

## Vehicle-Dynamic Lab – NATRAX

Vehicle Dynamics Lab in Indore will complement the world class test tracks planned there. The Lab will give R&D facilities to the automotive sector by simulating real road conditions in test lab scenario. Vehicle Dynamics Lab will assist component and vehicle manufacturers in developing component and vehicle structural designs that are assessed using the latest techniques. The lab will provide test facilities for evaluation of vehicle components, automotive sub-assembly and complete vehicle for performance and durability. The entire facility is divided in to four Test Rigs. The technical details of these test and R&D facilities are as follows:

### Vehicle Dynamic Lab Capabilities At NATRAX

1) **K&C TEST RIG : Kinematics and Compliance Rig** are several components. This Single Axle Suspension Kinematics and Compliance Deflection Test System shall include the following major subsystems which are as follows:

- I. Platform modules
- II. Load reaction frame and body clamp system
- III. Position and Load Transducers
- IV. Controls and instrumentation system
- V. Data analysis system
- VI. Steering wheel robot
- VII. Hydraulic System or power transformer.

The main K&C test rigs sub systems technical features shall be as follows:

#### **I. Platform Modules**

<b>Platform Vertical Rating</b>	<b>30 kN</b>	
<b>Platform Motion</b>	<b>Range</b>	<b>Accuracy</b>
<b>Vertical</b>	±190 mm	±0.4 mm
<b>Longitudinal</b>	±75 mm	±0.2 mm
<b>Lateral:</b>	±75 mm	±0.2 mm

<b>Steer:</b>	$\pm 45^\circ$	$\pm 0.03^\circ$
<b>Roll:</b>	$\pm 10^\circ$	$\pm 0.03^\circ$
<b>Platform Surface Diameter:</b>	<b>400 mm (for PC and LCV)</b>	

**System Specifications:**

<b>Vehicles to test</b>	<b>From small cars up to Light commercial vehicles</b>	
<b>Maximum weight:</b>	<b>3,600 kg</b>	
<b>Maximum axle weight: 2,200kg</b>	<b>2,200kg</b>	
<b>Track Range (motorised adjustment) :</b>	<b>1.1 - 2.1 m</b>	<b><math>\pm 1</math> mm</b>
<b>Steering Wheel Angle:</b>	<b><math>\pm 1080^\circ \pm 1.0^\circ</math></b>	<b><math>\pm 1.0^\circ</math></b>

**II. Load reaction frame, body clamp systems and platform modules**

**III. Position and Load Transducers :**

<b>Parameter channels</b>
<b>Track</b>
<b>6 DOF load at each wheel</b>
<b>6 DOF wheel position</b>
<b>Platform vertical, lateral, longitudinal, and roll</b>
<b>Platform steer angle</b>

<b>Steer wheel position</b>
<b>Steer wheel torque</b>
Track

- IV. Six Axis Load Transducers:** The System shall be equipped with two six axis force transducers per axle.
- V. Mechanical Wheel Motion Sensor :** The wheel motion sensor shall be designed to measure the displacement of a wheel in six axes with respect to the machine frame. The two most important requirements for the wheel motion transducer are accuracy and the need to setup the test in minimum time.

**2) ELASTOMER CHARACTERIZATION TEST RIG:** The Elastomer Characterization Test Rig has following specifications :

1. **Model : MTS 370.10**
2. **Force Specification : 100kN**
3. **Dynamic Stroke : 50mm**
4. **Min vertical test space : 76.2 mm**
5. **Working height : 932 mm**
6. **Weight : 635 kgs**

**3) DAMPER CHARACTERIZATION TEST RIG:** The Damper Characterization Test Rig following specifications:

1. **Model : MTS 850.25**
2. **Actuator Rod Diameter: 80 mm (3.15 in.)**
3. **Frame Dynamic Load Rating : 50 kN (11 kip)**
4. **Actuator Stroke: 250 mm (10 in.)**

**4) STEERING TEST RIG:** The Steering Test Rig has following specifications :

1. **Model : MTS 335**
2. **Lateral Input:**
  - Lateral displacement: +/- 125 mm
  - Lateral force: 25 kN
  - Frequency range: 40 Hz
3. **Steer Input**
  - Steer Displacement: +/- 1080 deg

- Steer velocity: 1500 deg/s
- Steer Torque: 150 Nm
- Recession / precession: 50mm / 50 mm

**4. Accuracies**

- Lateral Displacement: +/- 0.2% FS
- Steer Displacement: 0.05 deg
- Force Measurement: +/- 0.2% FS\* Lateral Input:
- Lateral displacement: +/- 125 mm
- Lateral force: 25 kN
- Frequency range: 40 Hz