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: ≤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, 1x10^6 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, ±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
### PERFORMANCE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Dynamic Force (100% of theoretical motor rating)</td>
<td>&gt;17kN Pk Instantaneous (uncooled)</td>
</tr>
<tr>
<td>Peak Dynamic Force (de-rate for reasonable operation)</td>
<td>&gt;14kN Pk Instantaneous (uncooled)</td>
</tr>
<tr>
<td>Continuous Static Force</td>
<td>&gt;4kN Pk (Sine test)</td>
</tr>
<tr>
<td>Static Support Force (Air spring actuator)</td>
<td>&gt;8kN Continuous</td>
</tr>
<tr>
<td>Peak Velocity (no payload)</td>
<td>4m/s</td>
</tr>
<tr>
<td>Peak Velocity (10kg payload)</td>
<td>4m/s</td>
</tr>
</tbody>
</table>

### SAMPLE REPORTS

- Coefficient of Friction vs. Displacement

### TYPICAL TEST ITEMS

- Depends on fixturing

### 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

- Actuator Table
- Drive Shaft
- Fixed Frame
- Magnet Tracks
- Linear Motors for Dynamic Actuation
- Anti-rotation Device
- Air Bearings
- Air Actuator for Compressive Load & Positioning

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

Opening for Test Items Measuring >1m X >1m X >1m

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