# VEHICLE INERTIA MEASUREMENT FACILITY

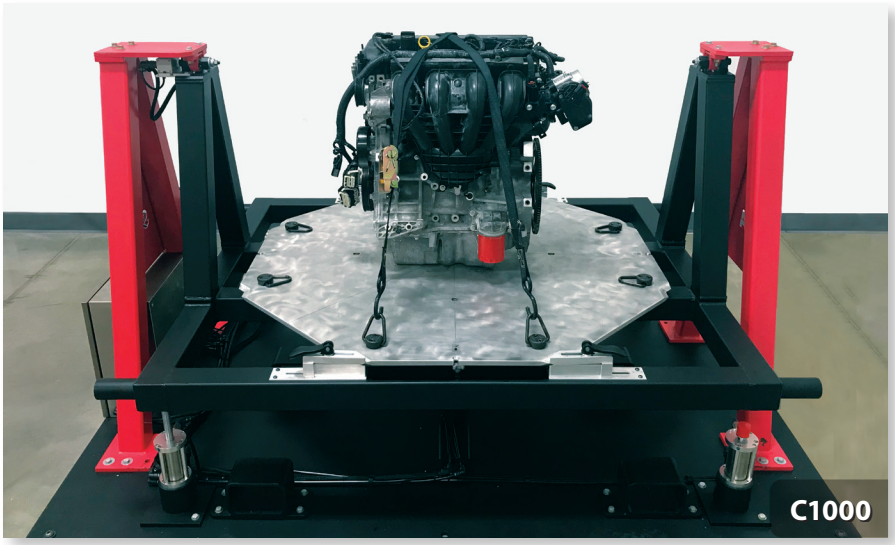
## VEHICLE & PRODUCT SOLUTIONS

***Certification, advanced modeling, and competitive benchmarking demand precise CG and inertia measurements.***

The **Vehicle Inertia Measurement Facility (VIMF)** is the premier, state-of-the-art system for measuring mass, center-of-gravity (CG) position, moments of inertia (MOI), and various products of inertia (POI). 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 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 and inertia properties. 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.


| | C1000 | C3000 | V10K | V30K | V100K |
|---|---|---|---|---|---|
| Mass | 1000 lb (450 kg) | 3000 lb (1350 kg) | 10,000 lb (4500 kg) | 30,000 lb (14,000 kg) | 100,000 lb (45,000 kg) |
| Platform Dimensions (mm) | 1200 x 1200 | 2500 x 2500 | 2100 x 5500 | 260 X 890 (1295) | 3600 x 12,000 |
| CG Height | 1% | 1% | 0.5% | 1% | 1% |
| Moment of Inertia (MOI) | 1-2% | 1-2% | 1-2% | 1-3% | 3% |
| Product of Inertia (POI) | 1% of smallest MOI | 1% of smallest MOI | 2% of smallest MOI | 3% 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

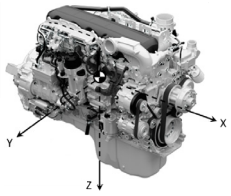
*Inertia Measurement Facility*

**C1000 Test #:** 110 **Test Date:** 10/24/2017 **Date Printed:** 10/24/2017

**Year:** 2016 **Project:** SEA Research

**Make:** Ford **Model:** Fusion Engine **Engine Weight (kg):** 113.2

**Description:** 2016 Ford Fusion Engine




| | |
|---|---|
| Engine X CG from Y-Axis (mm): | 0.8 |
| Engine X Reference from Y-Axis (mm): | 6.4 |
| Engine X CG from Engine X Reference (mm): | -5.6 |
| Engine Y CG from X-Axis (mm): | 1.5 |
| Engine Y Reference from X-Axis (mm): | -266.5 |
| Engine Y CG from Engine Y Reference (mm): | 268.0 |
| Engine Z CG from Platform (mm): | 332.2 |
| Engine Z Reference from Platform (mm): | -215.9 |
| Engine Z CG from Engine Z Reference (mm): | -116.3 |

| Applied Weight (kg) | Platform Angle (deg) | CG Height Above Platform (mm) |
|---|---|---|
| 9.343 | -3.734 | 331.0 |
| 9.343 | -3.733 | 330.7 |
| 9.343 | 3.713 | 333.3 |
| 9.343 | 3.716 | 333.8 |
| | | **332.2** |

| Platform Period (sec) | Platform Amplitude (deg) | Ixx MOI (kg-m²) | Platform Period (sec) | Platform Amplitude (deg) | | Ixy POI (kg-m²) |
|---|---|---|---|---|---|---|
| 1.693 | 2.25 | 5.842 | 1.685 | 2.25 | | 0.051 |
| 1.693 | 2.29 | 5.836 | 1.685 | 2.26 | | 0.052 |
| 1.693 | 2.28 | 5.838 | 1.685 | 2.27 | | 0.053 |
| | | **5.839** | | | | **0.052** |
| **Platform Period (sec)** | **Platform Amplitude (deg)** | **Iyy MOI (kg-m²)** | **Platform Period (sec)** | **Platform Amplitude (deg)** | **Reaction Torque (N-m)** | **Ixz POI (kg-m²)** |
| 1.676 | 2.37 | 4.042 | 0.815 | 3.33 | 0.170 | 0.046 |
| 1.676 | 2.36 | 4.051 | 0.815 | 3.12 | 0.158 | 0.046 |
| 1.676 | 2.35 | 4.054 | 0.815 | 3.04 | 0.158 | 0.044 |
| | | **4.049** | | | | **0.045** |
| **Platform Period (sec)** | **Platform Amplitude (deg)** | **Izz MOI (kg-m²)** | **Platform Period (sec)** | **Platform Amplitude (deg)** | **Reaction Torque (N-m)** | **Iyz POI (kg-m²)** |
| 0.815 | 3.33 | 3.225 | 0.814 | 3.34 | 2.147 | 0.618 |
| 0.815 | 3.12 | 3.218 | 0.814 | 3.29 | 2.124 | 0.619 |
| 0.815 | 3.04 | 3.216 | 0.814 | 3.36 | 2.147 | 0.613 |
| | | **3.220** | | | | **0.617** |

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**CG MEASUREMENT follows the Stable Pendulum procedure outlined in ISO 10392**

Data sheet containing the complete results from a V10K test.

## S-E-A VIMF

*Vehicle Inertia Measurement Facility*

**VIMF Test #:** 9070 **Test Date:** 10/30/2025 **Date Printed:** 1/9/2026

**Year:** 2026 **Project:** SEA Research

**Make:** Tesla **VIN:** 7SAY**********

**Model:** Model Y **Mileage:** 29

**Description:** Driver, Electric Fuel, Electric, Auto, RWD, 4 Door, SUV

| | |
|---|---|
| Front Track (mm): | 1640 |
| Rear Track (mm): | 1643 |
| Average Track (mm): | 1642 |
| Roof Height (mm): | 1615 |
| Wheelbase (mm): | 2893 |

**Load:** Driver

**Front Tire Type:** Hankook Ion EVO A/S SUV M+S
**Front Tire Size:** 255/40R20 101V
**Front Tire:** 42 *psi* 2.90 *bar*
**Rear Tire Type:** Hankook Ion EVO A/S SUV M+S
**Rear Tire Size:** 255/40R20 101V
**Rear Tire:** 42 *psi* 2.90 *bar*

**Weights (kg)**

| Left Front | Right Front |
|---|---|
| 478.5 | 457.2 |
| **Left Rear** | **Right Rear** |
| 529.1 | 521.3 |

**Total Weight (kg)** 1986.1
**Lateral CG (mm)** -12.1
**Longitudinal CG (mm)** 1530.0

| Applied Weight (kg) | Platform Angle (deg) | Motion Relative to Platform (mm) | CG Height (mm) | |
|---|---|---|---|---|
| 0.000 | -0.061 | 0.000 | 0.0 | |
| 21.196 | 3.344 | -0.586 | 540.3 | |
| 28.008 | 4.402 | -0.723 | 540.0 | |
| 21.196 | -3.422 | 0.318 | 540.7 | |
| 28.008 | -4.490 | 0.511 | 541.1 | |
| | | | **540.5** | *T/2H* = **1.519** |
| **Period (sec)** | **Platform Amplitude (deg)** | **Relative Motion (mm)** | **Pitch Inertia (kg-m²)** | |
| 4.887 | 4.182 | 0.551 | 2883 | |
| 4.887 | 4.178 | 0.550 | 2883 | |
| 4.887 | 4.211 | 0.553 | 2883 | |
| | | | **2883** | |
| **Period (sec)** | **Platform Amplitude (deg)** | **Relative Motion (mm)** | **Yaw Inertia (kg-m²)** | **Roll/Yaw Product (kg-m²)** |
| 2.703 | 3.118 | 0.122 | 3201 | 57 |
| 2.704 | 3.056 | 0.119 | 3204 | 58 |
| 2.704 | 2.820 | 0.111 | 3206 | 60 |
| | | | **3203** | **58** |
| **Period (sec)** | **Platform Amplitude (deg)** | **Relative Motion (mm)** | **Roll Inertia (kg-m²)** | |
| 1.458 | 2.851 | 0.504 | 818 | |
| 1.458 | 2.837 | 0.507 | 818 | |
| 1.458 | 2.990 | 0.540 | 819 | |
| | | | **818** | |

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**In production for OVER 30 YEARS and have conducted 45,000 world-wide tests!**

**To schedule a demo or request more information:**
**VPS@SEAlimited.com**

SEE THE TESTING IN ACTION!