



VEHICLE INERTIAL PROPERTIES EVALUATION RIG (VIPER)

Combat Capabilities Development Command (CCDC) Ground Vehicle Systems Center's (GVSC) Physical Simulation Team (PST) operates a Vehicle Inertial Properties Evaluation Rig (VIPER) that is capable of determining various parameters including vehicle COG, mass moments of inertia, total vehicle weight and roll/yaw mass product of inertia.

VIPER Capabilities

The VIPER is able to quickly calculate the Center of Gravity, Moments of Inertia, and Vehicle Weight of systems up to 100,000 lbs, 50 ft long, and 12.5 ft wide.

Benefits

- Mass property measurements made are an essential component for developing realistic dynamics models when solid modeling is not an option due to cost or availability.
- The VIPER directly impacts vehicle design trade-off, rollover analysis/prediction, vehicle stability/handling/ride, turret drive/control, transportability assessments, suspension tuning/design, vehicle data plate information and analysis



2 Axle / 18,000 Lb Wheeled Vehicle



VEHICLE INERTIAL PROPERTIES EVALUATION RIG (VIPER)

Capacity

- Vehicle Weight (3,000 –100,000 lbs.)
- Vehicle Width (up to 150 in.)
- Vehicle Length (up to 600 in.)

Accuracy

- CG Positions $\pm 1\%$
- Moments of Inertia $\pm 3\%$
- Weight and Axle Load ± 1 lb.

Parameters Measured

- Vehicle Center of Gravity
- Mass Moments of Inertia in Roll
- Mass Moments of Inertia in Pitch
- Mass Moments of Inertia in Yaw
- Roll/Yaw Mass Product of Inertia
- Axle Loads
- Total Vehicle Weight



2 Axle / 8,000 Lb Wheeled Vehicle



4 Axle / 60,000 Lb Wheeled Vehicle

FOR FURTHER INFORMATION:

U.S. ARMY COMBAT CAPABILITIES
DEVELOPMENT COMMAND — GROUND
VEHICLE SYSTEMS CENTER:

<https://tardec.army.mil/>

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