RAPTOR SCIENTIFIC®

MOI Control Surface Measurement

Global Provider of Test & Measurement Solutions

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 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 ±3%.

Aircraft Control Surface Moment of Inertia Measurement Instrument

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.

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.

Other Deign 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	± 3%
Payload Weight Capacity	50 - 500 lbs (22 - 225 kg)
Hinge Point Spacing	48 - 112 in (120 - 285 cm)
Test Article Length (Span) (typ.)	54 - 288 in (130 - 735 cm)
Test Article Width (Chord)	Up to 72 in (Up to 185 cm)

*Custom sizes available

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