

# Suspension Component Test Rig

## NOISE CHARACTERIZATION AND NVH:

- Strut Pop
- Rebound Noise
- Sway Bar & Bushing Noise
- Leaf Spring Noise
- Noises in Active Dampers / Mounts
- Stick/Slip and Squeak Noise

## PERFORMANCE CHARACTERIZATION:

- Road Load / Time History Replication
- Force / Displacement
- Force / Velocity
- Coefficient of Friction vs. Displacement vs. Time
- Damper / Strut / Spring Testing
- Higher-Velocity Testing

## SPECIFICATIONS:

- Linear Motor Actuator: acoustically quiet, high-fidelity dynamic waveforms
- Air Spring Actuator: high compressive force, more durable than air cylinder
- Quiet: test equipment does not mask test item noises
- Background Noise:  $\leq 2.0$  Sones or 35dBA, 13Hz 1.0g pk 3mm p-p sine motion, no test item mounted
- No Hydraulics: safe, no high pressure oil, no environmental issues
- Low Maintenance: no seals, servo-valves, hoses to replace
- Low Operating Costs: uses power only during excitation
- Air Bearings: frictionless motion, non-contacting, no wear, no stiction, no balls or rollers, low noise
- Control Modes: acceleration, displacement, force (static and dynamic); road load time history, PSD random, sine, triangle, square, synthesized waveforms
- Time History Force Accuracy: typically  $< 5\%$ , Response vs. Target
- Displacement: 205mm p-p between stops
- Velocity and Force: Next page
- Control Frequency Response: DC–100Hz, rolls off to 200Hz
- Encoder: Resolution,  $1 \times 10^6$  pulses/mm 1V p-p Sine / Cosine analog, incremental
- Load Cell: Interface Model 1010, 12.5kN or 25kN, tension & compression, shunt calibration, eccentric load compensation, performance to 0.03%, safe overload,  $\pm 300\%$  (option)
- Analog signals available: acceleration, velocity, displacement, force, motor current proportional to dynamic force
- Motor-controlled height adjustable crosshead (option)
- Hinged safety guard (Lexan) around test item for see-through viewing
- Dimension: 1.56m x 1.56m x 2.91m (Safety guard)
- Max test item height: 1000mm
- Test space width between columns: 1050mm
- E-STOP: at Rig and at operator console



VIEW OF MOTORS & INSIDE FRONT



SUSPENSION COMPONENT TEST RIG



SUSPENSION RIG ASSEMBLY WITH COIL SPRING

## PERFORMANCE SPECIFICATIONS

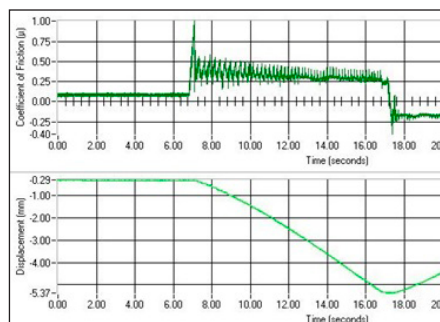
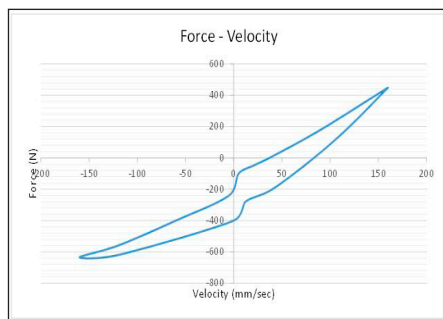
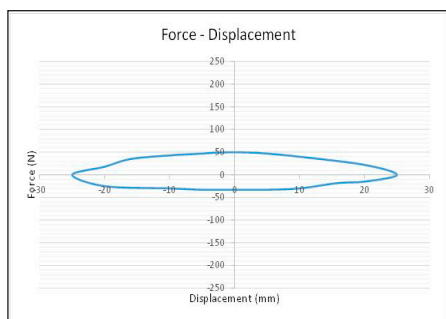
Peak Dynamic Force (100% of theoretical motor rating)	>17kN Pk Instantaneous (uncooled)
Peak Dynamic Force (de-rate for reasonable operation)	>14kN Pk Instantaneous (uncooled)
Continuous Static Force	>4kN Pk (Sine test)
Static Support Force (Air spring actuator)	>8kN Continuous
Peak Velocity (no payload)	4m/s
Peak Velocity (10kg payload)	4m/s

## TYPICAL TEST ITEMS



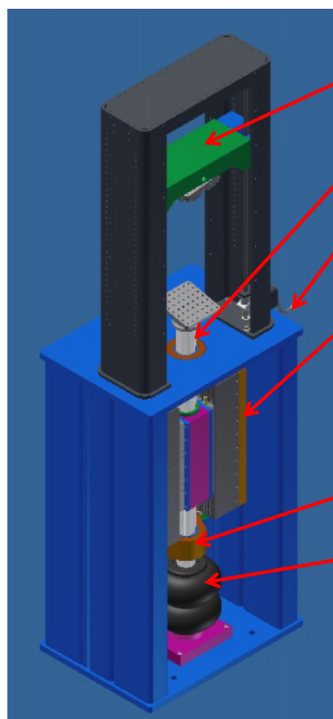
DEPENDS ON FIXTURING

## SAMPLE REPORTS

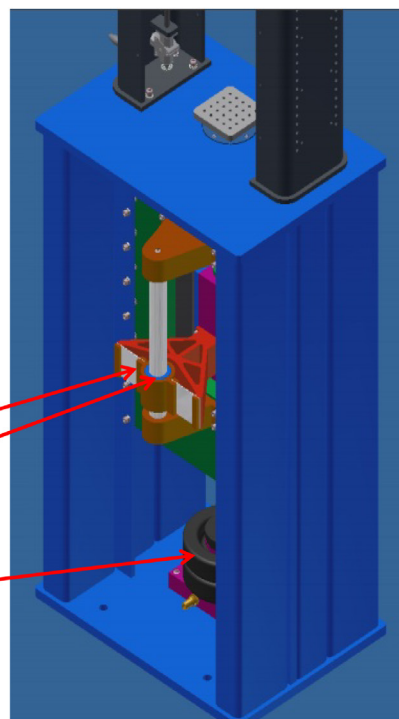


Coefficient of Friction vs. Displacement

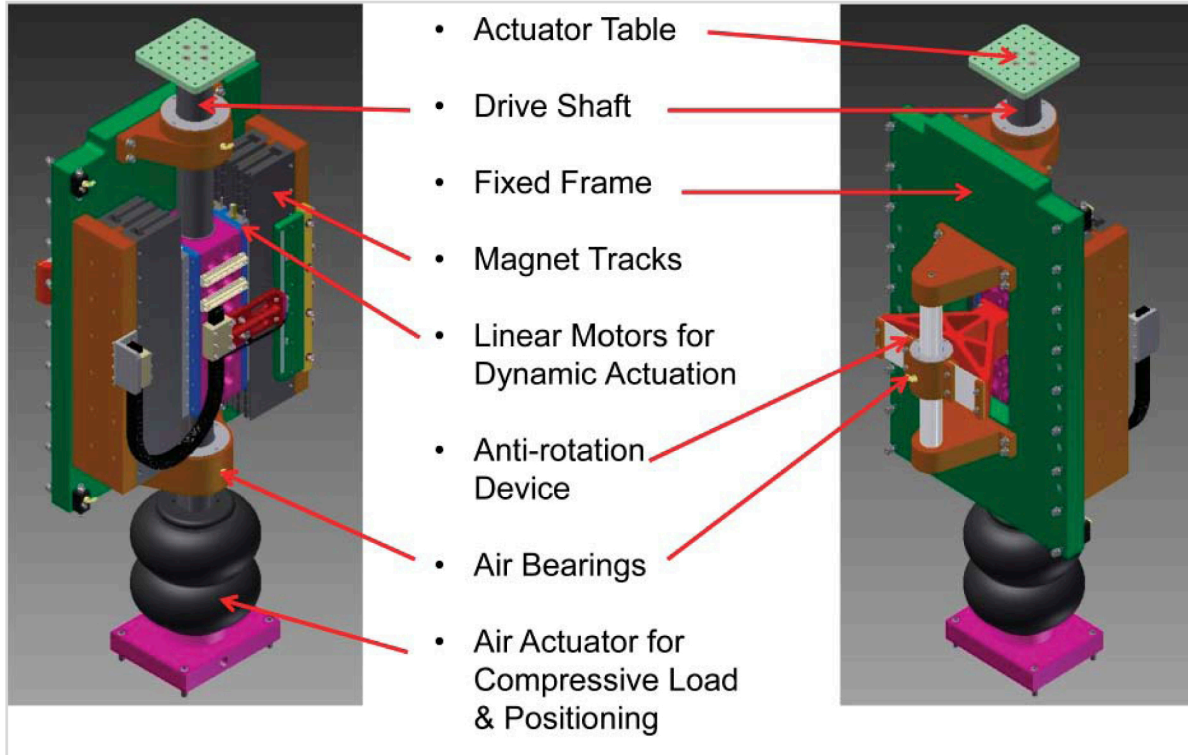
## ACTUATOR ASSEMBLY & LOAD FRAME



- Crosshead
- Drive Shaft
- Motorized Crosshead Height Adjustment
- 4 Linear Motors for Dynamic Actuation
- Anti-Rotation Device
- Air Bearings
- Air Actuator for Compressive Load & Positioning

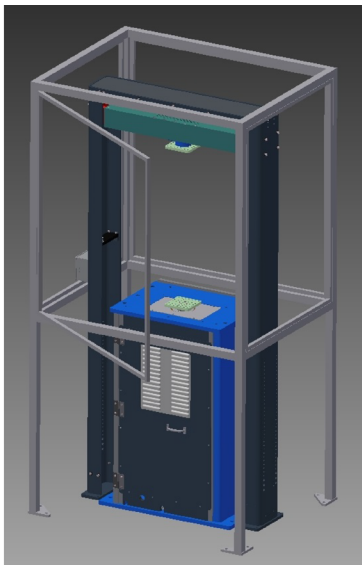


## EXPLODED VIEW OF ACTUATOR ASSEMBLY

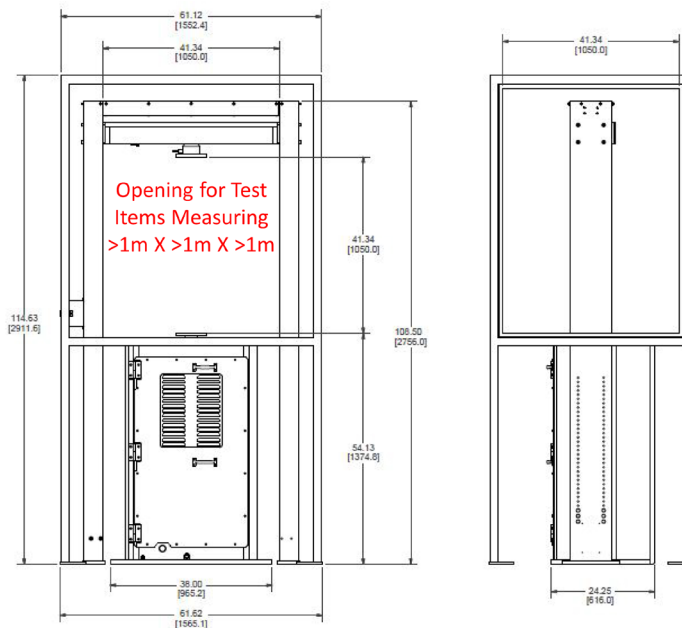


EXPLODED VIEW OF ACTUATOR ASSEMBLY

## DIMENSIONS AND FACILITIES REQUIREMENTS



Floor-mounted Safety Guard structurally isolated from SCTR: 4 hinged doors, each with aluminum frames to secure polycarbonate see-through panels

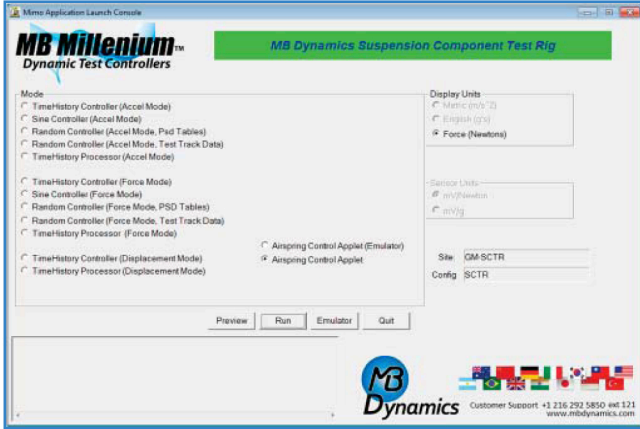


Electrical: 440 VAC, 3 phase, 28 Amps, 21 kVA

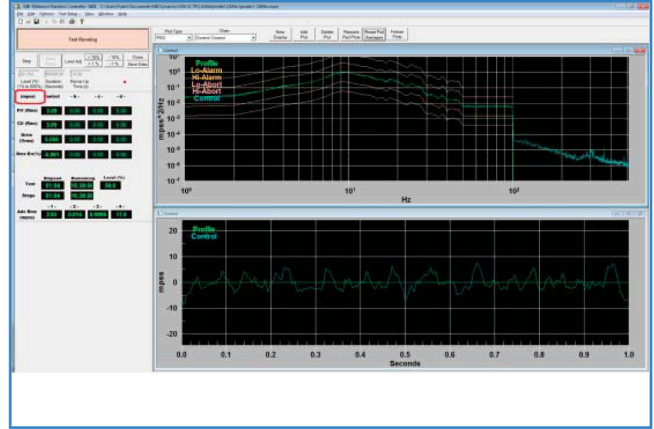
Electrical: 110--220 VAC 1 phase, 1.7kVA

Air: 90 psi (6bar), 1 CFM (30 liters/min)

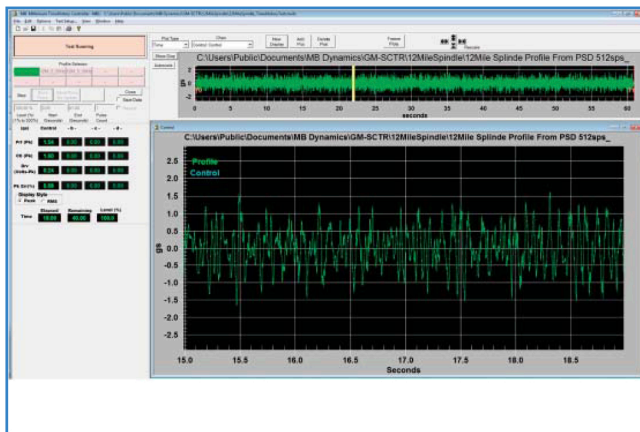
# TEST AND CONTROL MODES



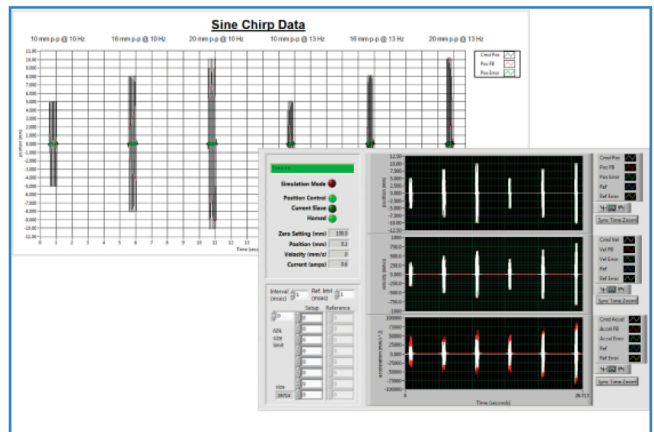
MILLENIUM CONTROL AND TEST MODES



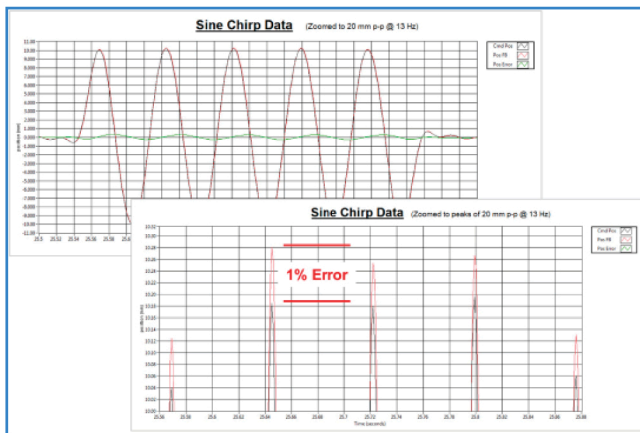
PSD RANDOM ACCELERATION ROAD PROFILE



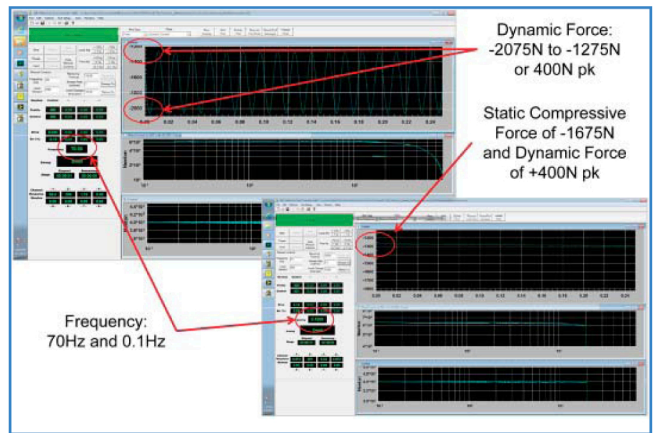
TIME HISTORY ACCELERATION ROAD PROFILE



TIME HISTORY & SINE DISPLACEMENT/POSITION CONTROL



TIME HISTORY & SINE DISPLACEMENT/POSITION CONTROL



SINE FORCE CONTROL, STATIC & DYNAMIC

**MB Dynamics, Inc.**

25865 Richmond Road · Cleveland OH · 44146 USA  
 +1 216 292 5850 phone +1 216 292 5614 fax  
 www.mbdynamics.com