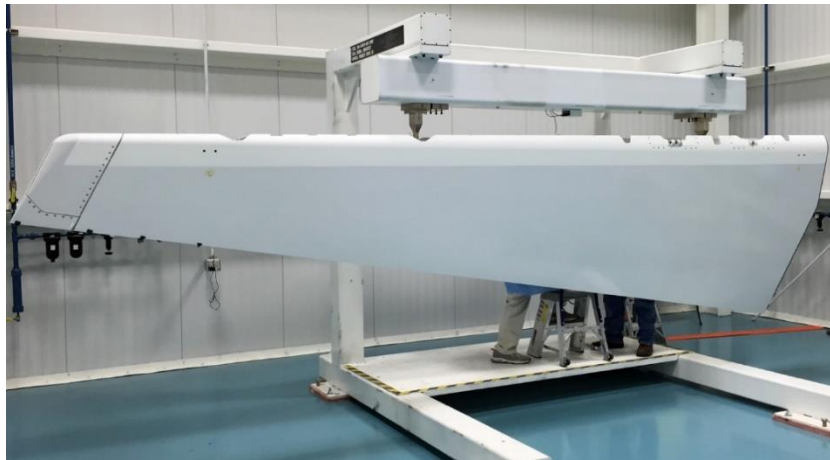


Aircraft Control Surface

Moment of Inertia

Measurement Instrument



Unlike the relative measurement method, which requires a mass model for system calibration and then compares the measurements of production units to mass model measurements, the absolute method measures MOI directly.

And by measuring the decay of the amplitude of oscillation, we are able to correct for the effects of entrained air in the wake of the oscillating control surface, a significant source of measurement error.

Why Measure?

It is important to measure the MOI of an aircraft control surface to ensure that the maximum MOI about the hinge line does not exceed pre-established limits. This is to better predict and reduce the likelihood of flutter and divergence characteristics.

Concept of Operation

Raptor Scientific Control Surface MOI Instruments suspend the test article in a horizontal orientation to create a gravity-driven pendulum. The pendulum oscillation is initiated manually. The frequency of oscillation and damping coefficient are measured, and forces are recorded using a high-accuracy

force transducer to measure control surface Center of Gravity. Inertia is derived from the oscillation period, the mass of the control surface, and CG offset distance. Measured MOI is accurate to $\pm 3\%$.

System Design

The Aircraft Control Surface MOI measurement instrument is a cantilevered design, allowing for a smaller footprint, unobstructed mounting of long parts, and a stiffer system.

Absolute Measurement

Raptor Scientific Control Surface MOI Instruments rely on absolute rather than of relative measurements.

Other Design Advantages

- Out-of-level error tolerance – inconsequential up to 5°
- Ease of handling and loading – interface locations are independent of ground support handling requirements
- Ceiling height – parts are measured in the shortest, most ergonomically efficient configuration

The absolute measurement method also allows for quick measurements of prototypes or major block revisions. It is also insensitive to the effects of altitude, temperature, and humidity.

General Specifications

MOI Accuracy	$\pm 3\%$
Payload Weight Capacity	50 - 500 lbs
Hinge Point Spacing	48 - 112 in
Test Article Length (Span) (typ.).....	54 - 288 in
Test Article Width (Chord).....	Up to 72 in

* Custom sizes available