TM TechniTalk

Autumn 2014

Who's Who ?

We interrupt our calibration facility series to make a new personnel announcement.
We are pleased to say that Andrew Ramage (son of Ian) has joined our technical sales team from September, and will be looking after some of the customers in the south of the UK, as well as providing support in the office. Andrew comes from 14 years in the aerospace industry where he rose to Principal Engineer level, and we are looking forward to harnessing his management expertise and engineering knowledge, as we continue to improve our service to our customers.

Techni Measure on Show...

Exhibitions booked for the rest of 2014 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.

30th September – 1st October
SENSORS & INSTRUMENTATION at Birmingham

22 – 23rd October
ENGINEERING DESIGN SHOW at Coventry

11 – 12th November
ADVANCED ENGINEERING (Auto) at Birmingham

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 Triangulation Measurement ?

Several of our new laser displacement sensors, work on a triangulation system, whereby a laser light is projected at and reflected back off a target at an angle, and the returning light captured inside the sensor. In this article we will try to explain exactly how this works.

The basic principle of triangulation is shown in Figure 1. The laser beam is projected from the instrument and is reflected from a target surface to a collection lens. This lens is typically located adjacent to the laser emitter and focuses an image of the spot on a linear array camera (CMOS array). The camera views the measurement range from an angle that varies from 45 to 65 degrees at the centre of the measurement range, depending on the particular model. The position of the spot image on the pixels of the camera is then processed to determine the distance to the target. The camera integrates the light falling on it, so longer exposure times allow greater sensitivity to weak reflections.

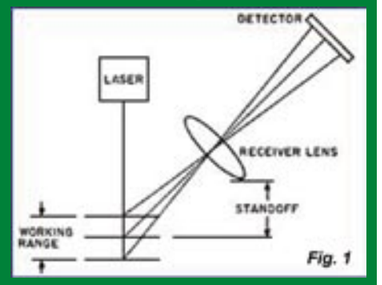

Fig. 1

By determining the position of the imaged spot and calculating the angles involved, the distance from the sensor to the surface can be determined. The measurements are processed in the integral controller and then converted into a scaled output via an analogue or a digital interface.

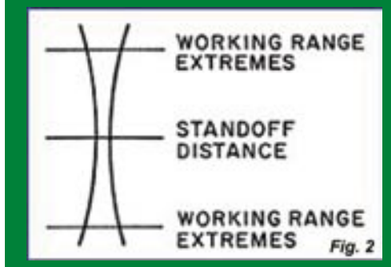

Fig. 2

Common sensor design practice is to focus the laser beam to create the smallest spot at the sensor standoff distance. This is the point where the laser spot size is specified. The size of the beam is then smallest at the standoff point, but it is larger both inside and beyond this point (Figure 2). Where the smallest spot size is required, the sensor will perform best for objects near the stand-off (best focus). Triangulation devices may be built on any scale, and can be quite large, but the accuracy falls off rapidly with increasing range. The depth of field (minimum to maximum measurable distance) is typically limited, as triangulation sensors can only measure relative to their baseline, the distance between the emitter and the detector inside the sensor. The exposure and laser power level are typically controlled to optimize the accuracy of the measurements for the signal strength and environmental light level measured, and the range data may be internally averaged over multiple exposures prior to transmitting, if the sample rate is set appropriately.

We would be pleased to offer advice on which sensor would be the best choice for any given application. Shiny targets can present a problem, but there are solutions, and we would be pleased to offer a trial demonstration when possible.

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 twenty fourth 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.

New Range of Laser Sensors

Techni Measure is pleased to announce the addition to our range, of the laser displacement and position sensors from Acuity Lasers www.acuitylaser.com.
Acuity's line-up of short range displacement sensors, include compact laser triangulation sensors and ultra-precise confocal displacement sensors.
Acuity also offers a variety of laser distance sensors for accurate, non-contact distance measuring. The AR1000 is a versatile, visible beam laser distance sensor that measures to 30 meters at slow speeds. The AR2500 laser sensor is Acuity's ultra-compact rangefinder model. This eye-safe rangefinder can measure to 30 KHz to natural targets 30 meters away or to reflectors 260 meters away. The AR3000 is an eye-safe distance measurement sensor which measures up to 300 meters at up to 2 KHz.
The AccuProfile 820 Laser Scanner creates 2D profiles using laser triangulation measurement principles. The AP820 is compact and performs very well on shiny or jagged targets, and edge scanning poses little problem due to the units auto gain and high dynamic range.

We would be pleased to help with advice on any application you may have for these types of sensor, and we look forward to a long relationship with Acuity.

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Techni Measure
Alexandra Buildings, 59 Alcester Road,
Studley, Warks. B80 7NJ

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Tel: 01527 854103 Fax: 01527 853267 Email: info@techni-measure.co.uk Web: www.techni-measure.co.uk

Product News

IEPE Wireless Node

LORD MicroStrain Sensing Systems have introduced a new wireless node that operates with an IEPE (Integral Electronic Piezoelectric) accelerometer. The IEPE-Link-LXRS delivers 24-bit resolution and up to 104 kHz sample rates, and is designed for high-speed vibration sensing in challenging applications.
The IEPE-Link works using periodic burst sampling of vibration signals from IEPE piezoelectric accelerometers, and is ideally suited for critical structure and machine health monitoring. This new node features 109.5 dB of dynamic range, 1 kHz to 104 kHz sampling rates, ± 32 microsecond network burst synchronization, and user selectable low pass filtering. It cannot be used for continuous vibration monitoring, but monitors short bursts of vibration signals at pre-set intervals. Globally recognized, license-free IEEE 802.15.4 radio communications provide up to 1 kilometre (line of sight) range with one of MicroStrain's WSDA base stations. Small, rugged, and easy to use, the IEPE-Link™ is packaged with a rechargeable high-capacity battery, providing power and conditioning for the external user supplied IEPE accelerometer, as well as Node Commander software for out-of-the-box use. Applications would include condition monitoring of machines, health monitoring of aircraft, structures and vehicles, plus general product testing. There is also the possibility of signing up for a free SensorCloud™ account to have seamless connectivity between your IEPE-Link and the cloud, for data storage, viewing & analysis.
For more information about this wireless sensor node, please ask for a copy of the new IEPE-Link leaflet. We would be very pleased to discuss any application that you may have for wireless sensor monitoring.

Low Bias Accelerometers

Whilst Dytran Instruments have been able to supply accelerometers with a low bias voltage operation for some time, they have recently introduced a new triaxial model 3433A1 accelerometer with a 5mV/g sensitivity and an overall weight of 14 grams. It operates from a voltage as low as 6 to 9 volts, with a constant current supply of 0.3 to 0.7mA, since it has a bias voltage of only 1.5 to 3.0 volts. This makes it suitable for low turn-on applications where power is limited.
The Dytran 3433A1 accelerometer is packaged in a lightweight titanium housing with a vertical height of 13.7mm and a body size 15 x 15mm square. Mounting is via a 10-32 tapped hole in the base, and a 4-pin radial connector interfaces the signal and power. The sensors are case isolated and are hermetically sealed for reliable operation in high humidity and dirty environments. The 3433A1 has a 300g range, a frequency response up to 3.5 kHz, and a temperature range up to 121 degC. Other low bias models have been designed for working in temperatures up to 185 degC, and the 3003B is a 2mV/g, 500g range triaxial accelerometer, with an integral cable, suitable for down hole vibration measurements. The new 3205 series is a single axis design, also with a low bias operation, and is packaged in a miniature 2.5 grams titanium housing with a height of only 7.7mm. This sensor can work up to 175 degC and also has an integral cable. Sensitivities of 2mV/g and 0.33mV/g are available.
Please ask for further details of these low bias accelerometers, or supply details of any application you may have, so that we can advise on the best accelerometer solution.

GX4 Inertial Sensors

The new 3DM-GX4 series of Inertial Measurement Unit (IMU) and Inertial Navigation systems, are designed to be drop in improved successors to the popular LORD MicroStrain 3DM-GX3 range. They are smaller, lighter and incorporate the latest in MEMS sensor technology, whilst including some extra features. The 3DM-GX4-25 is the general purpose model, with the -15 providing a lower cost choice without magnetometers, and the -45 providing enhanced features including GPS. These units have a USB or RS232 interface as standard.
The 3DM-GX4-25™ offers a range of fully calibrated inertial measurements including acceleration, angular rate, magnetic field, deltaTheta and deltaVelocity vectors. It also outputs computed attitude estimates including Euler angles (pitch, roll, and heading (yaw)), rotation matrix and quaternion. Uncertainty values and data-valid flags are available for all estimated outputs. Thanks to a sophisticated Adaptive Kalman Filter, the estimates are highly immune to magnetic disturbances and linear motion. Bias tracking and sensor noise model options allow for fine tuning your application. All quantities are fully temperature compensated and are mathematically aligned to an orthogonal coordinate system. The 3DM-GX4-25™ architecture has been carefully designed to substantially eliminate common sources of error such as gain and offset errors induced by temperature changes and sensitivity to supply voltage variations. Gyro drift is extremely low, and through a variety of estimation techniques it can approach near-tactical performance in many applications. Applications for this device would include unmanned vehicle navigation, robotics, platform stabilisation, antenna and camera pointing, and personnel tracking. The 3DM-GX4-25 is initially sold as a starter kit consisting of an IMU module, RS-232 or USB communication and power cable, software, user manual, and quick start guide.
We would be please to discuss any application where this sensor could be used, and if you have any questions regarding inertial measurement in general, we would be pleased to visit you to discuss any possible application..

Our new short form catalogue for displacement sensors is an attempt to draw together comparative details of all our various ranges of sensors. Technologies used in these sensors vary from strain gauge, capacitance, inductive coils, and laser light, through to potentiometers. All these different technologies have their own uses, and we are here to offer advice on the most appropriate for any application.

Touch Panel Display

New to the Techni Measure range are the laser displacement sensors from Acuity. The triangulation sensors can be used in pairs for measuring the thickness of a target, and the new 5.7" touch panel display offers simple setup to give a direct display of the thickness of a target that is put between these two sensors. The meter can also be used with a single sensor, in order to display measurement data from most of the Acuity range of sensors.
The TPD model display is designed for use with Acuity brand sensors, connecting the sensor to the display via the Acuity connectivity kit that enables direct connection to the RS232 serial interface, and connects the power line as well. The fully enclosed touch panel full colour LCD meter display, communicates with one or two Acuity sensors via their serial interfaces. Sensors can be easily configured using the on-screen buttons, to display and scale their distance outputs. The meter accepts user defined distance offsets, and offers a TARE function through the touch screen interface and there is a supervisory lock-out feature to enable secure operation. The meter has an IP65 rating when panel mounted using the sealing gasket, and has an RS485 interface for transmission of dimensional data to an external device. The bright and easy to read display viewing area is 117.6 x 88.9 mm, and the meter has an operating temperature up to 70 degC.
We would be please to discuss any application where this meter could be used, and if you have any questions regarding laser distance measurement in general, we would be pleased to visit you to discuss solutions.

USB 6D Accelerometer

Dytran Instruments has introduced a replacement for the 5340 digital USB accelerometer. The new 5346A USB powered, digital, 6 degrees of freedom sensor combines a 3-axis MEMS accelerometer, 3-axis gyroscope, and on-board temperature sensor with a microcontroller, to create a smart sensor. The VibraScout™ 6D is a plug-and-play, cost effective, portable data acquisition system, measuring X,Y,Z acceleration, roll, pitch, yaw and temperature, using a laptop or tablet.
The accelerometer contains a variable capacitance (VC) MEMS chip with a USB interface which handles all the sensor communications with the PC, and also uses USB power, so that no external power is required for the sensor. The sensor is hermetically sealed in a titanium housing weighing 13 grams, allowing it be used in harsh environments from test tracks to field monitoring. The frequency range of the VibraScout 6D™ accelerometer is 0 Hz (DC) to 1,100 Hz and the gyroscope is 0 to 250 Hz. Units can withstand 10,000g shock. The supplied software offers real time display and also frequency analysis or waterfall plots. The temperature range of the sensor is from –40 to +85 deg C, and the cable connection is on the side, with mounting accomplished using two screws. Applications would include Noise, Vibration and Harshness testing (NVH), as well as seismic monitoring, ride quality, rollover studies and tilt measurements.
Please ask for further details on this new VibraScout 6D system, or for any advice you may need on any suitable applications. We have the products and expertise to solve most vibration measurements.