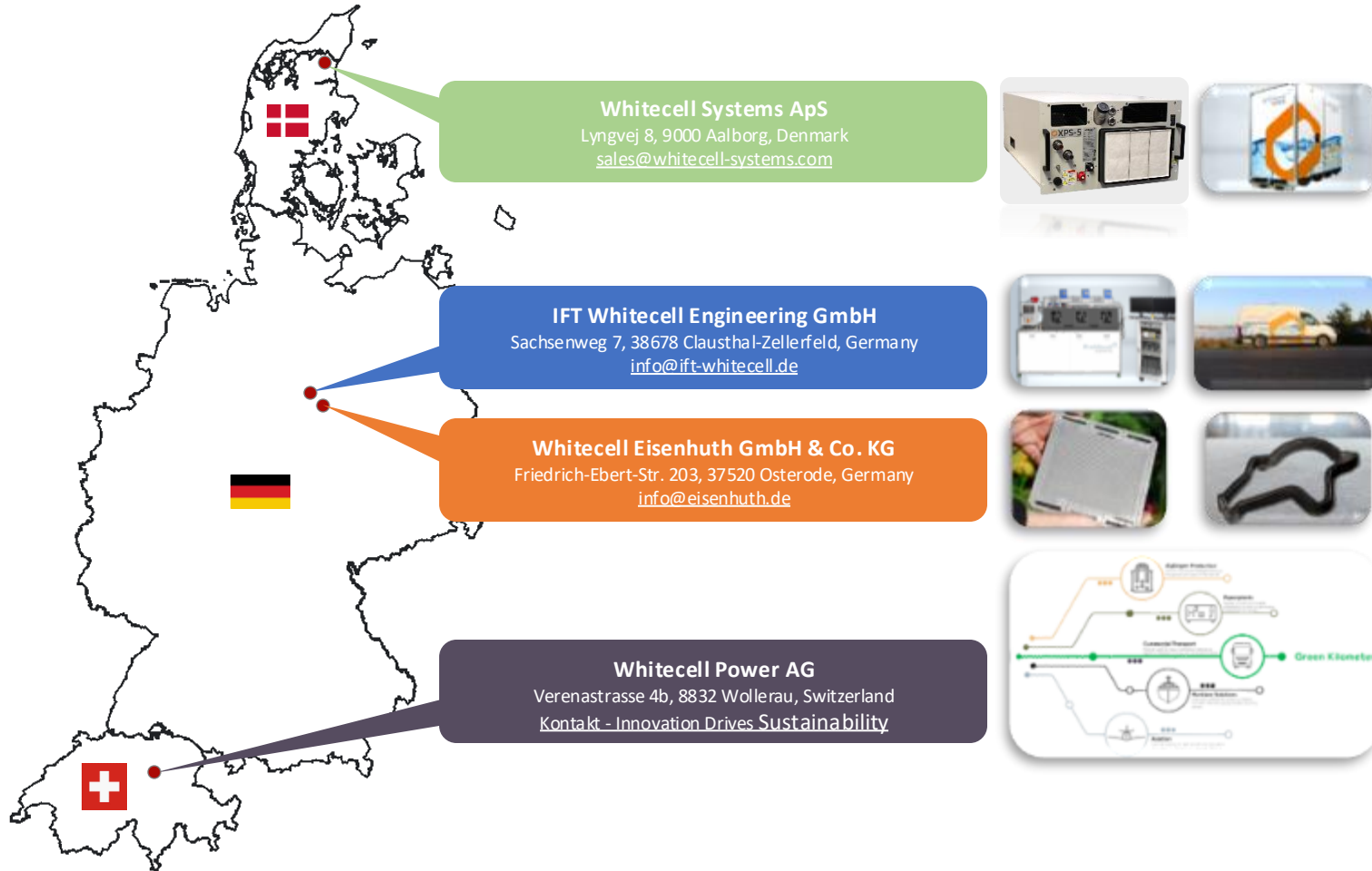




Clausthal-Zellerfeld



Whitecell Group

A total of 140 employees, revenue approx. EUR 22 million (2023)

► **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



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

High Dynamic Drives

Radionuclide
Technology

Engine Test Field

Powertrain Test Field

Environment Test Field

Wear & Friction
Test Rigs

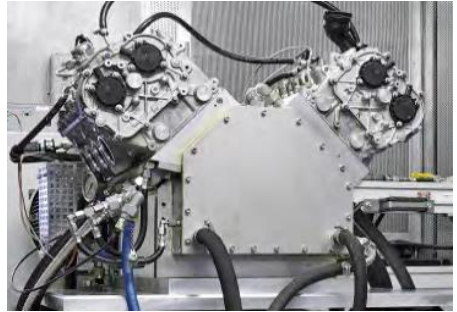
Material & Measuring
Laboratory

Fatigue Strength Test
Field

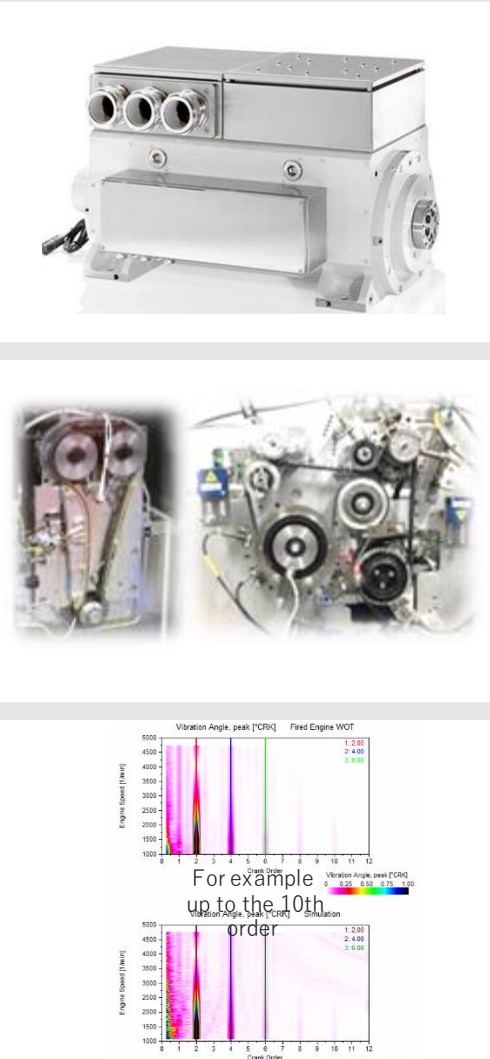


**Range of Services
Testing & Engineering**

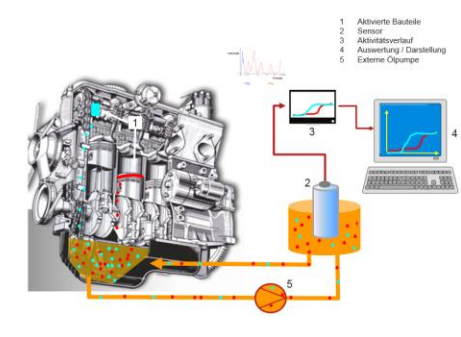
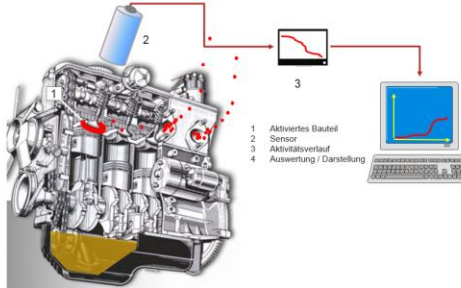
Techniques	Services	Functional Test	Endurance Tests	Environment Tests	Tribology / Analysis	Engineering
Component Test Field		TECHNIQUE				
High Dynamic Drives		Equipment		Infrastructure		
Radionuclide Technology		<ul style="list-style-type: none">45 test cells85 component test rigsPowered up to 100kWSpeed up to 19.000 rpmModular test rig concept24/7 operationHigh dynamic rigs		<ul style="list-style-type: none">Cooling circuit -44° CEnergy recoveryBattery simulation 800V / 600A / 160kWOwn test bench construction for special applications		
Engine Test Field		SPECIAL FEATURES				
Powertrain Test Field		Load		Measuring		
Environment Test Field		<ul style="list-style-type: none">Medium contamination: dirt, soot, foaming, fuel, acidThermal load: -40° C up to 160° CMechatronic load: high-speed, speed gradient > 10.000rpm/sTest environment like mechanical, electrical and hydraulic operation parameters (Virtual ICE)		<ul style="list-style-type: none">Mechanical, thermodynamic, hydraulic, acoustic, optical and electrical measurementDelta analyzer10x ROTEC Measurements Systems for torsional vibrations, temperature, acceleration, velocity and soundPre- and post-analysisWear measurement via RNTMicro movement via laser, encoder, RNT		
Wear & Friction Test Rigs						
Material & Measuring Laboratory						
Fatigue Strength Test Field						



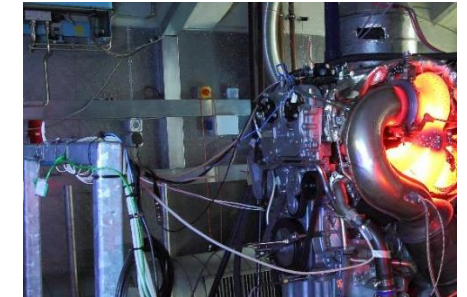
Techniques	Services	Functional Test	Endurance Tests	Environment Tests	Tribology / Analysis	Engineering
Component Test Field	TECHNIQUE					
High Dynamic Drives	Equipment		Infrastructure			
Radionuclide Technology	<ul style="list-style-type: none">ETAS IncaDiagRAVispiron RotecIn-house developed programmable logic controllerMATLAB®		<ul style="list-style-type: none">3 High Dynamic Drives up to 600 kW+/- 1.200 Nm alternating torqueVibration velocity: 1,8 mm/sVery low rotor moment of inertia: 0.116 kgm²Gradient up to 60.000 1/min/sRotational speed up to 10.000 1/minBattery simulation 800 V / 600 A / 160 kW			
Engine Test Field	SPECIAL FEATURES					
Powertrain Test Field	Operations		Measuring			
Environment Test Field	<ul style="list-style-type: none">Angle-synchronous signal reproductionFull frequency spectrum < 500 HzAdjustable Amplitudes (orders/frequencies)Combined operation with fired engineReproduction of road surfaces/tyre typesFunctional & endurance testsFull path open ECU		<ul style="list-style-type: none">All physical measuring valuesDynamics (angle-/time-based)NVH (acoustics & vibration)Torsional VibrationWear measurement via surface scanWear measurement via RNTDelta Analyzer			
Wear & Friction Test Rigs						
Material & Measuring Laboratory						
Fatigue Strength Test Field						



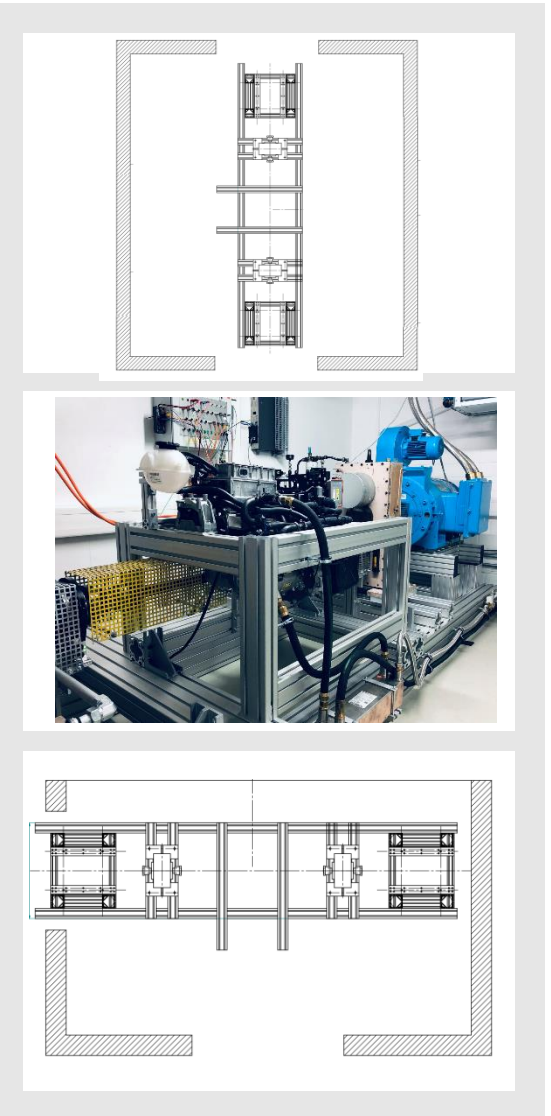
Techniques	Services	Functional Test	Endurance Tests	Environment Tests	Tribology / Analysis	Engineering
Component Test Field	TECHNIQUE					
High Dynamic Drives						
Radionuclide Technology	Equipment		Infrastructure			
Engine Test Field	<ul style="list-style-type: none">RNT handling permit for test field and measuring roomManufacturer: Zyklotron AG Karlsruhe (ZAG)Model: RTM 20003 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 flowFilter measuring system (FMA), for measuring the particles separated in the oil filterReference measuring system (RMA), for referencing a known sample with short half-lives			
Powertrain Test Field	SPECIAL FEATURES					
Environment Test Field						
Wear & Friction Test Rigs	Operations		Measuring			
Material & Measuring Laboratory	<ul style="list-style-type: none">Ferrous materialsAlloy metals, like Molybdenum, Tungsten, Vanadium, Non-Ferrous metals, e.g. CopperBearing metals, e.g. Lead, tin, zincAluminium, if at least 5% copper is contained (activation takes place via the copper)TitaniumSintered metals, hard metals		<ul style="list-style-type: none">Ceramic materials (Al₂O₃, SiC, Si₃N₄, ZrO₂)Plastics and lubricating varnishes, DLC coatings via storage of Be-7Thin film differential measurement method (DMV)Concentration measurement method (KMV)Wear measurements in the Nm/h rangeMotion measurements at optically inaccessible locations (piston ring rotation, floating bush rotation)			
Fatigue Strength Test Field						



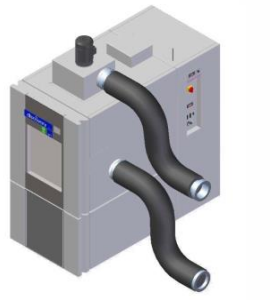
Techniques	Services	Functional Test	Endurance Tests	Environment Tests	Tribology / Analysis	Engineering
Component Test Field		TECHNIQUE				
High Dynamic Drives		Equipment		Infrastructure		
Radionuclide Technology		<ul style="list-style-type: none">5 fired engine test rigs450kW / 1.000Nm / 10.000rpmBattery simulation 800V / 600A / 160kWWD passenger car chassis dyno 300 kWMotorcycle chassis dyno 200 kWautomation: SARA & own system		<ul style="list-style-type: none">Cooling chamberCommon/special fuel infrastructureBattery simulation 800V / 600A / 160kW		
Engine Test Field		SPECIAL FEATURES				
Powertrain Test Field		Operations		Measuring		
Environment Test Field		<ul style="list-style-type: none">Functional & endurance testsThermodynamic test rigsHigh dynamic RigsFull engine / motored engine (parts)		<ul style="list-style-type: none">All physical measuring valuesAll dedicated process values (online/offline)Dynamics (angle-/time-based)NVH (acoustics & vibration)All relevant emissionsDelta analyzerTorsional vibrationsIndicated pressure & knock detectionWear measurement via surface scanWear measurement via RNT		
Wear & Friction Test Rigs						
Material & Measuring Laboratory						
Fatigue Strength Test Field						



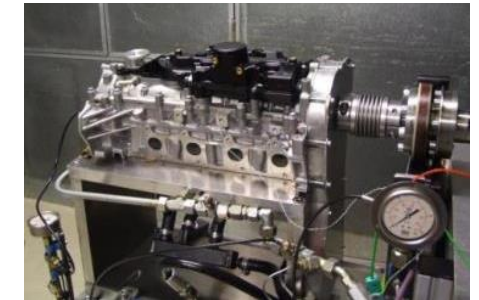
Techniques	Services	Functional Test	Endurance Tests	Environment Tests	Tribology / Analysis	Engineering
Component Test Field	TECHNIQUE					
High Dynamic Drives	Equipment			Infrastructure		
Radionuclide Technology	<ul style="list-style-type: none">2 powertrain test rigs (2/3 EM)Power-range up to 2.250Nm / wheelRig automation: SARA & own system			<ul style="list-style-type: none">Cooling chamberBattery simulation 800V / 600A / 160kW		
Engine Test Field						
Powertrain Test Field	SPECIAL FEATURES					
Environment Test Field	Operations			Measuring		
Wear & Friction Test Rigs	<ul style="list-style-type: none">Functional & endurance testsHigh dynamic rigs for engine simulationDriving StrategyTransmission calibrationPowertrain validationVehicle testing			<ul style="list-style-type: none">All physical measuring valuesAll dedicated process values (online/offline)Dynamics (angle-/time-based)NVH (Acoustics & Vibration)All relevant emissionsIndicated pressure & knock detectionWear measurement via surface scanWear measurement via RNTDelta analyzer		
Material & Measuring Laboratory						
Fatigue Strength Test Field						



Techniques	Services	Functional Test	Endurance Tests	Environment Tests	Tribology / Analysis	Engineering
Component Test Field	TECHNIQUE					
High Dynamic Drives	Equipment			Infrastructure		
Radionuclide Technology	<ul style="list-style-type: none">Climatic chambers -40° to 200° CCoolant or oil temperature -40° to 135 ° CIndependent control of ambient and mediumHumidity control 0...100%Shaker up to 40 kN			<ul style="list-style-type: none">Cooling circuit -44° CEnergy recoveryBattery simulation 800V / 600A / 160kWHydraulic power railOwn test bench construction for special applications		
Engine Test Field	SPECIAL FEATURES					
Powertrain Test Field	Operations			Measuring		
Environment Test Field	<ul style="list-style-type: none">Control of various actuators (LIN,CAN,SENT...)Functional & endurance testsLV124/VW80000VibrationMechanical shockMechanical, electrical & hydraulic misuse			<ul style="list-style-type: none">All physical valuesAll simulated valuesSimulation ↔ RigAll dedicated process values (online/offline)Dynamics (angle-/time-based)NVH (acoustics & vibration)Wear measurement via surface scanWear measurement via RNT		
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					
High Dynamic Drives	Equipment		Infrastructure			
Radionuclide Technology	<ul style="list-style-type: none">15 wear test rigs (rotational, translational)1 tribometer MTMOnline wear: RNT (Radio Nuclide Technology)High dynamic rotational friction rigMicro friction & sealing rig		<ul style="list-style-type: none">< 350 m² testing area for wear test & frictionHigh-resolution measuring technology & data evaluationOwn test bench construction for special applicationsOwn photo labs, measuring rooms, materials laboratory...			
Engine Test Field	SPECIAL FEATURES					
Powertrain Test Field	Load		Measuring			
Environment Test Field	<ul style="list-style-type: none">Medium contamination: dirt, soot, foaming, fuel, acidThermal load: -40° C up to 160° CMechatronic load: High-speed, speed gradient > 10.000rpm/sTest environment similar to mechanical, electrical and hydraulic operation parameters (Virtual ICE)		<ul style="list-style-type: none">All physical measuring valuesAll simulated valuesSimulation ↔ RigAll dedicated process values (online/offline)Dynamics (angle-/time-based)NVH (acoustics & vibration)Wear measurement via surface scanWear measurement via RNT			
Wear & Friction Test Rigs						
Material & Measuring Laboratory						
Fatigue Strength Test Field						

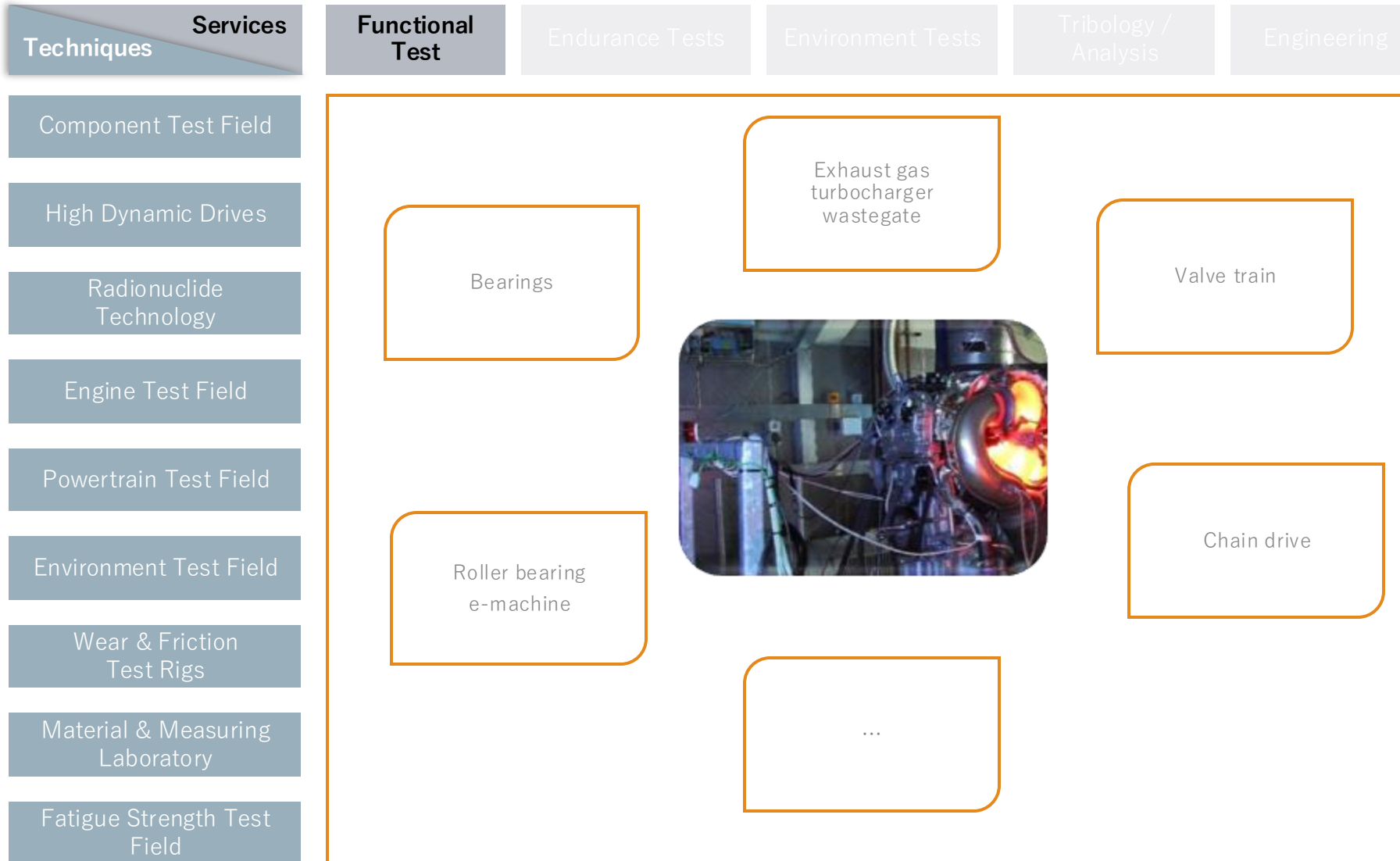


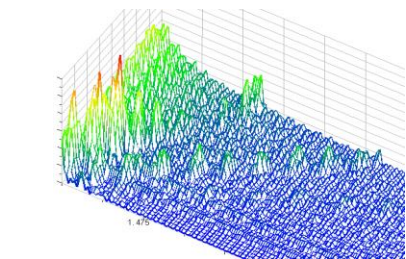
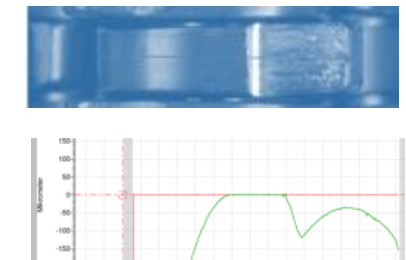
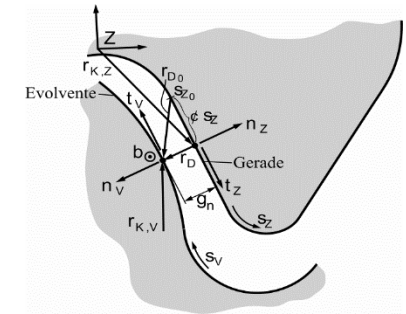
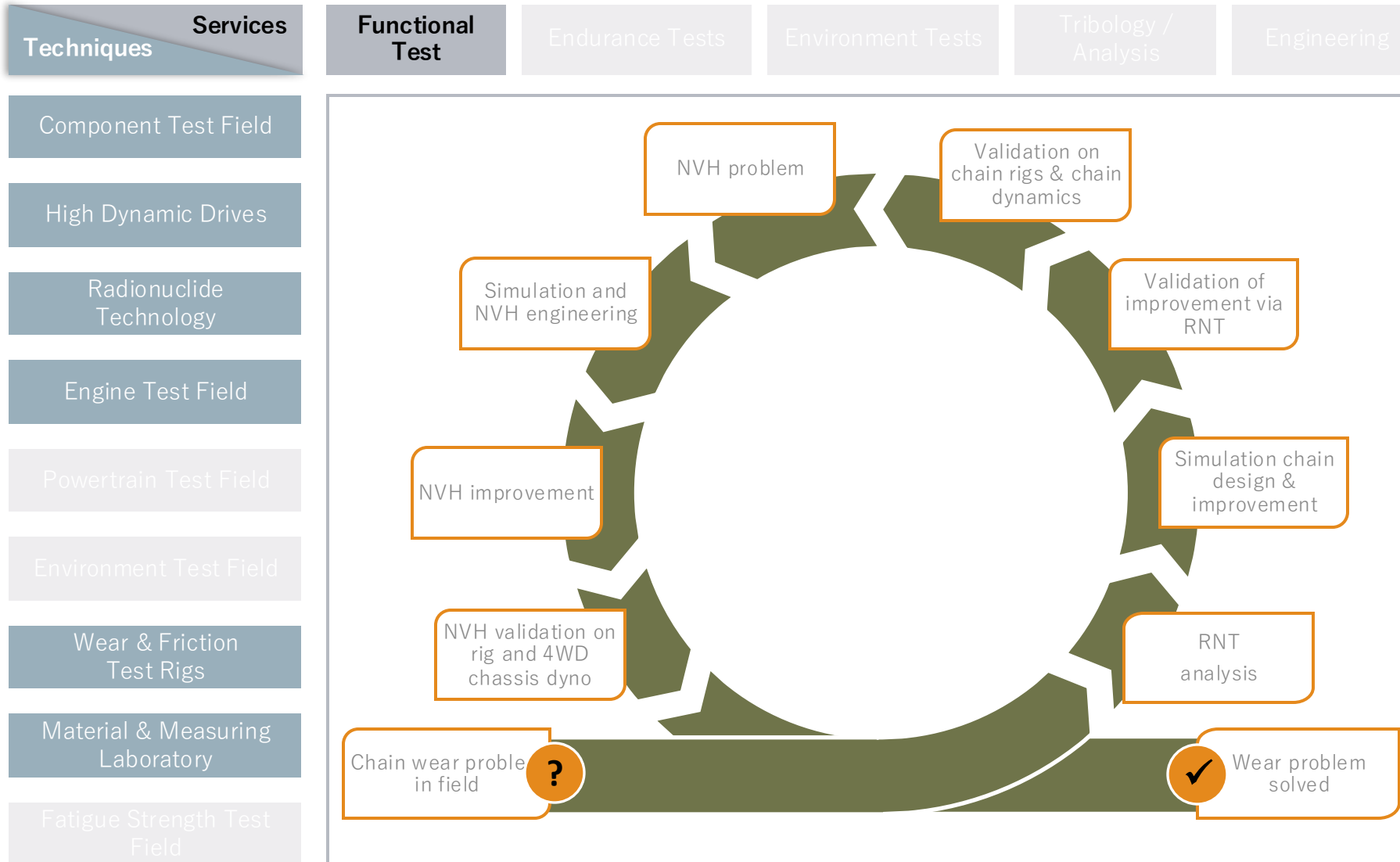
Techniques	Services	Functional Test	Endurance Tests	Environment Tests	Tribology / Analysis	Engineering
Component Test Field	TECHNIQUE					
High Dynamic Drives	Equipment		Infrastructure			
Radionuclide Technology	<ul style="list-style-type: none">3D measuring machine, Roundness, Straightness, Roughness measurementTransmitted light measurementPhoto microscopesHardness measurementMaterial-laboratory-MicroscopeREM use on request		<ul style="list-style-type: none">Materials laboratory with chemistry suction cupboardMaterial Cutting DeviceEmbed and Grind DevicePhoto laboratory			
Engine Test Field	SPECIAL FEATURES					
Powertrain Test Field	Operations		Measuring			
Environment Test Field	<ul style="list-style-type: none">Return Part Analysis on individual components (timing chain, valve train, transmission ...) with system view and system understandingApproval for measurement on RNT parts available		<ul style="list-style-type: none">All physical measurements tactile and opticalMaterial examination and assessment			
Wear & Friction Test Rigs						
Material & Measuring Laboratory						
Fatigue Strength Test Field						

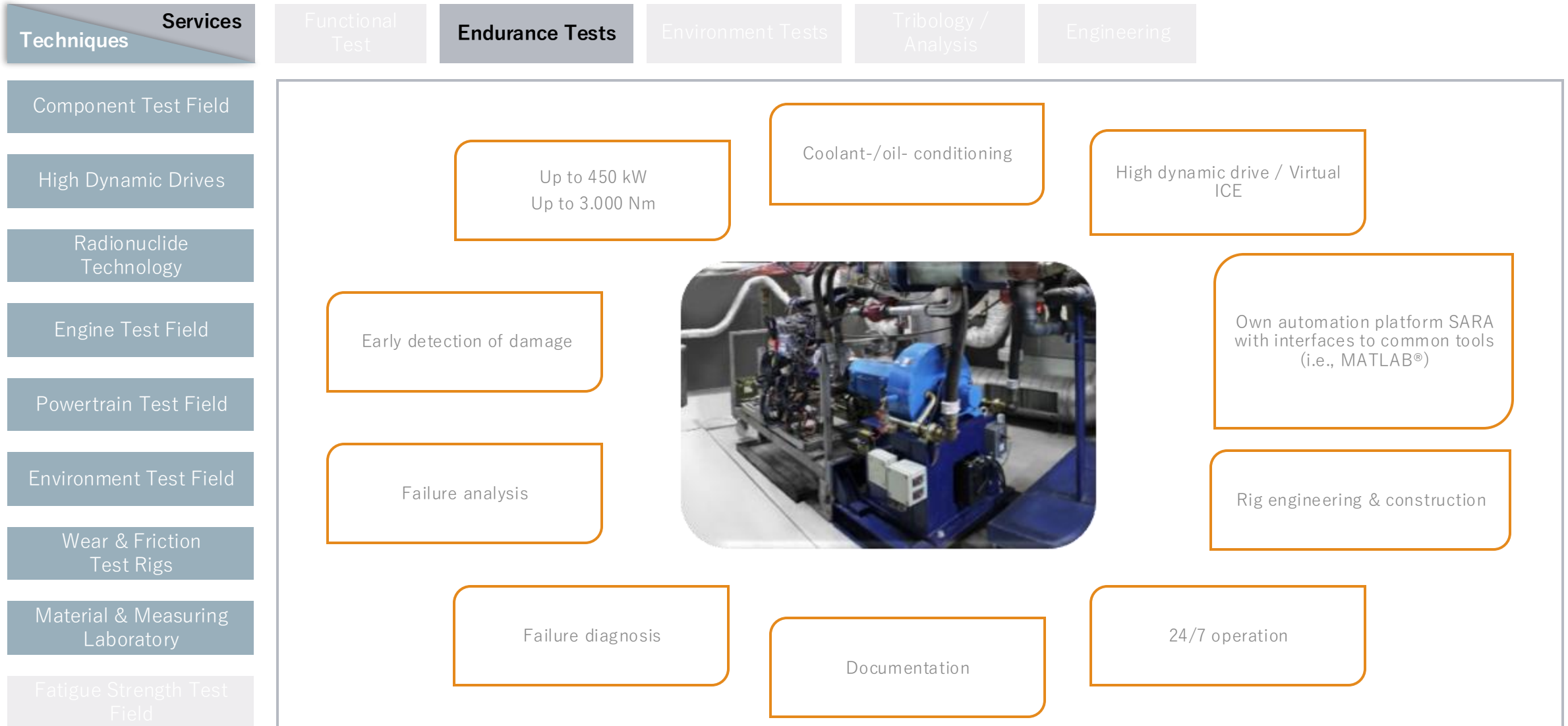


Techniques	Services	Functional Test	Endurance Tests	Environment Tests	Tribology / Analysis	Engineering
Component Test Field		TECHNIQUE				
High Dynamic Drives		Equipment		Infrastructure		
Radionuclide Technology		<ul style="list-style-type: none">• Resonance pulsators up to 20 kN• Resonance pulsators 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		<ul style="list-style-type: none">• Own photo labs, measuring rooms, materials laboratory...		
Engine Test Field						
Powertrain Test Field		SPECIAL FEATURES				
Environment Test Field		Services for Automotive Customers		Measuring		
Wear & Friction Test Rigs		<ul style="list-style-type: none">• Dynamic strength tests• Service strength tests• Crack detection and damage analysis• Lifetime valuation• Environmental simulation (-40 up to 160° C)		<ul style="list-style-type: none">• All physical measurements tactile and optical• Material examination and assessment		
Material & Measuring Laboratory						
Fatigue Strength Test Field						

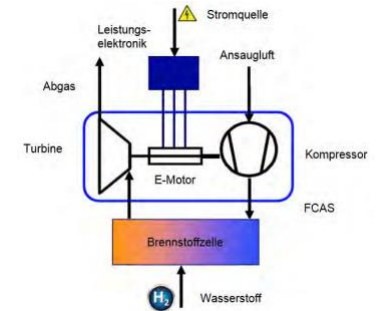
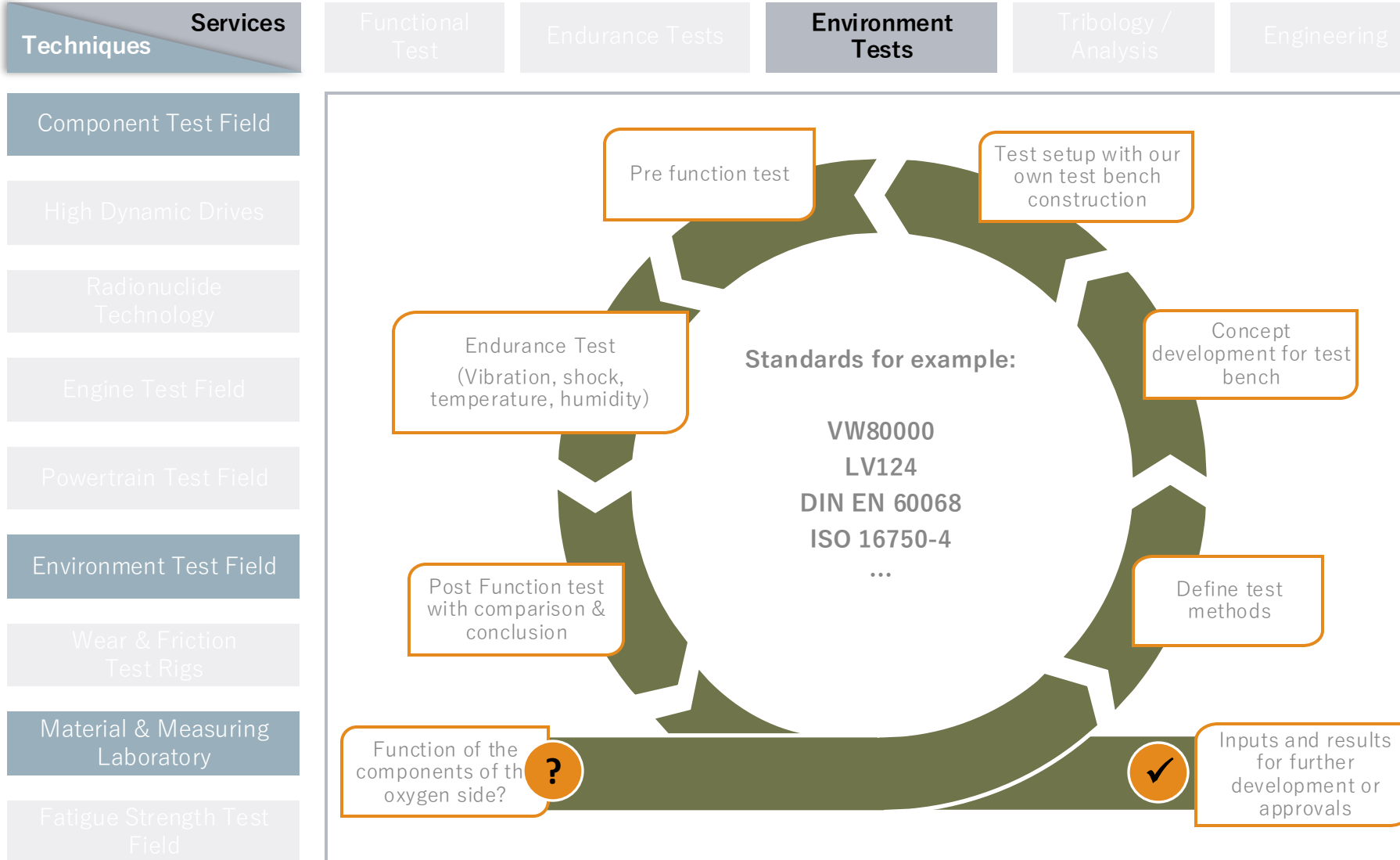


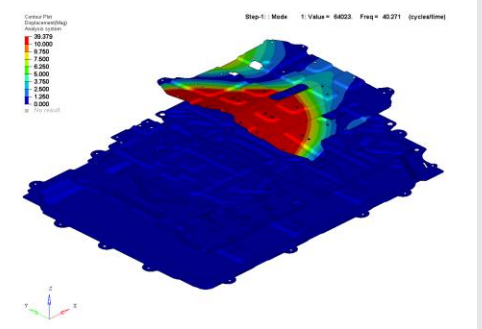
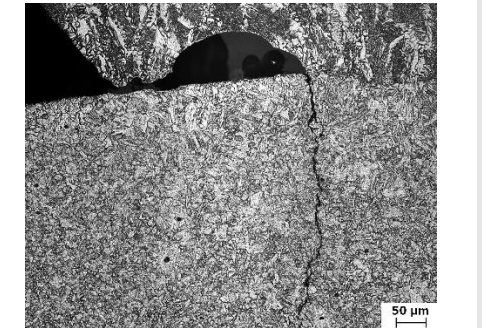
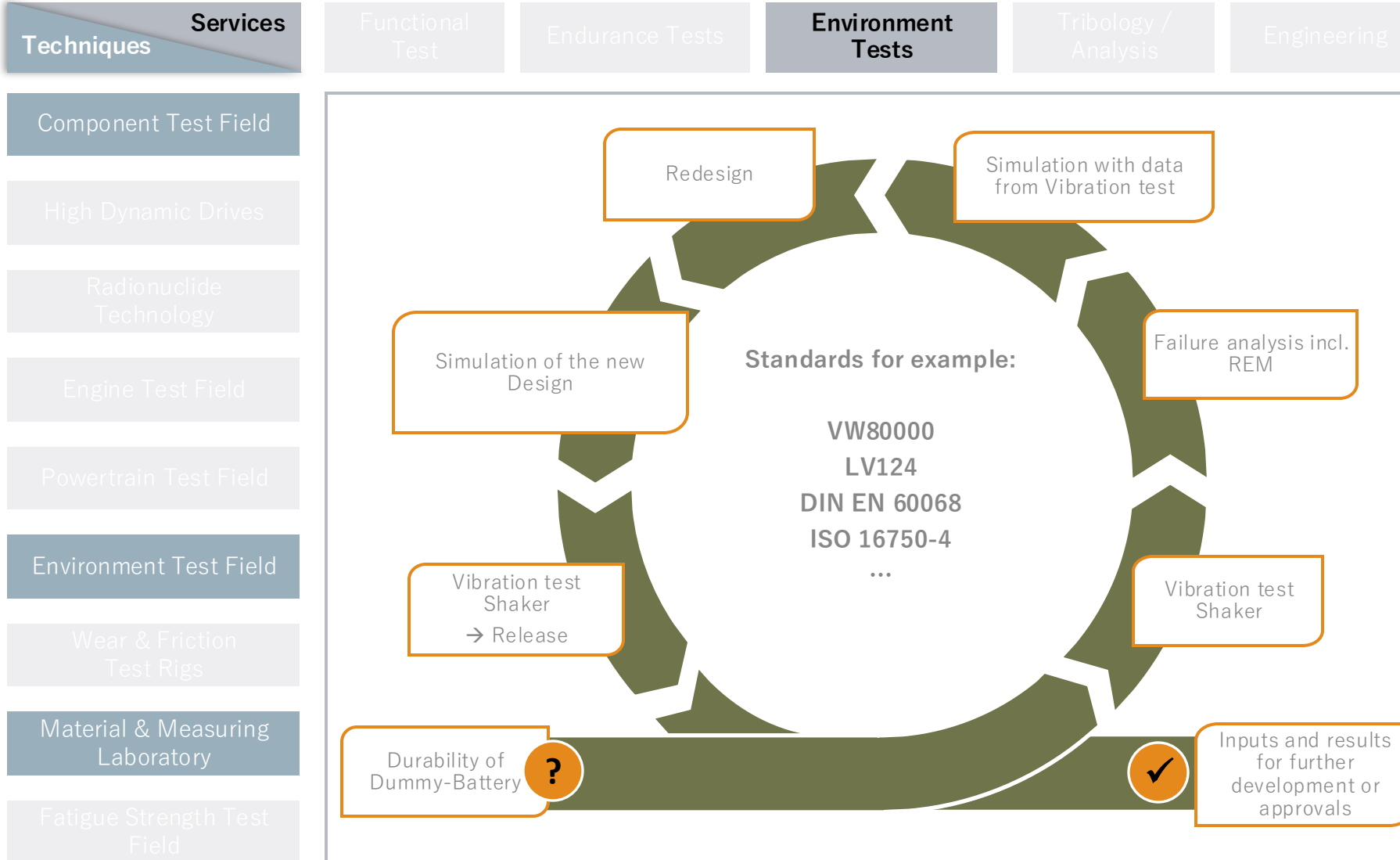


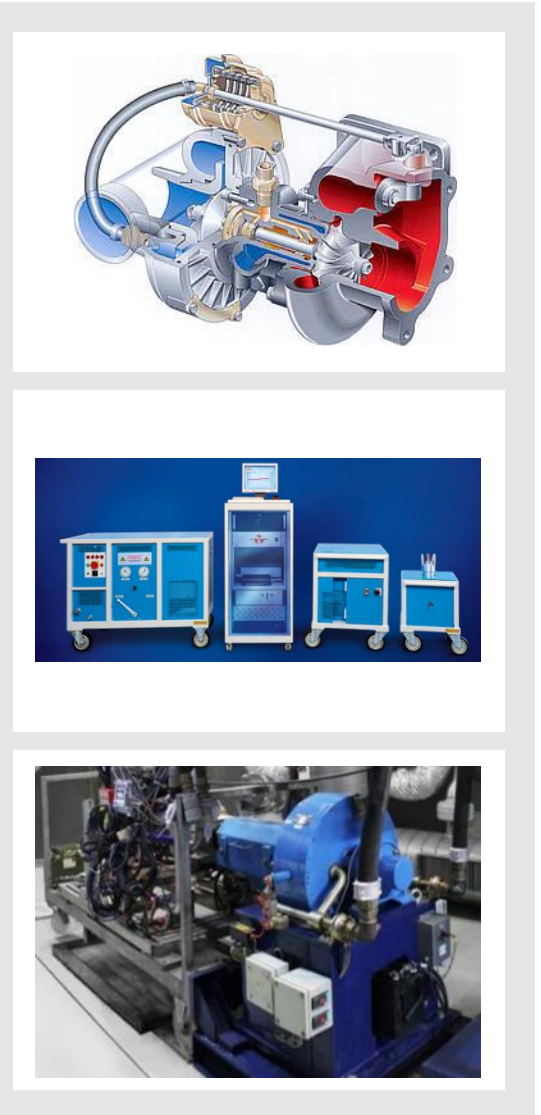
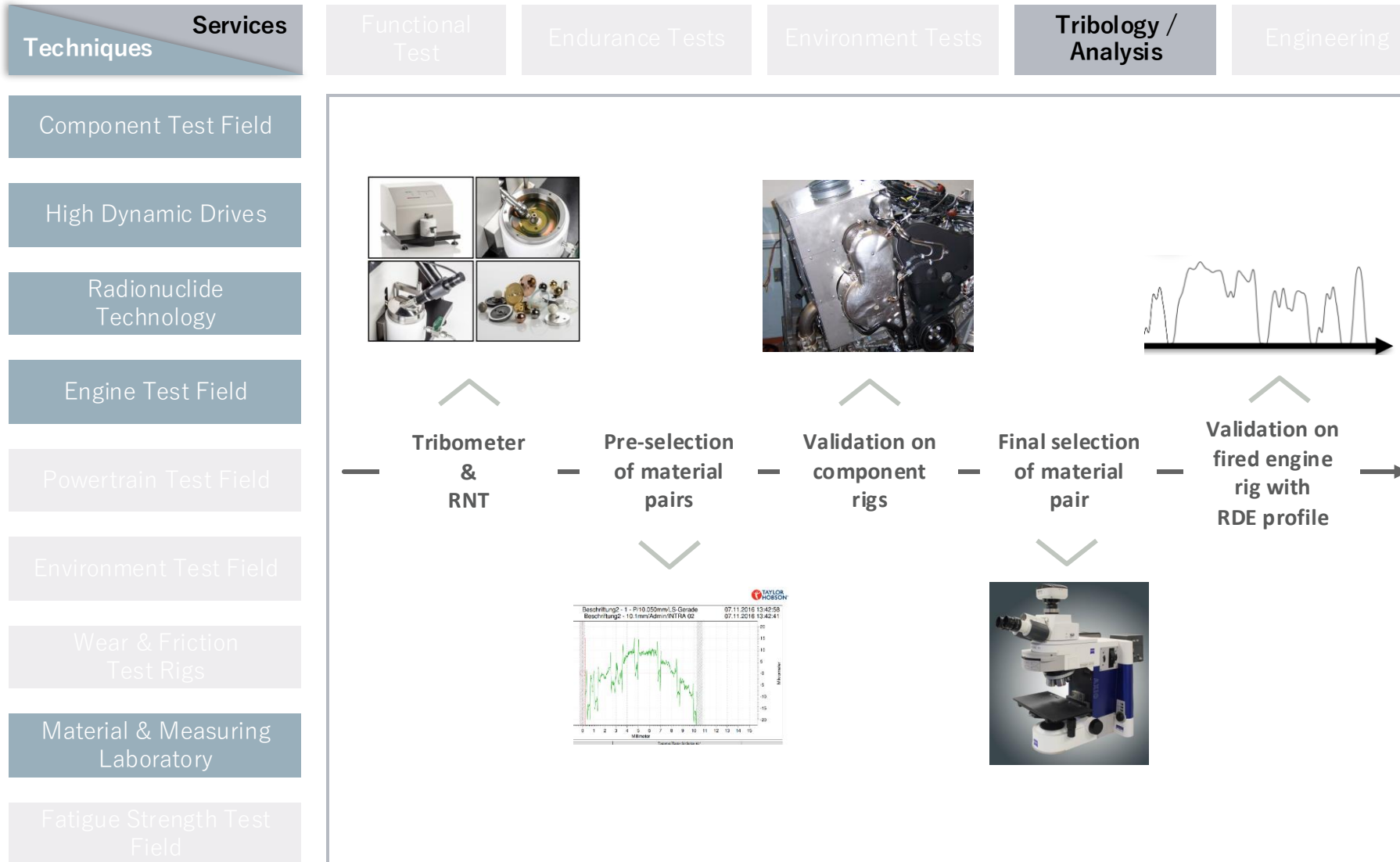


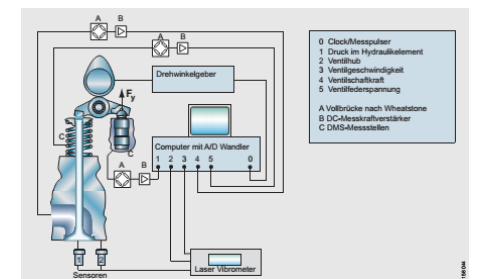
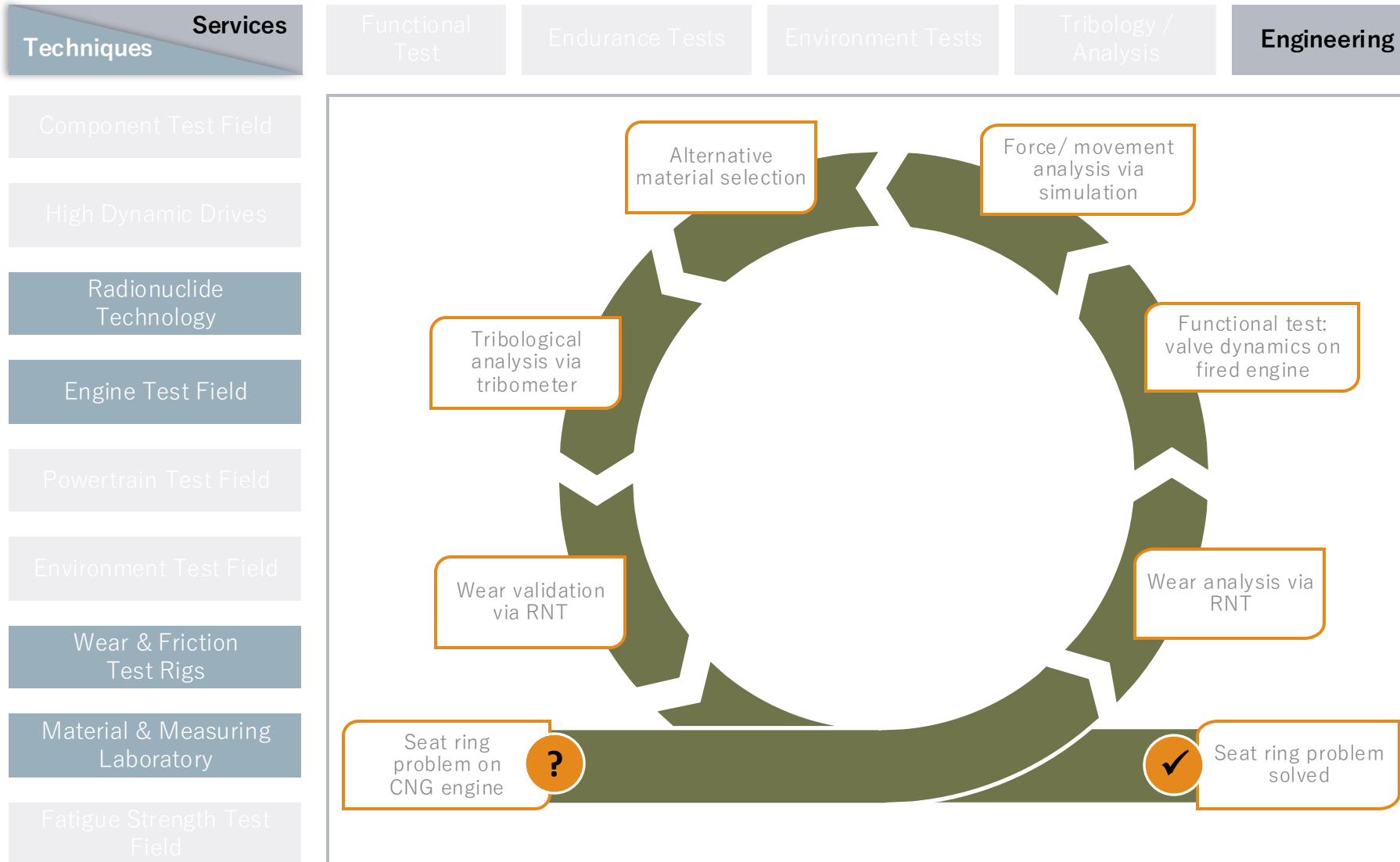


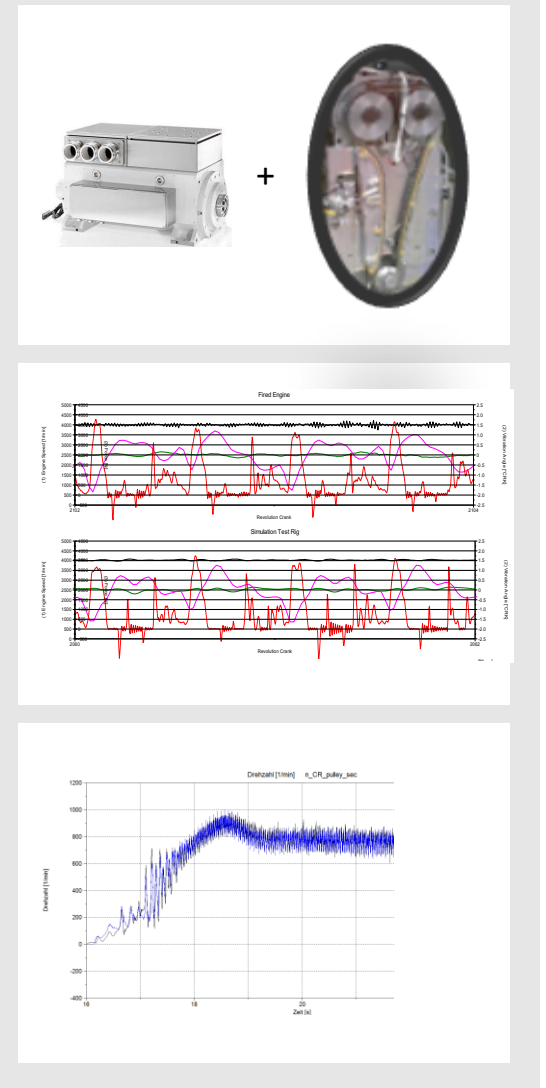
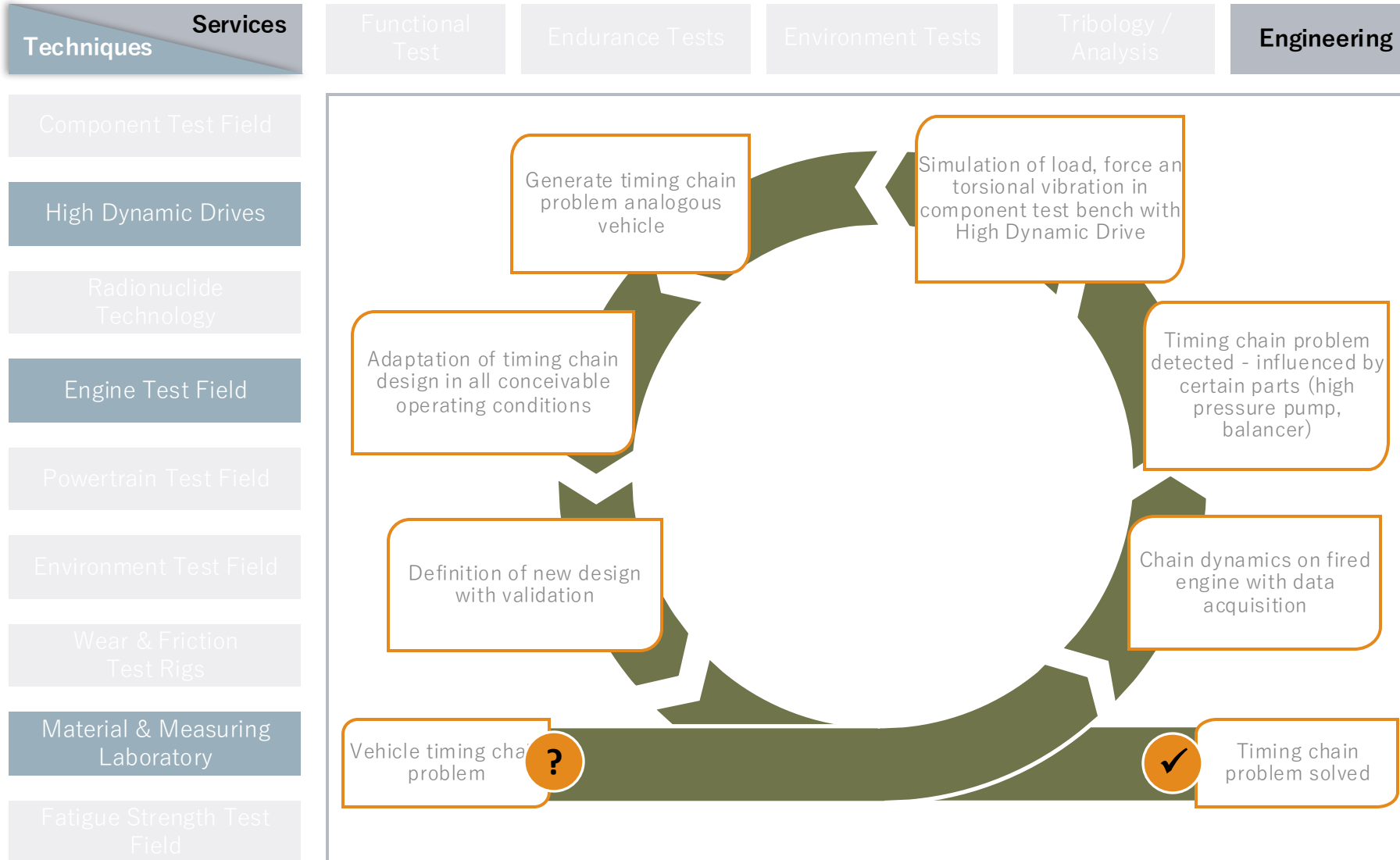
Environment Test / Example: Oxygen Supply for Hydrogen Fuel Cell

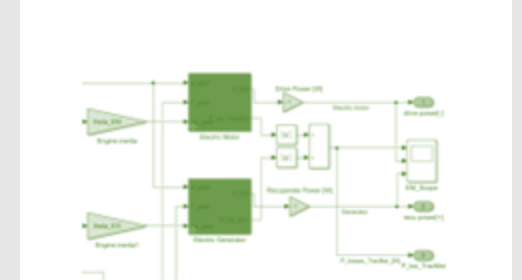
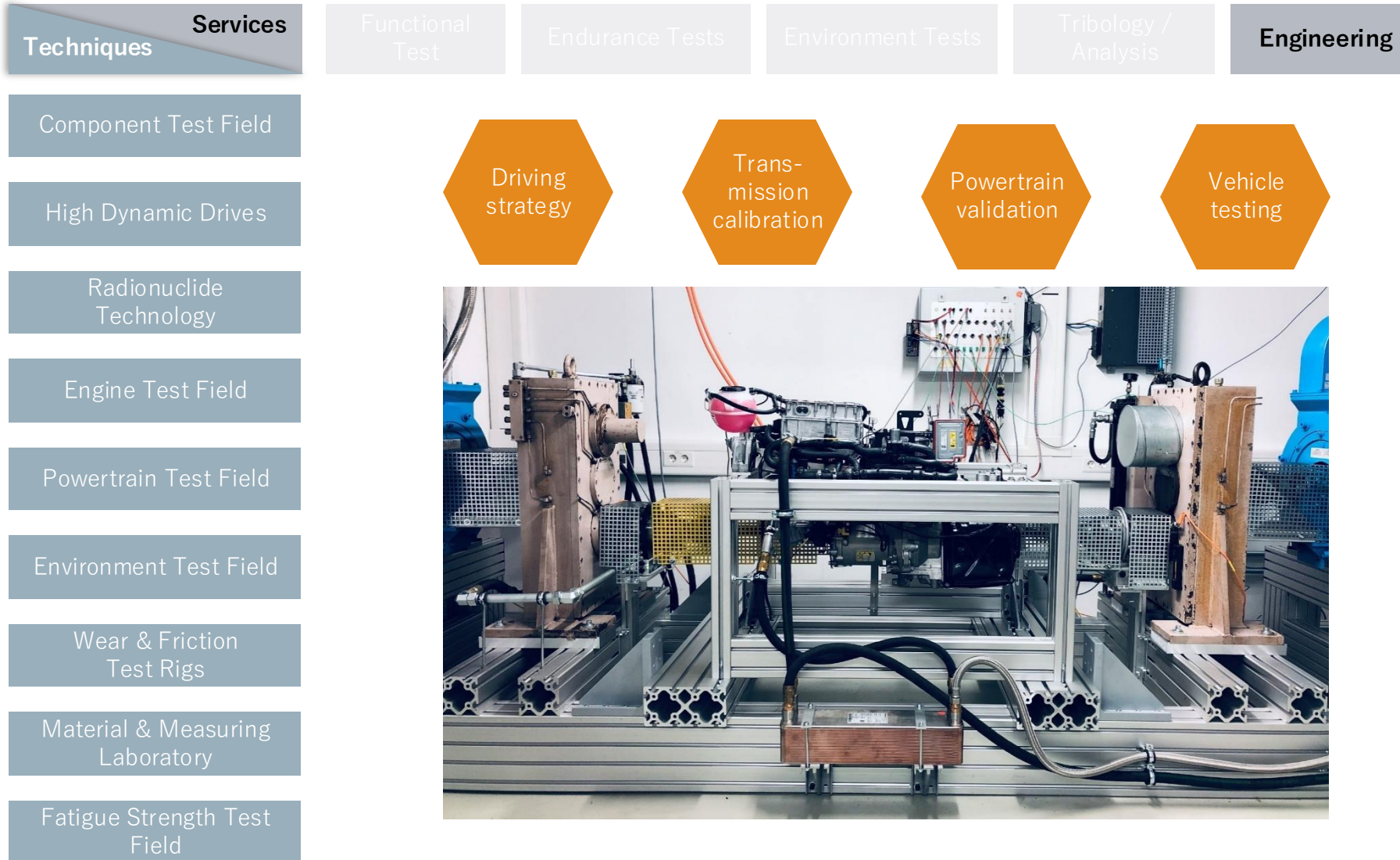


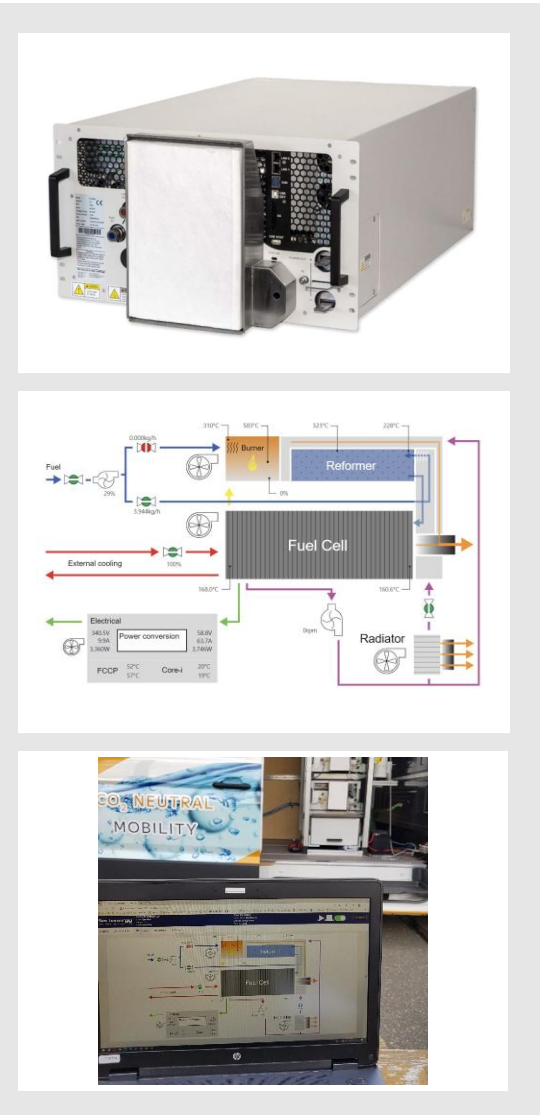
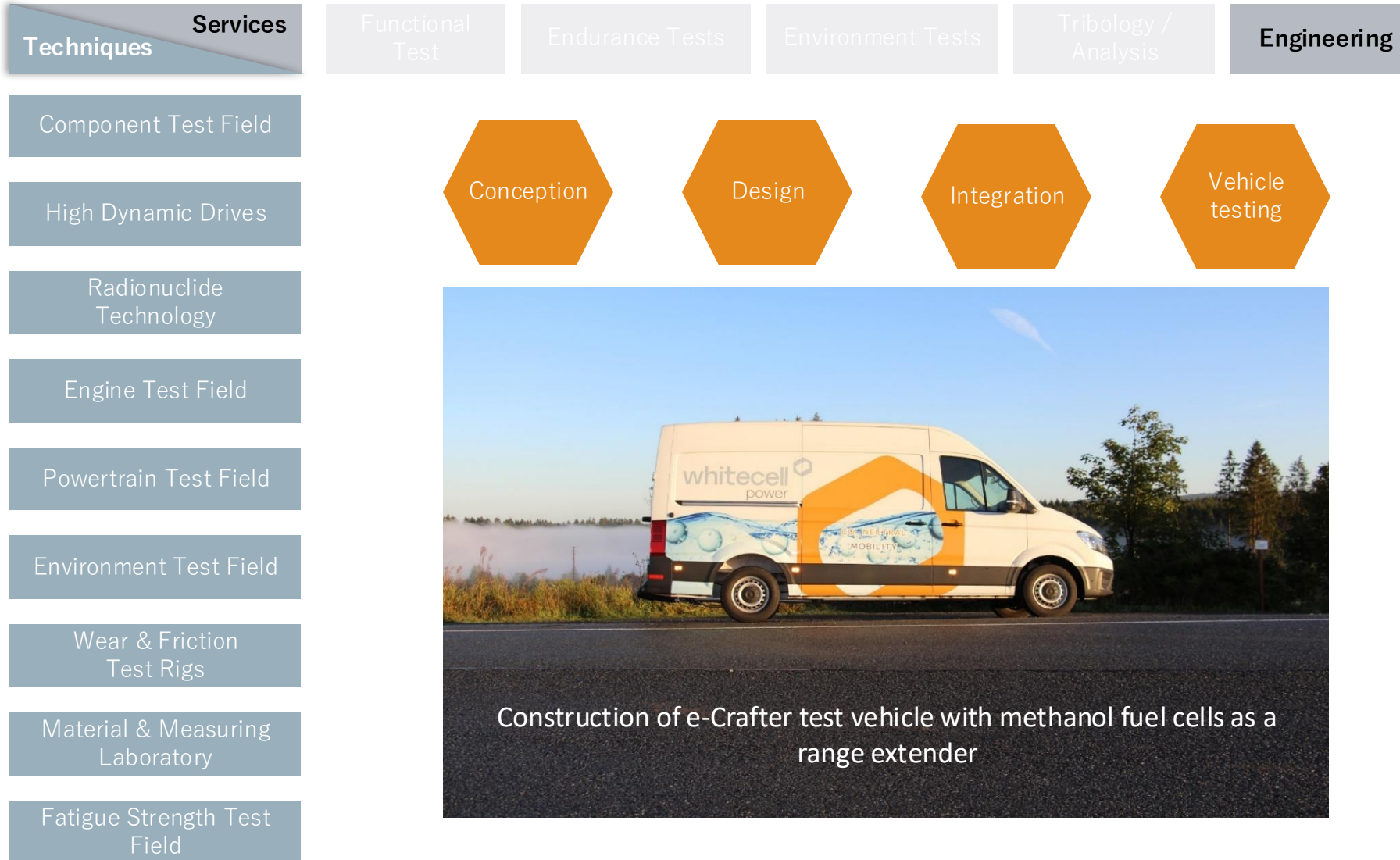


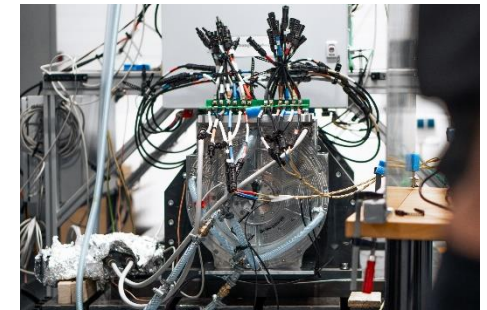
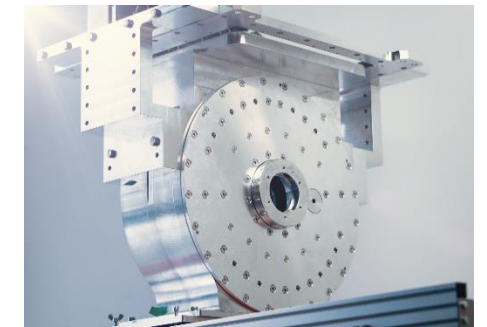
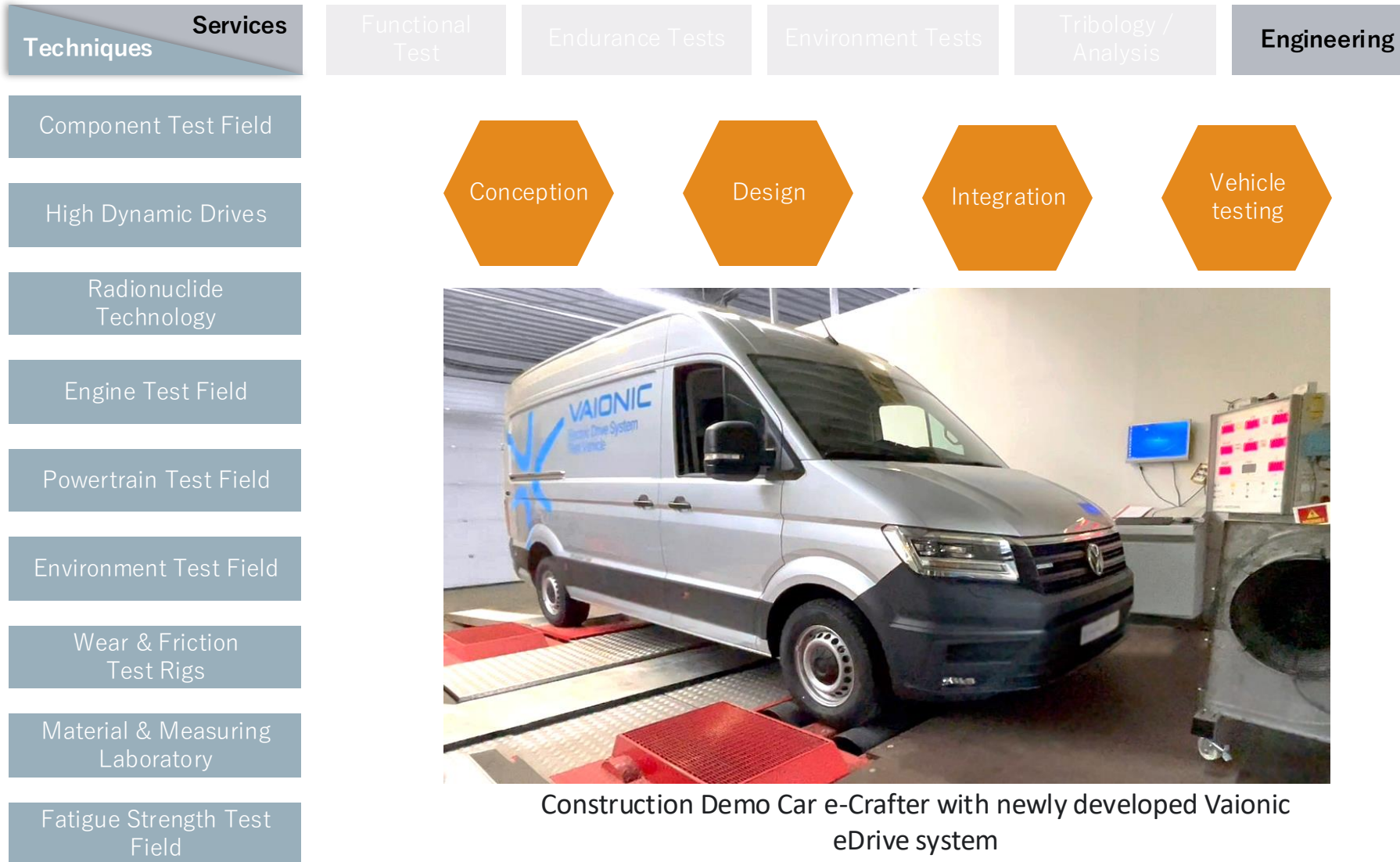














Component Test Field

High Dynamic Drives

Radionuclide
Technology

Engine Test Field

Powertrain Test Field

Enviroment Test Field

Wear & Friction
Test RigsMaterial & Measuring
LaboratoryFatigue Strength Test
Field

Prototypes

Design

Testing

Optimisation



Assembly of Whitecell Systems XGS-55 Generator with
Methanol Fuel Cells



Thank you.

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