



Touchless technology

Non-contact sensors and transducers are being used across the world in countless applications in a wide variety of industries, with two recent examples being renewable power and the automotive sector

Contactless sensors are used in a wide variety of applications. In one example, non-contacting angle sensors supplied by Variohm EuroSensor and manufactured by Novotechnik are being used at a commercial wave power plant in Spain; and in another non-contact transducers from Sensor Technology are being used on test beds in the automotive industry.

Power generation

The 300kW wave power plant in Mutriku, Northern Spain, was installed by Voith Hydro Wavegen of Inverness and is based on the company's Nearshore Oscillating Water Column (OWC) technology which employs Novotechnik RFC4800 series 'touchless technology' angle sensors.

These sensors are used for extreme environment applications, with features including resilience to shock and vibration, they can be used in space restricted installations, and the transmissive properties between magnet and sensor means that operation can be possible through non-magnetic barriers such as gearbox casings.

The Basque Energy Board (EVE) commissioned the OWC to be built into a new breakwater that was required to provide sea defence protection for the harbour. The civil structure has 16 integrated Wells turbines that are located above a large chamber with an opening that is submerged under the water. As the ocean swell rises and falls so does the water level in the chamber. Rising water compresses the chamber air which is forced through the turbine generator, and the falling water then sucks the air back through the turbine into the chamber. The Wells turbine is driven in the same direction irrespective of the air



Novotechnik RFC4800 series 'touchless technology' angle sensors

In Spain, the Oscillating Water Column (OWC) technology is built into a breakwater



Above right: TorqSense technology from Sensor Technology is being used in the automotive industry

direction. The electricity generated is conditioned and exported to the grid, producing enough to power 250 homes.

The sensors provide position feedback for a large butterfly damper located between the chamber and the turbine which is used to isolate the turbine for shut down purposes as well as throttle the turbine airflow in extreme sea states.

Using a magnetic field to determine measurement angle, the non-contact sensor includes a magnetic position marker typically attached to the customer's shaft that interacts with the sensor electronics, providing an analogue output proportional to angle position.

In this application, the position sensor element is fixed to the turbine frame and the corresponding magnetic position marker is located directly on the end of the actuator shaft. This arrangement, with no bearings to wear and with each element IP69 sealed, allows extremely high reliability and long working life. In addition, the magnet and sensor elements are easily installed and, as the 12-bit resolution (0.09°) analogue output is absolute, there is no need to recalibrate the valve position after a power shutdown.

Sensing in the automotive sector

According to Sensor Technology, in the automotive sector constant innovation is needed to help reduce the impact of each vehicle on the environment, and to ensure these vehicles are economical. Now, work being carried out in universities and research institutes is feeding into manufacturers' own R&D departments and out onto the world's roads.

To develop new generations of high performance, low emission power plants, new high capability test beds that simultaneously monitor multiple parameters have been developed.

Tony Ingham of Sensor Technology explains: "An engine's torque is its fundamental characteristic and previous methods of measuring it are not good enough for today's demands. So we at Sensor Technology have developed TorqSense, a non-contact digital technology that can be set up in minutes and fed straight into TorqView software to produce data customised to each job. This allows the automotive engineers to concentrate on their



development work rather than having to worry about the mechanical details of running tests.

"They need like-for-like comparisons of the performance of petrol engines, diesel engines, LPG engines, electric motors, generators and regen units. Quite simply, TorqSense is their favourite way to do this."

Modern test beds need to be able to monitor all rotating shafts within various hybrid configurations of IC engine and electric machine in moments. TorqSense is a direct in-line mount that gives plug and play levels of ease and efficiency. Its digital signals and non-contact operation, easy set up and automatic analysis, mean test regimes can be executed efficiently.

Lotus Engineering has worked with Elektro Magnetix (EMX) of Brighton to develop a new hybrid power plant. Mapping the full performance range was an essential part of the project, but with a tight development timetable, testing had to be simple and effective. TorqSense meant EMX could set up torque profiling quickly, reset it at will and have half the analytical workload done automatically.

Everybody recognises the vital role of the internal combustion (IC) engine to modern life, but many organisations are working on improving IC efficiency. Powertrain Technologies has therefore designed an intelligent engine lubrication system which uses a bank of computers to control oil supply to different parts of the engine.

The system can be used on a variety of engines, and each needs to be mapped in considerable detail over its entire performance range and in all climatic conditions. An efficient test bed design was essential here. Sensor Technology's suggestions for simple in-line test bed geometries and its plug and play TorqSense technology have made a major contribution to time to market objectives.

Furthermore, safety is another pressing issue for automotive researchers and TorqSense is helping to reduce driver fatigue by improving power steering technologies by forming the basis of a highly automated test cell at a Tier 1 supplier which checks nearly 200 systems an hour.

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