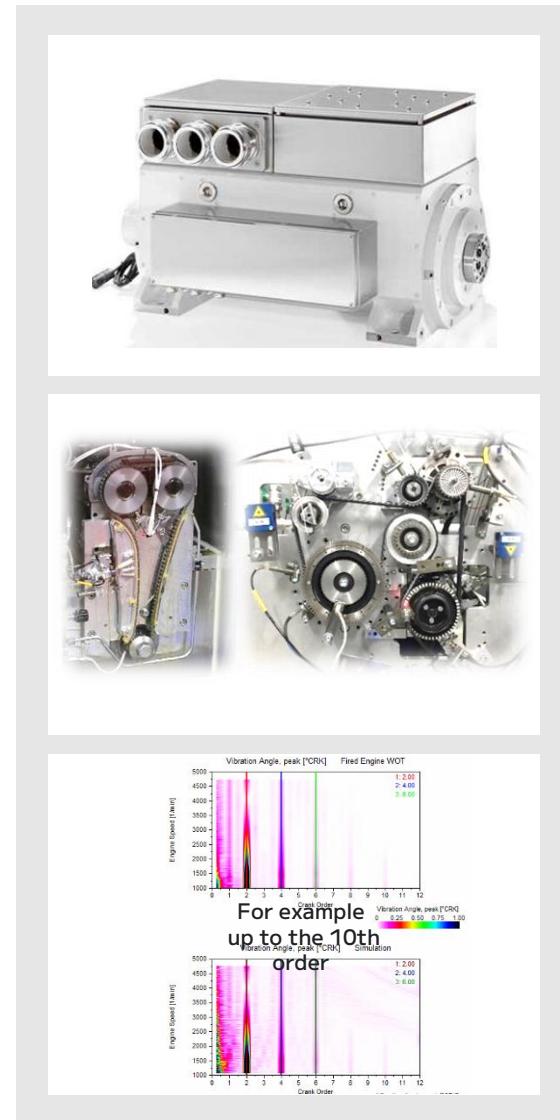
High Dynamic Drives	Equipment	Infrastructure
---------------------	-----------	----------------

- | | |
|--|---|
| <ul style="list-style-type: none"> • ETAS Inca • DiagRA • Vispiron Rotec • In-house developed programmable logic controller • MATLAB® | <ul style="list-style-type: none"> • 3 High Dynamic Drives up to 600 kW • +/- 1.200 Nm alternating torque • Vibration velocity: 1,8 mm/s • Very low rotor moment of inertia: 0.116 kgm² • Gradient up to 60.000 1/min/s • Rotational speed up to 10.000 1/min • Battery simulation 800 V / 600 A / 160 kW |
|--|---|

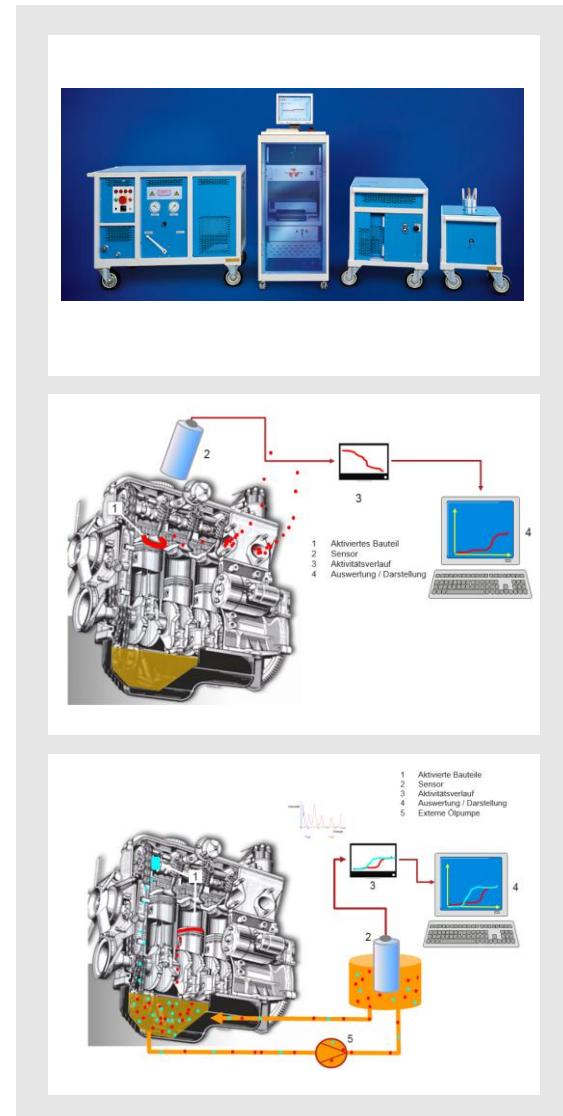
Engine Test Field	SPECIAL FEATURES
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Powertrain Test Field	Operations	Measuring
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- | | |
|--|--|
| <ul style="list-style-type: none"> • Angle-synchronous signal reproduction • Full frequency spectrum < 500 Hz • Adjustable Amplitudes (orders/frequencies) • Combined operation with fired engine • Reproduction of road surfaces/tyre types • Functional & endurance tests • Full path open ECU | <ul style="list-style-type: none"> • All physical measuring values • Dynamics (angle-/time-based) • NVH (acoustics & vibration) • Torsional Vibration • Wear measurement via surface scan • Wear measurement via RNT • Delta Analyzer |
|--|--|



Techniques	Services	Functional Test	Endurance Tests	Environment Tests	Tribology / Analysis	Engineering
Component Test Field						
High Dynamic Drives						
Radionuclide Technology						
Engine Test Field						
Powertrain Test Field						
Environment Test Field						
Wear & Friction Test Rigs						
Material & Measuring Laboratory						
Fatigue Strength Test Field						
TECHNIQUE						
Equipment			Infrastructure			
<ul style="list-style-type: none"> RNT handling permit for test field and measuring room Manufacturer: Zyklotron AG Karlsruhe (ZAG) Model: RTM 2000 3 x scintillation vendors 3 "x 3" NaJ (TI) 2 x measuring windows (Co-57 and Co-56, or comparable gamma energies) 			<ul style="list-style-type: none"> Concentration measuring system (KMA), for measuring the wear particles in the oil flow Filter measuring system (FMA), for measuring the particles separated in the oil filter Reference measuring system (RMA), for referencing a known sample with short half-lives 			
SPECIAL FEATURES						
Operations			Measuring			
<ul style="list-style-type: none"> Ferrous materials Alloy metals, like Molybdenum, Tungsten, Vanadium, Non-Ferrous metals, e.g. Copper Bearing metals, e.g. Lead, tin, zinc Aluminium, if at least 5% copper is contained (activation takes place via the copper) Titanium Sintered metals, hard metals 			<ul style="list-style-type: none"> Ceramic materials (Al_2O_3, SiC, Si_3N_4, ZrO_2) Plastics and lubricating varnishes, DLC coatings via storage of Be-7 Thin film differential measurement method (DMV) Concentration measurement method (KMV) Wear measurements in the Nm/h range Motion measurements at optically inaccessible locations (piston ring rotation, floating bush rotation) 			



Techniques	Services	Functional Test	Endurance Tests	Environment Tests	Tribology / Analysis	Engineering
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Component Test Field

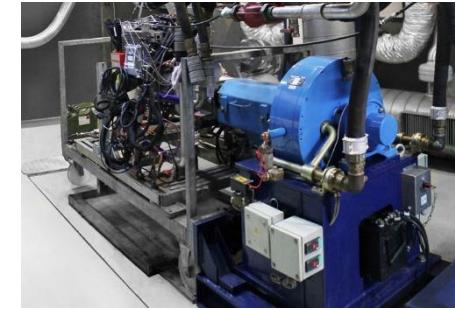
TECHNIQUE

Equipment

Infrastructure

- 5 fired engine test rigs
- 450kW / 1.000Nm / 10.000rpm
- Battery simulation 800V / 600A / 160kW
- automation: SARA & own system

- Cooling chamber
- Common/special fuel infrastructure
- Battery simulation 800V / 600A / 160kW



High Dynamic Drives

Radionuclide Technology

Engine Test Field

Powertrain Test Field

Environment Test Field

Wear & Friction Test Rigs

Material & Measuring Laboratory

Fatigue Strength Test Field

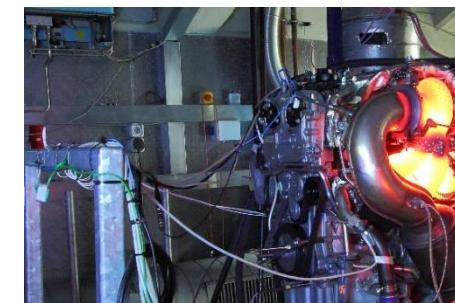
SPECIAL FEATURES

Operations

Measuring

- Functional & endurance tests
- Thermodynamic test rigs
- High dynamic Rigs
- Full engine / motored engine (parts)

- All physical measuring values
- All dedicated process values (online/offline)
- Dynamics (angle-/time-based)
- NVH (acoustics & vibration)
- All relevant emissions
- Delta analyzer
- Torsional vibrations
- Indicated pressure & knock detection
- Wear measurement via surface scan
- Wear measurement via RNT



Techniques
Services
Functional Test
Endurance Tests
Environment Tests
Tribology / Analysis
Engineering
Component Test Field
TECHNIQUE
High Dynamic Drives
Equipment

- 2 powertrain test rigs (2/3 EM)
- Power-range up to 2.250Nm / wheel
- Rig automation: SARA & own system

Infrastructure

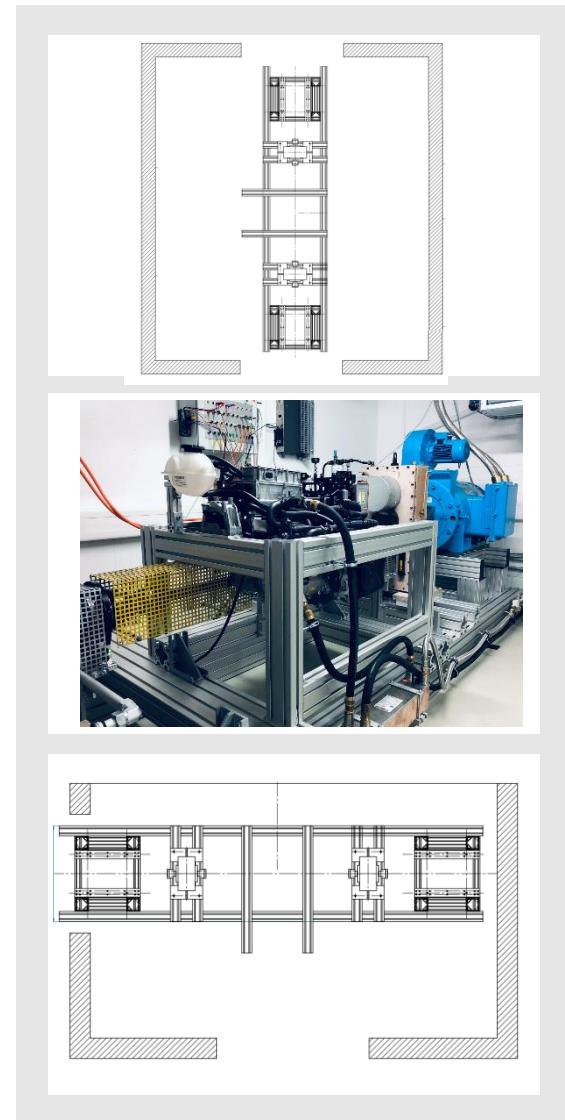
- Cooling chamber
- Battery simulation 800V / 600A / 160kW

Engine Test Field
Powertrain Test Field
SPECIAL FEATURES
Environment Test Field
Wear & Friction Test Rigs
Material & Measuring Laboratory
Fatigue Strength Test Field
Operations

- Functional & endurance tests
- High dynamic rigs for engine simulation
- Driving Strategy
- Transmission calibration
- Powertrain validation
- Vehicle testing

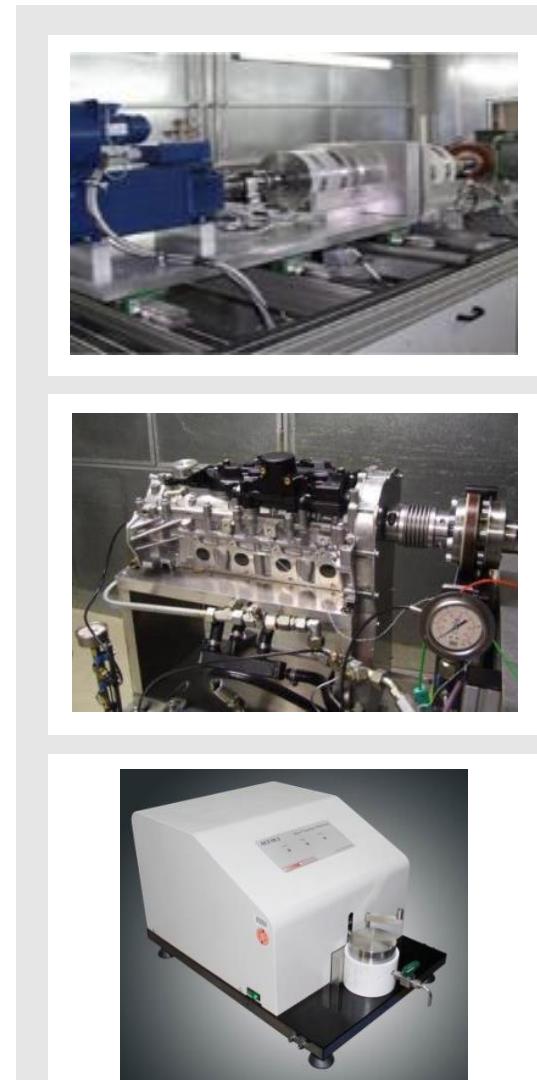
Measuring

- All physical measuring values
- All dedicated process values (online/offline)
- Dynamics (angle-/time-based)
- NVH (Acoustics & Vibration)
- All relevant emissions
- Indicated pressure & knock detection
- Wear measurement via surface scan
- Wear measurement via RNT
- Delta analyzer



Techniques	Services	Functional Test	Endurance Tests	Environment Tests	Tribology / Analysis	Engineering
Component Test Field	TECHNIQUE					
High Dynamic Drives	Equipment <ul style="list-style-type: none"> • Climatic chambers -40° to 200°C • Coolant or oil temperature -40° to 135 °C • Independent control of ambient and medium • Humidity control 0...100% • Shaker up to 40 kN Infrastructure <ul style="list-style-type: none"> • Cooling circuit -44°C • Energy recovery • Battery simulation 800V / 600A / 160kW • Hydraulic power rail • Own test bench construction for special applications 					
Radionuclide Technology	SPECIAL FEATURES					
Engine Test Field	Operations <ul style="list-style-type: none"> • Control of various actuators (LIN,CAN,SENT...) • Functional & endurance tests • LV124/VW80000 • Vibration • Mechanical shock • Mechanical, electrical & hydraulic misuse Measuring <ul style="list-style-type: none"> • All physical values • All simulated values • Simulation ↔ Rig • All dedicated process values (online/offline) • Dynamics (angle-/time-based) • NVH (acoustics & vibration) • Wear measurement via surface scan • Wear measurement via RNT 					
Powertrain Test Field						
Environment Test Field						
Wear & Friction Test Rigs						
Material & Measuring Laboratory						
Fatigue Strength Test Field						



Techniques	Services	Functional Test	Endurance Tests	Environment Tests	Tribology / Analysis	Engineering			
Component Test Field									
TECHNIQUE									
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 5px;">Equipment</th> <th style="text-align: left; padding: 5px;">Infrastructure</th> </tr> </thead> <tbody> <tr> <td style="padding: 10px;"> <ul style="list-style-type: none"> • 15 wear test rigs (rotational, translational) • 1 tribometer MTM • Online wear: RNT (Radio Nuclide Technology) • High dynamic rotational friction rig • Micro friction & sealing rig </td> <td style="padding: 10px;"> <ul style="list-style-type: none"> • < 350 m² testing area for wear test & friction • High-resolution measuring technology & data evaluation • Own test bench construction for special applications • Own photo labs, measuring rooms, materials laboratory... </td> </tr> </tbody> </table>						Equipment	Infrastructure	<ul style="list-style-type: none"> • 15 wear test rigs (rotational, translational) • 1 tribometer MTM • Online wear: RNT (Radio Nuclide Technology) • High dynamic rotational friction rig • Micro friction & sealing rig 	<ul style="list-style-type: none"> • < 350 m² testing area for wear test & friction • High-resolution measuring technology & data evaluation • Own test bench construction for special applications • Own photo labs, measuring rooms, materials laboratory...
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Techniques

Services

Functional Test

Endurance Tests

Environment Tests

Tribology / Analysis

Engineering

Component Test Field

TECHNIQUE

High Dynamic Drives

Equipment

- 3D measuring machine, Roundness, Straightness, Roughness measurement
- Transmitted light measurement
- Photo microscopes
- Hardness measurement
- Material-laboratory-Microscope
- REM use on request

Infrastructure

- Materials laboratory with chemistry suction cupboard
- Material Cutting Device
- Embed and Grind Device
- Photo laboratory

Engine Test Field

Powertrain Test Field

Environment Test Field

Wear & Friction Test Rigs

Material & Measuring Laboratory

Fatigue Strength Test Field

SPECIAL FEATURES

Operations

- Return Part Analysis on individual components (timing chain, valve train, transmission ...) with system view and system understanding
- Approval for measurement on RNT parts available

Measuring

- All physical measurements tactile and optical
- Material examination and assessment



Techniques

Services

Functional Test

Endurance Tests

Environment Tests

Tribology / Analysis

Engineering

Component Test Field

TECHNIQUE

High Dynamic Drives

Equipment

Infrastructure

- Resonance pulsators up to 20 kN
- Resonance pulsators up to 100 kN
- Resonance magnetic test system up to 20 kN
- Hydraulic system up to 7 kN and 500 Hz
- Hydraulic system up to 20 kN and 150 Hz

- Own photo labs, measuring rooms, materials laboratory...

Engine Test Field

Powertrain Test Field

Environment Test Field

Wear & Friction Test Rigs

Material & Measuring Laboratory

Fatigue Strength Test Field

SPECIAL FEATURES

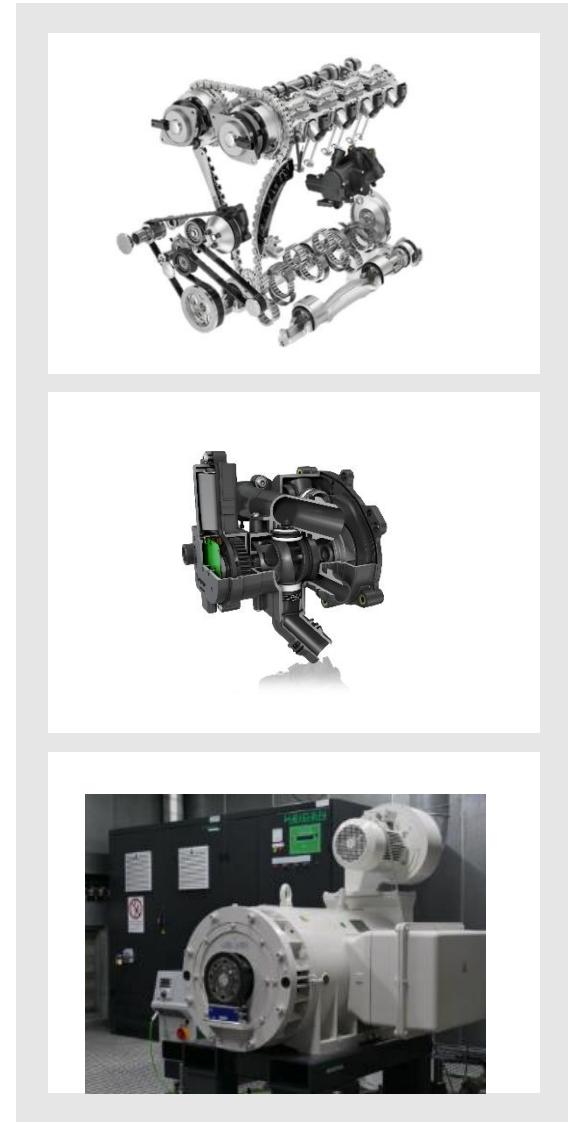
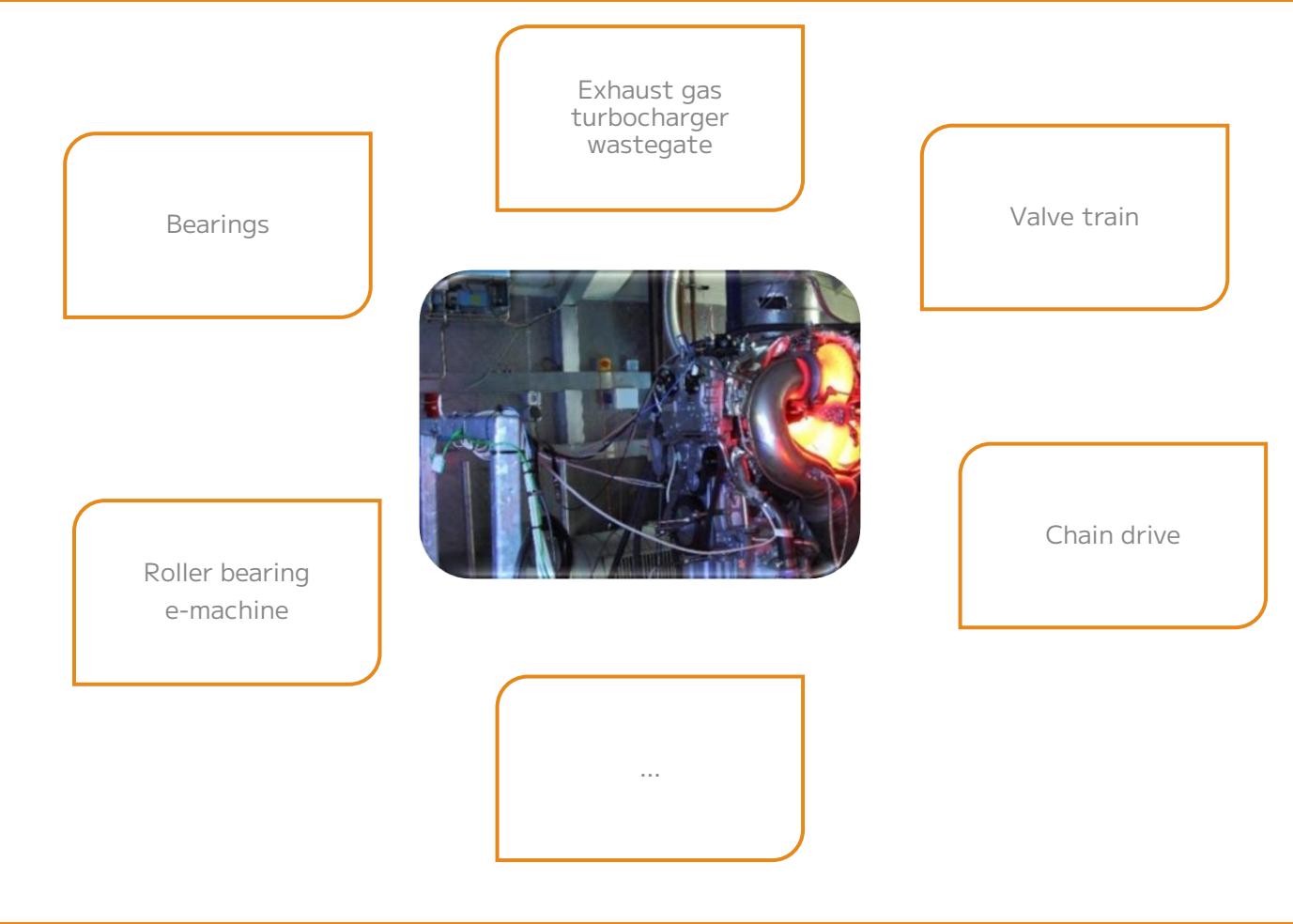
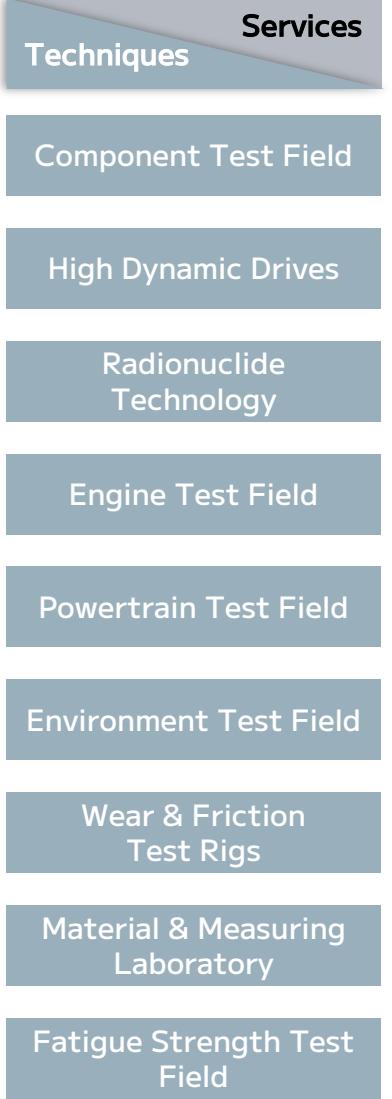
Services for Automotive Customers

Measuring

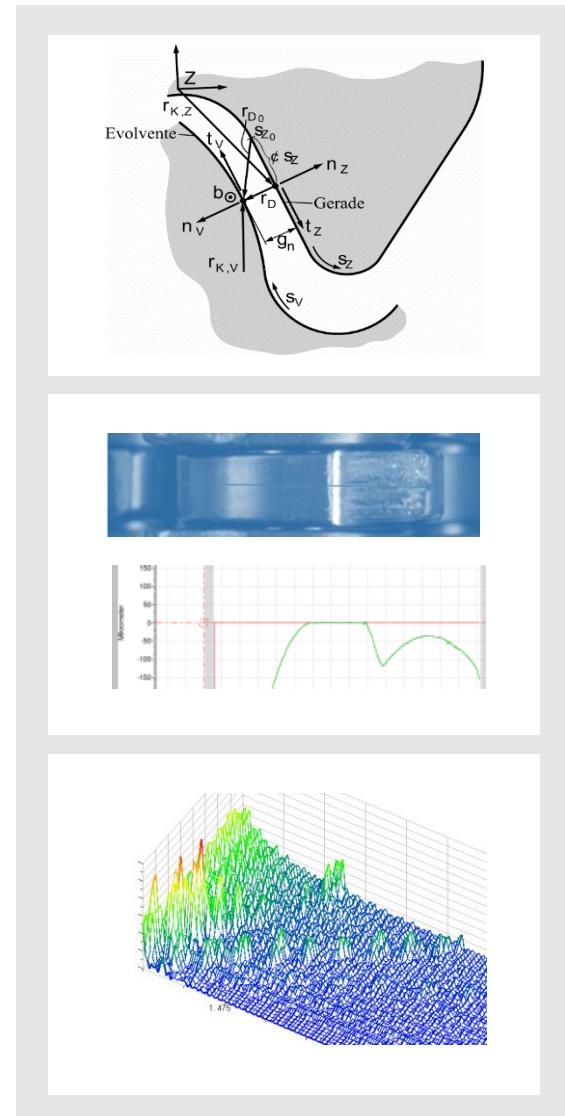
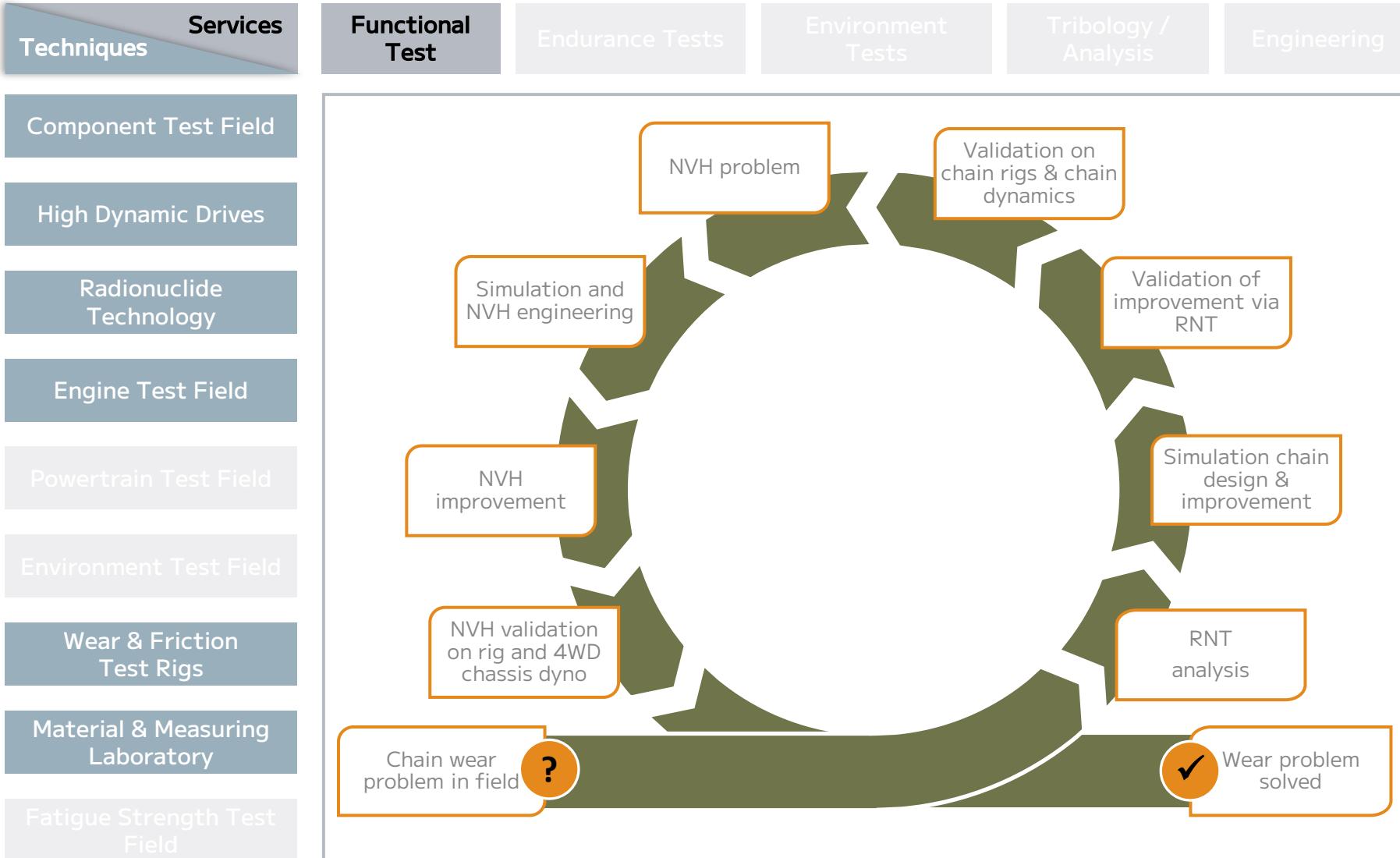
- Dynamic strength tests
- Service strength tests
- Crack detection and damage analysis
- Lifetime valuation
- Environmental simulation (-40 up to 160°C)

- All physical measurements tactile and optical
- Material examination and assessment





Functional Test / Example



Services

Techniques

Component Test Field

High Dynamic Drives

Radionuclide
Technology

Engine Test Field

Powertrain Test Field

Environment Test Field

Wear & Friction
Test RigsMaterial & Measuring
LaboratoryFatigue Strength Test
FieldFunctional
Test**Endurance Tests**Environment
TestsTribology /
Analysis

Engineering

Up to 450 kW
Up to 3.000 Nm

Coolant-/oil- conditioning

High dynamic drive / Virtual
ICE

Early detection of damage

Own automation platform
SARA with interfaces to
common tools (i.e., MATLAB®)

Failure analysis

Rig engineering & construction

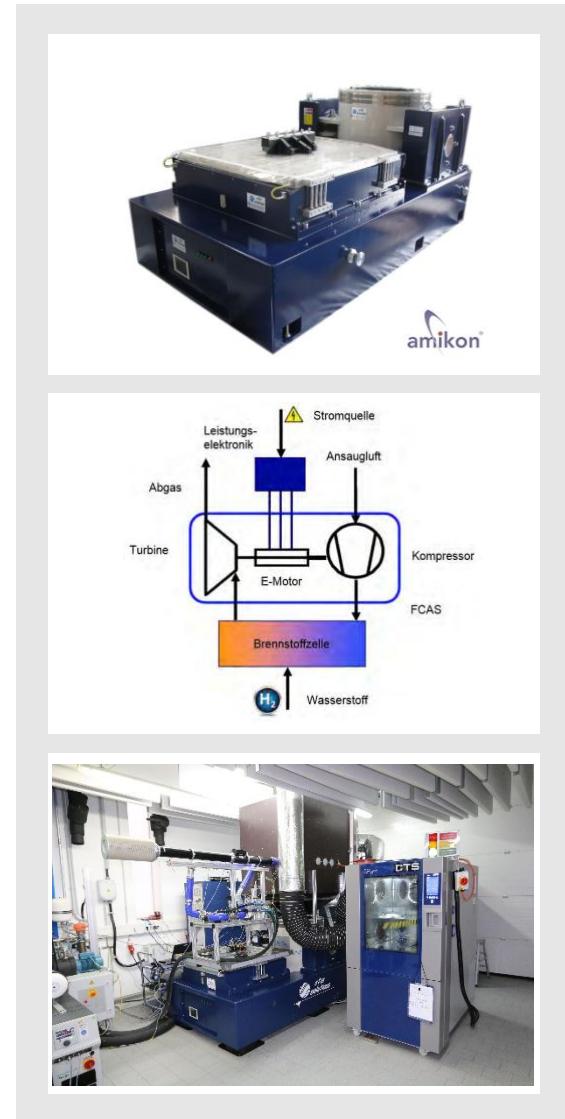
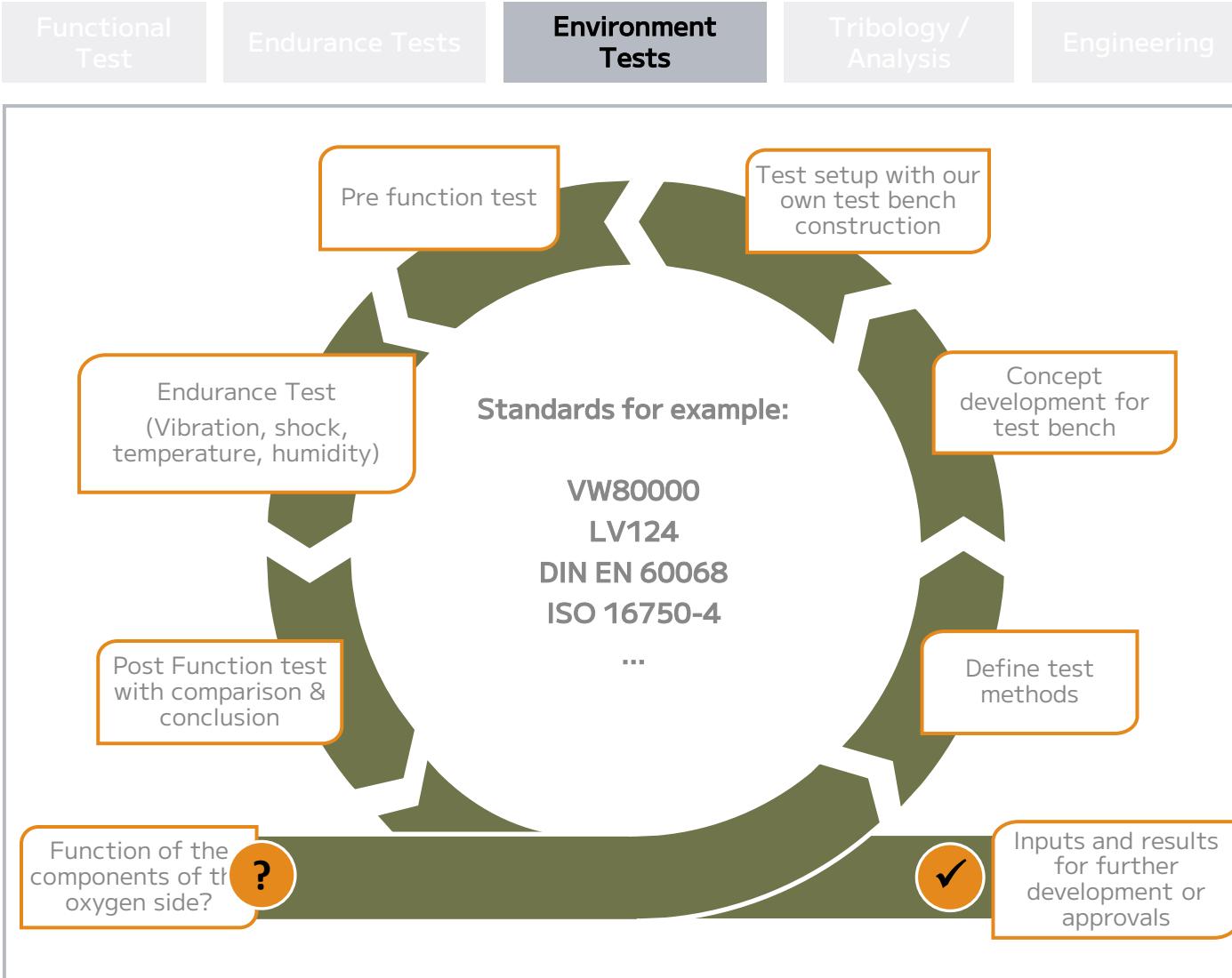
Failure diagnosis

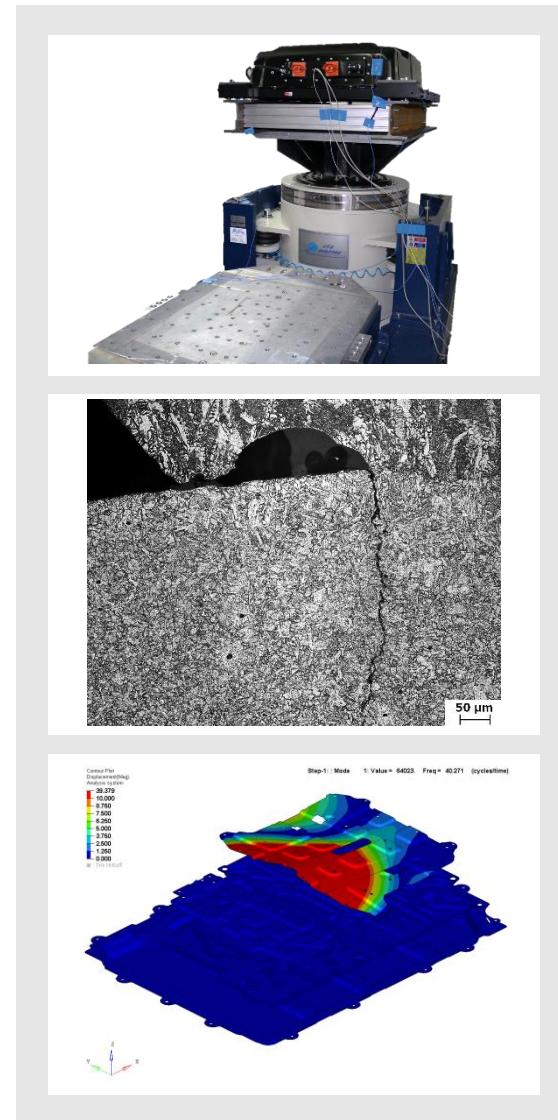
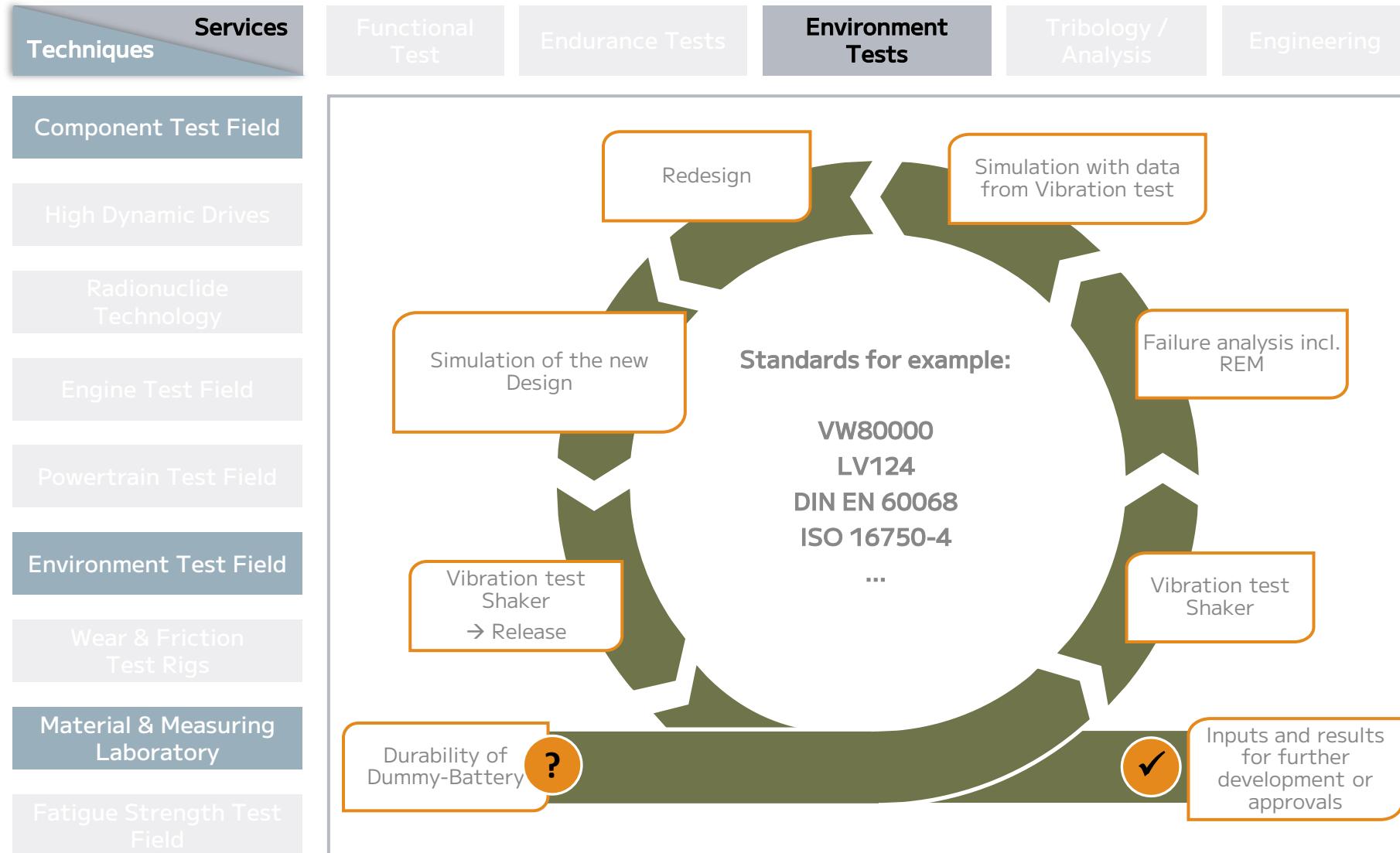
24/7 operation

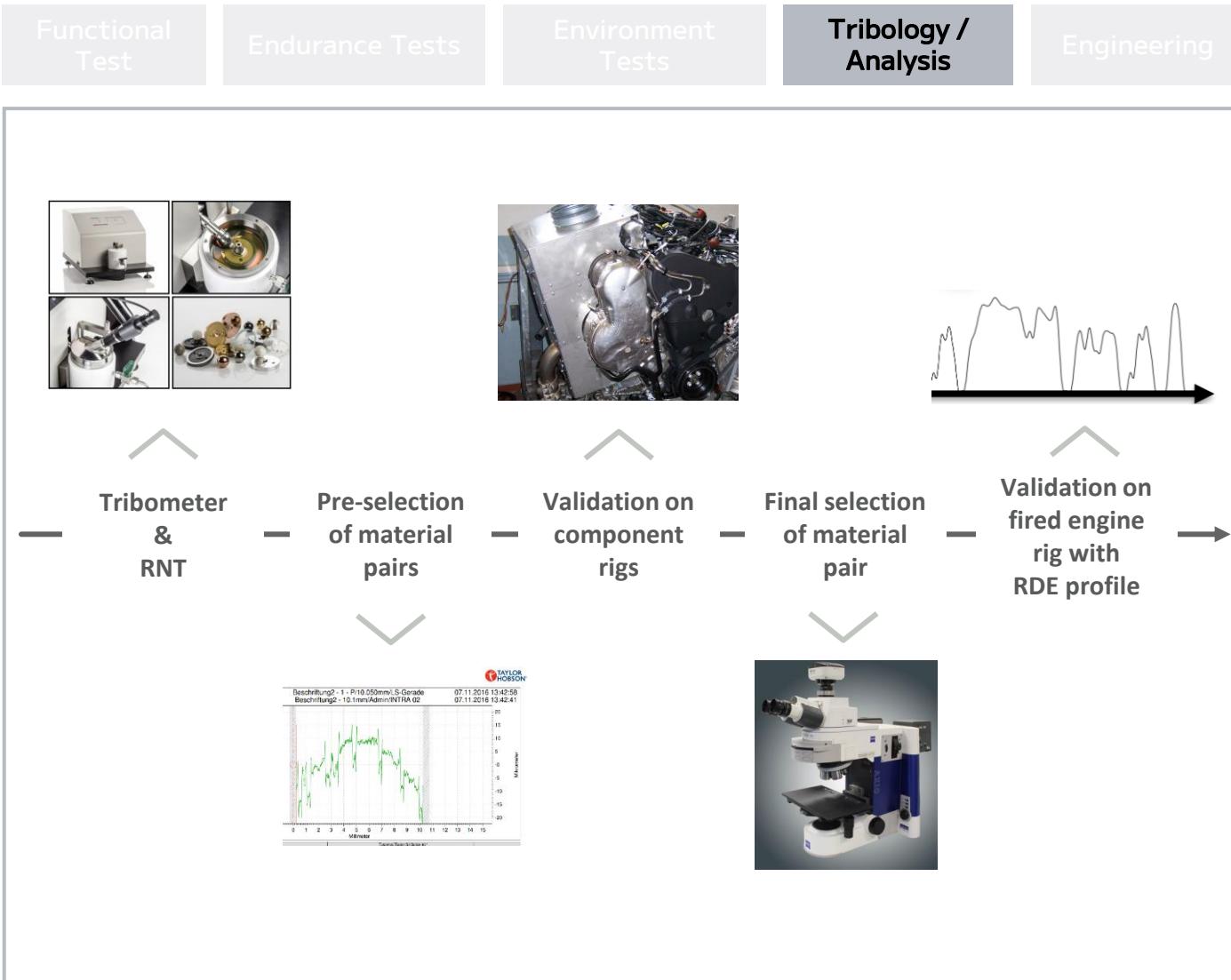
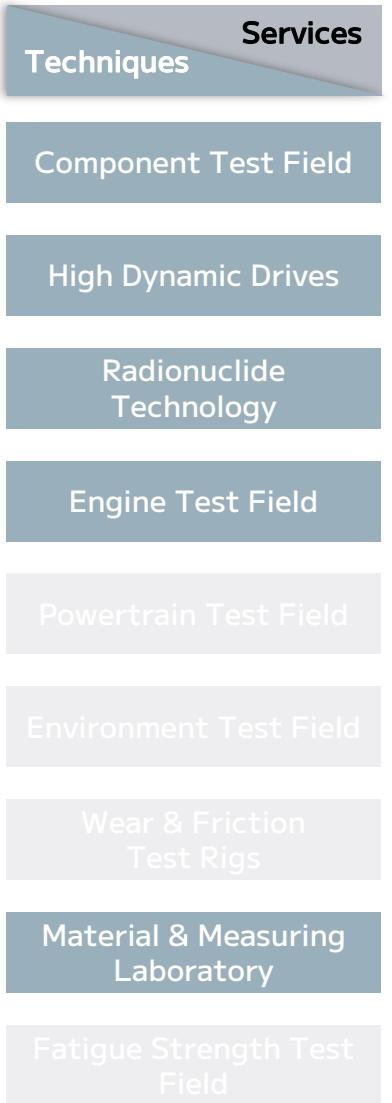
Documentation



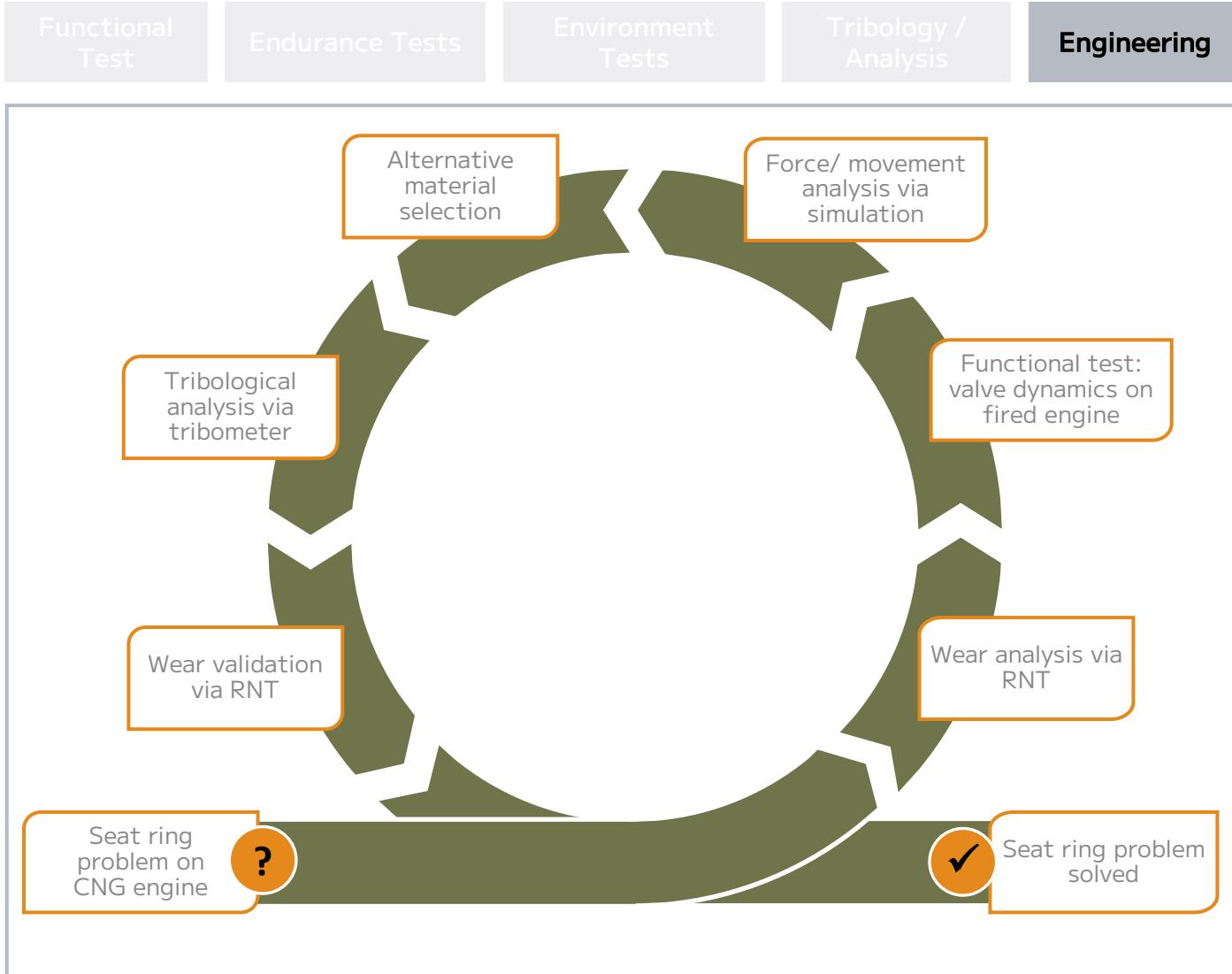
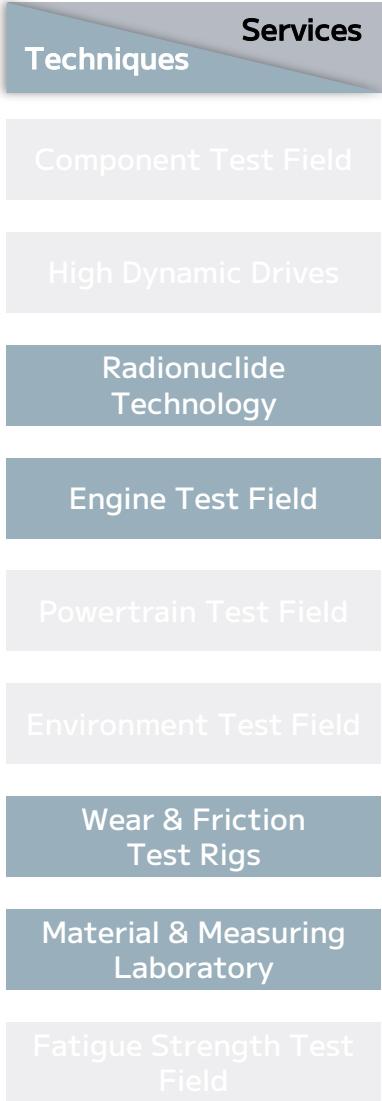
Environment Test / Example: Oxygen Supply for Hydrogen Fuel Cell



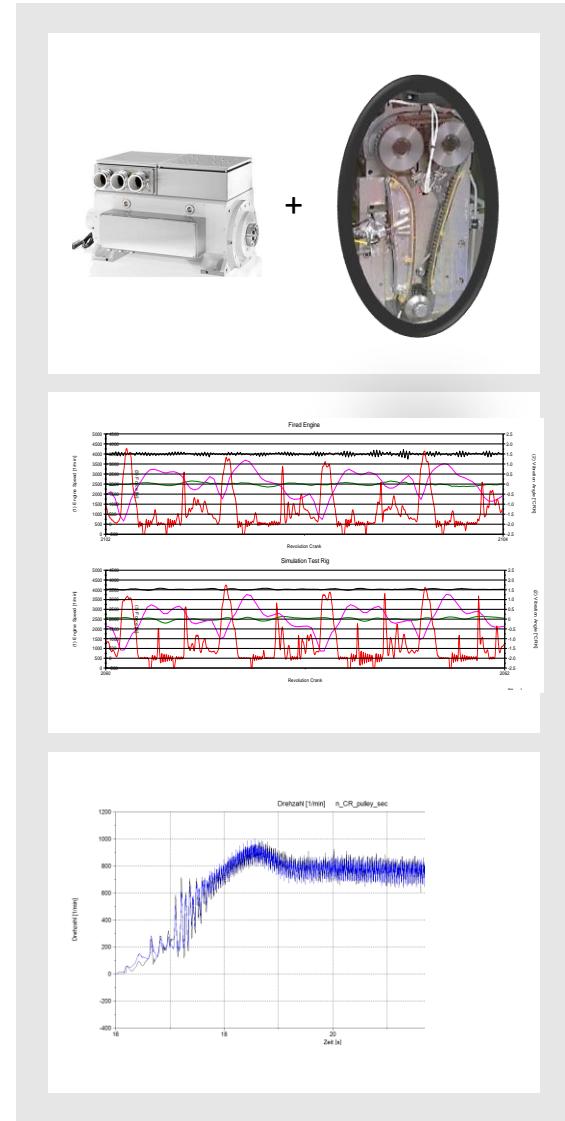
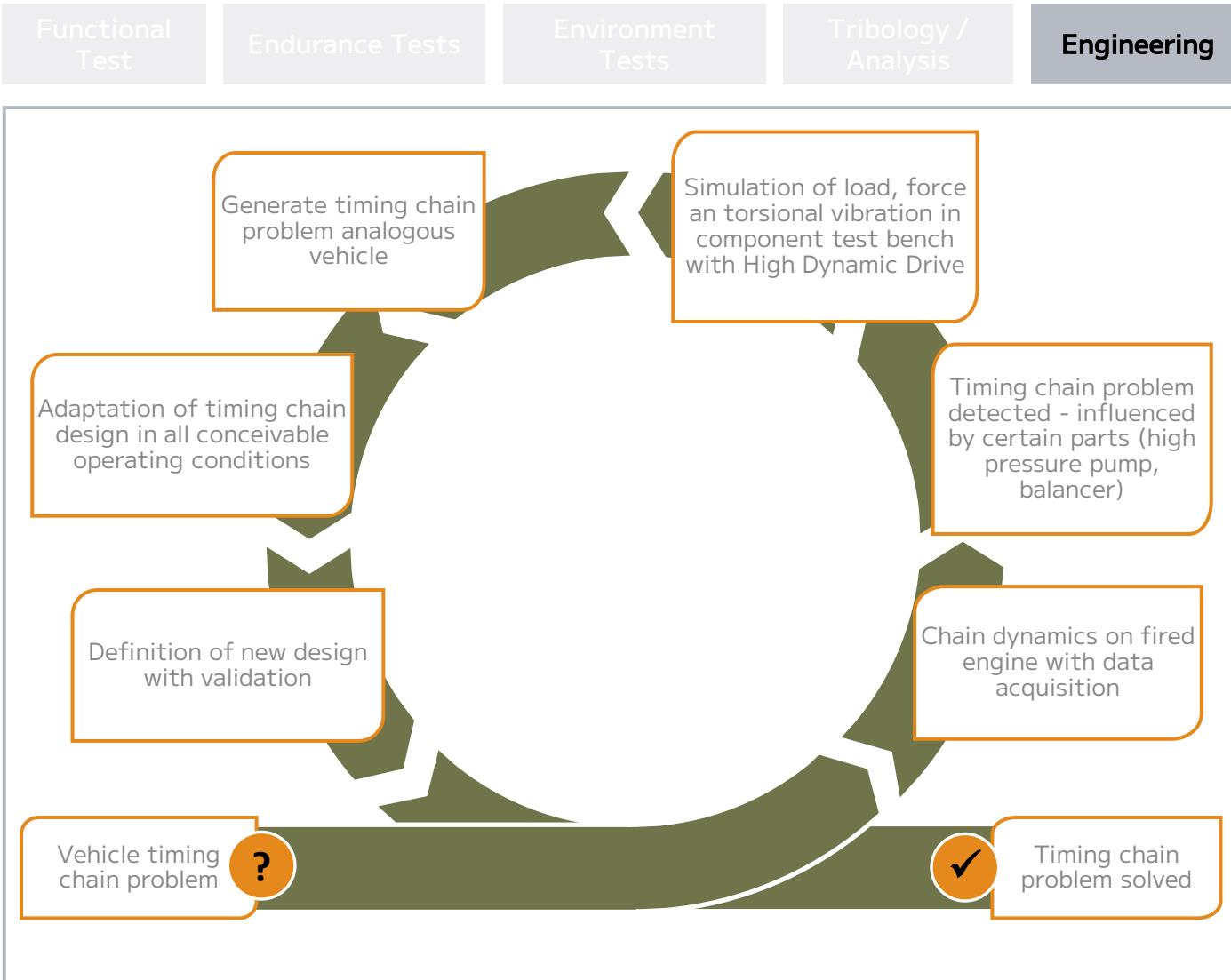




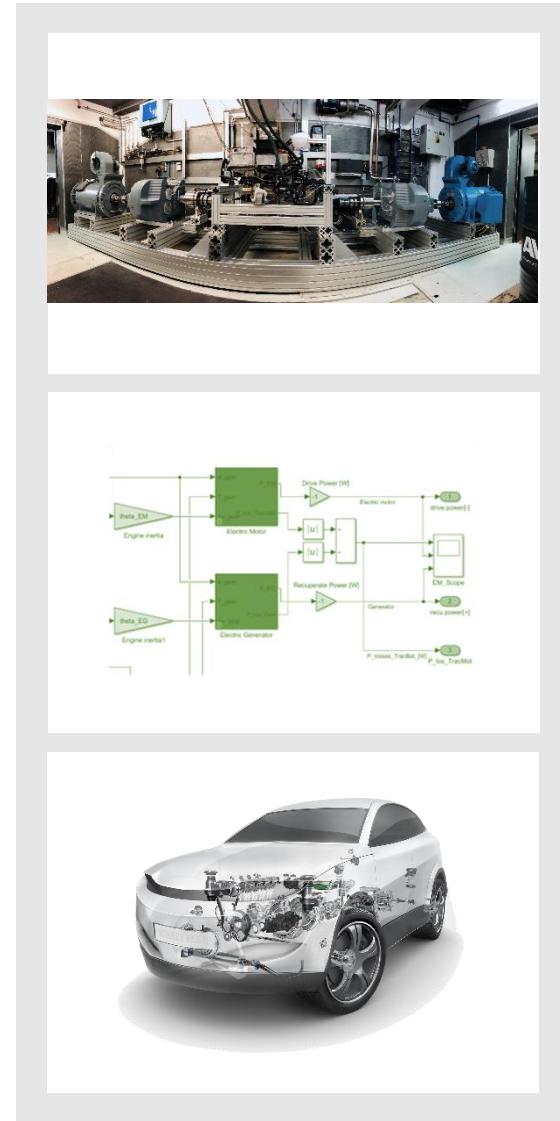
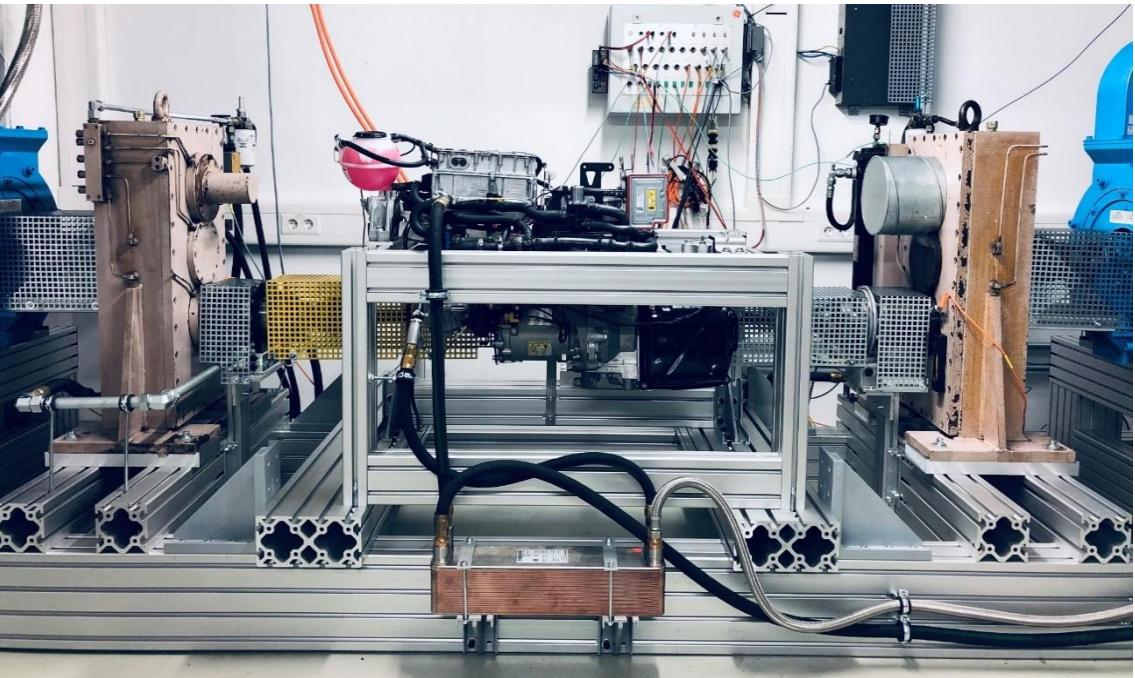
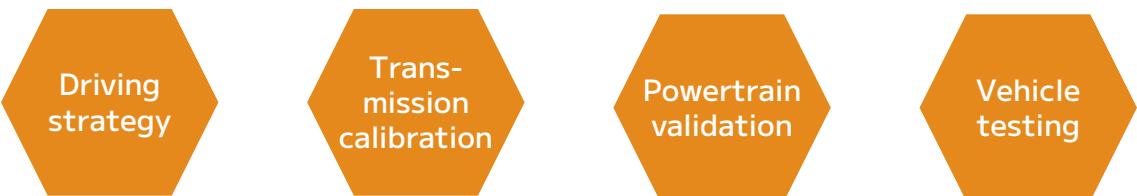
Engineering / Example: Seat ring problem



Engineering / Example: High Dynamic Drives

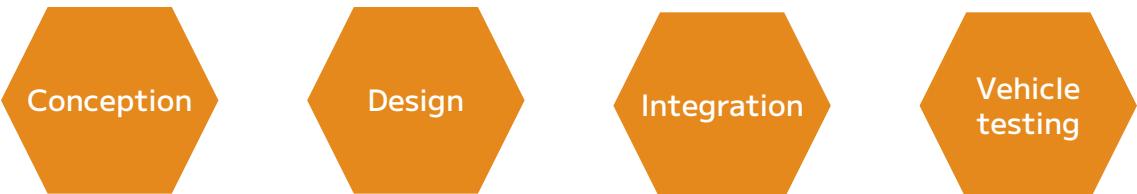


Techniques	Services
Component Test Field	Functional Test
High Dynamic Drives	Endurance Tests
Radionuclide Technology	Environment Tests
Engine Test Field	Tribology / Analysis
Powertrain Test Field	Engineering
Environment Test Field	
Wear & Friction Test Rigs	
Material & Measuring Laboratory	
Fatigue Strength Test Field	

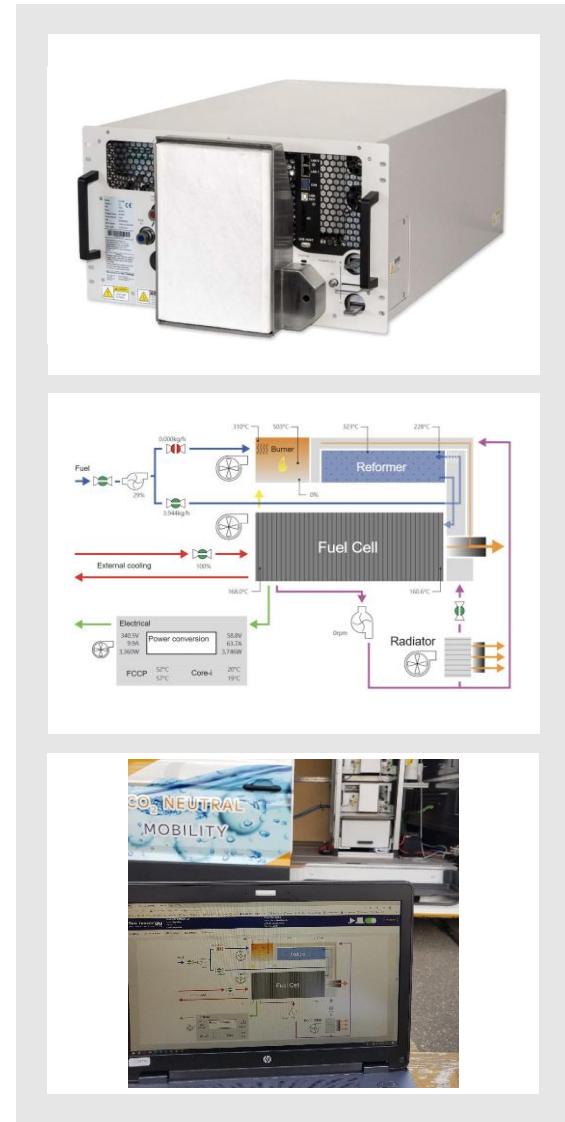


Engineering / Example: EV Powertrain

Services		Functional Test	Endurance Tests	Environment Tests	Tribology / Analysis	Engineering
Techniques						
Component Test Field						
High Dynamic Drives						
Radionuclide Technology						
Engine Test Field						
Powertrain Test Field						
Environment Test Field						
Wear & Friction Test Rigs						
Material & Measuring Laboratory						
Fatigue Strength Test Field						

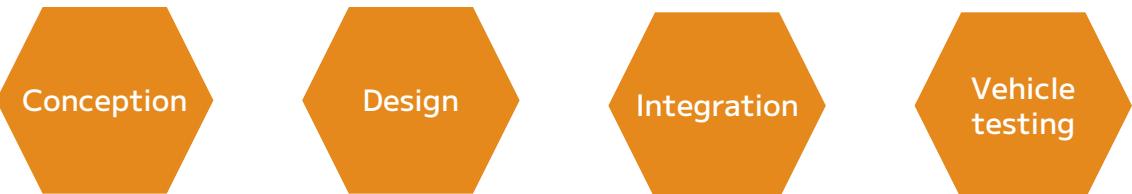


Construction of e-Crafter test vehicle with methanol fuel cells as a range extender

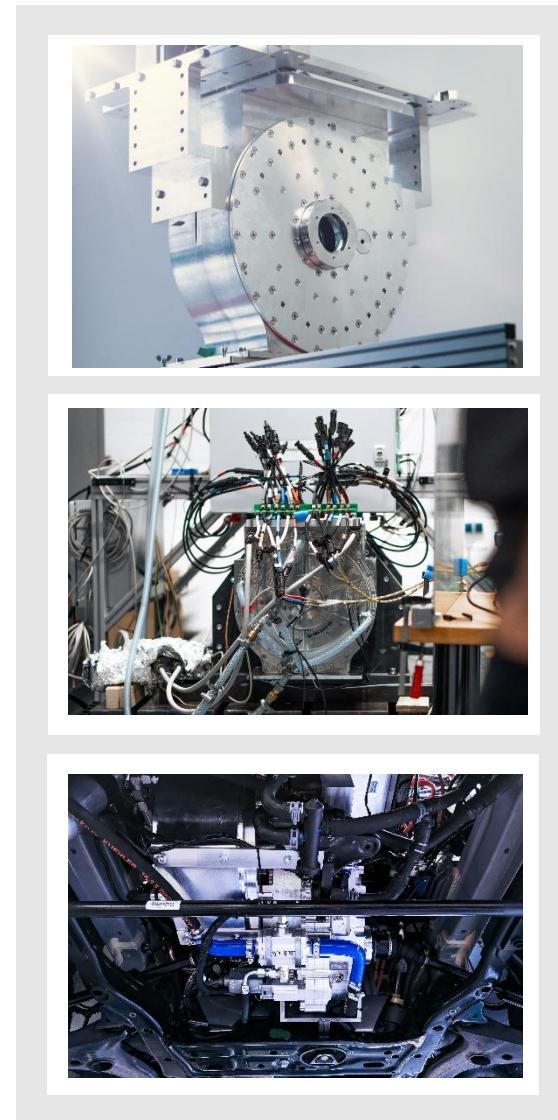


Engineering / Example: EV Powertrain

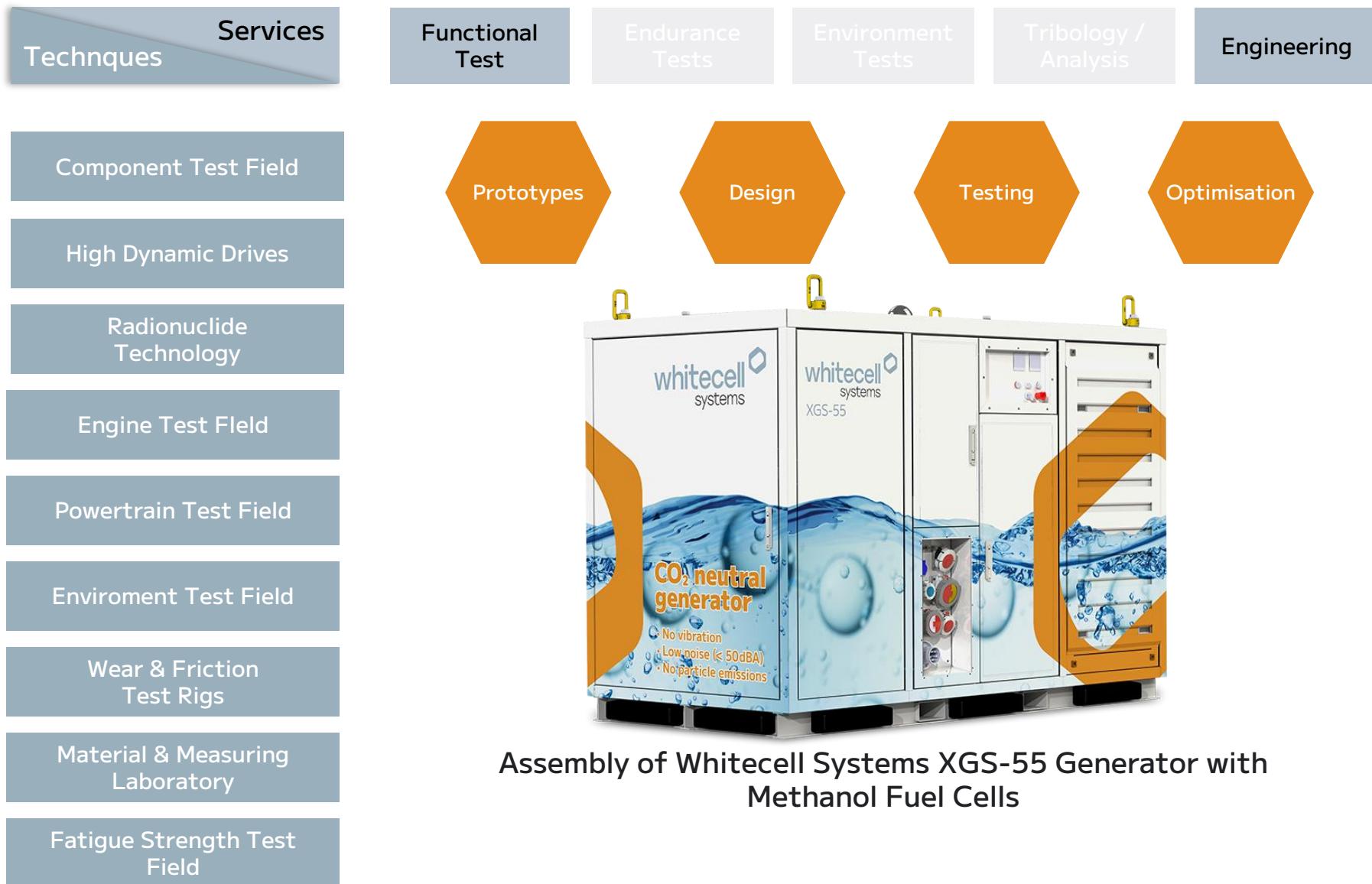
Techniques	Services
	Functional Test
	Endurance Tests
	Environment Tests
	Tribology / Analysis
	Engineering
Component Test Field	
High Dynamic Drives	
Radionuclide Technology	
Engine Test Field	
Powertrain Test Field	
Environment Test Field	
Wear & Friction Test Rigs	
Material & Measuring Laboratory	
Fatigue Strength Test Field	



Construction Demo Car e-Crafter with newly developed Vaionic eDrive system



Engineering / Example: Construction of innovative, CO₂-neutral and low-noise generators



Thank you.

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