TM TechniTalk

Spring 2010

Welcome to the Techni Measure Newsletter

Whether you are reading this for the first time or have been following our series of publications, we hope that our sixteenth edition of **Techni*Talk***, continues to inform readers of new products, whilst providing technical suggestions on how or where these products might be used. If you are reading this for the first time and want to be added to our contact list for future copies, or you would rather receive this publication electronically in the future, please let us know.

Aerospace & Defence Roadshow

During late September and early October last year, Techni Measure joined an Aerospace Roadshow exhibition that toured various aerospace and defence sites throughout the south of the UK. This venture was supported by three of our suppliers, Dytran Instruments, MicroStrain and Capacitec, and we had some very good days meeting new contacts at many of the sites. The front-page picture in this issue shows the backboard that we used for the exhibition stand. If there is anyone reading this who we did not see during this tour, and who wishes to discuss any of our products, then please let us know.

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Issue No.16

Product News

High Temp Accelerometers

Dytran have recently been expanding their line of ultra high temperature accelerometers, designed for vibration testing under extreme temperatures. All designs are charge output types with some having a differential output, although the model 5334 comes with an in-line miniature differential charge amplifier creating a system that will operate from a standard IEPE 2-wire constant current supply.
Whilst there have been designs for some time that can be used up to 260degC, new crystal technologies has enabled accelerometers to be designed for use in temperatures up to 482degC, with even higher temperature models being planned. The model 5334 utilises the model 3218C accelerometer, which has a 3-bolt mounting, a differential output, and comes fitted to a standard length of hard line cable. For the 5334 system, this accelerometer is fitted to an in-line differential charge amplifier, giving a 10mV/g system output sensitivity that can operate from a constant current supply. The 3235C series has a differential output and is available with 50, 100, or 200pC/g sensitivities. With operational temperatures of up to 482degC, these units are ideal for turbine vibration measurements, including aircraft turbines, industrial turbines, vibration studies of automotive engine and exhaust systems, and general vibration measurements under ultra high temperature conditions.
These sensors are the first utilising some of the new crystal technology being developed at Dytran, and we would be very pleased to discuss any application that you may have for high temperature vibration measurements

100kHz Wireless Node

The new HS-Link wireless node from MicroStrain is the latest in their series of wireless sensor nodes for strain gauge and voltage output sensors. A maximum sample rate of up to 100kHz is possible as burst data, which is stored in an internal memory. Either one full differential input with optional bridge completion or one single ended 0-3V input can be ordered.
The node is designed to log data to internal memory, and upload this data wirelessly to a host computer once logging is complete. Data is collected during periodic, user definable sampling sessions, at rates up to 100kHz. Burst data (0.4 seconds at 100kHz) are temporarily stored in a sample buffer (125,000 data points) and are then transferred to a non-volatile internal 2MB flash memory (1,000,000 data points). The bi-directional RF communications link can trigger logging from at least 50m, or request stored data to be transmitted to the host computer for data acquisition and analysis. A network of nodes can be used to simultaneously store dynamic data, with node-to-node synchronisation of +-4 microseconds. Including the mounting lugs and connectors, this node is just 56.4mm long, 47.6mm wide and 15.1mm high, and weighs 24.8 grams. Applications for this device would include health monitoring of structures and vehicles, shock detection, or any other dynamic experimental tests.
We would be please to discuss any application where this node could be used, and if you have any questions regarding wireless sensor monitoring in general, we would be pleased to visit you to discuss any possible application.

New Strain Gauges

TML have just published a new strain gauge catalogue that includes details on several new products. Of particular interest should be the new YUF strain gauges that have a strain limit for post yield work up to 20 to 30%, but there is also a new cryogenic gauge (CEF) that can be used not only at -269degC, but also up to +200degC.
Available in 2mm or 5mm gauge lengths, the YUFLA series is not applicable to the measurement of repeated strain measurements and should be used with TML's cyanoacrylate adhesive. However when correctly fitted this gauge should be capable of post yield measurements up to 30% strain levels (300,000 microstrain). The CEFLA series of gauges cannot only be used at cryogenic temperatures, but also up to +200degC. This series is available in 1, 3 and 6mm gauge lengths. There is also a special new gauge designed for embedding in asphalt. The PMFLS gauge has a 60mm gauge length and is encased in a special plastic, having water and heat resistance. The gauge can withstand the typical 200degC temperatures of hot asphalt during embedment, but then measure strain at -20 to + 60degC and is temperature compensated for asphalt. A new Pavement surface strain gauge series SSM-360, has 16 gauges mounted on one backing in either X or Y orientation providing strain measurements over a 360mm length. There is also an extension to the BF range of gauges that can be supplied temperature compensated for various composite materials. With 2 or 5mm gauges lengths, 2 and 3 element gauges (cross and rosette) are now also available. In addition there is a two-page description of TML's new, patented 4-wire strain gauge system, as well as two pages devoted to applications for miniature strain gauges. Although the cover looks the same as previous publications this new 77 page catalogue contains many new products.

Please ask for a copy of the new catalogue, version number E-101S, and if you have any questions regarding the measurement of strain in general, we would be pleased to visit you to discuss any possible application.

Bearing Temperature Sensors

Conax have recently produced a data sheet to describe their range of miniature bearing temperature sensors. These sensors are designed to measure the temperature of a bearing beneath the shoe, and if required can also be supplied with sensor wire seals to prevent oil leakage along the wires.
The Conax MBS series is available as either Platinum resistance (RTD's) or various standard thermocouple sensors, and come in five different sizes and designs. Some of the designs are also available with dual sensor elements, and various case materials can be supplied, including stainless steel and brass. The E, J, K or T type thermocouples can be supplied as grounded or ungrounded, and the lead wire length can be specified, with 36 inches being the standard. The sensors can be bonded inside the bearing shoe with epoxy, or there is a version that can be mounted with the use of a retaining ring and spring that allows easy removal and reinstallation. If an oil seal is required (BSWS series), the sensor wires to be sealed pass through holes in the sealing assembly components and a cap is then torqued to the recommended value, thus translating an axial force on a follower. This force compresses the sealant contained within the body housing so that the sealant conforms to the wires.
Please ask for further details on this new series of bearing temperature sensors, or for any advice you may need on any bearing monitoring application. We have the products and expertise to solve most applications.

Portable Vibration Meter

The new HS-620 portable vibration meter from Hansford Sensors has been designed for use both as a simple vibration level meter, or for maintenance engineers across all types of industries. The kit consists of an internal battery operated meter, a hand held probe, magnetic mount, a carrying case and battery chargers for both mains and in-car use.
The vibration meter is microprocessor based and by selection of the controls can easily be set up to monitor acceleration (g) levels, velocity (mm/sec), displacement (microns) and bearing condition. The unit conforms to ISO 10816-3 and has an automatic alarm check for bearing condition. A display-hold function is also included. The internal rechargeable Lithium battery offers 48 hours of continuous operation, although without any operator input there is an automatic switch off after 3 minutes. The supplied 100mV/g sensor has a 0.8m integral cable, and is supplied with a 70mm long probe fitting or an alternative magnetic mounting base with a 22kg pull strength. The meter has a LCD display, is in a 115 x 70 x 25mm plastic case, and weighs 160gms. Typical applications include condition monitoring of machines, structures or vehicles.
For additional information on this new vibration meter kit or any of the other vibration sensors in the Hansford Sensors range, please let us know what you wish to measure. We would be pleased to visit you to discuss any possible application.

Who's Where ?

Three of our suppliers have recently moved premises. Schreiber Messtechnick have moved next door into larger premises, and MicroStrain have moved down the road, although they do have very long roads in the USA. They are now at 459 Hurricane Lane, again in larger premises.
Hansford Sensors have also moved and are now producing their range of industrial vibration sensors from a new site on the outskirts of High Wycombe.

Techni Measure on Show...

Exhibitions planned so far for 2010 are listed below, where we would be pleased to meet with anyone to discuss possible applications for our wide range of products. If you need tickets or further information then please let us know.

10 - 11th February
MANUFACTURING SOUTH at Farnborough

23rd February
EIS INSTRUMENTATION at Silverstone

8th September
EMEX at Liverpool University

8-9th September
INSTRUMENTATION SCOTLAND at Aberdeen

Tech Note

What is ... Accuracy ? (Part 2)

In the last Newsletter we tried to define and describe the various parameters that can have an effect on accuracy with respect to sensors and instrumentation. Resolution, repeatability, hysteresis, drift and response were covered, but we stated then that linearity probably deserves an article on its own since there are several different ways in which this can be described. Firstly a reminder of the definition of linearity:-

Linearity - the closeness to which an output signal approximates to a straight-line input.

Non-linearity (usually abbreviated to Linearity) is usually expressed as a % error from this straight line, which ideally would be drawn between zero and the full-scale range of the sensor. Commonly however, this line is drawn in other ways and therefore the exact nature of the reference line must be clearly defined before it is possible to interpret or compare linearity specifications for a measuring system or sensor.

Illustrated graphically, in Figure 1, the reference line is shown drawn through the zero point, whereas in Figure 2, the line is fitted as closely as possible to the data points, without regard to the origin. This is commonly called the best straight-line method, or independent linearity, and the non-linearity is then specified as a percentage error band, either side of this line. It would be usual for the sensitivity of the sensor to be determined from the slope of this line and a supplied calibration sheet for any particular sensor may well show deviations at individual calibration points. Any zero offset can usually be allowed for by electrically zero-shifting the output signal, thus giving better results than by merely using a forced zero reference line.

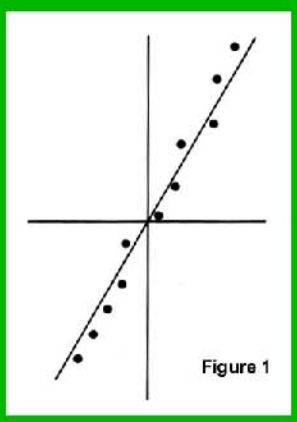

Figure 1

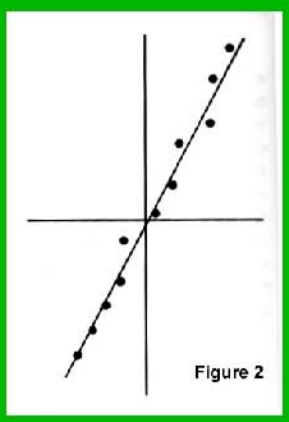

Figure 2

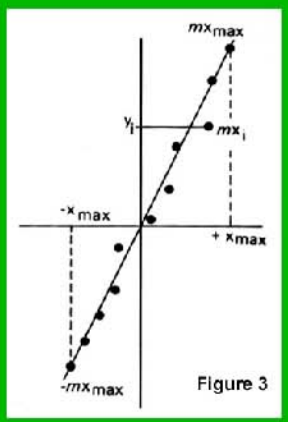

Figure 3

Another technique is to use a least squares data plot as shown in Figure 3, where the sum of the squares of the deviations of the data points from the line being fit is minimised. This is a statistical technique, and beyond the scope of this simple introduction, but this technique can also be taken to another level, by fitting to a polynomial curve. In the dynamic world it is difficult to accurately determine linearity, since there is also frequency to take into account, which may or may not have an effect on the output. It would often be impossible to keep at the same frequency of operation over the entire full-scale range of a dynamic sensor, and consequently with piezoelectric sensors that require a dynamic calibration, a calculated 1% non-linearity figure is often quoted.

Non-linearity is one of the errors that can be included in a summation of all errors into one overall accuracy figure, maybe expressed as a root mean sum of the squares of the combined errors. It should however be understood that actual accuracy could be worse than portrayed in such a specification.