MicroSPECT

Features:

- *10mm (0.4inch) stroke length*
- *High accuracy(0.5% FS) +resolution(0.01% FS) using DETECT technology.*
- *Inherently digital technology*
- *Microcontroller provides output in real world units (μm + °C)*
- *Microcontroller stores sensor ID & Calibration Coeffs. in Flash EEPROM*
- *Digital temperature sensor for accurate compensation*
- *Immunity to hostile environment*
- *High survivability to shock and vibration*
- *Easy to install and maintain and re-zero.*
- *Low cost readout unit which detects damaged leadwires*
- *Easy to interface with PLC's*
- *Competitively priced*

YieldPoint's unique microSPECT (micron Scale Precision Eddy Current Transducer) technology is a high precision digital strain-gauge that can monitor either discrete displacements (i.e. crack opening) or distributed strains (i.e. stretch of a steel member) to either μm or με resolutions. The sensor is extremely thin (<7mm OD) and can easily be recessed down boreholes, attached to cables and bolts or embedded in shotcrete pillars.

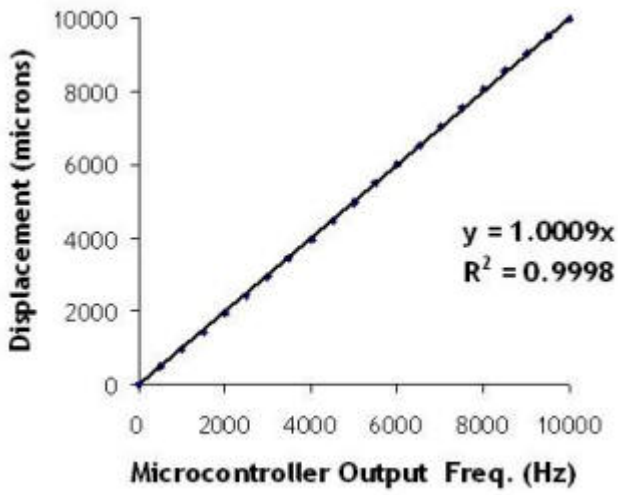
The microSPECT is easy to install by attaching the #8-32 threaded rods at both ends of the sensor to eyes-pieces. By twisting the two independent ends of the sensor an accurate zero point can be attained and if necessary the sensor can be re-zeroed.

The inherently digital form of the output signals eliminates the necessity for expensive analog-to-digital conversion and results in low cost readout unit that outputs data in real world units (μm and °C). Readings can also be made directly with a PALMOS device (see SENSORSYNC) or routed directly to the digital channels of a PLC. Solutions using microSPECT typical cost less than 50% those of competing products on the market. Long term data logging is possible using the low cost SLUG datalogger.

The microSPECT strain gauge is capable of 1μm resolution over a range of 10mm. The gauge is attached to the structure using the #8-32 threaded rod at either end. The length of the sensor is 250mm and the diameter of the body is 7mm.

Signal Conditioning

An on-board microcontroller provides temperature compensation and outputs a digital signal with 1Hz=1μm over the range 100Hz-10100Hz. The digital temperature sensor, besides providing temperature compensation, can provide information concerning the curing of concrete or backfill. A Frequency modulated output signal is widely recognized as preferable for the harsh mining environment. The signal can be routinely transmitted over 1000ft of lead-wire.



The relation between displacement and microcontroller output frequency for microSPECT(20°C)

Manual Readout

Readout can be made using YieldPoint's low cost manual readout box, with a backlit LCD. An on-board micro-processor performs diagnostics on the leadwires, recognizes the sensor type and ID and outputs the displacement and temperature data in mm and °C.

A measurement can also be directly made using the SensorSync module which beams the result to the IrDA port of a PalmOS device. Palm Zire models costing <$100 dollars can be used.

Automated Data Retrieval

The microSPECT can be monitored for up to 100 days using the SLUG automated datalogger or alternatively the sensor can be interfaced through the digital channels of a PLC into the mine-wide instrumentation network.

Clusters of sensors (6 per box) can be polled YieldPoints DESTINY (Digitally Enabled Sensor Transducer and Instrumentation Network from YieldPoint) technology. This is a low cost, low maintenance RS-485 network (modbus protocol), that can save time and money by transmitting data directly to a central control room or an engineer's desktop computer. A 2nd generation networking product, currently in development, will implement TCP-IP protocol for internet connectivity.

Applications

- Monitoring crack opening in drifts and slopes.
- Monitoring shotcrete fracturing
- Monitoring the loading of rock pillars
- Monitoring the loading of shotcrete pillars
- Determining load in steel elements including end-anchored bolts
- Monitoring loads in ground anchors.

Specification

Borehole size: 25mm+
Range (F.S.) – 10mm, Temp: -40 to 125°C
Core Technology
eddy current sensor (oscillation Frequency 100 – 10,100Hz @ 1Hz/μm)
temperature sensor (oscillation frequency 10Hz/°K)
Output Signal – CMOS + TTL compatible 0-5V square wave train.
Displ. Resolution - 1μm with hand held readout.
Displ.Linearity - typically 0.5% F.S
Displ. Accuracy – better than +/- 100μm absolute or 50μm relative.
Temp. Range –40 – 125°C
Temp Accuracy +/- 2°C –Digitally trimmed at 0oc and 25°C
Temp Resolution 0.1°C
Temp coeff for eddy current sensor : <0.02%FS/°C (0-50°C)