



Welcome to our latest newsletter, keeping our customers and partners up-to-date with the latest developments at Sensonics. New projects, new products and case-studies, all helping to protect your critical rotating plant.

## Cost-Effective Protection



### for Smaller Plant

Protecting smaller, yet critical items of rotating plant such as fans and pumps, has become increasingly important as the focus to improve efficiencies, reduce energy consumption and eliminate downtime has moved beyond protecting only more expensive assets, such as turbines and compressors. However, the higher cost of more sophisticated protection systems is difficult to justify for smaller machinery operating in less critical applications, although the requirement for low-cost sensors offering direct connection via 4-20mA current loop, needs to be met.

Sensonics have been working with industry for over 20 years, developing effective and affordable monitoring and protection devices which are appropriate for smaller items of plant. However, matching this type of product to the application is not always straightforward and it's important to outline the key points which need to be considered along with the problems that can be encountered. For example, the majority of absolute vibration transmitters available today utilise a standard piezoelectric compression technique coupled with electronics performing a current sink in the circuit loop to the PLC / DCS. The advantage of this solution is that no other power is required for the sensor and a single cable pair can be used from the connecting system to the machine

However, whilst the sensor is simply mounted on the machine bearing case and connected to the current loop, there are pitfalls to be avoided.

These include the earthing regime, low frequency vibration and high acceleration noise, which can lead to measurement error and spurious machine shutdown in protection applications, resulting in expensive downtime.

### Overcoming Earthing Problems

Earthing and grounding issues are where the majority of problems in new installations occur, particularly in heavy industry where power usage is high and effective earthing regimes are difficult to achieve. The internal sensor arrangement relies on a very high impedance circuit to extract the charge from the ceramic sensor and therefore with limited isolation to the external case, pick-up from a noisy earth is unavoidable and can appear on the output as an unstable current reading.

This is because at the connecting system end the transducer low is usually connected through a terminating resistor to a different, normally cleaner, ground point which offers no common mode advantage. If the transducer low could be connected to ground at the system end (rarely available in PLC's) there is the option to ground to the machine which effectively provides the required common mode rejection. However, this is against best practice and could result in large current flows in the sensor cables due to the potential differences identified with the initial problem.

One practical method utilised on sites to reduce this effect has been the installation of a galvanic isolator / current repeater between the sensor on the machine and the connecting

*continued overleaf*

## Mongduong II Project Status

In December 2011 Sensonics were contracted by Doosan Heavy Industries to supply vibration monitoring systems for the steam turbines and all balance of plant equipment for the Mongduong II 1,200MW power project, which is currently under construction for AES. We are pleased to report all equipment has passed first stage inspection and Unit 1 is currently undergoing site commissioning.



The project represents one of the largest undertaken by Sensonics, with over 450 channels of vibration monitoring implemented across 8 panels and 150 4-channel Sentry G3 modules. The equipment (manufactured in the UK) was first shipped to Seoul in Korea for factory testing before being transferred to Busan for system integration. Following this all panels were transported to site in Central Vietnam over rough terrain. Russell King, Managing Director at Sensonics stated, "The Sentry G3 modules have lived up to our expectations, this project represents a tough test for our designs and so far G3 has proved to be extremely reliable with not one module problem reported. We are looking forward to continuing success on this project through to the planned completion in 2015."



Unit 1 Balance of Plant VMS

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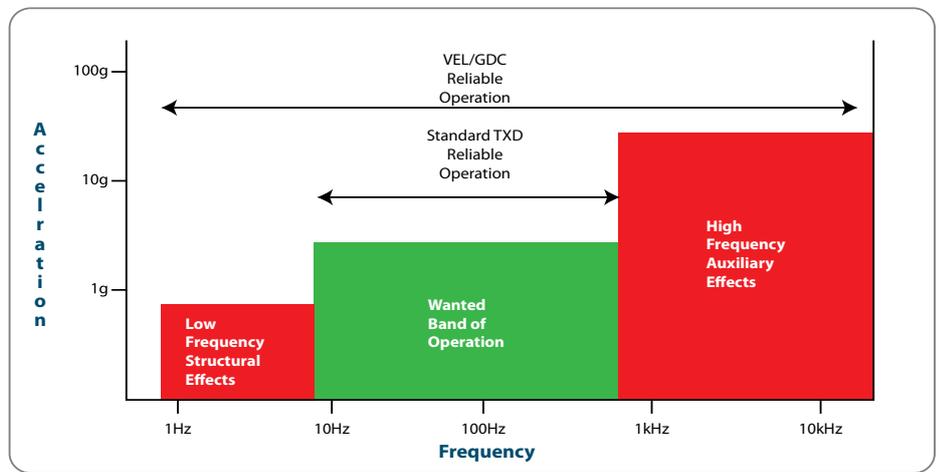
system. This has the effect of terminating the sensor 4-20mA circuit with a common earth and repeating the current onto the connecting system earth regime with no continued interference.

### Spurious Frequency Issues

Whilst the transducer is normally utilised on the main drive train bearings, other mechanical systems on the machine (e.g. oil pump) can interfere with the measurement. Fundamentally the sensor element is an accelerometer with a wide bandwidth of measurement (beyond 10kHz) and auxiliary systems running at higher speeds can generate high acceleration vibration at high frequencies (20g at 1kHz for example).

These represent a very small vibration displacement (few um) but have a large impact on the transducer as the high charge output from the piezo-ceramic material causes saturation in the integration circuitry and subsequently an erroneous reading.

The sensors primary purpose is to measure vibration at the machine running speed, typically in the range of 10Hz to 50Hz. To avoid spurious readings it is important there are no low frequency structural movements (<3Hz) present on the machine.



Since the sensor has limited filtering capabilities, a low frequency event can have a significantly large impact on the measured reading due to the inherent integration in the device (higher gain at lower frequencies).

This type of issue is rare, but is a reminder to ensure the transducer is well mounted and best practice applied to the routing of the connecting cable.

Sensonics recognised the need for a sensor which can meet with heavy industrial demands and can be utilised on a wide range of plant with reduced sensitivity to auxiliary systems.

The **VEL/GDC** is an electro dynamic sensor providing a 4-20mA current sink output proportional to velocity vibration and offers the advantage of offering double isolation in conjunction with a low impedance circuit making it suitable for high noise environments. Due to the electro dynamic nature of the sensor assembly both high and low frequency events are filtered mechanically and since no integration is required the arrangement is immune to the saturation seen in piezoelectric devices.

See full article at [www.sensonics.co.uk/media/press\\_releases.html](http://www.sensonics.co.uk/media/press_releases.html)

### Sensonics and Hima-Sella to develop innovative rail track void monitoring solution

Sensonics has received funding from the Technology Strategy Board to develop an innovative low-power and wireless rail track bedding displacement (void) monitoring solution.

Collaborating with Hima Sella - experts in rail systems integration - the solution will use track-mounted units containing tri-axial accelerometers in order to sense movement in three planes. Activated by the track vibrations of an approaching train the units, which can also record temperature, will transmit the maximum displacement in each axis.

A data acquisition unit, located trackside and which can be integrated into the current Network Rail maintenance monitoring strategy, will timestamp the data; which can then be used for trending purposes and better scheduling maintenance work.

Andy Pitt, Sensonics' Engineering Manager, comments: "We're delighted to be working with Hima-Sella on this exciting new project, bringing new technologies to the marketplace. There is a great synergy in the technology and knowledge between our two companies and we are hopeful this is the first of many successful innovative products from this partnership."

The money from the Technical Strategy Board funds a two-year project to not only develop an innovative technical solution but also to demonstrate how the void monitoring system may be exported to overseas markets.



**NEW APPOINTMENT:-SENSONICS** have strengthened their sales team following the appointment of **Paul Wilford** as **Business Development Manager**. In addition to his engineering qualifications and background, Paul brings extensive sales experience, including equipment sales with Casella. Paul's role at Sensonics will be to generate new business in both the UK and Europe with the goal of developing existing sector activity as well as finding new sectors to contribute to Sensonics current impressive expansion.

<http://uk.linkedin.com/in/paulwilfordsensonics/>

### RECENT SIGNIFICANT CONTRACT AWARDS

- Sentry G3 Vibration, Expansion & Overspeed Monitoring Equipment for GT and ST sets, including balance of plant.  
**Location India**
- Sentry G3 vibration and speed monitoring and protection system for Hydro plant (3 units).  
**Location Romania**
- SIL rated Seismic Protection System for nuclear processing facility.  
**Location U.K.**
- Sentry G3 monitoring and protection system for LNG tanker power plant.  
**Location Singapore**

**For more details about Sensonics go to: [www.sensonics.co.uk](http://www.sensonics.co.uk)**

Sensonics are a leading supplier of turbine supervisory and high integrity protection equipment to industry. With 30 years experience in providing vibration, displacement and speed instrumentation solutions in demanding environments, not only do they supply a full range of sensors and API 670 compliant measuring and protection equipment, but also offer design through to installation & commissioning services.



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