



23. FORUM

GEHEIMNISSE IM RODGAU-DUDENHOFENER WALD

DIGITALE FAHRZEUGE UND PHYSISCHES TESTEN?

VORTRAG

»Testen und Validieren für künftige Homologation und Zertifizierung im Testcenter«

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AUTOMOTIVE
CLUSTER Rhein
Main
Neckar
WIR BEWEGEN DEUTSCHLAND

 **SEGULA**
TECHNOLOGIES



High speed track



Calibration track



Performance area



Comfort & Noise



Torture track



Long straight+
300m Ø Skid-Pad



100m Ø Skid-Pad



Hill section



Handling track



Sand & Gravel



Salt splash & mist
Water bath & trough



Pass by Noise



Airbag Misuse



Climate Chambers



Workshops



Fuel & Charge



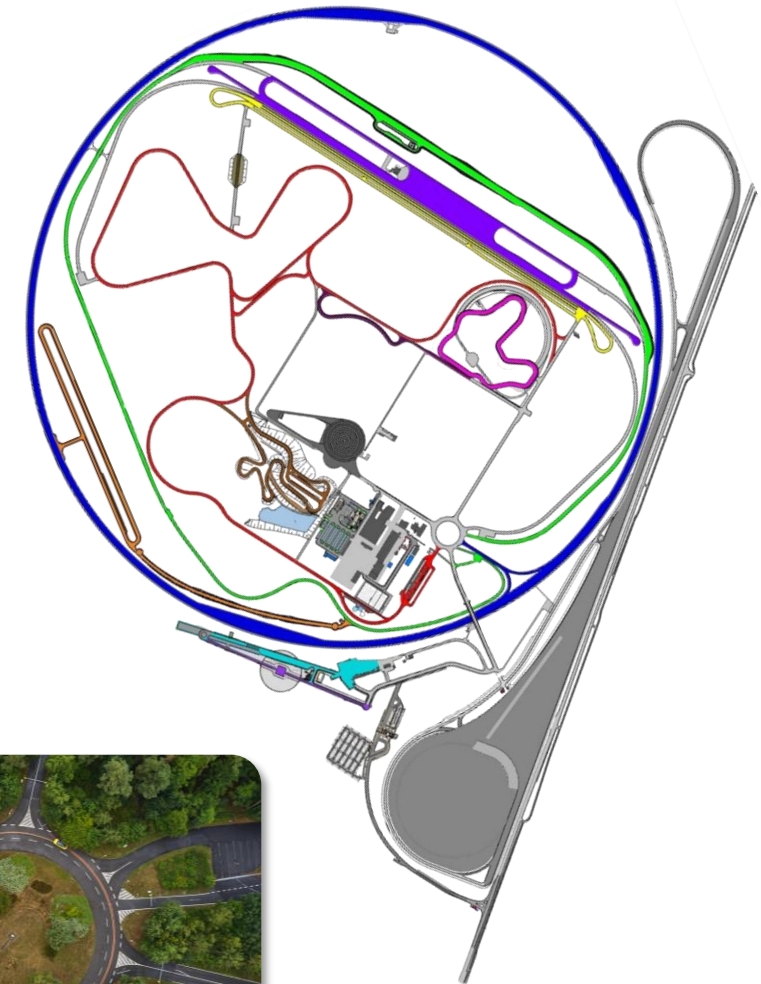
Conference area



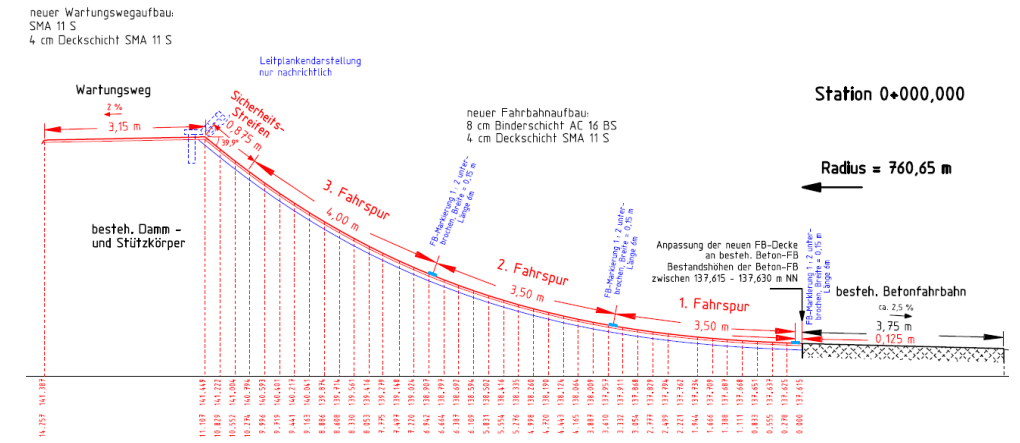
ADAS Testing



Emission & Durability



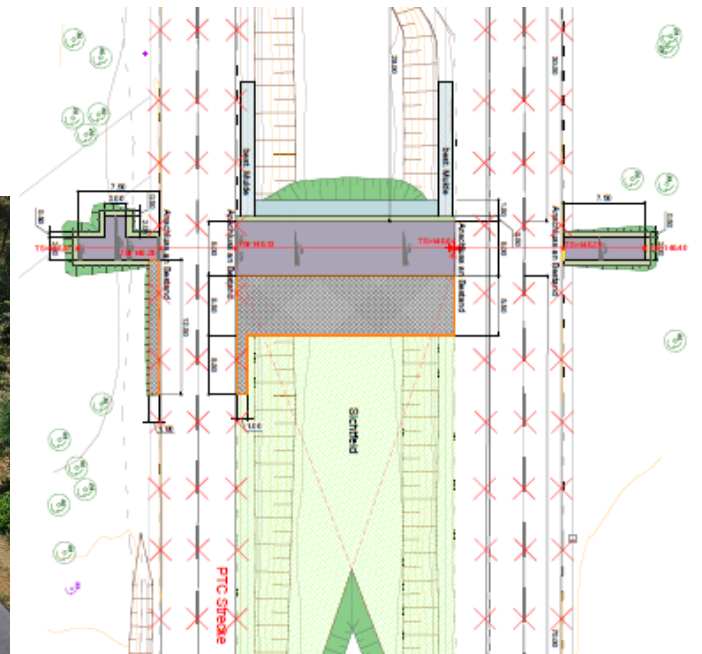
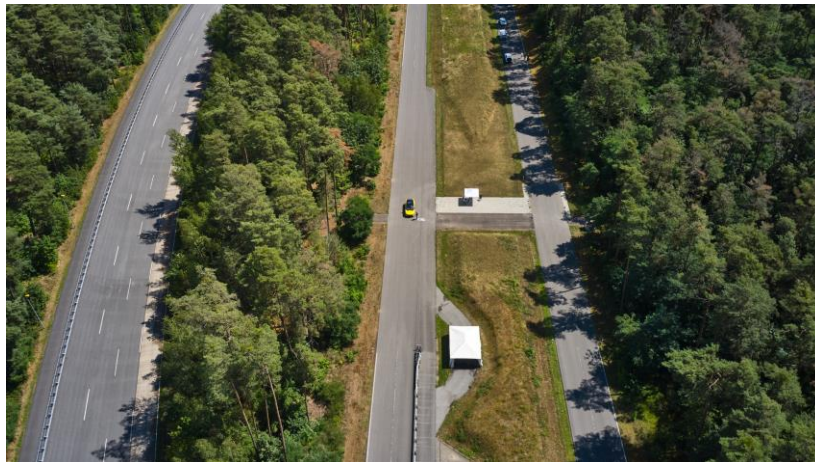
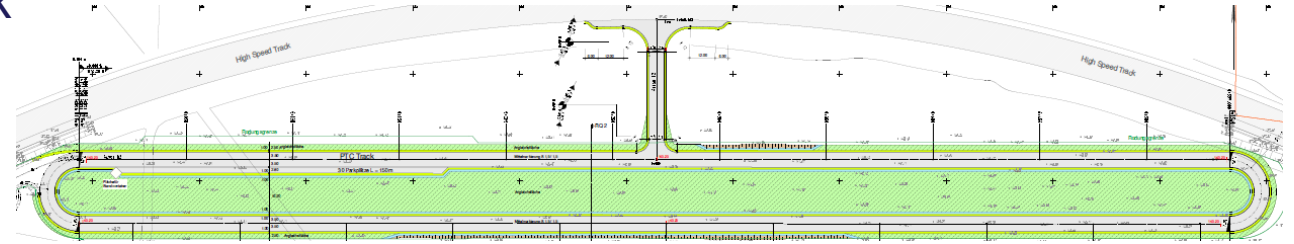
- 4,8 km Length
- 39,9° Banking of the highest point
- Driving side force free up to 250 km/h
- Even at night with illumination up to 250 km/h
- 4 Lanes (1x Concrete / 3x Asphalt)
- 3 Braking zones
- 3 Heating / Cooling Boxes next to the track



TESTCENTER RODGAU-DUDENHOFEN

CALIBRATION TRACK

- Direct connection to the high speed track
 - Flat oval with 1,2km total length
 - 2 straights with 550m length each
 - 2 Driving lanes
 - Stop & Go possibility
-
- NCAP compliant pedestrian path integrated into existing PTC track
 - 2 parallel tests with NCAP Pedestrians can be performed



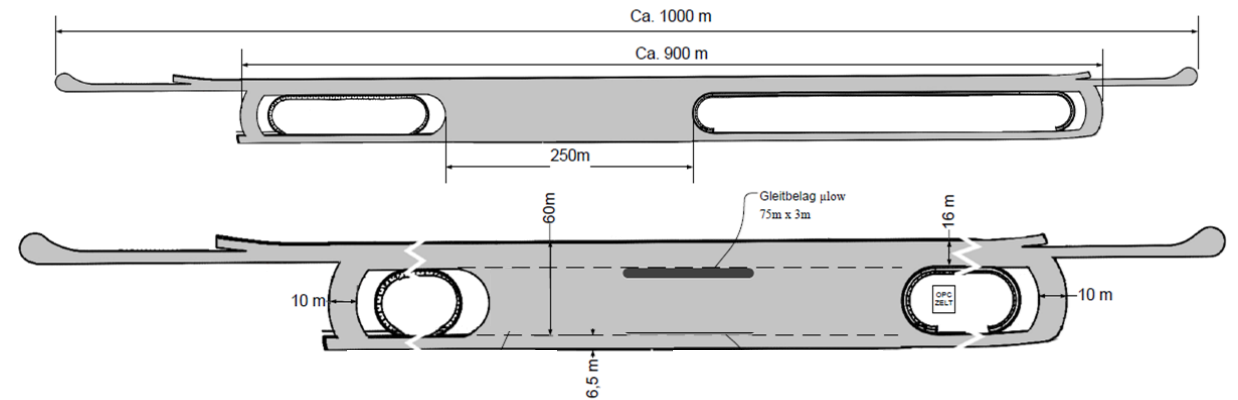
TESTCENTER RODGAU-DUDENHOFEN

PERFORMANCE AREA

- 1.000m Total Length
- 250m x 60m Dynamic Area
- 3 Floodable Sections

Planning for 2024

- 1 integrated μ -low lane with 100m x 4m
- Marked parking bays for parking tests

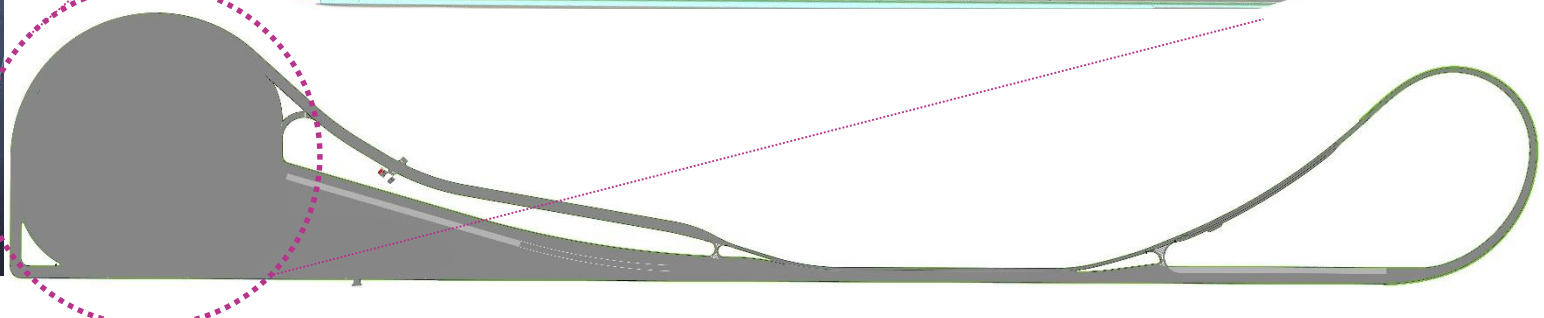
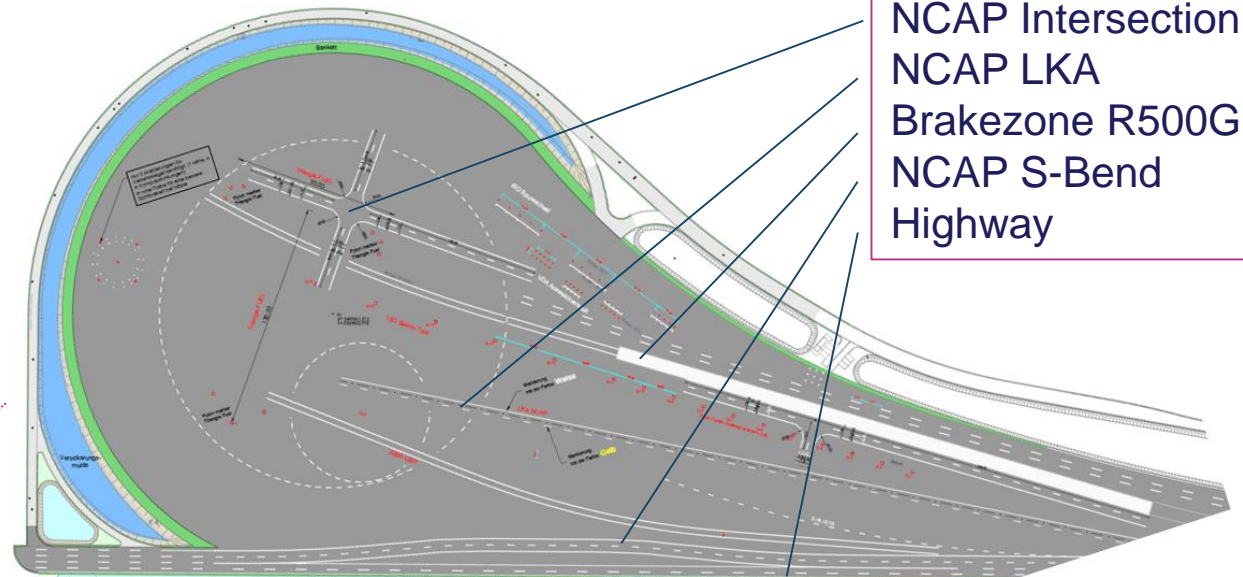


„The BLACK LAKE“

- 2.100 m Straight (incl. acceleration curve)
- 1.705 m Straight
- 300m Ø of Skid-Pad
- EC2017/1151*2018/1832 certification (Coast Down)

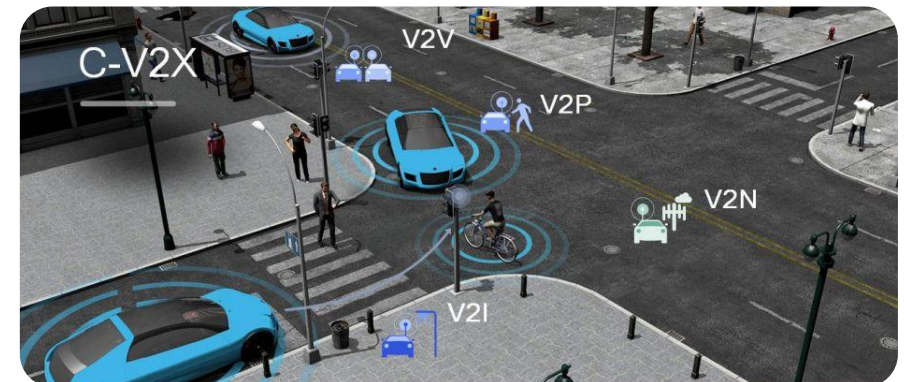
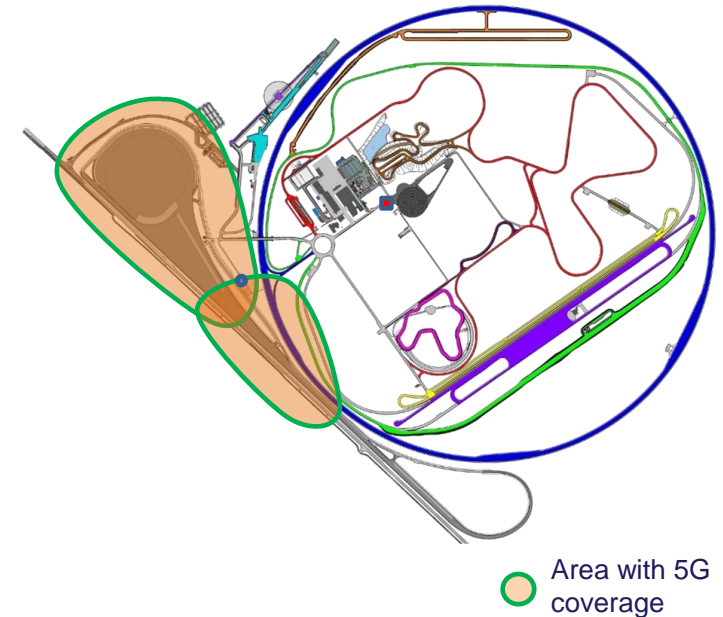
Update Q4/2023

- NCAP Intersection
- NCAP LKA
- Brakezone R500GB/T
- NCAP S-Bend
- Highway



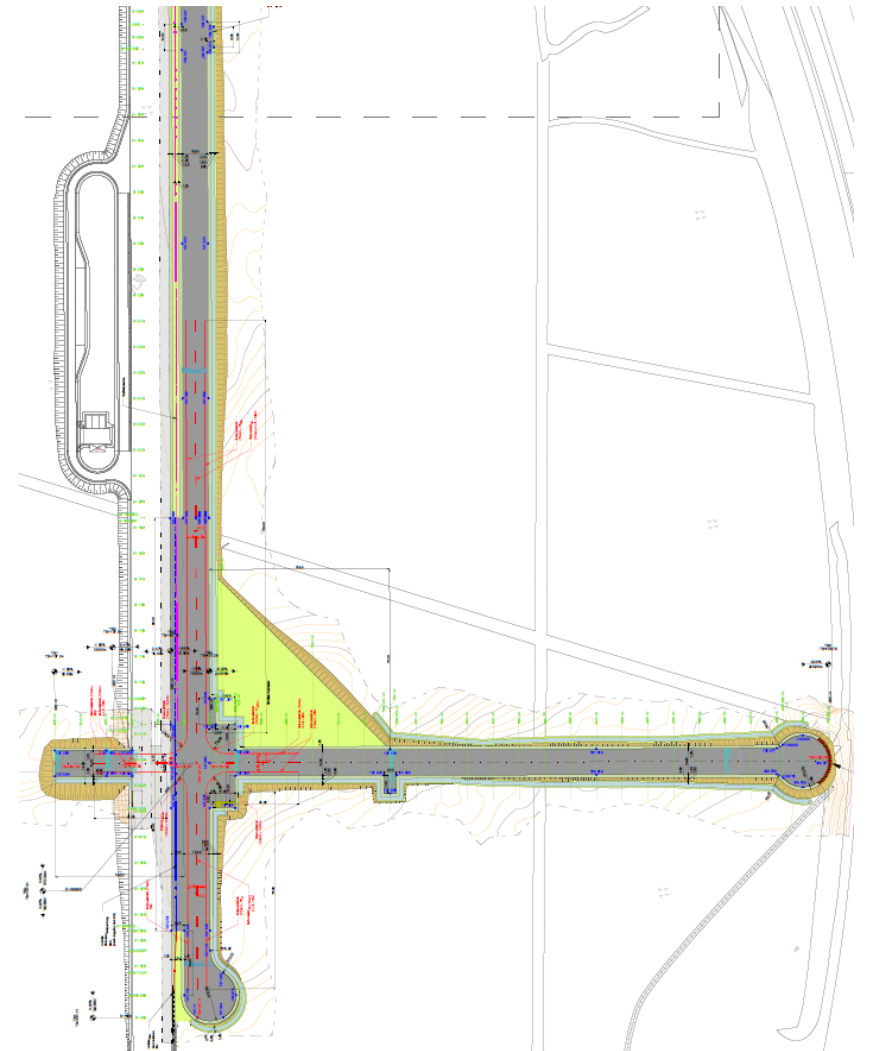
Privat 5G Network for ADAS Testing

- V2X applications
- Partnership between SEGULA and Cellnex Telecom
- Start of the implementation of use cases:
 - V2X 5GAA Day-1 use cases
 - Extended implementation of custom ADAS and advanced V2X use cases
- Simulation of C-V2X participants
- Attractive for any service and use case requiring a low latency, large bandwidth and high speed.



ADAS CAPACITY EXPANSION 2023

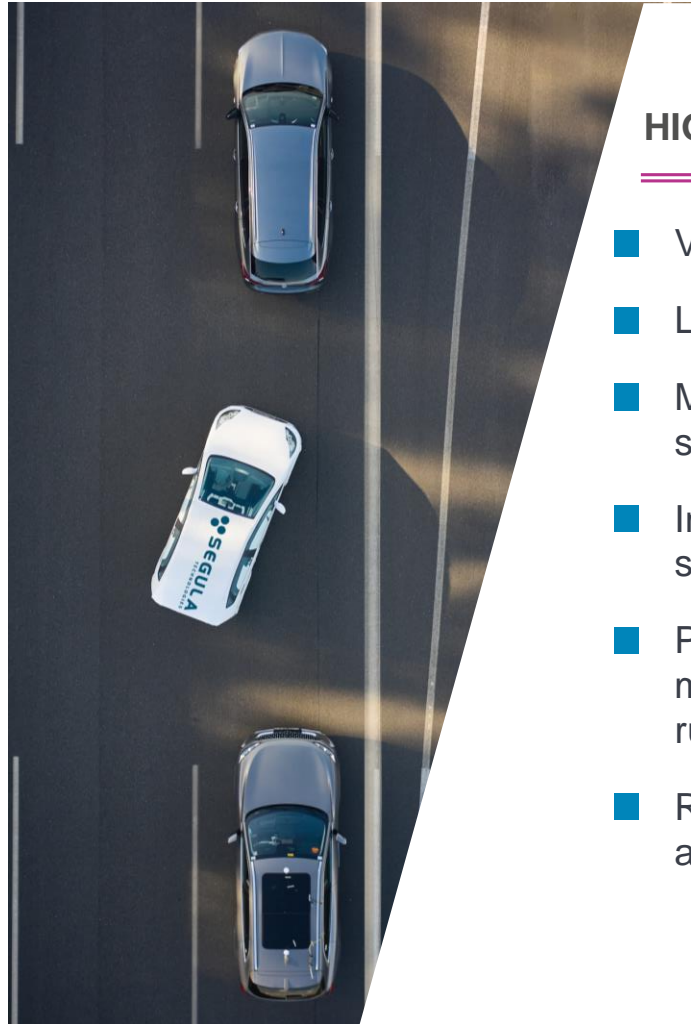
- NCAP Intersection
- LKA - Lane Keep Testing
- AEB C2C – Testing
- 650m x 300m





Segula, your full-service ADAS partner

- ⊕ MANY YEARS OF GLOBAL ADAS DEVELOPMENT AND VALIDATION EXPERIENCES
- ⊕ OWN PROVING GROUND, AVAILABLE AT ANY TIME, ALSO ON SHORT NOTICE
- ⊕ STATE-OF-THE-ART TEST EQUIPMENT
- ⊕ PROFESSIONAL MEASUREMENT TOOLCHAIN
- ⊕ INTERNATIONAL NETWORK OF QUALITY AND EXPERIENCE



HIGHLY EFFICIENT LOGGING TOOLCHAIN

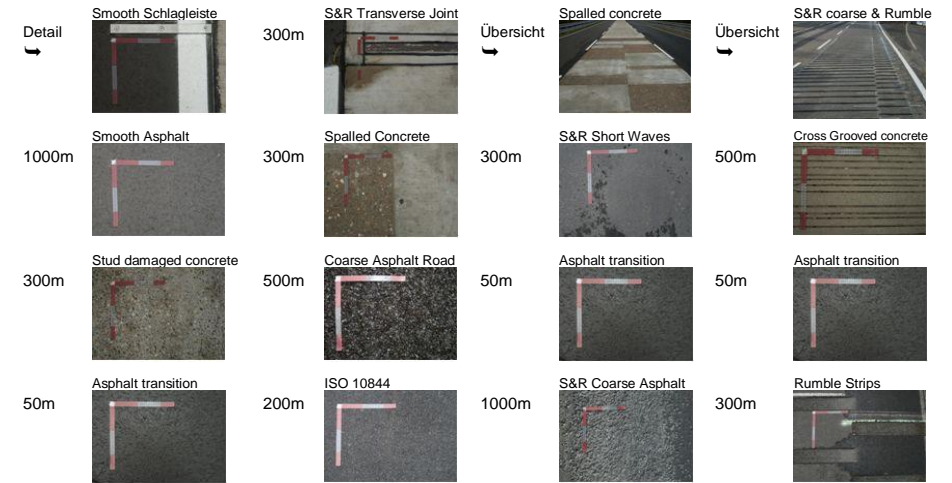
- Vector toolchain (SW & HW)
- Logging of up to 14 vehicle bus systems
- Multi-camera setup to guarantee surround view
- Implementation of external sensors such as GPS, force or torque
- Programmable simulations and manipulations of signals in the running vehicle
- Replaying and exporting for a variety of analysis purposes

STATE-OF-THE-ART TEST EQUIPMENT

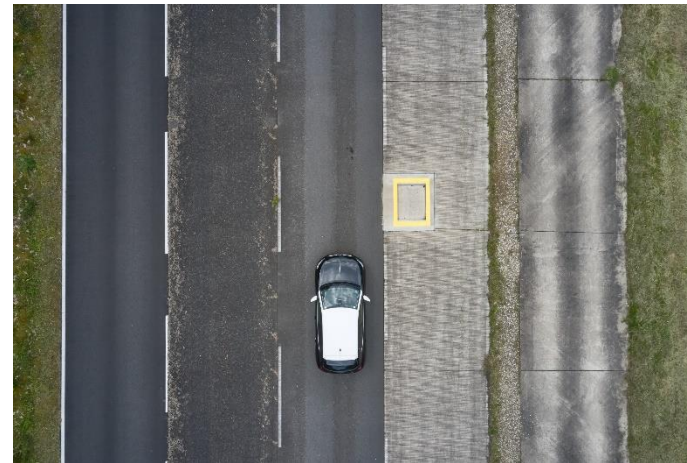
- Robotic target platforms
 - 4ActiveSystems Freeboard Small
 - 4ActiveSystems Freeboard Large
- GPS-controlled up to 2cm accuracy
 - ADMA Eco dGPS Systems
 - IMAR dGPS Systems
- Wide variety of target dummies
 - Motor vehicles (C2 vehicle target, Motorcyclist)
 - Pedestrians (Adult & child, both articulated and static)
 - Bicyclist (Adult)
- 2 x Stähle driving robot

4.5 km total track length for subjective evaluation and objective measurement of comfort and noise behavior

- Silent asphalt
- Rough asphalt
- Chatter bumps & different waves
- German concrete highway



Incl. combination of different road surfaces for noise evaluation



TESTCENTER RODGAU-DUDENHOFEN

TORTURE TRACK

- 4 Lanes each 900m long
- Potholes
- washboard / bumps
- cobblestone
- Belgian block

Different types of potholes and obstacles
(the pictures do not show all of them)



TESTCENTER RODGAU-DUDENHOFEN

HANDLING TRACK

- 900m Total Length
- 10m Track Width
- 16 Curves
- Sprinkling of the Track possible



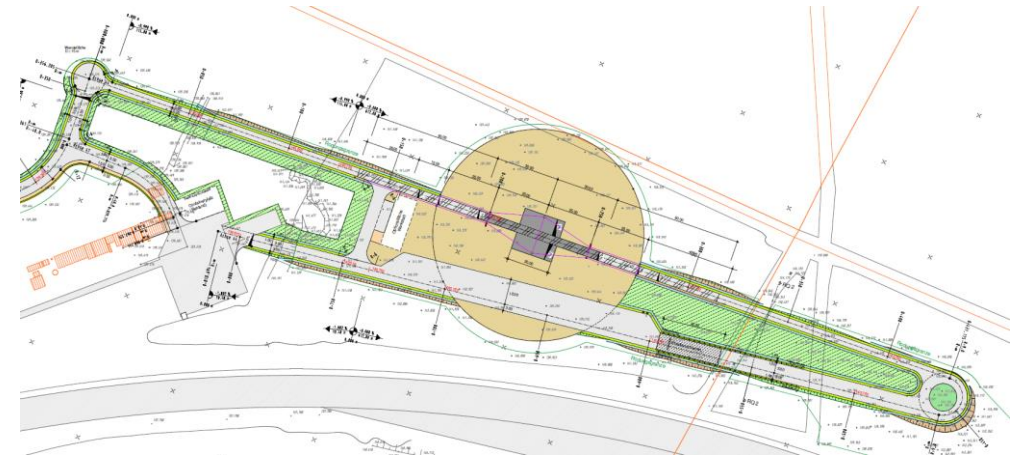
TESTCENTER RODGAU-DUDENHOFEN

HILL SECTION

- 8 % Gradient / Slope
- 12 % Gradient / Slope
- 20 % Gradient / Slope (Dual lane)
- 30 % Gradient / Slope (Dual lane)
- Usable as an endless loop
- Serpentine Area
- Approach / Stop & Go zones



- Pass by Noise (ECE-R51.03 - SAE1470 - GB1495)
- AVAS (ECE-R138 - FMVSS141 - GB/T37153)
- Horn (ECE-R28)
- Certified track, MISOR (ISO 10844) / (SGS TÜV GmbH)



- 500m Track length
- 180m of it heated (water-borne floor heating)

Our measuring systems

- Müller-BBM PAK
- Siemens LMS



- VDA guidelines and worldwide standards
- Curbs 100 - 150 mm
- Steel beams 80 - 140 mm
- Artificial boar (50 & 80kg)
- Various potholes and ramps
- Pendulum (bicycle & shopping cart)
- Sled for side curb impact



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WATER & SALT



Salt Mist (1% NaCl)

15 m
3 m
2,5 m

Length
Width
Height / Depth

Water Bath

60 m
5 m
30 cm



Salt Splash (5% NaCl)

75 m
5 m
2 - 4 cm

Length
Width
Depth

Mud Trough

56 m
5 m
5 cm



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SAND & GRAVEL TRACKS



Sand Tunnel
100 m
5 m
3 m

Length
Width
Height / Surface

Gravel Track
900 m
up to 10 m
Gabbro 8/11



Performance data		1x Cold chamber	1x Humid heat chamber
Temperature	Temperatur range	-40 °C to +60 °C	+20 °C to +60 °C
	Temperature constancy	+/- 1 °C in stady state	+/- 1 °C in stady state
	Measuring location	At the air outlet	At the air outlet
Humidity	Climatic range	+10 °C to +40 °C	+20 °C to +60 °C
	Humid	50 + 95 %	>98 %
	Dew point range	-5 °C to +39 °C	Saturation
	Measuring location	At the air outlet	At the air outlet



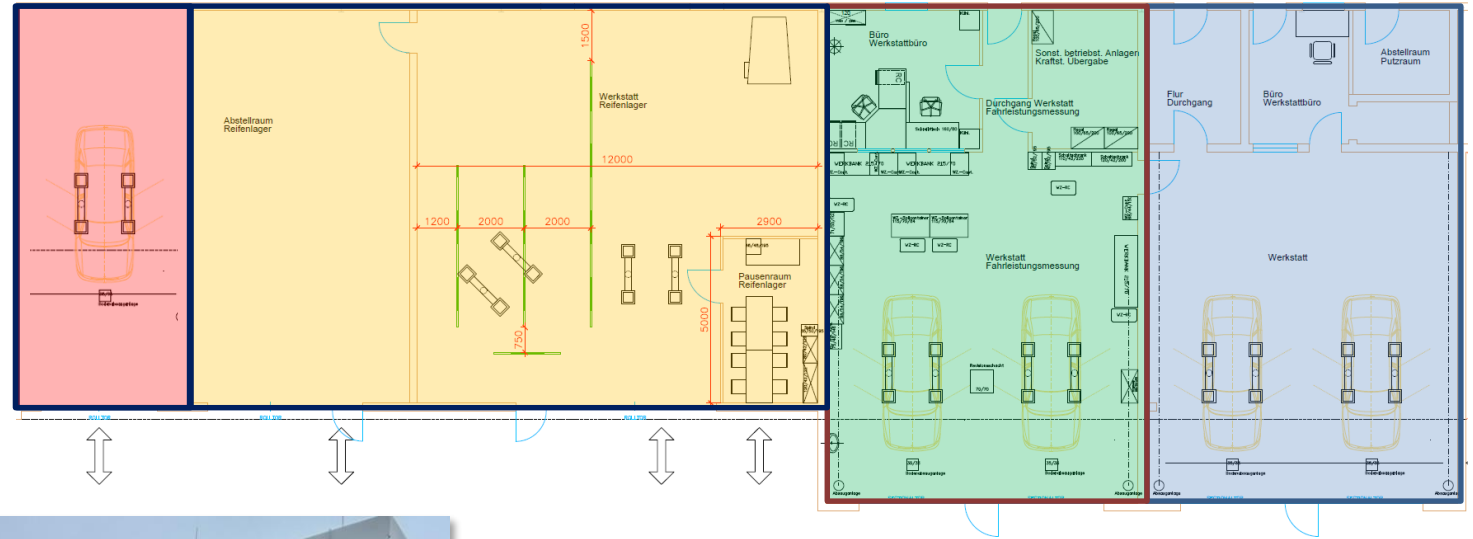
Performance data		6x Climate containers
Temperature	Temperatur range	-30 °C to +30 °C
	Temperature constancy	+/- 1 °C in stady state
	Measuring location	At the air outlet



TESTCENTER RODGAU-DUDENHOFEN

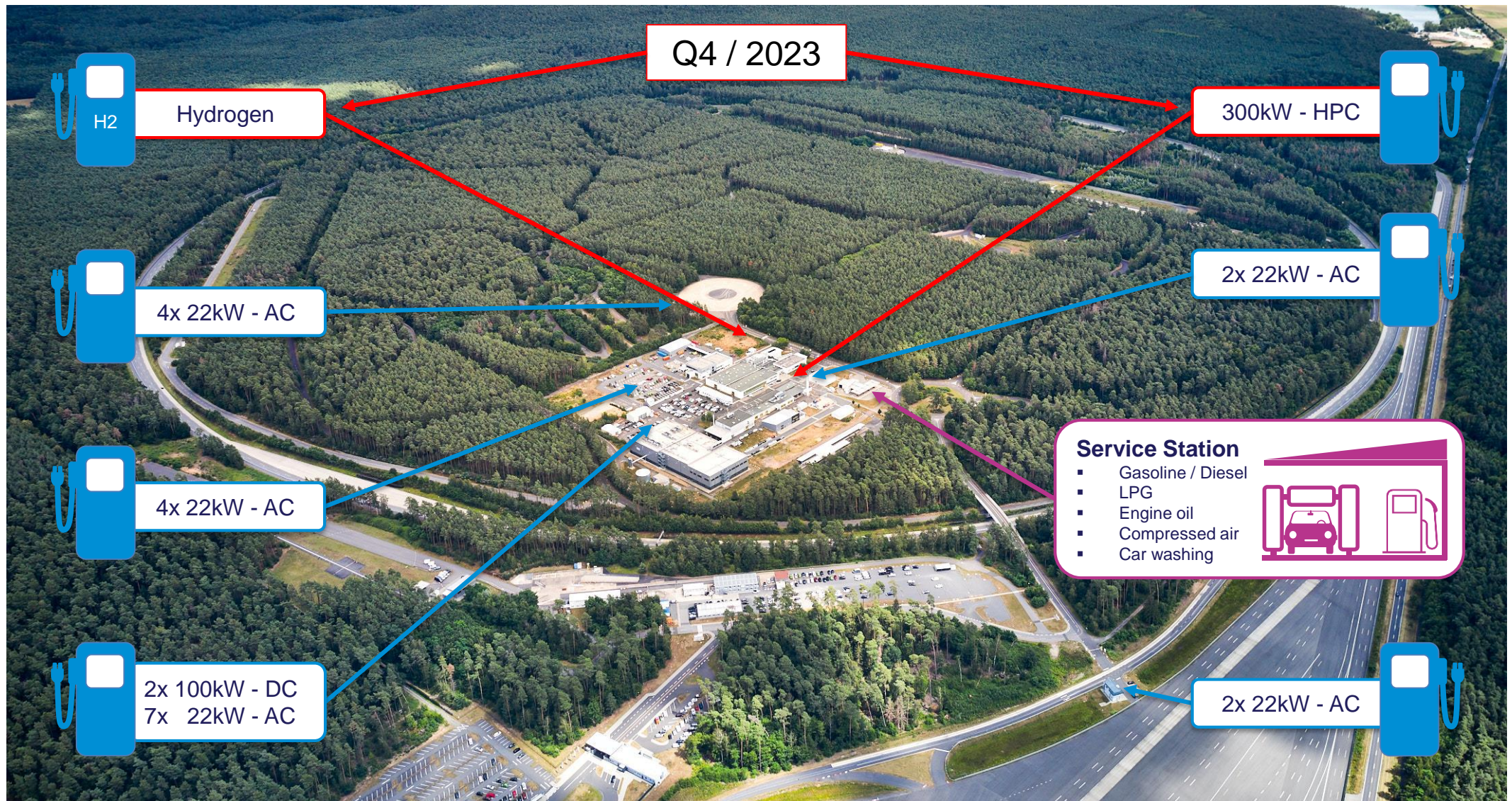
WORKSHOPS RENTABLE

- Closed, exclusive workshops with office space incl. WiFi
- 1 - 2 hoists in each workshop



TESTCENTER RODGAU-DUDENHOFEN

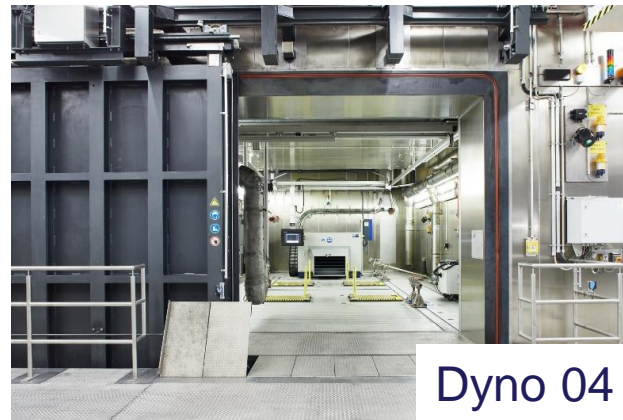
FUELING & CHARGING INFRASTRUCTURE



Performance data	Dyno 01	Dyno 02	Dyno 03	Dyno 04	Dyno 05	Dyno 06
<i>Roller concept</i>	FWD	AWD	AWD	AWD	AWD	AWD
<i>Roller type</i>	AVL Roadsim 48"	AVL Roadsim 48"	AVL Roadsim 48"	AVL Roadsim 48"	AVL Roadsim 48"	AVL Roadsim 48"
<i>Nominal power</i>	150 kW	150 kW / Axle	150 kW / Axle	200 kW / Axle	200 kW / Axle	200 kW / Axle
<i>Mass simulation</i>	2.949 kg	2.949 kg	2.949 kg	5.448 kg	5.448 kg	5.448 kg
<i>HORIBA MEXA ONE C1</i>	Bag/Modal diluted	Bag/Modal diluted	Bag/Modal diluted	Bag/Modal diluted	Bag/Modal diluted	Bag/Modal diluted
<i>HORIBA MEXA ONE D1/2</i>	Raw exhaust gas measurement 2 lines	Raw exhaust gas measurement 3 lines	Raw exhaust gas measurement 2 lines	Raw exhaust gas measurement 3 lines	Raw exhaust gas measurement 3 lines	Raw exhaust gas measurement 3 lines
<i>EU-Norm</i>	EU6	EU7 PN10, NH3, N2O	EU6	EU7 PN10, NH3, N2O	EU6	EU7 PN10, NH3, N2O
<i>Temperatur</i>	10°C to 40°C	10°C to 40°C	-30°C to +50°C	-30°C to +50°C	-30°C to +50°C	-30°C to +50°C
<i>Special</i>				Altitude climate chamber -275m to 5.000m		Sun simulation [SC03, AC17]



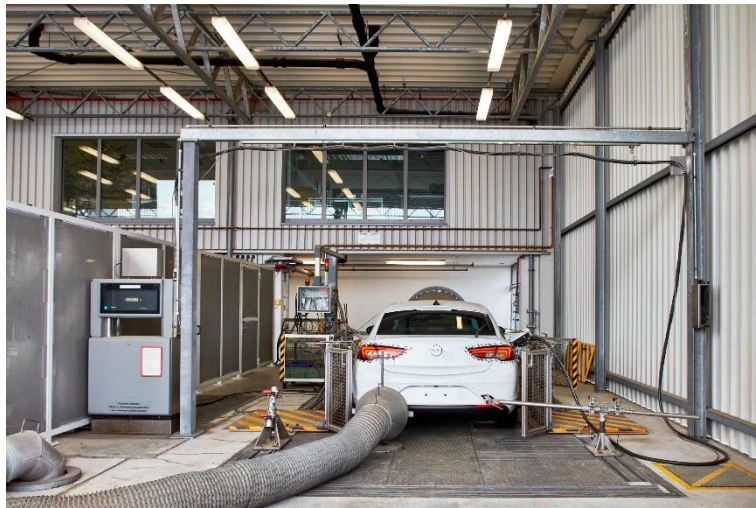
Dyno 01



Dyno 04



Dyno 06



2x FWD & 1x AWD Durability Roller Dyno

- Automated refueling system
- Speed-dependent cooling system
- Driving, shifting and pedaling robots
- 2x FWD up to 120kW / axle, 200km/h
- 1x AWD up to 260kW / axle, 260km/h



In-Situ-Emission Measuring System

Precise measurements of real-world driving emissions are required to meet the Euro 7 emissions standard.

Mobile solutions must be able to operate efficiently in a wide range of scenarios and during long measurement journeys in order to verify compliance with the extended legislation on emission reduction.

With a measurement system developed by Segula Technologies, robust measurements for determining real-world emissions can be performed both on the test bench and on longer journeys with varied scenarios.



PEMS

- 6 AVL PEMS incl. PN and EFM
- RDE test on road, emission rolls and test site
- Worst case simulation on the road and emission rolls
- Development and homologation according to Euro 6d temp

TESTCENTER RODGAU-DUDENHOFEN

EVENT & PRESENTATION OPPORTUNITIES

Auditorium

- 125 seats possible

Glashaus

- 100 seats possible

Conference room „Hockenheim“

- 50 seats possible



Glashaus



Hockenheimring



Auditorium