Road Simulators

Global Expert in Servoelectric Testing Solutions

REV. 4.0 SEP2025

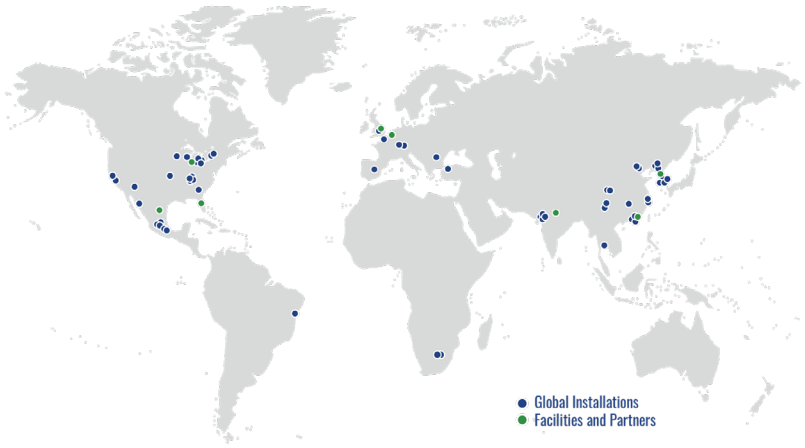
eMpulse test systems

Servoelectric Road Simulators

Precisely replicate real-world driving conditions, from urban streets to off-road environments. With configurations up to 108kN, our seaPLUS systems simulate varied road surfaces, terrains, and environmental factors, supporting 4-Poster, body-coupled, and aero loading applications.

Engineered for high accuracy and efficiency, our systems integrate with acoustic and climatic chambers for NVH, temperature, humidity, and solar testing. Utilizing SEA technology, they deliver superior control, reduced maintenance, and up to 80% energy savings over hydraulic systems. The seaPLUS series boosts efficiency by 46%, further extending performance, durability, and testing capabilities. Designed to meet SAE, ISO, and other industry standards, these systems provide reliable, high-fidelity testing for a range of automotive applications.

- **Durability**
- **Research and Development**
- **Noise, Vibration, and Harshness (NVH)**
- **Buzz, Squeak, and Rattle (BSR)**
- **End-of-Line Production**
- **Accelerated Life**



Advantages of seaPLUS Road Simulators

Extended Wheelpans

Pedestal style servo electric linear motors are fitted with extended wheelpans for vertical motion into the tire patch for the typical Four Poster system configuration.

Thermal Management for Extended Testing

Increased efficiency in converting electrical to mechanical energy, results in significantly lower heat generation. This improved efficiency reduces the size of the active cooling infrastructure, minimizes thermal loading on components, and contributes to lower overall operational costs.

Integrated Safety Features

These features are built into the control architecture to ensure operator safety and specimen integrity during every test cycle. Every system includes comprehensive safety monitoring:

- Safe Limited Speed (SLS)
- Safe Limited Acceleration (SLA)
- Absolute encoder fault detection
- Safe Torque Off (STO)
- Internal motor/drive temperature monitoring
- Customizable specimen-specific protection limits

High-Frequency Capability

Motor coherence up to 400 Hz enables test profiles that demand high dynamic response, exceeding the capabilities of servo-hydraulic actuators.

Solid Welded Construction

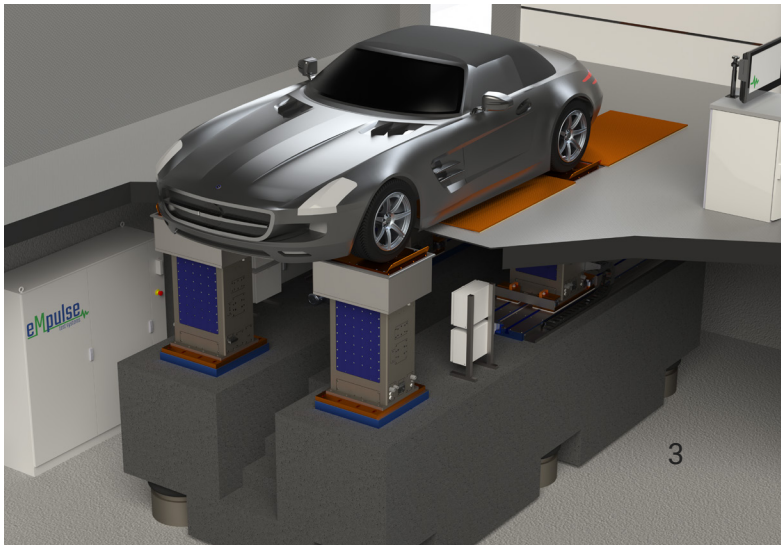
Precision CNC machined and ground surfaces to 0.0001” tolerances to ensure perfect alignment for system longevity. Nickel plating surfaces resist long-term corrosion better than zinc, powder-coating or paint.

Nanometer-Level Accuracy

Integrated displacement feedback systems offer <10 nm resolution, supporting high-precision test requirements.

Body Coupled Actuation

Additional body coupled actuators can inject higher frequency vibration directly into the vehicle frame.



Advantages of seaPLUS Road Simulators

High Fidelity
High fidelity 32-bit closed-loop control ensures smooth, accurate motion across all test speeds, without switching valve types or control strategies.

Force Range and Modular Design
Modular motor configurations deliver peak dynamic forces from 1 kN to 108 kN, independent of static load.

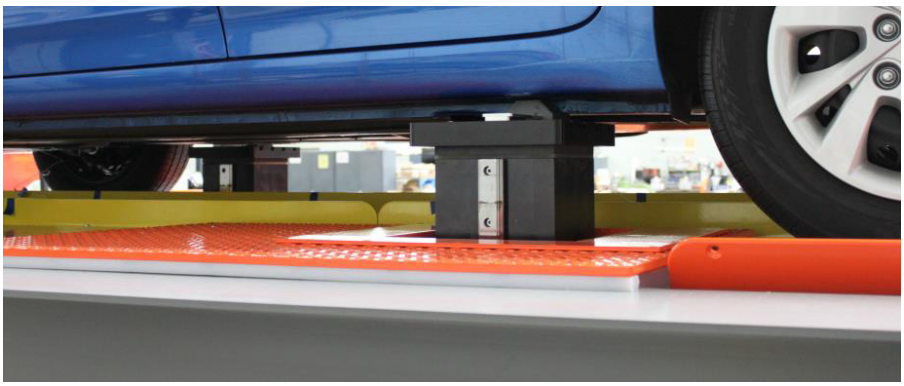
Pneumatic Support
Patented Integrated high volume Air-bag pneumatic support system for no maintenance and long-term durability.

Tired Coupled Actuation
Available in configurations for 2, 3, 4 or more tire coupled actuators, in addition to direct body coupled actuators or aeroloaders.

Efficient, Clean Operation
Direct-drive electric motion is up to 80% more efficient than hydraulics, with no fluid handling, reduced maintenance, and a cleaner test environment.

Pneumatic Static Load Support
Supports the vehicle weight, which allows the motors to provide the full dynamic force capacity independent of vehicle weight.

Application-Specific Software
Integrated with eMpulse controls that feature application-specific software, seaPLUS Road Simulators are ideal for field data reproduction, sine sweep, or Power Spectral Density (PSD) profile replication.



seaPLUS Road Simulator Specifications

Typical Applications			Body Coupled*	NVH 4-Post		4-Post Durability		4-Post Durability		4-Post Durability	
xxx= A Stroke M working Stroke, peak - peak	S	m (in)	330* (13)*	160 (6.3)	260 (10.2)	160 (6.3)	260 (10.2)	160 (6.3)	260 (10.2)	160 (6.3)	260 (10.2)
Motor Dynamic Peak Force Motor Peak Force	Fpk, mot	N (lbF)	13486 (3028)	26910 (6050)		40326 (9066)		53820 (12100)		107640 (24200)	
Motor Continuous Dynamic Force** Motor Continuous or rms Force	Fn, mot	N (lbF)	5018 (1128)	10530 (2367)		21060 (4735)		21060 (4735)		42120 (9469)	
Static Load Support Max Air Spring Capacity at Prated	Fpk, air	N (lbF)	8900 (2000)	17800 (4000)		17800 (4000)		17800 (4000)		35600 (8000)	
Total Continuous Force **Fpk, mot + Fpk, air**	Fpk, total	N (lbF)	13918 (3129)	28330 (6369)		38860 (8737)		38860 (8737)		77720 (17473)	
Total Peak Force **Fn,mot + Fpk,air**	Fcont, tot	N (lbF)	22368 (5029)	44710 (10052)		58126 (13068)		71620 (16102)		143240 (32203)	
Velocity max at Fn,mot	Vmax, fn	ms/ (in/s)	4.6 (181)	4.2 (165)		4.2 (165)		4.2 (165)		4.2 (165)	
Velocity max at Fpk,mot	Vmax, fpk	m/s (in/s)	2.0 (78.7)	1.9 (74.8)		1.9 (74.8)		1.9 (74.8)		1.9 (74.8)	
Acceleration max (unloaded)	gmax	G	26	30	24	30	24	36	30	36	30
Absolute Digital Encoder Resolution	Enc res	Nm	10.0 for playback and monitoring								
Noise Level – Typical (NVH Mode)	SPL(A)	dbA	<55								
Safety Rating, DIN EN 61508***	SIL		2								
Safety Rating, DN EN ISO 13849-1***	Cat		3								
Performance, DIN EN ISO 13849-1***	PL		D								
Bearing Materials			Qty 4 - Prelubricated, preloaded t-rail caged roller bearings. Replacement interval: 15 years under designed usage.								
Facility Requirements		V A	380-480Vac, 3φ, 50-60 Hz Current Rating based on motor sizing and system performance requirements.								
Air Supply, Rated	Prated	Psi (bar)	100 (6.9), higher Static Load Support possible at higher supply pressures.								
Recommend Liquid Cooling Flow, approximately 20deg delta C	Q	Lpm gpm	20 5.3	22 5.8	22 5.8	26 6.9		26 6.9	26 6.9	52 13.7	52 13.7
Max Motor Heat Removal **@100% duty cycle,**	Qp	kW Btu/hr	15.5 52832	29.4 100205	29.4 100205	53.8 183713		53.8 183713	53.8 183713	53.8 183713	107.7 367426

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