

Real-World Experience and Limitations of SHM in Civil Engineering Applications

Ruben L. Boroschek*

* Civil Engineering Department
Faculty of Physical and Mathematical Sciences
University of Chile

e-mail: rboroschek@uchile.cl, web page: <https://boroschek.com>

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ABSTRACT

For several years now, Structural Health Monitoring (SHM) has moved beyond laboratories and experimental prototypes to become a practical tool deployed in real structures. This shift has transformed “simple” on-site measurements into comprehensive SHM systems. Many projects still require only basic monitoring of key variables and direct reporting—often with comparisons against predefined alert or alarm thresholds for parameters such as maximum displacement, peak velocity, or tilting.

However, as technology has matured and become more accessible, user expectations have grown. Stakeholders increasingly demand not only raw physical measurements but also automated damage assessment, diagnostics, and even prognostics. This has led to more sophisticated processing, more complex installations, and more demanding operational procedures.

This keynote presentation reviews both fundamental and advanced examples of SHM that we have implemented across industry. It highlights the limitations, practical difficulties, client needs, and potential solutions observed in real projects. Typical challenges involve timely and reliable notification, system robustness, initial and maintenance cost, and the definition of responsibilities.

In Chile, earthquakes represent one of the extreme load cases of interest. Nevertheless, the most frequent monitoring needs arise from structural deterioration, instabilities, and extreme operational demands. Examples from the mining sector will be presented, along with key recommendations and identified limitations for each scenario.