



# VEHICLE INERTIA MEASUREMENT FACILITY

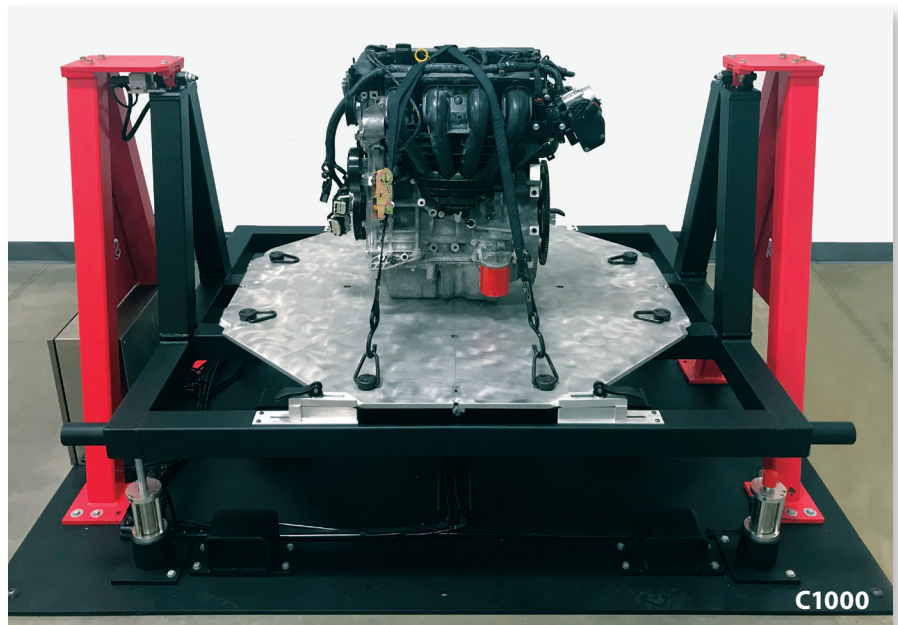
The **Vehicle Inertia Measurement Facility (VIMF)** is the premier, state-of-the-art system for measuring vehicle mass, center-of-gravity (CG) position and moments of inertia (MOI). Originally designed and built by S-E-A in 1994, the VIMF has remained the gold standard in the automotive industry since its inception. Over its nearly 25 years in production, the VIMF has been used to conduct over 30,000 tests for automobile manufacturers, race teams and design consultants worldwide. The U.S. National Highway Traffic Safety Administration (NHTSA) uses the measurements taken on S-E-A's VIMF to provide Static Stability Factor (SSF) data to rank vehicle rollover propensity as part of its New Car Assessment Program (NCAP).

The VIMF is available in various sizes, each utilizing a single platform for all measurements, thus minimizing test time and space requirements. The VIMF uses a combination of stable and inverted pendulum methods to determine CG height, moments of inertia and various yaw cross products of inertia. Test operation is computer guided, user friendly and highly accurate.

The VIMF technology has multiple configurations to accommodate small vehicle components, engines, passenger vehicles, large commercial and military vehicles and anything in between. VIMF test facilities range from 450 to 45,000 kg capacities and can be installed at an automotive R&D campus, or testing can be performed by S-E-A at our facility.




V10K



C1000

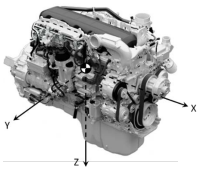
	C1000	C3000	V4500	V10K	V100K
Mass	1000 lb (450 kg)	3000 lb (1350 kg)	4500 lb (2000 kg)	10,000 lb (4500 kg)	100,000 lb (45,000 kg)
Platform Dimensions (mm)	1200 x 1200	2500 x 2500	1800 x 3600	2100 x 5500	3600 x 12,000
CG Height	1%	1%	0.5%	0.5%	1%
Moment of Inertia (MOI)	1-2%	1-2%	1-2%	1-2%	3%
Product of Inertia (POI)	1% of smallest MOI	1% of smallest MOI	2% of smallest MOI	2% of smallest MOI	5% of smallest MOI
Test Duration (includes setup)	3 hours	3 hours	3 hours	3 hours	4 hours

Data sheet containing the complete results from a C1000 test.



**S-E-A C1000**  
Inertia Measurement Facility

**Test Date:** 10/24/2017      **Date Printed:** 10/24/2017  
**Year:** 2016      **Make:** Ford  
**Project:** SEA Research      **Model:** Fusion Engine      **Engine Weight (kg):** 113.2  
**Description:** 2016 Ford Fusion Engine



**Engine X CG from Y-Axis (mm):** 0.76  
**Engine X Reference from Y-Axis (mm):** 6.35  
**Engine X CG from Engine X Reference (mm):** -5.59

**Engine Y CG from X-Axis (mm):** 1.52  
**Engine Y Reference from X-Axis (mm):** -266.45  
**Engine Y CG from Engine Y Reference (mm):** 267.97

**Engine Z CG from Platform (mm):** 332.23  
**Engine Z Reference from Platform (mm):** -215.90  
**Engine Z CG from Engine Z Reference (mm):** -116.33

Applied Weight (kg)	Platform Angle (deg)	CG Height Above Platform (mm)
9.343	-3.734	330.96
9.343	-3.734	330.71
9.343	3.713	333.25
9.343	3.713	<u>333.76</u>
		332.23


Platform Period (sec)	Platform Amplitude (deg)	Ixx MOI (kg-m <sup>2</sup> )	Platform Period (sec)	Platform Amplitude (deg)	Iyy POI (kg-m <sup>2</sup> )
1.6929	2.25	5.842	1.6845	2.25	0.051
1.6929	2.29	5.836	1.6845	2.26	0.052
1.6929	2.28	<u>5.838</u>	1.6845	2.27	<u>0.053</u>
		5.839			0.052

Platform Period (sec)	Platform Amplitude (deg)	Iyy MOI (kg-m <sup>2</sup> )	Platform Period (sec)	Platform Amplitude (deg)	Izz POI (kg-m <sup>2</sup> )
1.6758	2.37	4.042	0.8153	3.33	1.5
1.6760	2.36	4.051	0.8151	3.12	1.4
1.6760	2.35	<u>4.054</u>	0.8150	3.04	1.4
		4.049			<u>0.044</u>
					0.045

Platform Period (sec)	Platform Amplitude (deg)	Izz MOI (kg-m <sup>2</sup> )	Platform Period (sec)	Platform Amplitude (deg)	Izz POI (kg-m <sup>2</sup> )
0.8153	3.33	3.225	0.8139	3.34	19.0
0.8151	3.12	3.218	0.8138	3.29	18.8
0.8150	3.04	<u>3.216</u>	0.8138	3.36	<u>0.813</u>
		3.220			0.817

S-E-A  
7001 Buffalo Parkway, Columbus, Ohio 43229

Data sheet containing the complete results from a V10K test.



**S-E-A VIMF**  
Vehicle Inertia Measurement Facility

**VIMF Test #:** 6024      **Test Date:** 2/3/2016      **Date Printed:** 2/3/2016  
**Year:** 2016      **Project:** SEA Research  
**Make:** Lexus      **VIN:** 2T2ZZMCA3GC009201  
**Model:** RX350      **Mileage:** 44  
**Description:** Driver, Full Fuel, 3.5L V6, 8AT, FWD, 4 Door, SUV  
**Load:** Driver

Front Tire Type:	Front Tire Size:	Front Tire:	Rear Tire Type:	Rear Tire Size:	Rear Tire:	Weights (kg)	Total Weight (kg)								
Bridgestone Ecopia HL422 Plus	235/65R18 106V	33 psi	Bridgestone Ecopia HL422 Plus	235/65R18 106V	33 psi	<table border="1" style="width: 100%;"> <tr><td>Left Front</td><td>605.1</td></tr> <tr><td>Right Front</td><td>557.6</td></tr> <tr><td>Left Rear</td><td>426.3</td></tr> <tr><td>Right Rear</td><td>409.6</td></tr> </table>	Left Front	605.1	Right Front	557.6	Left Rear	426.3	Right Rear	409.6	1635.76 1623.70 1629.73 1695.45 2792.73
Left Front	605.1														
Right Front	557.6														
Left Rear	426.3														
Right Rear	409.6														

Applied Weight (kg)	Platform Angle (deg)	Motion Relative to Platform (mm)	CG Height (mm)
0.000	-0.035	0.000	0.0
16.711	3.357	-0.636	674.7
23.556	5.133	-0.948	674.7
16.711	-3.700	0.618	373.7
23.556	-5.212	1.148	<u>374.7</u>
			674.4

T/2H = 1.208

Period (sec)	Platform Amplitude (deg)	Relative Motion (mm)	Pitch Inertia (kg-m <sup>2</sup> )
6.051	3.997	0.592	3501
6.050	3.982	0.586	3502
6.050	3.962	0.593	<u>3499</u>
			3500

Period (sec)	Platform Amplitude (deg)	Relative Motion (mm)	Yaw Inertia (kg-m <sup>2</sup> )	Roll/Yaw Product (kg-m <sup>2</sup> )
3.019	3.038	0.357	3845	136
3.019	3.032	0.353	3845	139
3.017	3.016	0.355	<u>3838</u>	<u>136</u>
			3843	137

Period (sec)	Platform Amplitude (deg)	Relative Motion (mm)	Roll Inertia (kg-m <sup>2</sup> )
1.609	2.846	0.579	849
1.609	2.779	0.563	860
1.609	2.678	0.501	<u>852</u>
			850

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# VEHICLE DYNAMICS

ENGINEERING - INNOVATION - PRECISION

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