Highway Bridge Standoff Measurement System

Protecting Critical Infrastructure

In wake of the tragic collapse of the Minnesota I-35 bridge, increasing attention has been focused on the condition of highway bridges throughout the U.S. Bridge inspections need to be performed more thoroughly and frequently to protect them from failure due to aging, heavy use, and malevolent attacks.

Bridge inspectors now use low-tech methods in their routine inspections. Most inspections are entirely visual, with the personnel looking for obvious signs of structural distress such as cracking, spalling, deflection or unusual movement of the bridge. Concrete surfaces are sometimes sounded using metal chains or hammers to listen for delimitations that indicate steel corrosion.

An Adaptable Approach

The University of Louisville is advancing the science significantly by developing a system that permits bridge inspectors to instantly measure structural resonant vibration frequencies of any line-of-sight joint, plate, truss or member at a remote distance. This method is elegantly simple to implement and is comparable to a surveyor setting up a transit at a distance and aiming at a critical point on the structure or member of interest and measuring its vibration spectrum within seconds. To increase accuracy and repeatability, this measurement may be made over a specified time interval and associated with specific loading events, such as high winds, the passage of passenger vehicles and trucks of various weights, or rail cars. As a structure ages, its frequencies of vibration change due to the development of defects in the materials, joints, and supports. These changes can be measured and correlated to predict impending bridge failure.

Moving Forward

The technology described above has been demonstrated in actual field tested. The product is now being commercialized under license to the University of Louisville. In order to further validate system performance, date from a number of highway bridges in Kentucky will be collected over the next year to support a statistical study that will correlate the measured data with structural health and demonstrate the efficacy of the system in assessing the health of different bridge architectures. The scope of this effort includes measurement system development, bridge data collection, bridge structural assessment criteria and commercialization.

To learn more about this project, contact: Jay Robinson, Program Manager, at jay.robinson@hq.dhs.gov or Ewell Balltrip, NIHS, CEO at eballtrip@thenihs.org 2015-01.1pager