

MAST - Multi Axis ShakeTable

The Multi Axis Shake Table (6 degrees of freedom) consists of six Hydropuls™ actuators, each with a direct force of 50kN and a stroke of 150mm. For the vertical, pitch and roll movements there are three vertical actuators attached under the table. For movements in the X-direction and yaw movements about the Z-axis, there are two actuators that are attached horizontally to one side of the table. For movements in the Y-direction, there is a single actuator attached to the center of one side of the table.

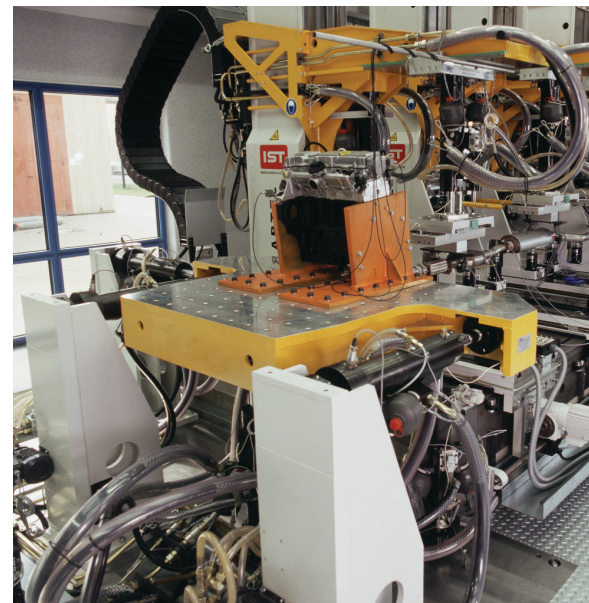
Ball joints connect the 3 horizontal and 3 vertical actuators to the table.

Actuator bases are supported by rigid pedestals.

Optionally, in order to simulate a pitching or rolling motion that a motor would make (when changing gear for example), an additional hydraulic cylinder can be attached to the MAST table.

The table has a surface area of 1100 mm x 1100 mm and a grid of M16 threaded holes. This grid is defined with the customer after order placement.

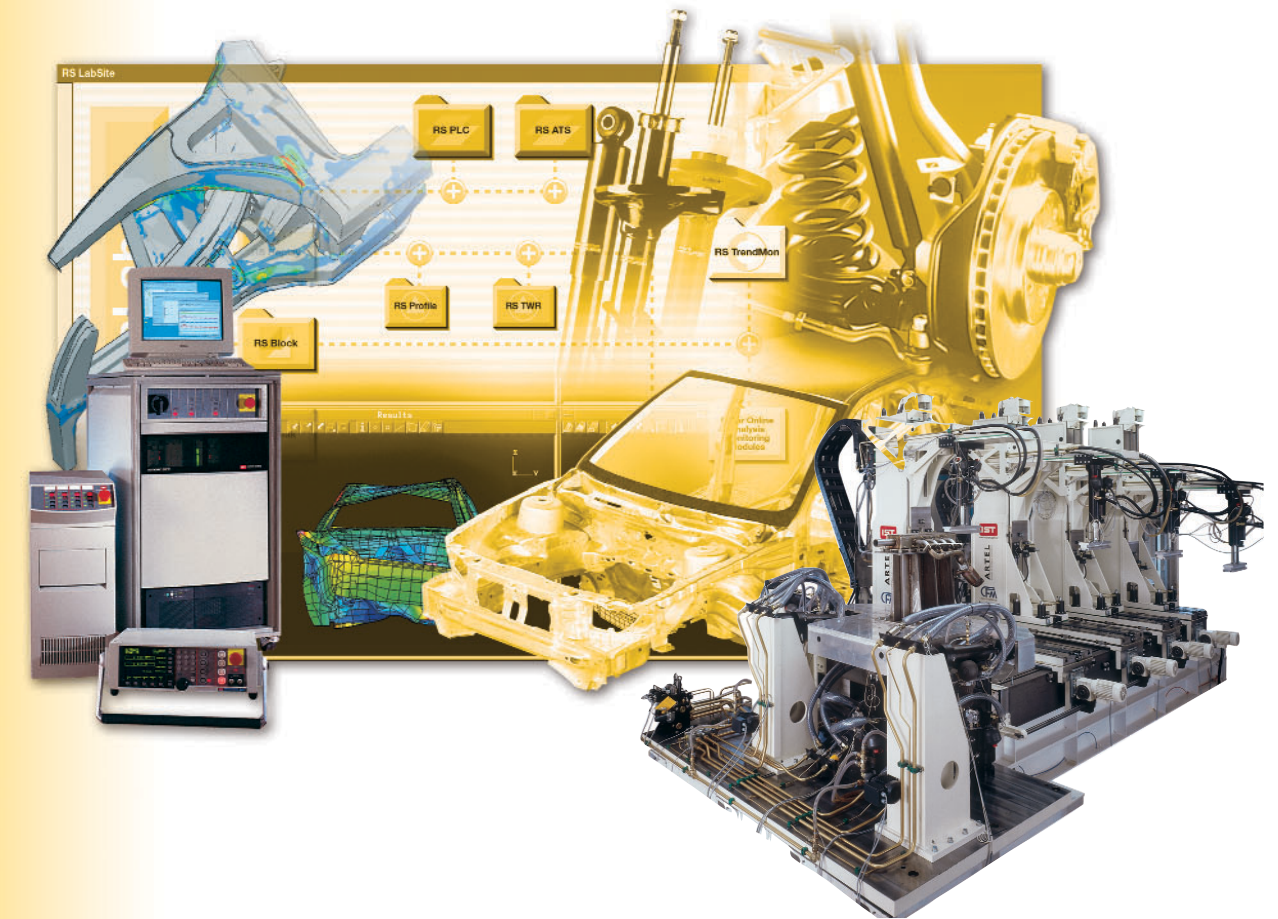
Technical Data - Mast Section	
Dimensions	2000 x 1100 x 220 mm
Degree of freedom	6
Vertical stroke (Z)	150 mm
Stroke in longitudinal direction (X)	150 mm
Transverse stroke (Y)	150 mm
Rotation about X	app. ± 5°
Rotation about Y	app. ± 8°
Rotation about Z	app. ± 5°
The indicated angular ranges are valid for single axis motion only.	
Acceleration in X	app. 100 m/s ²
Acceleration in Y	app. 50 m/s ²
Acceleration in Z	app. 130 m/s ²



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ARTEL

Advanced Rig for Testing Exhaust Lines



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ARTEL - Advanced Rig for Testing Exhaust Lines

The ARTEL is a unique way of simulating both thermal and mechanical fatigue of complete exhaust systems. The exhaust gas system consists of a Multi Axis Shake Table (MAST) with 6 primary directions of movement and a mounting table which holds 5 loading arms, each with vertical cylinders. All subsequent movements are controlled using software and can replicate road load conditions.



The test rig allows users to conduct long-term tests to detect material fatigue of exhaust lines. Road load simulation is accurately reproduced in the laboratory. The following kinds of simulation are possible:

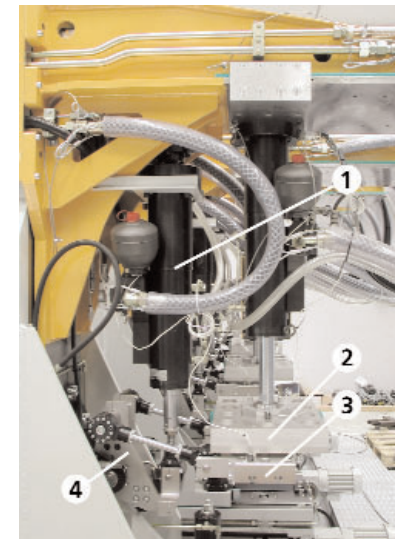
- Engine movement simulation
- Exhaust line movement simulation
- Thermal stress (optional)

Features:

- Multi Axis Shake Table with up to six DOF for engine excitation
- Exhaust line excitation with up to five independent vertical actuators
- Optional horizontal excitation of the exhaust gas line with up to five actuators
- Realistic and fast mounting of the exhaust line using production hangers
- Minimal fixturing changes required to accommodate different specimens

The hydraulic cylinders attached to the loading arms (inverted), simulate vertical movements of the car. As an option, lateral input arms can be fitted with actuators for controlled lateral loading. Realistic conditions are simulated using an independent control of each point of contact. The exhaust system is connected to the motor or dummy motor (to be supplied by customer) which in turn is attached to the MAST. The positioning of the loading arms is arranged in such a way that they coincide with the mounting points of the car.

The exhaust system is then attached. Many different types of exhaust systems can be tested, due to the wide range of possible adjustments. For a quick and easy linear adjustment, the loading arms can be operated electronically. Each of the electronically adjusted axis is hydraulically fixed and released.



1. Lateral Actuator
2. Adapter Plate
3. T-Slot Attachment
4. Lever Arm

Optional Laterally-applied Loading

As an option to this particular application, the loading arms can, in addition to the actuators for vertical movements, be equipped with actuators for movements in the Y-direction. This provides an even more realistic simulation of the vibrations of the car. These additional actuators would be attached vertically and inverted to the loading arms, and by using a bellcrank, would convert vertical movement into lateral movement.

Hanger Point Excitation

- Stroke 150 mm
- Direct force ± 10 kN
- max. acceleration ± 400 m/s²
- with 20 kg load, including adapter
- Optional actuator for side loading
- Stroke 150 mm
- Direct force ± 10 kN

19" cabinet for integration of the various components of complex testing systems. Each cabinet accommodates the control electronics for up to 12 control channels.

Labtronic™ 8800

The test rig equipment includes two expandable Labtronic 8800 controllers installed in the IST control cabinet in the control room.

The Labtronic is based on a modular hardware platform that can easily be expanded. User-oriented software facilitates handling.

With the Labtronic 8800, complex test rigs can be developed based on standard hardware and software.

The hardware can be configured for each slide-in module (IAC board). Below you can find some examples of the possible configurations:

- Sensors
- Digital inputs and outputs
- Real time CPUs

The user designs a virtual customized test rig, specifying the respective control channels and sensors. The user can create own names for the respective control channels and sensors. Various control channels can be combined in groups. The test rig configuration can be saved as a file.



Overall Software Package:

The basic modules include:

RS Console: Connects Labtronic 8800 controllers with individual application programs of the RS LabSite™ software package

RS BasLab: Administers all information for the connected test rigs and specimens



RS SigEdit

(Local version): Provides further options to display and edit signals.

RS Block: Provides graphical programming environment and block programming generation

RS Replay: Enables replay of stored multiaxial time histories

RS PLC: Programmable controller software for controlling and monitoring all sequences to allow automated and safe testing

RS TWR: Modules for the reproduction of measured load signals.