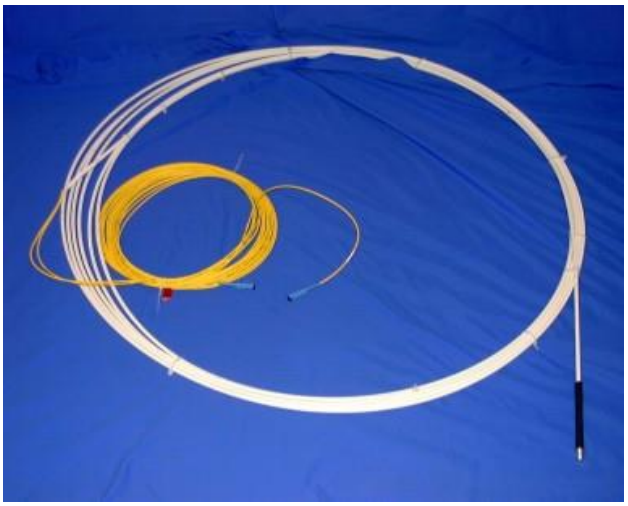
SmartRod

FBG Strain and Curvature Sensor



50 m Riser Curvature SmartRod

Key Features

- FBG Strain, Curvature and Displacement Sensor
- FBG Arrays Embedded within Pultruded Composite Rod
- Zero Power, Electrically Immune
- Intrinsically Safe
- Multiple km Signal Integrity
- Suitable for Long-Term SHM
- Developed by Smart Fibres for Monitoring Rail Tunnel 3-D Deformations

About SmartRod

SmartRod comprises a composite pultrusion into which one or more arrays of FBG strain sensors are installed so as to measure the local (short gauge) or average (long gauge) strains within the pultrusion.

By locating the strain sensors some distance from the neutral axis of the SmartRod, then the SmartRod curvature can be calculated, as can the curvature of a structure to which SmartRod is affixed (see Figure 1).

The curvature measurement sensitivity is increased with increasing SmartRod cross-sectional dimension. If the structure is such that multiple, single-axis SmartRods can be affixed relative to the neutral axis of the structure itself (for instance a pip or a wall), then the curvature measurement sensitivity can be greatly increased (see Figure 2).

The nature of the differential measurement that SmartRod adopts means that temperature and axial strain effects can often be isolated from the normally required curvature measurement.

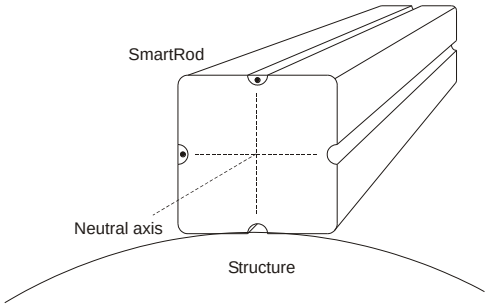


Figure 1) Measurement w.r.t. SmartRod Axis

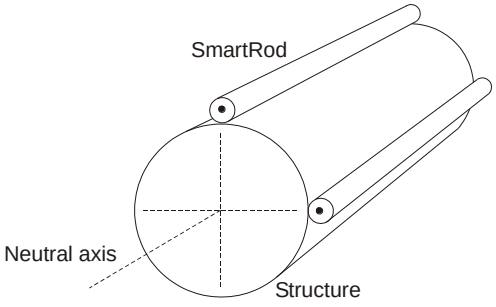


Figure 2) Measurement w.r.t. Structure Axis

Specifications

Note that the measurement performance of SmartRod is very dependent on installation methods and application conditions. Whilst there have been several installations of SmartRod, the sensor is presently considered as conceptual. To discuss your potential SmartRod application, please contact us.

Example SmartRod Installations:

Crane Girder Deflection

Road Tunnel

Diaphragm Wall Reinforcement

Catenary Riser