



**AUTOMOTIVE  
CAMPUS**

**TECHNICAL FACILITIES ON THE CAMPUS**

# Technical (Shared) Facilities

- The Automotive Campus houses various high-quality technical facilities for a variety of purposes. A number of research laboratories and test facilities form part of the Automotive Campus Shared Facilities.
- Others are the property of test and research companies such as TNO, TASS International and Altran as well as a number of test centers at companies associated with the Campus.

# Powertrain Test Center

Future powertrain requirements ask for enormous commitment. To meet these requirements related to pollutants and CO2 emissions, exploiting the synergy between engine, drivetrain and after-treatment subsystems has become increasingly important.

TNO's focus is on automotive powertrain control systems that optimize overall system performance. This is achieved by using (virtual) sensors and model predictive control strategies based on combined emission and energy management concepts.

Our technical developments concentrate on truck and bus applications for city distribution as well as long haul transportation.

Contact:

Daan de Cloe MSc MBA

+31 88 866 22 20

**TNO** innovation  
for life



**Powertrain testing**



**Climate Altitude Chamber**

# Safety Center

Accurate data, fast results and controlled development costs. These are the most important aims in crash testing vehicles, components and safety systems. The Safety Center is able to meet these goals for you. We offer fully equipped facilities to perform tests on a whole range of automotive applications, both indoor and outdoor. From vehicle components or even aircraft parts via passenger cars to buses and trucks up to a gross weight of 22 tons. With our equipment our staff can handle nearly every kind of impact in standard or customer specific conditions.

Contact: Erik Scheurkogel  
T: +31 888 277 100  
E: [info@tassinternational.com](mailto:info@tassinternational.com)



## Full scale crash testing

This facility offers the entire range of testing capabilities necessary to cover all existing legal and customer-specific requirements.



## Inverse crash sled

Our inverse crash sled is a simulator designed to test occupant restraint systems, vehicle and aircraft seats and all other interior vehicle components, either in subcomponent- or full body-in-white-testing.



## Laboratory for pedestrian & interior protection and components

This highly advanced testing resource is dedicated to both vehicle front structure impact tests with head, lower- and upper-leg-forms and to impact tests within the vehicle interior.



## Road furniture

Adequate performance of road furniture is one of the key elements to ensure overall road safety. On our outdoor proving ground we test road furniture like lighting columns and guardrails, for which we are one of the accredited test centres.



## Vehicle Dynamics

Vehicle dynamics boils down to mastering the lateral, longitudinal and vertical forces acting on the vehicle. OEMs use an increasing number of subsystems to enhance driving stability, safety and comfort under all driving conditions.



## Homologation

TASS provides the final and independent verification of your product's compliance against worldwide standards. Time is money. Rejection is bad news. Outstanding test procedures and expert consultancy make the difference.



# ADAS Testing

The demand for Advanced Driver Assistance Systems (ADAS) in the automotive industry is greater than ever and will continue to grow rapidly. Vehicle Integrated safety systems are becoming more and more sophisticated to be able to cope with scenario's with increased complexity. At TASS International we are fully accredited to assess the performance of these systems according to the globally recognised testing procedures, which are devised by consumer group Euro NCAP for passenger vehicles.

We are also fully equipped to perform all ADAS tests conforming to current UNECE regulations for Heavy duty vehicles (trucks and buses).

Contact: Nicole Zaky

T: +31 888 277 100

E: [info@tassinternational.com](mailto:info@tassinternational.com)



## Autonomous Emergency Braking – Car to Car

- City Systems where the vehicle under test needs to automatically brake when approaching a stationary target vehicle at a speed of 10 – 50 km/h.
- Inter Urban System where the vehicle under test needs to brake or give a Forward Collision Warning in several scenarios.

## Autonomous Emergency Braking – Vulnerable Road Users

The AEB test in relation to Vulnerable Road Users includes adult dummy approaching from the far side, adult dummy approaching from the near side and child dummy approaching from the near side from behind an obstruction.

## Lane Support Systems

The LSS test in accordance with Euro NCAP 2016 protocols consists of the following elements:

- Lane Departure Warning (LDW) with a solid line.
- Lane Departure Warning (LDW) with dashed line.
- Lane Keeping Assist (LKA) with a fully marked lane.

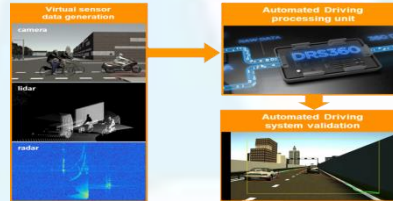
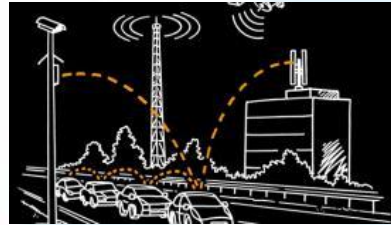
## Advanced Emergency Braking

AEB warning and activation, where the vehicle under test needs to automatically brake when approaching a stationary and a moving target vehicle at a speed of 80 km/h.

# Automated Driving Validation

TASS International's vision is that the most effective way to develop and validate cooperative and automated driving systems is by using a combination of simulation, laboratory experiments and real-world testing. Simulation results are used to define the physical experiments, whereas experimental results are used to validate the simulations. Our methodology and tool-suite enables our customers to validate cooperative and automated driving systems at a much earlier stage and for much smaller investments. In addition to this, TASS International also provides a wide range of engineering and consultancy services for automated vehicle development.

Contact: Gwen van Vugt  
T: +31 888 277 100  
E: [info@tassinternational.com](mailto:info@tassinternational.com)



## Virtual Testing

An integrated tool suite supporting the full development V-cycle is crucial to enable cost and time efficient development processes. For the development phase we offer a state-of-the-art simulation platform called PreScan for developing active safety systems, automated driving systems and connected vehicle systems .

## Mixed Reality Testing

Mixed reality testing environments (Hardware-In-the-Loop, Driver-In-the-Loop, Vehicle-In-the-Loop) are critical to speed up the validation of critical hardware components, without the need to spend timeless efforts on the street, capturing data. Also in mixed reality environments corner cases can more easily be tested, putting the hardware under more stressful scenarios.

## Real-World Testing

As a last step, the virtual and mixed environment results should be validated in a real-world environment. Proving grounds play an important role there. TASS International is world-known for its design of internationally recognized dedicated proving ground for Automated Driving.

Also TASS operates its own public road test site for the development, testing and validation of Intelligent Transport Systems (ITS) and cooperative driving technologies.



# International Mobility Center

Cooperative systems are being developed for large scale deployment in the near future. Validation of the performance of cooperative systems, and evaluation of the impact of cooperative applications is crucial before large scale deployment can proceed. The International Mobility Center facilitates testing, evaluation, and validation of cooperative systems from desktop simulation to indoor laboratory testing as well as outdoor testing on public roads.

Contact: Gwen van Vugt

T: +31 888 277 100

E: info@tassinternational.com



## DITCM test site

- 6 km highway, 2km urban road & 2 traffic light controllers
- 20 ITS G5 roadside units (802.11p)
- 56 cameras for real-time vehicle detection and tracking
- 11 dome cameras
- 4G Communication
- Integration of 3rd party hardware and software for testing



## DITCM control room

- Test control and monitoring
- Logging, on-line analysis and evaluation
- Control and test third party communication and application units
- Emulation of "Here I am" messages of non-equipped vehicles to increase the penetration rate of cooperative vehicles
- Measurement of PDR and signal strength (RSSI)



## DITCM CarLabs

- Instrumented vehicles with extendable in-car platforms
- Vehicles are equipped with radar, camera, lidar, DSRC, GPS, 4G
- Software toolkit to rapidly create and test application software



## Simulation toolsuite

- Detailed simulation of connected vehicle and automated driving systems
- Microscopic traffic simulation of intelligent systems on city-sized road networks
- Scenario-based V2X simulation
- Traffic, environment and communication channel modelling
- Support of standards (ETSI CAM/DENM, SAE J2735 BSM)
- Sensor fusion between V2x, Radar, Lidar, Camera, Ultrasonic, GPS etc.



## Laboratory testing

- HIL testing of Communication Units and Application ECUs
- Indoor laboratory testing of complete vehicle (VEHIL)
- Communication channel emulation

# Altran

With a headcount over 45.000 employees in 30+ countries, Altran is a global leader in Engineering and R&D services.

He Altran location at the Automotive Campus offers its clients special automotive engineering expertise in the areas of e-Mobility, ADAS, vehicle armouring and durability testing.

Having experienced engineering professionals and state-of-the-art testing facilities under the same roof enable us to find the best solutions which reduce customers' time, cost and warranty problems.

That is why OEMs worldwide find their way to Altran Helmond.

## Contact:

Harrold Quaaden – Markhorst

Business Development Manager Testing

T: +31 6 11 28 63 42E: [harrold.quaadenmarkhorst@altran.com](mailto:harrold.quaadenmarkhorst@altran.com)





# Engineering

## One stop shop for:

- (concept) Engineering
- CAD Design
- Simulations and Calculations
- Durability Testing
- Prototyping
- Small series production



ABAQUS

HyperWorks

MSC Software  
Smarting Reality. Delivering Certainty.

nCode n'

ANSYS

LS-DYNA

CATIA

SolidWorks

SOLID EDGE

NX

PTC  
creo™

# Prototyping

## Range of services:

- Assembly of prototype components and systems;
- Assembly of concept vehicles;
- Preparation of test cars/press cars/ show models;
- Vehicle elongations;
- Vehicle modifications including body work;
- Vehicle instrumentation;
- Vehicle armoring;
- Development and production of test rigs;
- Development and production of welding jigs;
- Development and production of control jigs;
- Small series production.

## Equipment:

- Production facility
- Metal workshop
- Calibration facility
- Full scale 3D measurement floor
- Body rotation system
- Visual/Mechanical 3D measurement device
- Various types of hoists



# Altran Testing Services & Facilities



## LOW FREQUENCY TESTING

Altran is offering services varying from durability testing for complete chassis systems to non-automotive components made from e.g. steel, cast iron or the latest lightweight materials.

### Facilities low frequency lab:

- 46 actuators, 5kN – 100kN
- 2D shaker for sun roofs
- 10 MTS controllers
- Meccano building blocks
- Salt spray installations
- 2 climate cabins
- Calibration equipment
- 12 channel test rig 6DOF
- 200kN special test rig
- 500bar pressure pulsation test rig
- 700bar pressure pulsation test rig



## HIGH FREQUENCY TESTING

At the electro dynamic shaker lab of Altran, components and products are tested on durability using high frequency vibrations (DC-4000Hz).

By generating resonance, the durability of the component or product is simulated and tested and possible fatigue is easily discovered. If requested by the customer, a product can be redesigned using CAD and recalculated with CAE to check the new design.

### Facilities high frequency lab:

- 1x 40kN shaker including table
- 1x 10kN shaker
- 1x 3kN shaker
- 2x LDS controllers
- 1x ETS controller
- Heat sources (turbo test)
- Hydraulic press and force



## CLIMATE

In the climate chambers multiple types of climate tests can be executed: hot / wet storage, temperature cycling and combined temperature and humidity testing. Temperatures can range from -45 to +150 degrees Celsius and humidity rising up to 95%. Our highlights in this testing area:

- Combining climate testing with our hydraulic and pneumatic actuators enables us to perform pneumatically driven closure-testing within our climate chambers at all possible conditions.
- Executing defogging, demist investigation and airbag deployment tests including high speed camera measurement.

### Climate testing facilities

- 5 climate cupboards
- Wekk 2x1,9x2,1m climate cabin
- Weiss 6x4x2,5m climate cabin
- Temperature shock equipment

# Altran Testing Services & Facilities



## CORROSION

Simulating what happens in the exhaust system of a combustion engine, both chemically- and temperature wise: at Altran we have developed a test bench with these functionalities in which for example components (turbo, EGR) or complete systems can be tested for reliability and durability.

The harsh conditions inside the system can even

be artificially influenced to exceed real time measured values in order to ensure multiple lifetime sequences in the most extreme thermal conditions within the shortest time period.

In the salt-spray environment we are able not to only simulate what happens when you drive through a salt-water puddle but also simulate the superfast drying of salt-water inside the engine bay by adding heat sequences in the process.

### Corrosion testing facilities:

- Chemical corrosion rig
- Salt spray corrosion rig
- Hot gas bench
- Final Inspection Lab



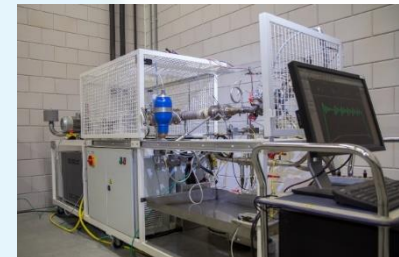
## FINAL INSPECTION LAB

Inspection of test parts through microscopic research on failure-modes, cracks, tears and malfunctions can be performed at our high tech inspection lab. Next to this, specific material properties can be tested on our laboratory equipment.

Reliable inspections and reports according to NEN-EN ISO 17025 are produced by our most experienced test engineers, providing our customers with the right information at the right moment within the development process. Based upon our extensive knowledge we are also able to provide our customers with custom built advice regarding how to improve, stiffen or strengthen their components as efficient as possible.

### Facilities final inspection lab:

- Water Slitting disc machine
- Polish machine
- Macroscope
- Microscope
- Hydraulic press
- Ultrasonic PVX Scan thickness gauge



## CUSTOM-BUILD TEST RIGS

Our multidisciplinary capabilities in engineering, prototyping and testing enables us to understand our customer's needs.

To meet our customers' testing requirements, we offer testing solutions by developing and prototyping of customized functional test rigs. Strengths of our customized test rigs:

- Flexible easy controllable setup.
- Test sequence according to customer request.
- Different types of pinching systems possible.
- All movements are freely and independent programmable
- Tests can run in an acclimatized environment.
- Pre and post test investigations of operational force and flushness.



# Rolling Road Testbench

With its weight of 800 tons and outskirts of 7 by 22 meters Automotive Campus in Helmond has one of the biggest rolling roads of Europe on site. Busses, trailers and trucks up till 30 tons can be tested.

- Engine performance tests
- Specific speed profile test
- Suspension fatigue tests
- Fuel consumption tests
- Road load simulation
- Ambient temp. test

**Available for SMEs in consultation with VDL, at special SME rates.**

Contact:

Frank van de Wetering

VDL Weweler BV

T:+31 (0)492 562 145 E: f.van.de.wetering@vdlweweler.nl



- This bench has 2 separately driven rollers

- Roller diameter: 3 m (118,11 Inch)
- Electric motor power: 2 x 245 kW,
- Electric motor torque: 2 x 15,5 kNm (braking and driving)
- Maximum axle load: 13 tonnes



- Two tracks of the rollers can be fitted with cleats for life time testing of (mainly) trailer axles and suspension systems

- The cleats are designed so that an entire frequency spectrum of a paved road can be simulated



- During the test the vehicle changes frequently between the two cleat tracks

- Peripheral speeds: up to 60 km endurance testing with cleats, up to 100 km without cleats



# Hydrogen Fueling Station

The refuelling station on the Automotive Campus comprise a hydrogen generator (using electrolysis) and consume water and (100% green) electricity generated by wind and solar power. The hydrogen can be stored on site under high pressure.

Vehicles – such as buses, cargo trucks and forklifts – require 350 bars. Private car requires a pressure of 700 bars.

## Contact:

Stefan Neis

Project Manager

T: +32 499 73 83 60 E:stefan.neis@waterstofnet.eu



**Tank units:** 350 & 700 bar



# Traffic Innovation Center

The Traffic Innovation Centre is an experimental area where national, regional and local road authorities test intelligent mobility solutions. Experiments occur in real life setting: on a real road, in a real network, in live traffic. That way, impact on traffic and traffic management becomes visible immediately.

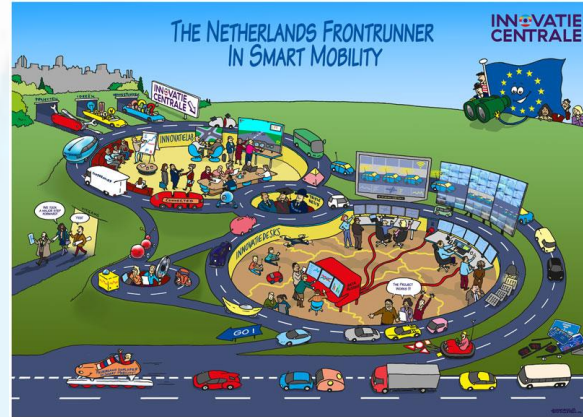
The Traffic Innovation Centre consists of an Innovationlab and the Innovationdesks. The Innovationlab's main purpose is synergy and knowledge sharing between market parties, governments and research institutes. The Innovationdesks are used to conduct real life experiments.

## Contact:

Peter Hoernig

Programmamanager Operationele Ontwikkeling Wegverkeersmanagement

T: +31 (0)6 533 12 045 E: peter.hoernig@rws.nl



Rijkswaterstaat  
Ministerie van Verkeer en Waterstaat