

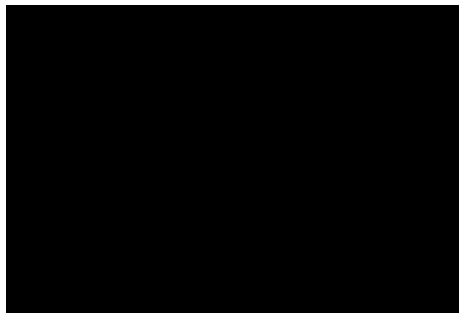
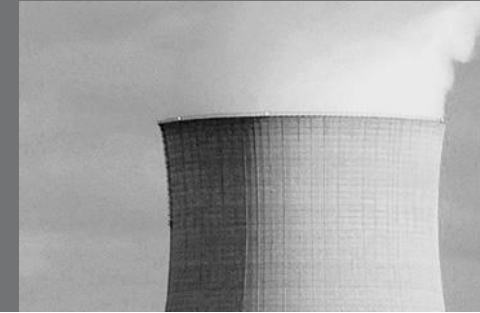
**CURTISS -
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VTS Series – Vibration Tolerant Tilt Sensors



Glossary

- **VTS – Vibration-Tolerant Tilt Sensor**
 - VTS is the name given to all CW sensors produced using IMU technology
- **MEMS – Micro-Electro-Mechanical Systems**
 - MEMS devices consist of miniaturized mechanical and electro-mechanical elements. MEMS sensors are used primarily to convert a mechanical signal into an electrical signal. Examples include microphones for mobile phones, pressure sensors for blood pressure monitoring, and inertial sensors for roll detection.
- **IMU – Inertial Measurement Unit**
 - A MEMS device that incorporates 3x miniaturized accelerometers and 3x miniaturized gyroscopes into a single chip package.

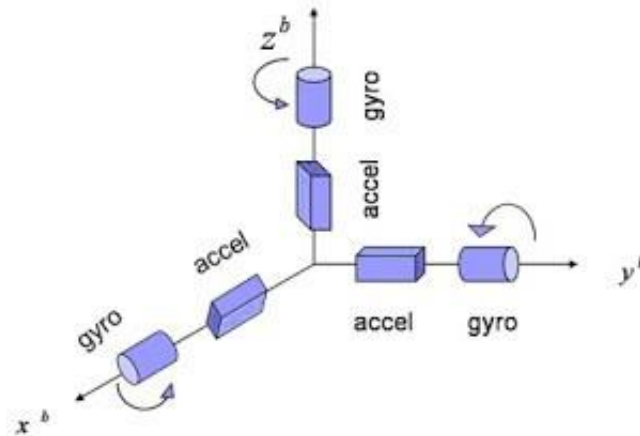


Illustration of an IMU showing arrangement of accelerometers and gyroscopes

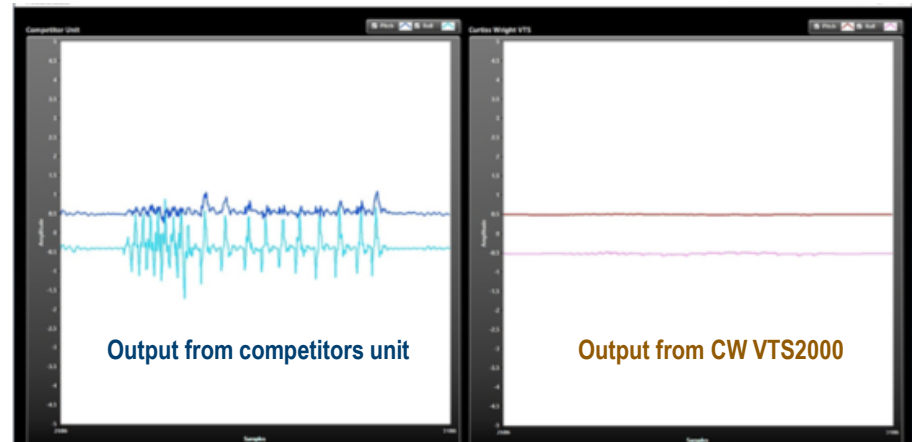
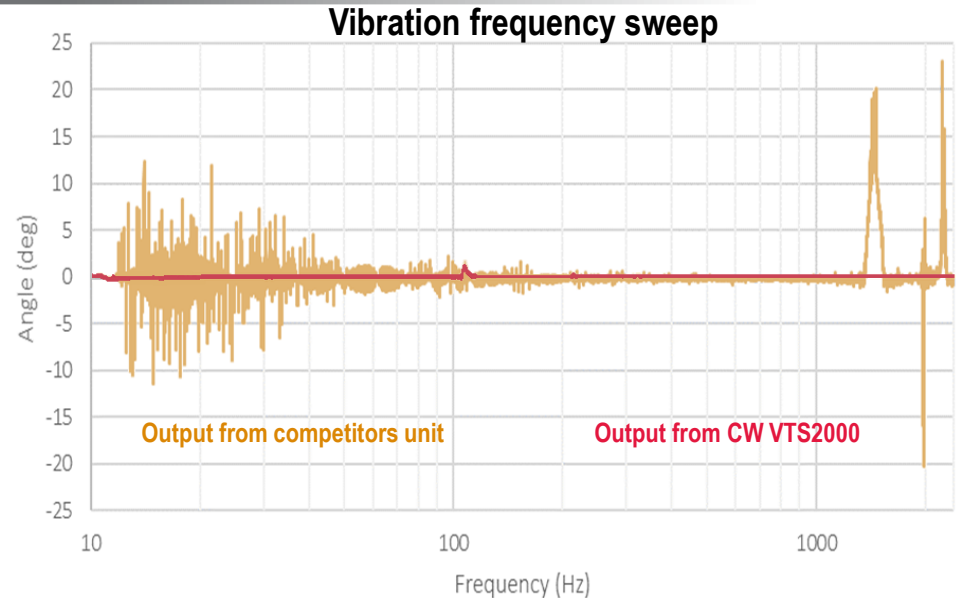
VTS Series – Overview



- **Vibration-tolerant**
 - Unaffected by parasitic vibration
 - Fast responding
 - Improves safety, reliability and efficiency
- **Thermally compensated**
 - Internal temperature monitoring
 - Limits thermal drift errors
 - Improves safety, reliability and efficiency
- **Dual-sensing per axis**
 - Redundancy for error detection
 - Internal cross-checking
 - Improves safety, reliability and efficiency

VTS Series – Vibration Tolerance

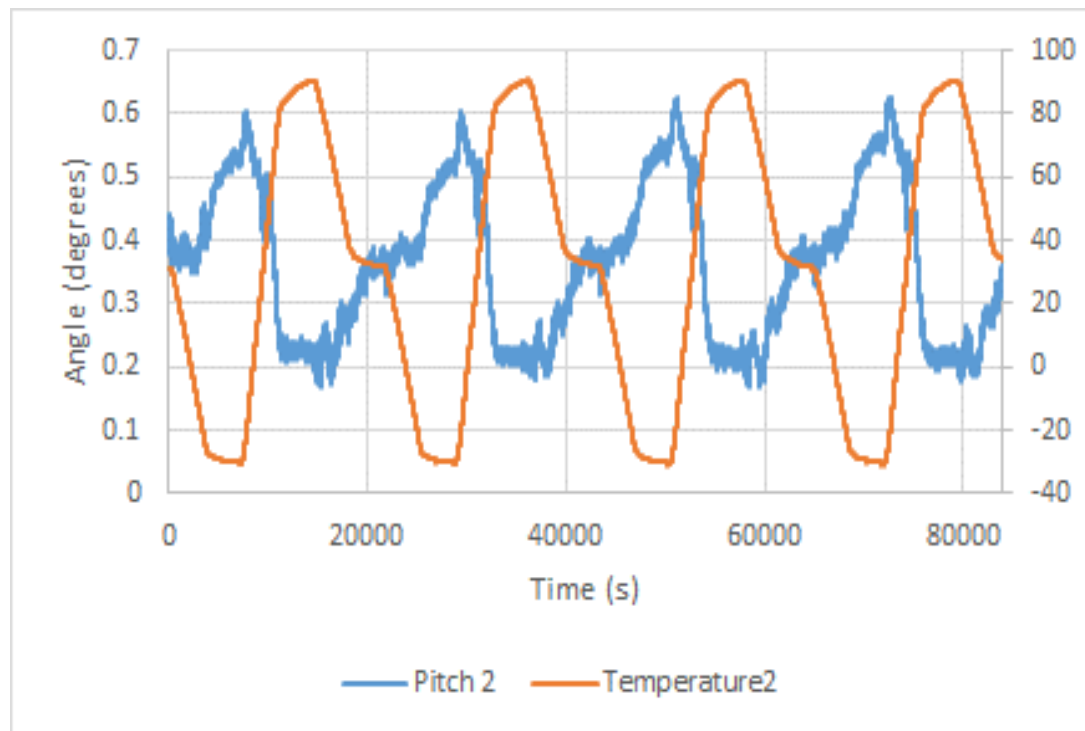
- **Unaffected by parasitic vibration**
 - Unwanted accelerations (e.g. engine vibration, mechanical movement, and acoustic noise) can distort tilt measurement
 - Complex VTS algorithms isolate unwanted data and only transmit true position data
- **Fast responding**
 - Filtering traditional accelerometer based tilt sensor outputs through damping induces signal delay
 - Fast-acting VTS algorithms provide rapid response to changes in tilt angle
- **Improves safety, reliability and efficiency**
 - Protects the operator from tip-over while eliminating downtime from nuisance trips



Horizontal vibration

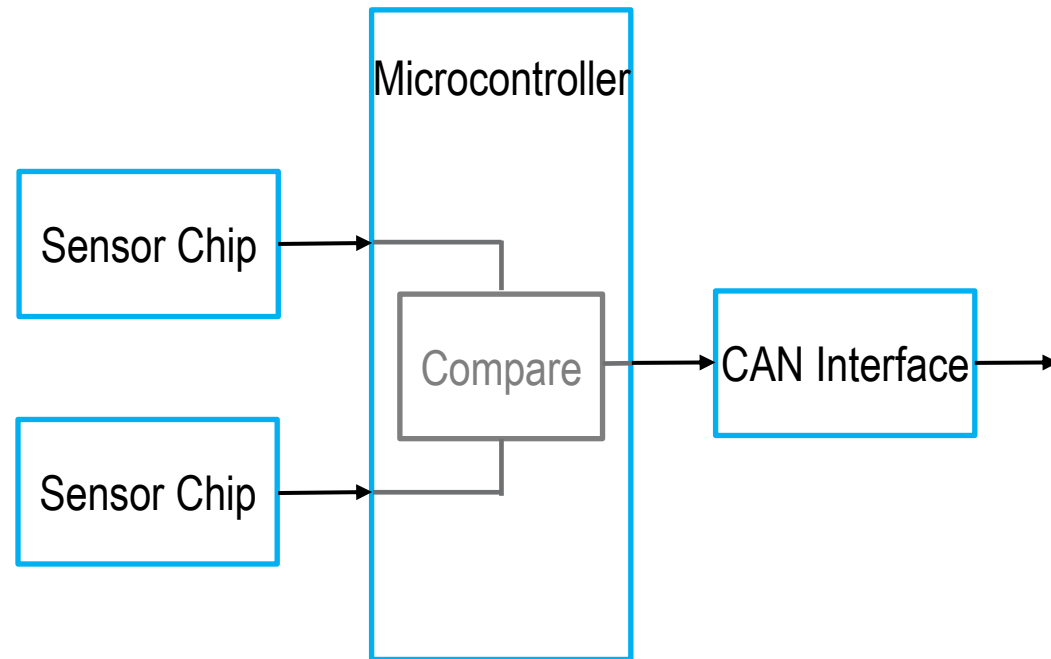
VTS Series – Thermal Compensation

- **Internal temperature monitoring**
 - VTS series sensors include on-board temperature sensing to identify operating conditions
- **Limits thermal drift errors**
 - Complex, fast-acting VTS algorithms incorporate measured temperature data to address thermal drift errors associated with IMU technology
 - Each sensor is calibrated for the operating temperature range (-40 to +85°C) to optimise the accuracy of output data
 - VTS thermal compensation ensures output deviation resulting from thermal drift is kept at $<0.004^{\circ}/K$
- **Improves safety, reliability and efficiency**
 - VTS provides accurate noise free reliable output data eliminating downtime from nuisance trips caused by acceleration induced noise spikes



VTS Series – Dual-Sensing

- **Redundancy for error detection**
 - Sensors that rely on a single source of measurement data are susceptible to errors associated with false readings (e.g. as a result of physical damage)
 - The VTS series utilises a dual-sensing architecture to validate the output data and detect errors
- **Internal cross-checking**
 - Signals from each chip are compared by the on-board microprocessor to verify signal veracity
 - If there is a difference in signals, then an error is assumed and a message put on the CAN bus to indicate this
- **Improves safety, reliability and efficiency**
 - Provides vehicle electronics with all the data needed to enforce a safe condition, protecting operators and equipment



The Curtiss-Wright logo is displayed in white, bold, italicized capital letters on a red rectangular background.

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