

Multi Axes Shaking Table

Noise and Vibration

Squeaks and rattles are a predominant indicator of subjective vehicle quality. The MAST is particularly well suited to investigate such noises. Caused by components either rubbing together or resonating, these noises are generally non-linear in nature, occurring at discrete frequencies or amplitudes. The ability of the MAST to reproduce the excitation causing these noises makes it invaluable in their isolation.

Ride Quality

Subjective evaluation of ride quality was the first application of the MAST and remains one of its predominant testing applications. KNR has a specific MAST model designed to assist the study of human evaluation of ride quality. This particular design is carefully crafted to ensure test subject safety while providing the evaluation engineer a fully capable test system.



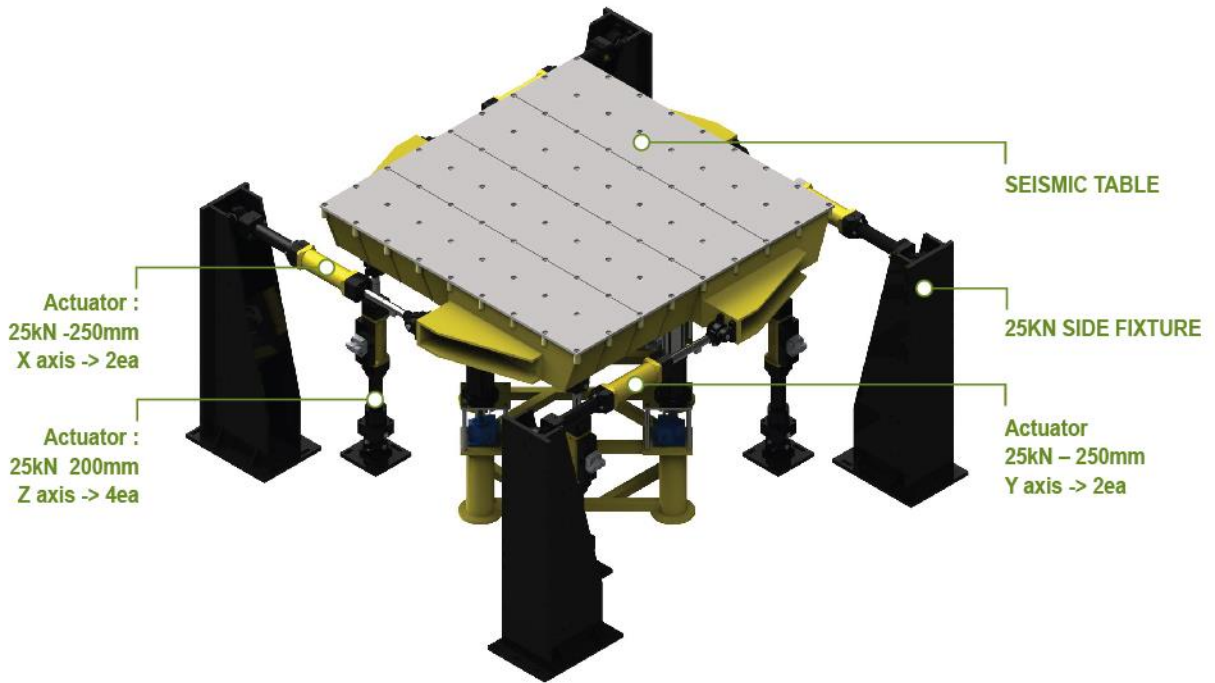


Fig. 1 Multi Axes Shaking Table System Overview

A seismic simulation testing system can be used to test the response of structures to verify their seismic performance, one of which is the use of an earthquake shaking table.

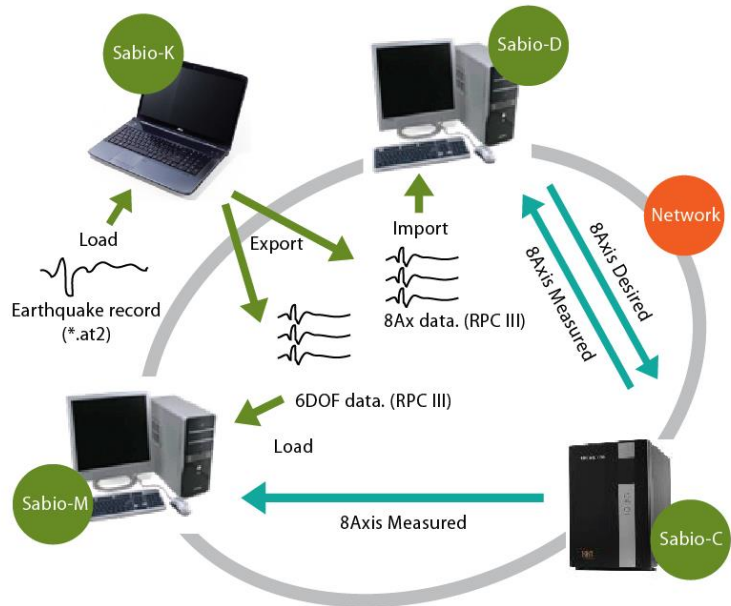
This system is for shaking structural models or building components with a wide range of simulated ground motions, including reproductions of recorded earthquakes time-histories. While modern tables typically consist of a rectangular platform that is driven in up to six degrees of freedom (6DOF) by servo-hydraulic.

Table. 1 Multi Axes Shaking Table System Specifications

Technical Parameters	
Table Size	1800 X 1800 mm
Max. specimen mass	3,000 kg
max. accel. with specimen (Z/X/Y)	0.8 / 1.5 / 1.5 g (@2Hz)
Peak vel. with specimen (Z/X/Y)	0.6 / 1.1 / 1.1 m/s
Stroke (Z/X/Y)	250 / 250 / 250 mm
max. angle Pitch/roll/yaw	8 / 8 / 8 °
Specimen max. center of gravity above table	2000 mm
max. overturning moment	300 kN.m
HPU Nominal flow	300 lpm
HPU Operating pressure	21 MPa

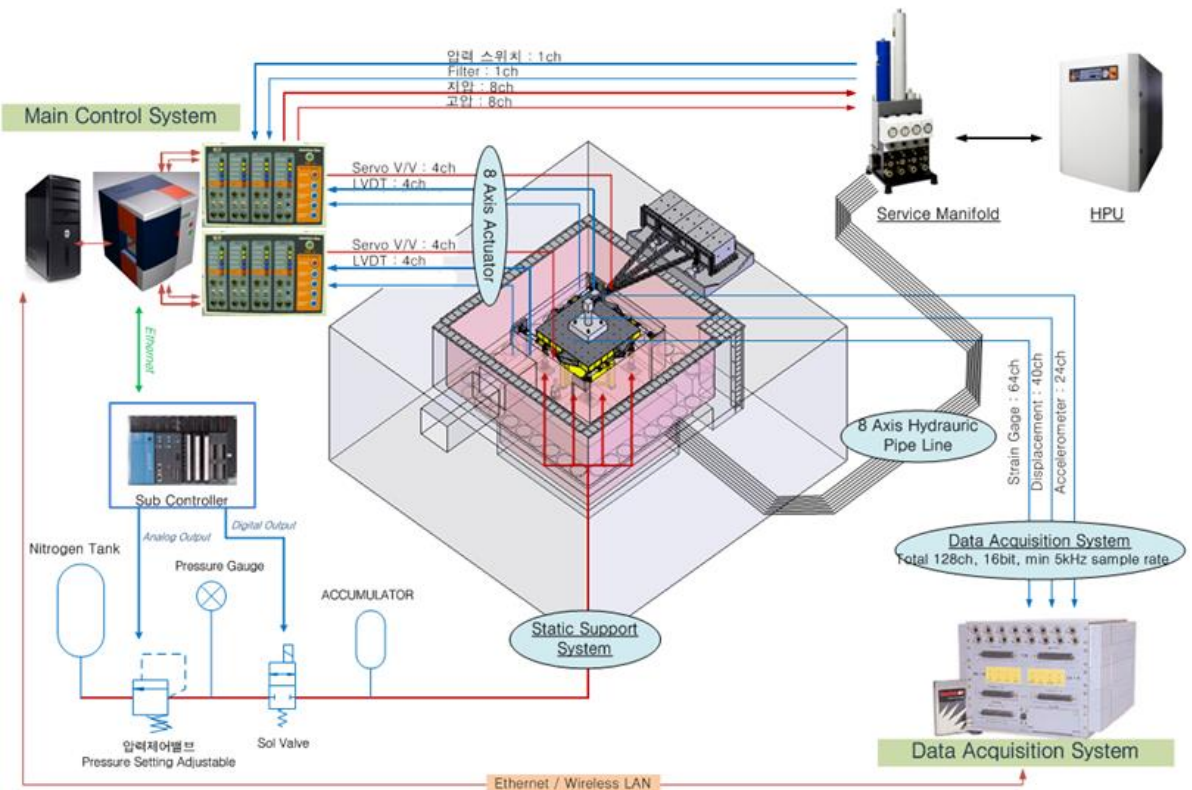
6 DOF Seismic Simulation System

There are four modules for the six DOF seismic simulation control system. First module is the Deneb-DE which is connected to sensors and actuators for the real time controlling. Second module is the Sabio-D to transmit the user's command to the Deneb-DE and show the status of actuators' real time information. The rest modules are Sabio-K and Sabio-M (Pre and Post processing module) to calculate and converse the data from the actuators and sensors.

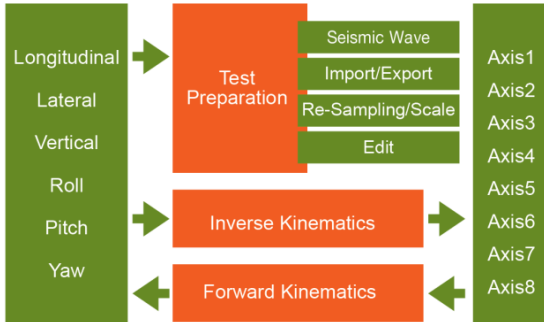


Deneb-DE transmits operating signals of the actuators, service manifold, and etc. and sensor signals of the LVDT, load cell, accelerometer, and etc. to the user.

Sabio-K which is to control the system and produce the test result makes a six DOF operation file through the process of calculating the kinematics of earthquake wave file. In addition, it has an edit function of the six DOF operation file.



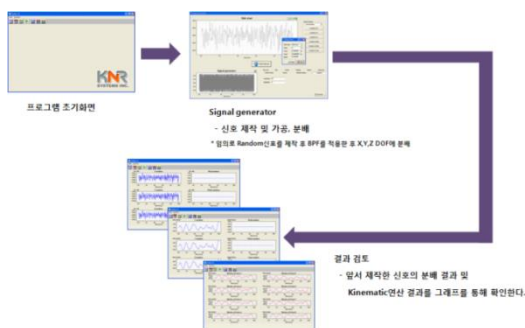
Sabio-K & Sabio-M



Sabio-K

The Sabio-K has the pre-processing function to make a signal for controlling the system from the earthquake data or random data.

Function	Specification
Inverse kinematic	6DOF data to 8 axes data conversion
Signal generation	Earthquake File load (*.at2) Sine, Cosine, Triangle, Square Trapezoid, Point to Point Sweep, Random square Random
Signal edit	Digital filter (LPF, BPF) Signal scaling



Sabio-M

The Sabio-M is a post processing software to provide the various data about the test result after the calculation of the forward kinematics from controlling result of the Deneb-DE and Sabio-C by real time.

Function	Specification
Forward kinematic	8 axes data to 6DOF data conversion
Data display	6DOF displacement 6DOF acceleration 8Ax displacement
Data acquisition	6DOF acceleration 8Ax displacement
Adaptive harmonic cancellation	



Sabio-D

The Sabio-D distribute the analyzed 8 axes operation data by the inverse kinematic to the each actuator and has functions of compensation and monitoring.

Function	Specification
Scheduler	8 axes data load repeat, hold, event Amplitude phase compensator
Compensator	Force balance compensator Overturning moment compensator Off center load compensator
Set point	Auto initial point moving

Function	Specification
8 axes control	
Three variable control	Displacement, Velocity, Acceleration
On - line iteration	
Limit detect	
HSM, Parking system control	

Sabio-C

The Sabio-C is to control the actuators with transmitted reference command from the Sabio-D. The Sabio-C is an interface between the hardware and Sabio-D. Therefore, the user doesn't need to operate anything.

