Strain Gauges for Steel
Weldable strain gauges measure strain in steel. Applications include:

- Monitoring changes in load on structural elements during and after construction.
- Monitoring the performance of wall anchors and other post-tensioned support systems.
- Monitoring loads in excavation support systems.
- Measuring strain in tunnel linings
- Monitoring distribution of load in pile tests.

Strain Gauges for Concrete
Embedment strain gauges measure strain in concrete. Typical applications include:

- Measuring strains in mass concrete.
- Measuring curing strains.

Operation
The vibrating wire strain gauge operates on the principle that a tensioned wire, when plucked, vibrates at a frequency that is proportional to the strain in the wire.

The gauge is constructed so that a wire is held in tension between two end flanges. Loading of the monitored element changes the distance between the two flanges and results in a change in the tension of the wire and its output signal.

An electromagnet is used to excite the wire and measure the resulting frequency of vibration. Strain is then calculated by squaring the frequency value and applying constant.

Careful positioning of the strain gauges on these lattice girders along with protective metal-foil wraps yielded a 100% survival rate during shotcreting.

Special end-blocks allow surface installation of strain gauges on concrete structural elements.
Arc-Weldable Gauges
Arc-weldable strain gauges are suitable for most applications and are quickly installed using an arc welder. They can be adapted for concrete by the use of grouted concrete mounting blocks.

Specifications
Sensor Type: Vibrating Wire
Gauge Length: 6 inches (150 mm)
Range: 3,000 μm
Resolution: 1.0 μm
Accuracy: ±0.5% FS
Non-Linearity: < 0.5% FS
Temp Range: −20°C to +80°C

Spot-Weldable Gauges
Spot-weldable strain gauges are compact gauges used when space is limited or when low-heat, shallow welds are required. For short-term applications, the gauge can installed with epoxy adhesive.

Specifications
Sensor Type: Vibrating Wire
Gauge Length: 2 inches (51 mm)
Range: 3,000 μm
Resolution: 0.4 μm
Accuracy: ±0.5% FS
Non-Linearity: < 0.5% FS
Temp Range: −20°C to +80°C

Embedment Gauges
Embedment strain gauges are designed for direct embedment in concrete. In reinforced or pre-stressed concrete applications, the embedment strain gauge is tied to the reinforcing cage. In mass concrete applications, the gauge is installed either before or immediately after placement of the concrete.

Specifications
Sensor Type: Vibrating Wire
Gauge Length: 6 inch (153 mm)
Range: 3,000 μm
Resolution: 1.0 μm
Accuracy: ±0.5% FS
Non-Linearity: < 0.5% FS
Temp Range: −20°C to +80°C