

TM

TechniTalk

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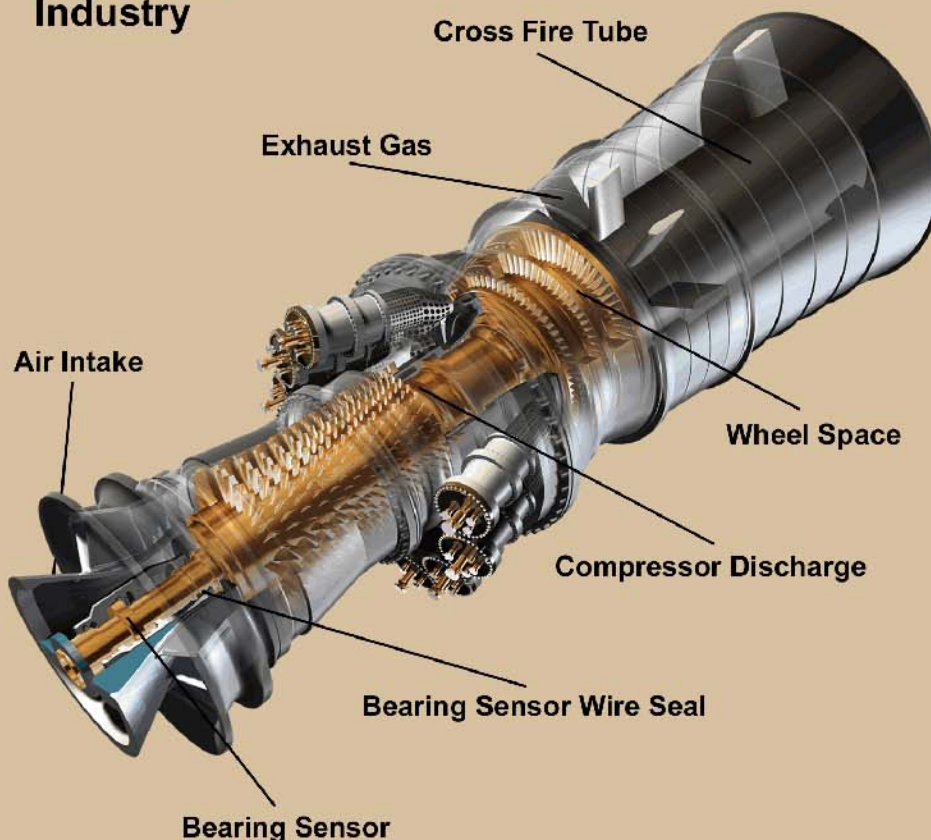
Welcome to the Techni Measure Newsletter

Whether you are reading this for the first time or have been following our series of publications, we hope that our seventeenth edition of **TechniTalk**, 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.

High Temperature Measurements

In recent years we have become more involved in helping to achieve various measurements at high temperatures. Requirements in the turbine and jet engine industries, illustrate very well the typical demands for such measurements. Various temperature measurements within the turbine are taken, and these involve some very special designs of thermocouples, which are also sometimes led out through sealing glands. Blade clearance measurements can be measured with capacitance sensors, strain gauges measure strain, and vibration is monitored at various positions using high temperature accelerometers. These are just a few of the high temperature solutions we can offer, so if you require our help and advice please contact us.

Sensors for the PowerGen Industry



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Data Aggregator



The new WSDA® unit from MicroStrain is a ruggedised, single board computer with Ethernet and optional cellular connectivity, designed to collect data from networks of wireless sensors. The WSDA® is compatible with all MicroStrain wireless sensor nodes and can collect and store up to 2GB of data locally.

The Data Aggregator is easy to install with an out-of-the-box set up that allows for online data collection within minutes, but currently the unit is limited to only 1Hz operation, with higher speeds planned for future models. The WSDA® is an extremely durable data acquisition product developed to withstand harsh environments (-40°C to +85°C), and has been extensively tested for military applications (MIL-STD-810F and MIL-STD-461F). This means that it can be deployed in settings where PCs are not viable, allowing users to collect long term data that has previously been very difficult to capture. The WSDA® also features a unique data visualization application that allows the user to navigate through gigabytes of data within seconds and quickly drill down to points of interest. The WSDA® is ideal for remote data collection applications including monitoring of remote structures such as bridges and dams as well as industrial and manufacturing equipment.

For additional information on this new data aggregator or any of the other wireless systems available from MicroStrain, please let us know details of any possible application.

New DC Accelerometers



Dytran Instruments have just released a new technology of high performance, variable capacitance (VC) accelerometers. The 7600B series is a family of DC response accelerometers that were designed, utilizing a capacitive sensing element and an advanced ASIC, to simulate the operation of a strain gauge bridge in order to directly replace piezoresistive units in new or existing applications.

The 7600B series sensors are tailored for zero to medium frequency instrumentation applications, and contain a hermetically sealed micro-machined capacitive sensing element, a custom integrated circuit amplifier, and differential output stages. It's hermetically sealed titanium case has a M4.5 X 0.35, 4-pin connector, and is easily mounted via two 4-40 screws. On-board regulation is provided to minimize the effects of supply voltage variation, and it is relatively insensitive to temperature changes and thermal gradients. The cable shield is electrically connected to the titanium case, but the power and signal wires are isolated from the case. The unique benefit of the 7600B series is that while they utilize variable capacitance technology, they are powered with the same power supply required for piezoresistive and strain gauge sensors. The 7600B series of accelerometers respond to both DC and AC acceleration, with typical applications being for bump testing, air bag testing, ride quality, flight-testing and seismic monitoring. Please ask for further details on this new series of DC accelerometers, or for any advice you may need on any suitable applications. We have the products and expertise to solve most measurement problems.

Product News



Energy Harvesting Wireless Node

MicroStrain have released their EH-Link node that collects energy from multiple sources including strain, vibration, thermal gradients, ambient light, and thermal and electromagnetic fields. In addition to multiple harvesting inputs, the EH-Link features an on-board triaxial accelerometer, relative humidity sensor, temperature sensor, and signal conditioning that is compatible with a strain gauge type sensor.

The EH-Link has two energy harvesting inputs and is compatible with piezoelectric, electro-dynamic, solar, RF field, and thermoelectric harvesters. The primary input can operate from AC or DC sources from 3 V to 20 V. The ultra-low voltage (ULV) input can be powered from Peltier thermoelectric generators (TEGs), or thermopiles, or it can also operate in ambient light levels well below that required for solar cell use with traditional electronics. Sophisticated energy conversion and conservation methods, allow the EH-Link to operate from a fraction of the power normally required for a wireless sensor node. The module is versatile and is designed to operate as part of MicroStrain's wireless sensor network. To promote experimentation with the product and discovery of new applications MicroStrain is offering an advanced Pioneer Kit for early adopters, that includes an EH-Link node, Software Developer Kit, tester board, two harvesters, and a wireless base station. The kit will allow engineers to test out a variety of sensing applications and harvesters to optimise their particular requirements.

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.



High Temperature Accelerometer Brochure

Dytran have just introduced their new brochure describing many of their high temperature accelerometers, some of them being new designs, that are typically used for engine and turbine testing. Please ask for your free copy, and let us know details of any appropriate application so we can help with correct product selection.

Low Noise Accelerometers



Dytran have recently introduced several new triaxial accelerometers. In particular the models 3333A and 3363A offer miniature size with low noise outputs. Both are IEPE type sensors and available with sensitivities of 10, 50 or 100mV/g, but the 3333A are adhesive mount, whereas the 3363A are stud mount.

Both sensors have a 4-pin connector, but the 3333A connector is 20% smaller than the standard design. This small connector and adhesive mounting makes the 3333A series very small (approx. 9mm cube) and very lightweight at around 2.3 grams. The laser welded titanium housing contains the shear design ceramic sensing elements which, coupled with ultra low noise JFET electronics, gives an excellent signal to noise ratio and good low frequency response. The 3363A series comes in a similar 9.1mm square hermetically sealed titanium housing but they are about 12mm high and have an industry standard size 4-pin connector on the side, making it heavier at 4 grams. Mounting can be via a 10-32 stud, but the noise and frequency ranges are the same as the 3333A. Both models are ideal for modal analysis applications but can also be used in general vibration measurements, shaker control, squeak and rattle and NVH measurements, where small size and weight, coupled with a good frequency response, are an important consideration.

These sensors are a useful addition to the Dytran range of miniature triaxial accelerometers and we would be very pleased to discuss any application that you may have for low weight vibration measurements.

New Hand-held Strain Meter



TML have introduced an upgraded replacement for their long established TC-31K strain meter. The new TC32K strain gauge meter includes many improvements and additions, yet will be offered at the same price. One of the most obvious improvements is the high brightness, high resolution, LCD display (255 x 160 dots), incorporating a backlight.

Other important new features include the ability to plug in directly, a 2GB capacity standard CF memory card, to extend the data memory storage for data-logger type applications. The sampling speed is also now as low as 60msec for the meter, and 80msec when used with the CSW-5, 5 channel switching box. The TML patented 1-gauge 4-wire strain measurement is now possible, using a special adaptor in order to accept the RJ12 modular plugs, and TEDS compatible transducers can also be used, with the TC-32K being able to read the technical data stored in the TEDS chip. There is now a built in USB as well as an RS232 connection, so that the device can be connected easily to a computer for easy set up and download of stored data. The 102(W) x 49(H) x 223(D) mm IP54 rated housing, uses the same tough plastic as the earlier model, and it comes supplied with a carrying strap and in an accessory box.

Please ask for a copy of the new brochure describing this meter, 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.

Who's Where ?

Sue Davis, our secretary for 15 years, left us at the end of June, in order to help care for her daughter's little baby. Grace was born on 19th April and it was not an easy birth, but with Sue and husband John's help, she is now a bonnie lass and doing well. We wish Sue all the best for the future, although we will be keeping in touch since she has offered to fill in during holiday times, so those who phone us may well hear her voice again.



Techni Measure on Show...

Exhibitions for the rest of 2010, and those planned so far for 2011, are listed below. We would be pleased to meet with anyone to discuss possible applications for our wide range of products and if you need tickets or further information, please let us know.

28 29th September
SENSING TECHNOLOGY at
Birmingham

16 - 17th February
MANUFACTURING SOUTH at
Farnborough

8th March
EIS INSTRUMENTATION at
Silverstone

8th September
EMEX at Edinburgh

Please remember that if it is not possible to attend any of these shows and you need a demonstration or explanation of any of our products, we will always be pleased to visit you instead.

Tech Note

What is ... Temperature Measurement

In the early 1700's, Gabriel Fahrenheit produced mercury thermometers, with the zero point based on a mixture of ice and salt. The high end was set at blood temperature, and this was labelled as 96 degrees, since the Fahrenheit scale of measurement was divided into 12 parts. In the mid 1700's Anders Celcius proposed the melting point of ice and the boiling point of water, as the low and high points and the scale divided into 10 parts, making the two points 0 and 100 degrees. In the early 1800's Lord Kelvin developed a scale based upon the coefficient of expansion of an ideal gas, and he established the concept of absolute zero. The conversion equations for these scales are:-

$$^{\circ}\text{C} = 5/9 (^{\circ}\text{F} - 32) \quad ^{\circ}\text{F} = 9/5 ^{\circ}\text{C} + 32 \quad \text{K} = ^{\circ}\text{C} + 273.15$$

There are several ways of measuring temperature, including thermistors, integrated circuit sensors and infra-red remote sensing, but we will concentrate here on the RTD and the thermocouple. RTD stands for Resistance Temperature Detector, and the most common element used for these is Platinum. They are sometimes also referred to as Platinum Resistance or PR sensors. Platinum can withstand high temperatures whilst maintaining excellent stability, and the resistance change with temperature is fairly linear. The Platinum wire can be wound onto a ceramic core and then encapsulated (Fig. 1), or a film is deposited onto a small ceramic substrate (thin film), to create the sensing element. The most common resistance of the RTD sensor is 100 Ohms at 0 °C, and since the resistance changes are very small, these devices usually employ a Wheatstone bridge arrangement to measure a voltage change. Three wire connections minimise the affects of temperature on the lead wires, but 4 wire connections alleviates many problems associated with the bridge.

Thermocouples operate using the Seebeck effect, discovered by Thomas Seebeck in 1821, whereby when two wires composed of dissimilar metals are joined at both ends and one of the ends is heated, whilst the other end is held at a lower temperature (cold junction), there is a continuous current which flows in the circuit. The corresponding thermoelectric voltage generated, is linearly proportional to small changes in temperature, and various combinations of metals are used to give the best output for any given temperature range. The graph below shows the most common types, and the ISA letters T, J, K etc, describes these. Electronic cold junctions can be achieved by referencing the voltage generated to a known accurate device such as a thermistor at a junction block, commonly referred to as cold or reference junction compensation, so that the output voltage is proportional to temperature. The basic thermocouple sensor is manufactured in many different forms, usually inside protection tubes of various materials (Fig. 2), and with a variety of connection possibilities. Digital panel meters and other instrumentation are available, incorporating cold junction compensation, to give displays or data directly in degrees.

