

**1998 NOVA AWARD WINNER****Strain Memory Alloy Passive Sensors for Civil Structures**

Strain Monitoring Systems (SMS) has developed a line of strain memory alloy-based passive sensors, trademarked as IntelliSense™ devices, and designed for use in civil structures as well as for other applications in industry. At the core of this technology is the patented use of a family of metal alloys that remember strain. Limited only by the needs of the user, strain can range from as little as 20 micro-strains (or .002% of elongation) to that causing complete fracture of the structure. When strained, the alloy instantly and irreversibly transforms from a non-magnetic to a magnetic state. This transformation to ferromagnetism precisely and proportionally correlates with the strain applied to the structure. Upon repeated strain, the alloy remembers its maximum strain. The degree of strain is permanently recorded in the metal's properties and is easily readable with magnetometers.

Various devices are available for a range of engineering and construction applications in which it is useful to know the amount of strain in a structure, and when the strain occurs. These devices are non-destructive and passive, and are intended for use in strategically high-stress (high-strain) areas of a structure. A human operator can periodically visit the site with an inexpensive, hand-held magnetometer to read the sensor's memory, or operators can remain off-site and interrogate the sensor remotely by phone. More complex applications might tie an array of IntelliSense™ sensors to a wireless transmission. Data can be conveyed to a computer either at pre-set intervals or only when a strain exceeding a pre-set limit occurs.

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