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Making Sense of STRUCTURAL HEALTH MONITORING DATA

The construction and engineering industry is facing a mounting challenge to shore-up the civil structures supporting transport infrastructure



IN DEVELOPED NATIONS, many civil structures are in urgent need of strengthening, rehabilitation, or replacement. Moreover, many developed nations are unable to expand their current transport infrastructure, resulting in increasing pressure to optimise and extend the life of supporting civil structures in place today.

Conventional methods of structural integrity assessment have centered on visual inspections, conservative codes of practice, and the use of large machines to 'excite' a structure in order for various parameters to be measured and analysed. However, whilst such techniques enable engineers to identify and assess the physical manifestation of an issue,

identifying an actual issue is extremely complex due to the sheer amount of data produced.

Structural Health Monitoring (SHM) is a system that provides information on demand about any significant change or damage occurring in a structure. SHM instruments have been employed for many years but difficulties in managing the huge volumes of data they generate have made efficient monitoring in civil engineering applications a challenge. However, advanced SHM solutions are now able to provide analysts with the means to interpret this data and diagnose potential problems early, and to a high degree of accuracy.

At the heart of SHM innovation are MEMS (Micro-Electro-Mechanical Systems) based sensors. These precision measurement servo accelerometers are now smaller, more cost effective, and so sensitive that there is no longer a need to excite a structure in order to gain vital information about its integrity.

Simply placed on a single or small number of positions on most bridges for a few hours, these devices record a structure's three-dimensional movement in extreme detail providing analysts with all the data required via ambient sources such as gusts of wind, foot falls, and traffic flows. What this means is that analysts can now make both short- and long-

term structural integrity assessments quickly and easily.

With the construction and engineering industry finding itself at an evolutionary crossroads, meaningful interpretation of the SHM data means that critical repairs and upgrades, strengthening projects, financing, insurance, and dispute resolution can now be carried out quickly and efficiently. ■

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