
The use of Sherborne Sensors Servo Inclinometers and Accelerometers in Bridge Health Monitoring



Hong Kong's Tsing Ma Bridge is the world's longest span suspension bridge carrying both road and rail traffic. As with other long-span cable-supported bridges, it can move and oscillate from several centimetres to several metres under different types of loading and environmental conditions. Although these displacements or deformations may not be in themselves hazardous, they significantly affect the bridge's structural integrity and maintenance needs. In other types of bridges too, the need for structural health monitoring has never been more crucial. A similar structure now under construction utilises a sensor network, including Sherborne Sensors' precision servo inclinometers and accelerometers, facilitating the identification of structural problems at an early stage, prolonging the life of these structures, identifying areas of concern and improving public safety.

Additionally, full-scale monitoring assists engineers to better understand the behaviour of bridges in real life conditions enabling the comparison of wind tunnel and FEM results with reality, thus improving design methods for incorporation in future structures.

Sherborne Sensors provide a wide range of standard and engineered custom solutions for infrastructure monitoring and evaluation including angle of tilt or inclination, acceleration and force. Sherborne Sensors has been providing custom engineered solutions to structural health measurement challenges for many years and customers are encouraged to contact us with their requirements.

SERVO ACCELEROMETERS

Sherborne Sensors servo accelerometers are highly accurate sensors that can measure both steady state and dynamic linear accelerations down to full-scale ranges as low as $\pm 0.1g$. When making long constant measurements, such as measuring displacement by double integration of acceleration data, low-range servo accelerometers provide superior DC response compared to other technologies reducing integration errors.

- Road deck frequency and mode shape determination.
- Earthquake structural monitoring.
- Vertical, lateral and rotational accelerations of decks, cables and bridge towers.
- Used in conjunction with GPS to improve frequency response of deflection measurements.

SERVO INCLINOMETERS

Sherborne Sensors servo inclinometers are available in full-scale ranges down to $\pm 1^\circ$ with a resolution of 0.1 arc-second. They have excellent low-frequency characteristics with transient response ability.

- Deflection, moment and shear force computation by analysis of angular deflection.
- Bridge pier settlement.
- Moment distribution through bridge pivot joints.
- Expansion joint investigation.
- Inclinometers may be permanently embedded into structures serving as a long-term monitoring facility.
- Monitoring and analysis of structural dynamic characteristics.