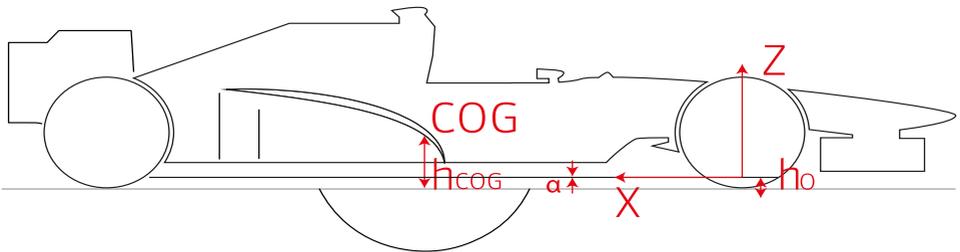


# CENTRE OF GRAVITY RIG



A specially-developed rig to determine, to a very precise level, the centre of gravity of a vehicle and the moment of inertia around the three main axes. Various complete cars can be mounted in exact road/track specification, up to a maximum weight of approximately 2,300kg.



## APPLICATIONS:

- Centre of gravity investigations
- Moment of inertia investigations

### ACCURACY (Based on Formula 1 car)

<b>CoG Height Over Road Surface</b>	±0.5mm
<b>Repeatability</b>	±0.1mm
<b>XCOG in Car Coordinates</b>	±1mm
<b>YCOG in Car Coordinates</b>	±1mm
<b>ZCOG in Car Coordinates</b>	±1mm
<b>IX Inertia Around X-Axis</b>	±1 kg m <sup>2</sup>
<b>IY</b>	±1 kg m <sup>2</sup>
<b>IZ</b>	±1 kg m <sup>2</sup>

## POWER STEERING TEST RIG

This dynamic test rig delivers realistic simulation of all suspension, turning and driving torque forces. A variety of different power steering solutions can be tested for durability and performance. For exceptional realism, simulated car or recorded track data can be used to test specific scenarios.



### APPLICATIONS:

- Durability testing
- Linear spool valve set-up
- Hydraulic power steering set-up and optimisation

### SPECIFICATIONS

<b>Track Width</b>	1000-1400mm
<b>Recession/Precession</b>	±220mm
<b>Vertical Displacement</b>	±50mm
<b>Vertical Acceleration</b>	25g
<b>Lateral Displacement</b>	±60mm
<b>Lateral Force</b>	±10kN
<b>Steer Input Velocity</b>	2000°/s
<b>Steer Input Torque</b>	±70Nm

## FULL HYDRAULIC SYSTEM TEST BENCH

This TGR-E-developed tool recreates a car's complete hydraulic system using a hydraulic pump, driven by an electric motor and features a dummy gearbox to test transmission-related hydraulic functions. It has a high sensor capacity and various displacement sensors.



### APPLICATIONS:

- Hydraulic system performance and reliability testing
- Clutch and gearshift actuator testing
- Hydraulic and sub-system testing
- Optimisation of control parameters
- Oil pressure and temperature measurements
- Oil flow rate measurement

### SPECIFICATIONS

<b>Channels</b>	50
<b>Max. Electric Motor Speed (for Hydraulic Pump)</b>	10,000rpm
<b>Servo Valves</b>	6
<b>Max. Oil Temperature</b>	180°C

# SHAKER

This medium force, LDS-manufactured shaker, model V850 is an air-cooled electro-dynamic shaker produced for vibration testing of items, making it ideal for automotive uses. This tool can be used in vertical orientation and it works in conjunction with our climatic chamber.



## VERTICAL ORIENTATION

<b>Positive Displacement Limit Peak</b>	25.4mm
<b>Negative Displacement Limit Peak</b>	25.4mm
<b>Max. Velocity Peak</b>	2m/s
<b>Max. Acceleration Peak</b>	60gn
<b>Min. Drive Frequency</b>	5Hz
<b>Max. Drive Frequency</b>	3000Hz
<b>Max. Drive Peak</b>	2V
<b>Sine Force Peak</b>	22.2kN
<b>Effective Mass of Moving Element</b>	24.52kg
<b>Plate Working Area (diameter)</b>	400mm

## HORIZONTAL ORIENTATION

<b>Positive Displacement Limit Peak</b>	23.5mm
<b>Negative Displacement Limit Peak</b>	23.5mm
<b>Max. Velocity Peak</b>	2m/s
<b>Max. Acceleration Peak</b>	37gn
<b>Min. Drive Frequency</b>	5Hz
<b>Max. Drive Frequency</b>	2000Hz
<b>Max. Drive Peak</b>	2V
<b>Sine Force Peak</b>	22.2kN
<b>Effective Mass of Moving Element</b>	61.01kg
<b>Plate Working Area</b>	600 x 600mm

# CLIMATIC CHAMBER

The Vötsch Industrietechnik VCV 4120-5 climatic chamber is an optional addition to our shaker, allowing the simulation of mechanical and thermal loads in a dynamic environment.



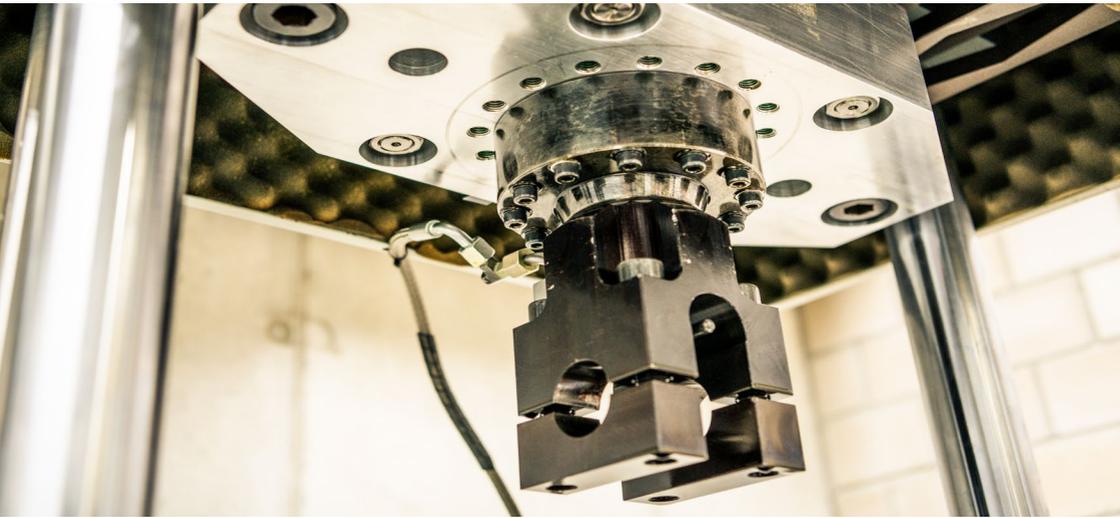
## APPLICATIONS:

- Stress and durability testing at a range of temperatures
- Stress and durability testing in different humidity environments.

TEMPERATURE TESTS	
Chamber Volume	1200l
Temperature Range	-40°C to 180°C
Temperature Fluctuation	±0.1 to ±0.8K
Deviation in Space	±0.5 to 2K
Temperature Gradient	1 to 4K
Temperature Change Rate	5.5K/min (cooling and heating)
Heat Compensation at 20°C	5000W
Heat Compensation at -20°C	2000W
Calibrated Values	23°C and 80°C
CLIMATIC TESTS	
Temperature Range for Relative Humidity	10-95°C
Temperature Fluctuation	±0.1 to ±0.3K
Deviation in Space	±0.5 to 1K
Temperature Gradient	1 to 2
Humidity Range	10-95%
Humidity Fluctuation	±1 to ±3%
Dew Point Range	4°C to 94°C
Heat Compensation	500W
Calibrated Values	23°C/50% and 95°C/50%

# VIBROPHORE

Manufactured by Zwick Amsler, the 250 HFP 5100 vibrophore is a specialised testing rig designed to determine fatigue strength using sinusoid loads.



## APPLICATIONS:

- Fatigue testing
- Lifing analysis
- Fracture toughness tests
- Conrod testing with conditioned oil cycle
- Oscillation tests of flexible or bending components
- Quality control

## VERTICAL ORIENTATION

<b>Max. Load Mean</b>	±150kN
<b>Max. Force Amplitude</b>	±125kN
<b>Max. Oscillation Range</b>	4mm
<b>Testing Frequency Range</b>	~35-300Hz
<b>Dimensions (height x width x depth)</b>	2700mm x 750mm x 600mm
<b>Height of Machine Table</b>	1235mm
<b>Height Between Machine Table and Load Cell</b>	160-660mm
<b>Horizontal Daylight</b>	530mm
<b>Max. Machine Frame Travel</b>	500mm

# MATERIAL TEST SYSTEMS

TGR-E has three MTS 810 uniaxial material test systems. The units use servo-hydraulic frames and can be customised to address a whole range of material testing demands. These test systems are suitable for large specimens and can accommodate various materials, including alloys and composites. TGR-E's range of material test systems includes MTS 318.10, 318.25 and 318.50 models.

## APPLICATIONS:

- Fatigue analysis
- Damper and suspension testing
- Side-intrusion or chassis safety testing
- Material tests for toughness and fatigue
- Sine wave simulation up to 3m/s

SPECIFICATIONS	318.10	318.50	318.25
<b>Actuator</b>	50kN	500kN	100kN
<b>Vertical Test Space</b>	1308mm	2108mm	1625mm
<b>Working Height</b>	889mm	889mm	889mm
<b>Column Spacing</b>	533mm	762mm	635mm
<b>Column Diameter</b>	64mm	102mm	76mm
<b>Base Width</b>	864mm	1245mm	1003mm
<b>Base Depth</b>	610mm	914mm	762mm
<b>Diagonal Clearance</b>	2718mm	3835mm	3251mm
<b>Overall Height</b>	2540mm	3581mm	3023mm
<b>Stiffness</b>	2.6 x 108 N/m	7.5 x 108 N/m	4.3 x 108 N/m

## DAMPER DYNO

This MTS-manufactured 850 Series damper test system features high-performance hydraulic actuators. Three load cells are available for simultaneous testing and all deliver accurate results for static or dynamic testing.



### APPLICATIONS:

- Damper and component evaluation
- Durability testing
- Performance testing

### SPECIFICATIONS

<b>Actuator</b>	Series 850
<b>Actuator Stroke</b>	+/- 125 mm
<b>Load Cells</b>	2 x 10kN 1 x 25kN
<b>Mounting Threads</b>	M12 x 1.25mm
<b>Vertical Test Space</b>	1397mm
<b>Column Spacing</b>	533mm
<b>Base Width</b>	1067mm
<b>Base Depth</b>	1143mm
<b>Overall Height</b>	3150mm

## **OPTICAL MEASUREMENT SYSTEMS**

TGR-E possesses several systems designed for highly accurate optical measurement of large or small objects. TriTop is an optical coordinate measuring machine which includes deformation module. ATOS is a very accurate three-dimensional digitizer for creating CAD drawings of small or large parts via reverse engineering. ARAMIS is an optical three-dimensional deformation analysis tool which indicates any tiny structural change on a part during use.

### **APPLICATIONS:**

- Mobile coordinate measurement
- Static movement analysis
- Static deformation analysis
- Three-dimensional digitisation for CAD export
- Reverse engineering projects
- Three-dimensional surface coordinate mapping
- Three-dimensional displacement and velocity analysis
- Surface strain testing
- Strain rate analysis