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Why do we care about uncertainty?

Sensor users want to know if their sensor is good or bad

Incorrectly testing a sensor causes:

- The customer to be unhappy because their sensor is broken
- The distributor to be unhappy because the customer loses confidence
- The factory to be unhappy because sensors are being returned
Why is the exciter so important?

Heart of the calibration system
- Provides mechanical motion
  - Frequency and amplitude
- Uni-axial motion assumption
  - Any transverse motion adds error to calibration
- Rigid structure for highest natural frequencies
- Defines mechanical ease-of-use

Durability - will see hundreds of thousands to millions of cycles over life time
What is transverse sensitivity?

Transverse sensitivity of accelerometer

- Sensitivity to motion perpendicular to the sensitive axis due to tolerance and alignment of sensing element

- Expressed as percentage of axial sensitivity

\[
\% = \frac{\text{Transverse Sensitivity (mV/g)}}{\text{Axial Sensitivity (mV/g)}} \times 100
\]
Air bearing shaker has no significant transverse modes – both well below ISO recommendation

Flexure design has multiple significant modes, particularly above 3k Hz
What is transverse sensitivity?

Transverse sensitivity presented as a polar plot showing sensor orientation corresponding to a max and min % value.

- Direction of transverse motion
- Ref transverse Sensitivity
- SUT transverse Sensitivity
What is transverse sensitivity?

Transverse sensitivity presented as a polar plot showing sensor orientation corresponding to a max and min % value.
Effects on Calibration Results

- Data acquired using TMS 9155C calibration workstation with NI 4461 24 bit DAQ
- PCB 352B22 miniature teardrop ICP® accelerometer on flexure-based shaker by rotating it in 30°
Effects on Calibration Results

Data acquired using TMS 9155C calibration workstation with NI 4461 24 bit DAQ

PCB 352B22 miniature teardrop ICP® accelerometer on air-bearing shaker by rotating it in 30° increments
Thank you for your time and attention

Any questions?