Testing Services

Testing and Verification from One Source
by Magna Powertrain Engineering Center Steyr

eDrive Testing

- eMotor, inverter and eDrive system testing
- Partly and/or fully conditioned test environment
- B2B Testing

Engine Testing

- Function - durability - emission testing
- High altitude & climate test bench
- 15 engine test benches
- Engine calibration

Fatigue Lab

- Fatigue component tests - functional fatigue testing on system level
- Measurement data logging and processing
- Material and joint testing for FEMFAT database

Vehicle Testing

- 4WD Chassis Dyno (acoustics, thermal, emission, function)
- Proving ground
- Vehicle validation and testing

Battery Cell Testing

- Thermal performance characterization
- Aging / lifetime
- Engineering/development of electro-thermal cell models

Driveline Testing

- Lubrication & Ventilation testing
- Functional testing
- Durability testing
- Ultimate strength testing

Thermal System Testing

- Component Tests
- Module Tests
- Complete Thermal System Tests (ViL)
- Thermal System Control Strategy Validation
- Refrigerant System Test

eDrive Testing

Main Development Topics

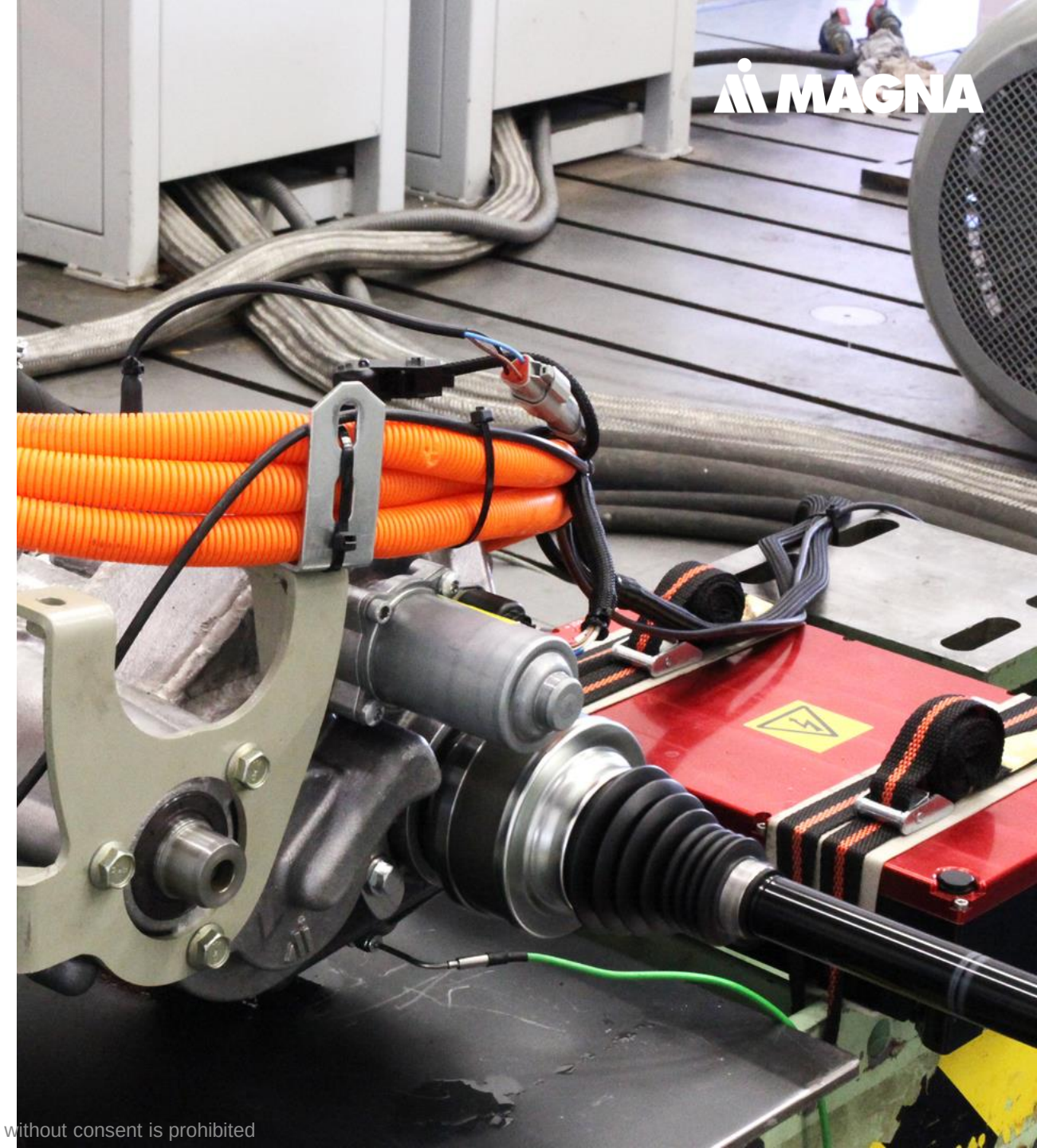
- Component testing
- System and functional testing
- Benchmarks
- Durability tests
- Efficiency analysis

Specification and Supported Engines

- Engine speed < 20.000rpm
- Performance up to 529kW
- Environmental conditions (water, oil and environment)
- Wide range of applications: passenger car, light & heavy duty trucks, nonroad, etc.

Measurement Equipment

- Battery simulator (@1000V, 1200A)
- Regatron 48V / HV systems
- Precision power analyzer



Engine Test Benches

Main Development Topics

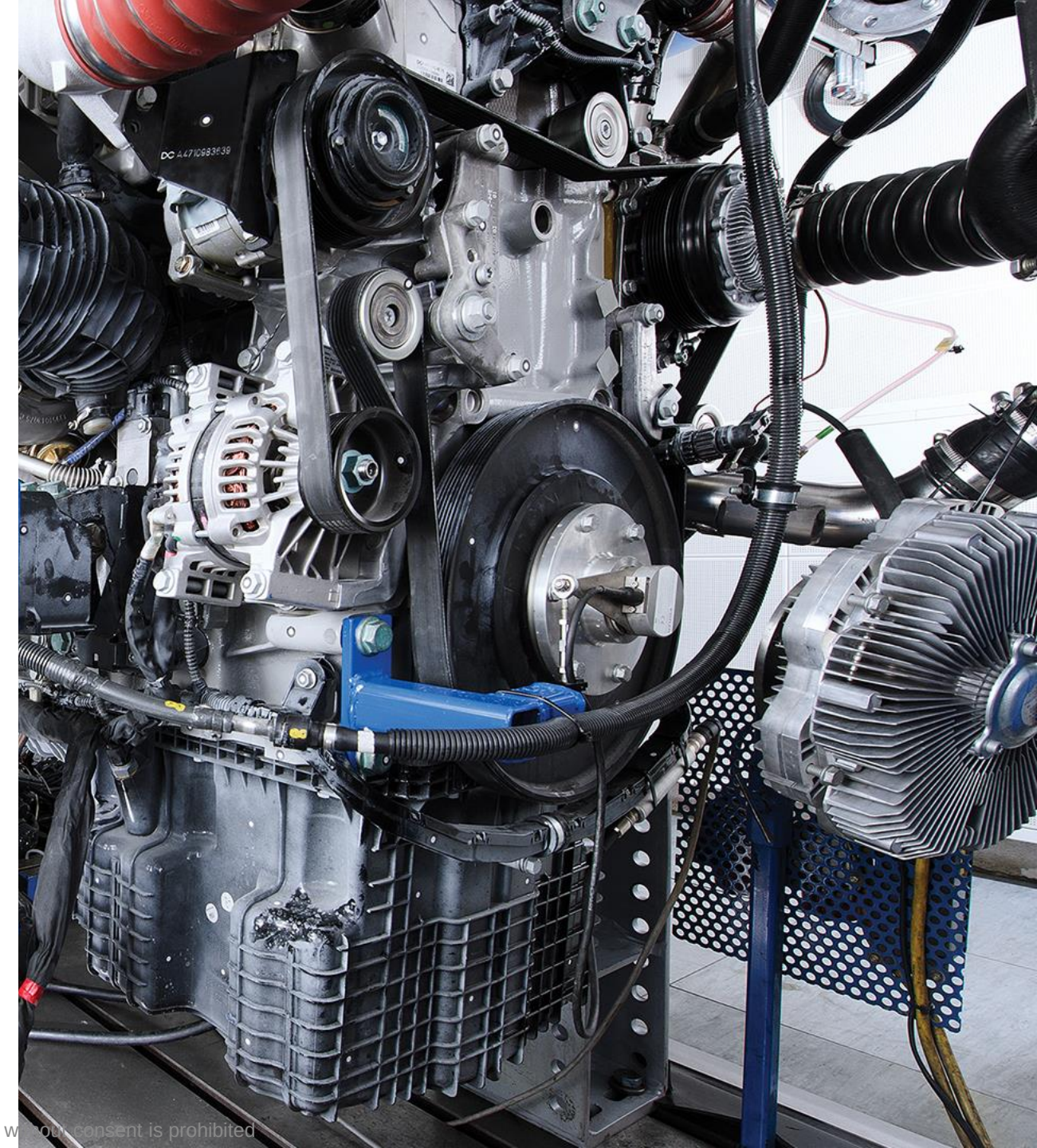
- Dynamic and steady state testing
- Function & durability testing
- Engine and OBD calibration
- Exhaust gas after treatment calibration and development
- Component testing
- Engine benchmark
- Engine homologation
- Frictional power analysis

Specification and Supported Engines

- Compression and sparked ignition engines
- Power range: up to max. 520kW
- Field of applications: passenger car, light & heavy duty trucks, nonroad, ….

Measurement Equipment

- AVL FTIR/IAG FTIR
- AVL Micro Soot
- AVL Particle Counter
- AVL Opacimeter
- AVL Coriolis
- AVL Indicating System
- AVL Flow Sonix
- AVL Fuel Measurement
- Horiba Mexa
- Oil Soot Analyzer
- Smart Sampler
- 48V Powersupply
- And many more…



High Altitude & Climate Test Bench

Test Chamber

- Max. altitude: 5000m (540mbar)
- Performance: 500kW
- Torque: 2600Nm / 3100Nm peak
- Max. speed: 8000 U/min
- Humidity abs.: 24g/kg
- Rel.: 95% @ T< 28°C
- Temperature: -30°C / + 50°C

Emission Measurement Equipment

- COH/CO2 -Analyzer
- COL -Analyzer
- CO2 -EGR –Analyzer
- CO2 -Analyzer
- THC -Analyzer Heated
- NO, NO2 u. NOx -Dual Detector (Analyzer heated)
- Accuracy class 1% full scale or 2% of reading
- Sampling rate1 Hz
- FTIR
- AVL Particle Counter
- AVL Micro Soot

Further Mess Data

- Temperatures
- Pressure
- Volume Flow
- Current/voltage
- Dynamic fuel consumption measurement

Fatigue Laboratory / Fatigue Testing

Equipment & Infrastructure

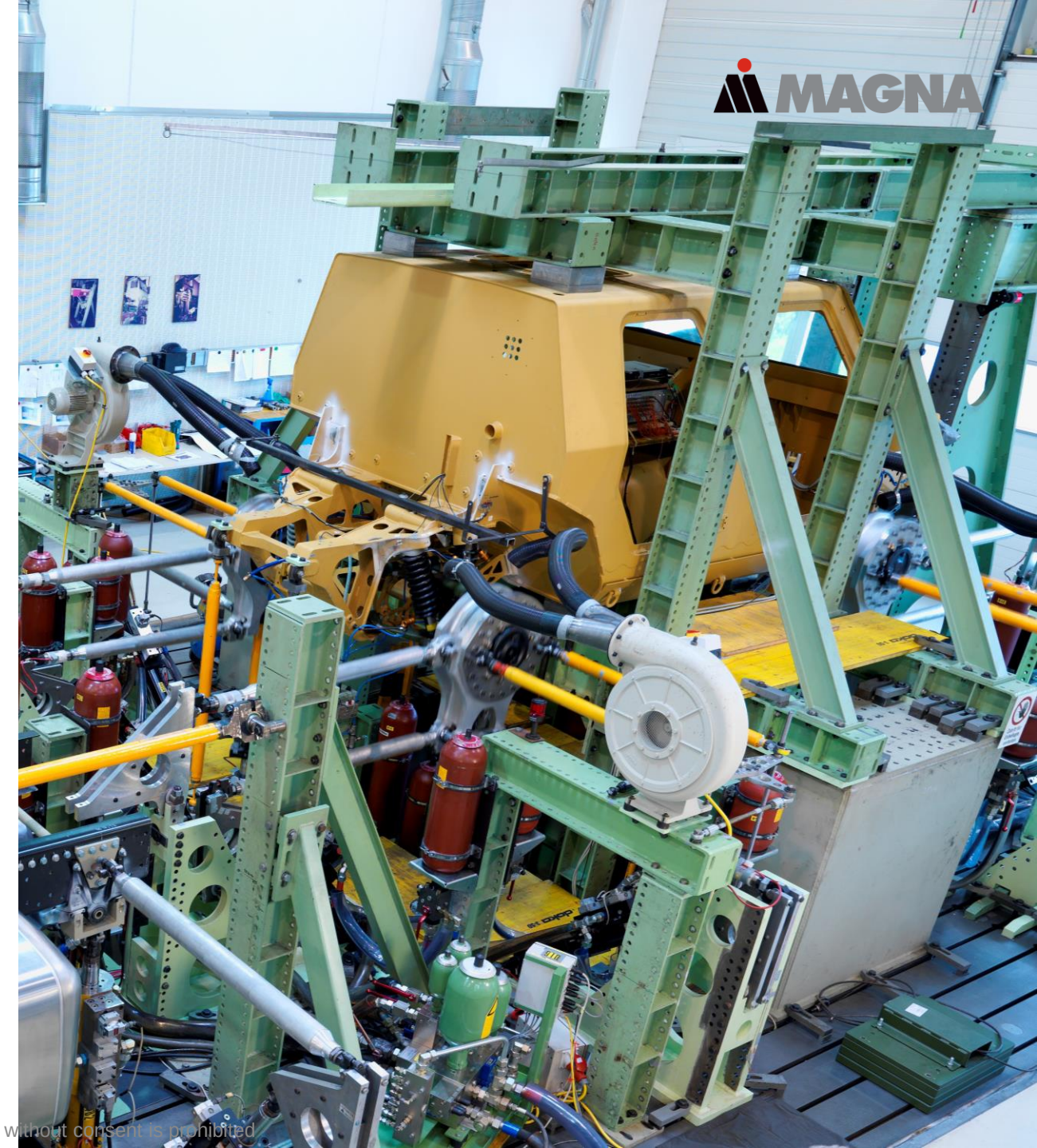
- 250 servo-hydraulic actuators
- Forces between 10kN – 500kN
- Frequency up to 100Hz
- Up to 40 actuators can be controlled simultaneously
- 9 foundations (Up to 500tons)
- Max. weight of specimen 50tons
- Flexible modular test rig systems

Main Testing Topics

- Cabin/body
- Axle and suspension
- Add-on parts and components
- Frame and subframe
- Steering system
- Determine material properties
- Measurement data analysis and processing
- Functional testing
- Testing under corrosion
- Special test rig design
- Material specimen testing (high T)
- Joint testing (thermal, mechanical)

Fatigue Testing Workflow

- Temperatures
- Pressure
- Volume Flow
- Creation of test program
- Test rig iteration
- Fatigue testing



4WD Chassis Dynamometer

Main Development Topics

- Acoustics and vibrations
- Energy and thermal management
- Functional development
- Torque management
- Emission development
- Fuel consumption optimization

Specifications

4 single wheel drives:	4 x 250 KW
Maximum vehicle speed:	260 km/h
Max. drag force:	12.000 N / axle
Flexible wheelbase from:	2.0 – 4.4m
Vertical load per axle:	5.500kg

Wind Tunnel

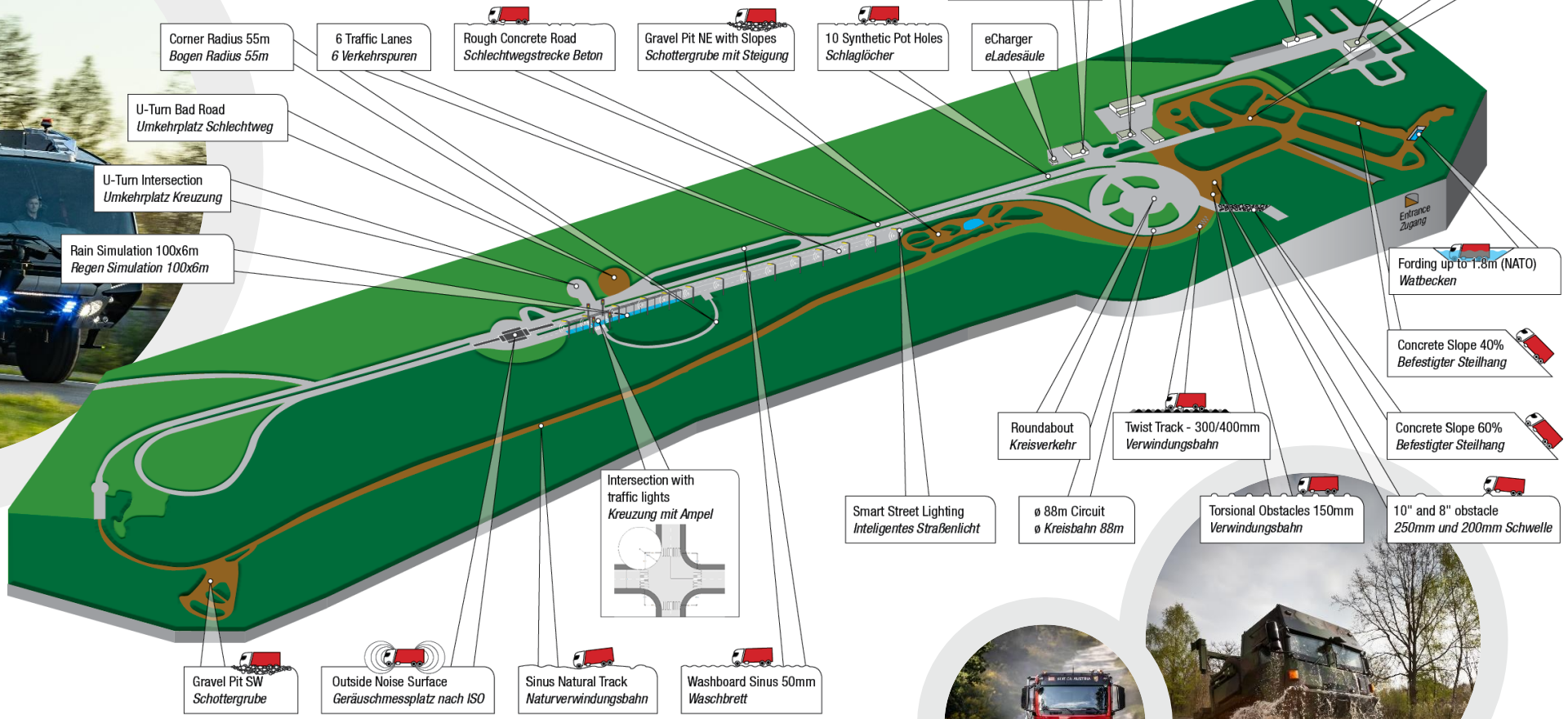
Airflow:	140.000 m³/h
Variable outlet:	0,54 … 1,8m²
Temperature condition:	-20°C up to 50°C

NVH Test Cell

Free field from:	40Hz to 10KHz
Cell dimensions (l x b x h):	12 x 8,3 x 4,5m

ECS Proving Ground

5G
Net Covering



Off Road: 7,2 km

On Road: 2,2 km

Straight Length: 0,85 km

Battery Cell Testing

Test Configurations

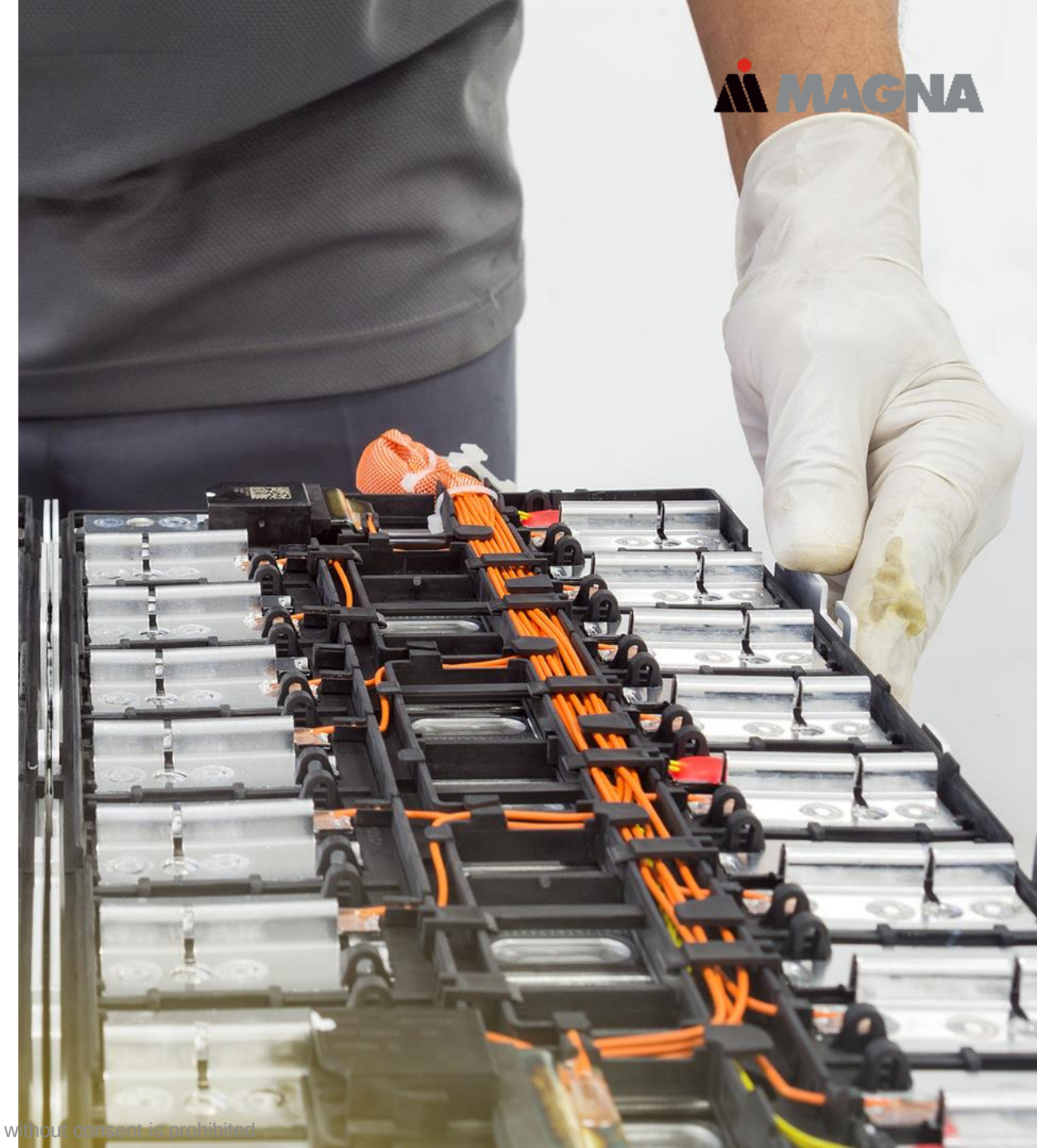
- Electrical characterization (performance, capacity, inner resistance)
- Thermal performance characterization
- Aging / lifetime
- Engineering/development of electrothermal cell models

Temperature Chamber

- - 40 to 90°C
- 5 K/min
- 4500 W heat compensation
- 1000 l
- Safety: HL5

Cell Cycler

- 0 – 5 V
- 12 channels á 50 A
- 4 channels á 600 A
- Parallelization up to 2400 A
- ± 0,01 % @ current
- ± 0,025 % @ voltage



Driveline Testing

Lubrication & Ventilation Testing

Functional Testing

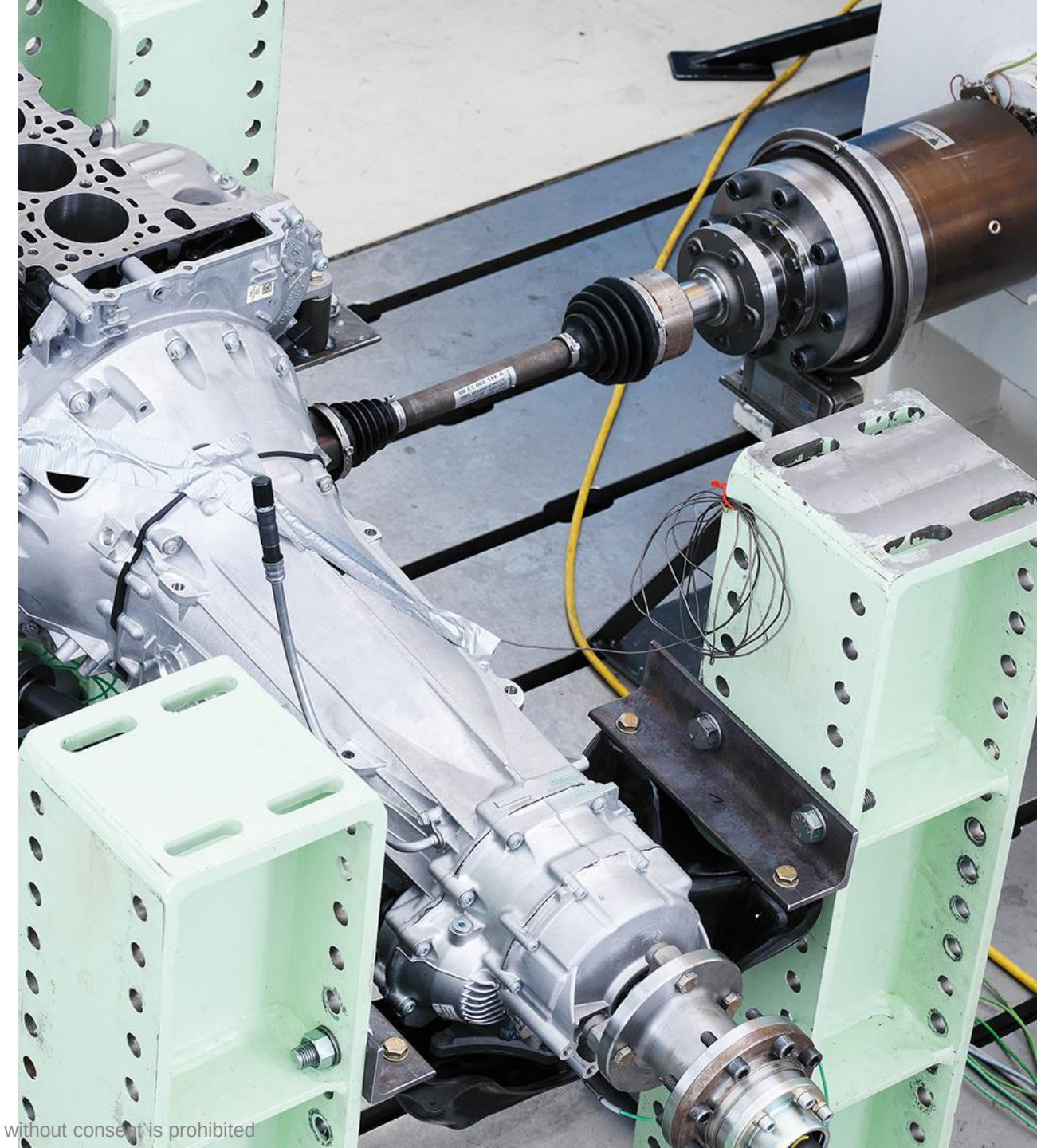
- Bearing adjustment
- Contact pattern
- Shifting of gears
- Engagement of locks
- Clutch characteristics
- Temperature behavior loaded
- Efficiency measurement
- NVH measurements

Durability Testing

- Gears, Bearings
- Differential
- Seal rings
- AWD clutch
- Actuation system
- Park lock

Ultimate Strength Testing

- Static ultimate strength testing
- Dynamic ultimate strength testing



Thermal System Testing

Test Configurations

- Component Tests (Radiators, HV heater, AC Compressor,…)
- Module Tests (Cooling Circuit, A/C System, HVAC System,…)
- Complete Thermal System Tests (ViL)
- Thermal System Control Strategy Validation
- Refrigerant System Test (R1234yf, R290, R744, …)

Test Chamber

- Ambient
  - Temperature -20 to +50°C
- Air flow
  - Air flow circuits 2 circuits
  - Air flow 1 up to 5000 m^3/h
  - Air temperature 1 -20 to +50 °C,
  - Air flow 2 up to 600 m^3/h
  - Air temperature 2 -20 to +35 °C, up to 80% rH
- Coolant
  - Cooling circuits 4 circuits
  - Coolant temperature -20 to +140 °C
  - Coolant volume flow up to 50 l/min
  - Heating performance 9 kW per unit
  - Cooling performance 6 kW per unit
- HV Supply
  - Voltage up to 800 V
  - Power up to 32 kW
- Measurement equipment
  - Air mass flow
  - Air speed
  - Humidity
  - Temperature (air, coolant, refrigerant)
  - Pressure (air, coolant, refrigerant)
  - Coriolis mass flow measurement device
  - Refrigerant mass flow
  - Coolant volume flow
  - Oil circulation rate (OCR)