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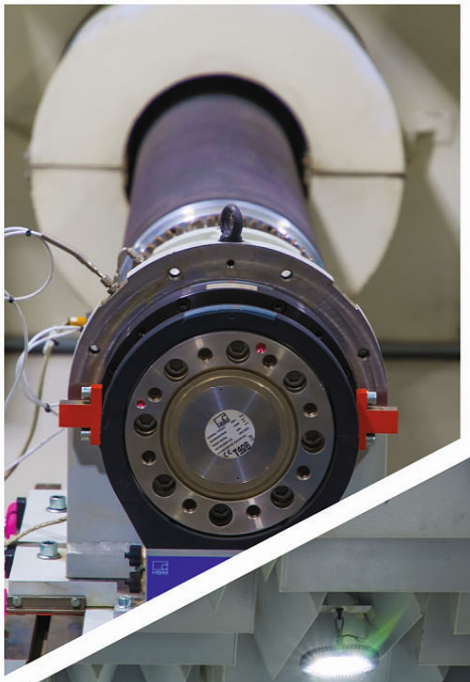
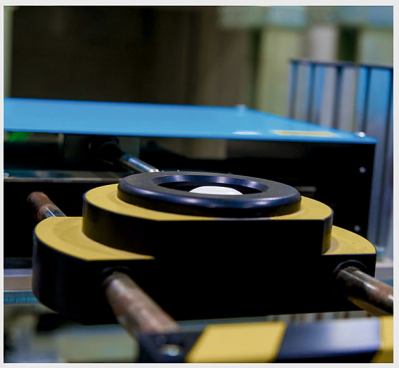
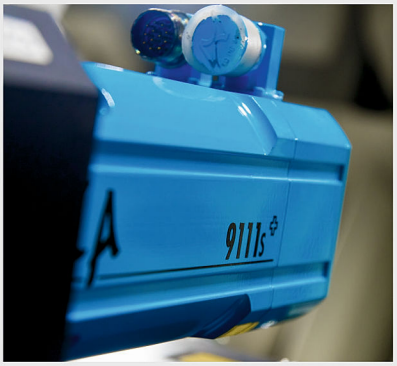


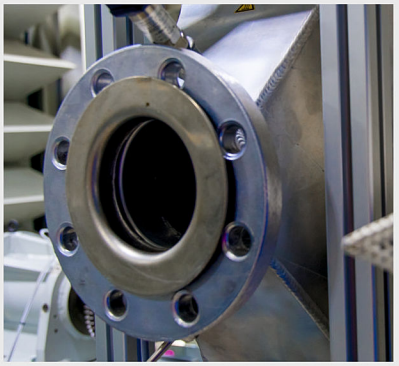
AUTOMOTIVE TRANSMISSION ENGINE TEST CELL (ATETC)

INTERNATIONAL CENTRE FOR AUTOMOTIVE TECHNOLOGY

Automotive Transmission Engine Test Cell established in view to perform test on 'Front and Rear Wheel Drive' vehicles for 'Noise, Vibration & Harshness' purpose. The lab will also capable to test all drive line components along with various transmission units with respect to Noise, Vibration & Mechanical Performance.
Broadly comprises Hemi-anechoic chamber (Sound Absorption Wedges), Vibration source identification devices (Microphone array) and Data Acquisition System for latter stage processing of vibration signals.







CAPABILITIES

Salient features of system are as follows:

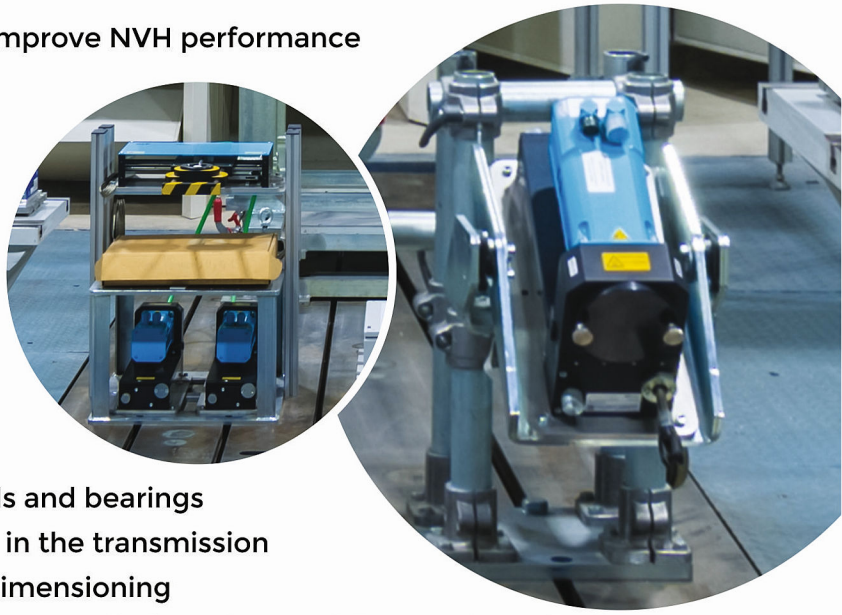
- Hemi-anechoic chamber of size 7m x 5m x 3.5m with cut-off frequency of 125 Hz.
- Functional testing of various transmission types in a virtual vehicle environment for Driving performance (acceleration, deceleration), Optimization of the fuel consumption, Base calibration of control units and durability testing for Manual Transmissions, Automatic Transmissions, CVT-Transmission, Automated Transmissions as well as of Dual Clutch Transmissions.
- Dynamometer of capacity 263 kW (2 no.'s) allows to simulate the inertia of the combustion engine and the dynamic behaviour of the combustion engine. It's necessary to get exact results in case of TCU shift calibration, of cooling performance and torque converter testing.
- System is capable for feature like Stall brake system, gear shifting system, shifting of Tiptronic AT transmission, clutch actuator, throttle actuator, conditioning systems for transmission oil, Engine Oil and Coolant, Charge air Conditioning, Combustion air Conditioning and fuel conditioning unit.
- STARS automation system combines the various functions out of one integrated system environment for the test stand and instrument control as well as allow for automation of test procedures.
- LMS Scadas data acquisition system capable for providing upto 204.8 kHz sampling rate per channel, 24-bit resolution and 150 dB spurious free dynamic range. System is having 16 channels for pressure measurement, 228 channels for noise and vibration measurements and 32 channels for temperature measurements. Additionally, 2 output DAC channels and 2 Tacho channels.
- 64 microphone arrays are used for the NAH acoustic measurements. To adapt the array for different frequencies ranges the microphone spacing can be adjusted in interval of 25mm, 50mm, 75mm & 100 mm. 1D robot specially designed for NAH measurements in vertical plane, horizontal plane as well as skewed plane. Optical fibre sensor is available for torsional vibration measurement.

LMS test lab specifications:

- LMS test lab Signature testing software for measuring & processing tracked spectral data in an efficient way. It enables repetitive measurements from pre-defined templates. It provides the capability for the on-line processing and post-processing.
- Special software to move the robot (on which the microphone arrays are installed) for the data acquisition on various position.
- LMS test lab Modal & operational modal analysis has the capability of performing modal parameters estimation using FRFs. Array based acoustic source identification provides the capability of identifying noise source based on spatial transformation of stationary or impulsive or transient sound field.

KEY BENEFITS OF THE TRANSMISSION NVH TESTING FACILITY

- Smarter Sensor Support
- Real time 1/1 and 1/3rd octave analysis with time domain A-weighing filter
- Optimization of the power train driveline components (engine accessories, shafts, intake system to improve NVH performance)
- Base calibration of control units (ECU & TCU) to improve NVH performance



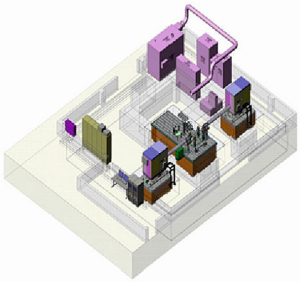
Driving performance such as:

- Shift quality evaluation
- Optimization of shift comfort
- Gear Shifting in various conditions
- Starting from rest

Durability Testing:

- Stationary Fatigue Test
- Transient Fatigue Test
- Full Load or high speed Test
- Evaluation of specified lifetime of toothed wheels and bearings
- Determination of lifetime of clutches and brakes in the transmission
- Evaluation and optimization of the component dimensioning

Test can be conducted with various range of transmission along with ease installation:

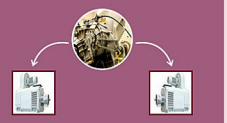


- Manual Transmission (MT)
- Automatic Transmission (AT)
- CVT-Transmission
- Automated Manual Transmission (AMT)
- Dual Clutch Transmission (DCT)
- Hybrid Transmission

Independent testing of the drive components such as **'Clutch, Flywheels, Torque Converters, Brake Units (Drum/Disc), Propeller Shaft'**

SPECIFICATIONS/DETAILS OF TEST EQUIPMENT

Dynamometer



Left wheel Dyno: (263 kW 2500 Nm @ 1005 rpm)

Right wheel Dyno: (263 kW 2500 Nm @ 1005 rpm)

Torque flange for high torque measurement accuracy

Speed range caters 12000 rpm

Test Bed Controller:

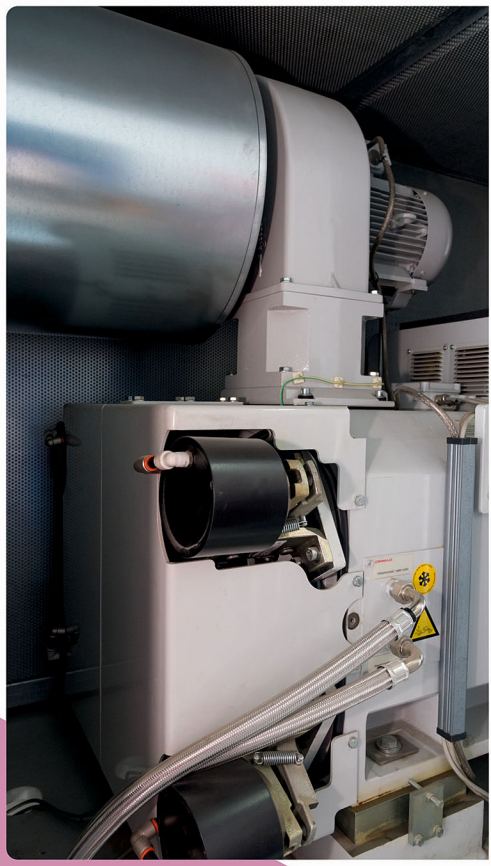
SPARC & STARS

Gear Shift Robot is an actuator which is movable in two axes for fully automatic shifting of gear

Clutch actuator is highly precise linear positioning device for the clutch actuation

SPECIFIC CAPABILITIES

- Driving Performance (Acceleration, Deceleration).
- Extended software module for shifting of tiptronic AT.
- Raw interface to vehicle CAN bus for communication with TCU from stars.
- Road Load Simulation (RLS) for calculating vehicle speed dependent driving resistance including dynamic shares for gradient angle & driving resistance due to acceleration of vehicle mass.
- Driver simulation such as cruise control, drive away & shift behaviour.
- Exhaust back pressure adjustment for simulating silencer condition.
- Robot – microphone positioning system for the array.



STARS TEST AUTOMATION CAPABILITIES

- Durability Testing
- Performance & emission development
- Quality Audit
- Mechanical Development
- Noise, Vibration & Harshness

INDIVIDUAL DRIVELINE COMPONENT TESTS

Evaluation of specified life of independent components of Drive; Clutch Unit, Flywheel, Torque Converters, Brake Unit (Drum/Disc), Propeller Shaft etc.

AUTOMOTIVE TRANSMISSION ENGINE TEST CELL (ATETC)

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