Keeping infrastructure healthy

Keeping the infrastructure and buildings around us safe requires continuous monitoring. Murata's new inclinometer provides the accuracy and stability required in this.

Driving to work, we take it for granted that the road will take us to our destination without a hitch. Tunnels and bridges zoom by, and we don't give them any thought. But we should.

The infrastructure around is aging, and even when there are no earthquakes or other natural catastrophes, there may occur cases of neglected maintenance and upkeep, at worst resulting in fatal disasters. Monitoring the health of structures is not only important to avert catastrophes but it is usually mandated by law.

Health monitoring in difficult conditions

Traditional structural health monitoring methods, however, are labour intensive and time consuming, so having reliable, automated ways of keeping up to date on their condition is essential.

By measuring structural health continuously and so being able to detect changes early, it is possible to send out a maintenance crew well before any actual problems develop. It also makes it possible to predict the structure's lifespan, making it possible to plan infrastructure investments far into the future.

The structures to be monitored are often in difficult-to-reach places, and the working conditions may be far from pleasant. To keep on-site maintenance visits to a minimum, it is essential to select monitoring solutions which retain their accuracy and stability for a long time in environments where external conditions like temperature vary a lot.

Naturally, the solutions should also be inherently robust, easy to install and simple to use in order to make the life of the maintenance crews as easy as possible.

Inclinometer provides accuracy and stability

One way of monitoring infrastructure health is to use inclinometers that measure e.g. deformation of the structure.

Murata 's new SCL3300, a digital 3-axis inclinometer, provides unparalleled performance and reliability for demanding environments.

The sensor has high accuracy even in applications with high temperature variations or where vibration is high. The user can choose from three different dynamic ranges; this allows the adjustment of accuracy and vibration resistance for each application and makes it possible to use the same sensor in different application, if necessary.

Thanks to its excellent stability over temperature and time, the SCL3300 has very low calibration needs.

The new sensor is based on the field-proven and robust MEMS technology, and it has excellent mechanical shock endurance.

To ensure safe operation over extended periods of time, the sensor has a built-in failsafe functionality and it monitor itself continuously to make sure it is working properly. If

something goes wrong, the sensor flags this. This way wrong or unreliable data can be stopped from being passed on to the monitoring system.

Outputting inclination data

What makes the SCL3300 unique is its genuine inclination output.

Inclinometers generally output acceleration data from which inclination is calculated. Now, for the first time, this calculation is not necessarily required, but the inclination data provided by the sensor can be input directly into a control or monitoring system.

In addition to well-versed inclinometer users, this feature makes the SCL3300 suitable even for users who have no previous experience with inclination measurements or the knowhow or will to do the calculations.

Same sensor for many uses

Structural health monitoring is an important application area for the whole society, but the SCL3300 lends itself to many different uses. The sensor can be used anywhere where accurate inclination angle measurements are needed, tilt compensation is required, or something needs to kept level.

The list of possible applications extends from checking machine levelling to container handling to lift levelling and scales.

SCL3300 inclinometer in short

- 3-axis accelerometer
- Direct angle output
- Angle resolution of true inclination angle output 0.0055°/LSB
- Typical noise density for small angles 0.001°/√Hz
- Excellent bias stability over component lifetime typically less than 10 mg
- Typical output temperature dependency only 15 mg
- Wide operating temperature range -40...+125 °C
- Low current consumption at the 1.2 mA level
- Digital 16-bit output
- Small size: 7.6 x 8.6 x 3.3 mm