cablescan™
Wire Rope Testing

Bridge Cable Assessment

An Innovative Product from a Leader in Acoustics

CableScan™ is a state-of-the-art NDT service offered by Pure Technologies, a leader in the development of technologies to monitor and assess the condition of critical structures. CableScan uses the principle of magneto-striction to rapidly test the condition of steel ropes or cables.

Prior to CableScan, engineers were limited to visual inspections of ropes and/or removal and testing of a few ropes on a structure. The limitations of visual inspections and the small sampling size of the ropes tested, meant that these types of inspection programs could miss potentially serious damage.

Now engineers can combine CableScan data with visual inspections to permit comprehensive evaluation of the ropes. A large quantity of ropes can be tested in a short period of time with areas of cross section loss and wire breaks reliably identified. Damage is found regardless of whether it is on the interior or exterior of a cable. This is important as corrosion often starts, and is most advanced on the interior of a rope.

MsS technology offers excellent repeatability, so that progressive damage can be detected and monitored through periodic inspections.

Using 10-kHz longitudinal guided waves on the GWB, the MsS could inspect the entire length of a suspender (up to 330 feet long) from a test location near the upper level bridge deck and provide data that could be used for grading the physical condition of suspenders to help prioritize the rehabilitation schedule. Pure Technologies has subsequently used the system to assess the condition of suspender ropes on a number of structures, including the Bridge of the Americas in Panama, the Walt Whitman Bridge in Pennsylvania, the Bronx-Whitestone Bridge, and the Throgs Neck Bridge in New York City,.

pure™ TECHNOLOGIES

www.puretechnologiesltd.com

Pure Technologies Ltd.

Calgary, Alberta (Head Office)
300, 705 - 11 Avenue SW
Calgary, Alberta, Canada T2R 0E3
(403) 266-6794

Pure US

Columbia, Maryland
8920 State Route 108, Suite B
Columbia, Maryland, USA 21045
(443) 766-7873

Pure China

Hong Kong, China
Unit No.1 , 11/F, Futurea Plaza
111-113 How Ming Street, Kwun Tong
Kowloon, Hong Kong
+852-23455527

pure™ TECHNOLOGIES

www.puretechnologiesltd.com

cablescan™
Wire Rope Testing

Bridge Cable Assessment

pure™ TECHNOLOGIES

www.puretechnologiesltd.com

cablescan™
Wire Rope Testing

The CableScan Advantage

CableScan is a new cable inspection service introduced by Pure Technologies that utilizes the magnetostrictive sensing method (MsS) developed and patented by Southwest Research Institute (SwRI). Pure Technologies holds a worldwide exclusive license for MsS for bridge applications. The system represents a major breakthrough in bridge inspection technology.

Corrosion of cables or ropes is not always evident from visual inspection, as corrosion often originates in the interior of the cable. Other non-destructive techniques have been used for bridge cables, such as magnetic flux leakage, dynamic analysis, or X-ray inspection. However, all of these techniques rely on bulky equipment or provide inconclusive results. MsS is the only technique currently available that is capable of detecting and reporting the location of corrosion damage with equipment that is light and easy to use in the field. MsS can identify anomalies in bridge cables from a single location on each cable. This means that engineers and bridge owners can now undertake fast, accurate non-destructive evaluation of cables without the need for heavy equipment or complicated access requirements. A 300-foot-long suspender rope can be inspected in as little as 15 minutes, depending on access. The system can detect and locate broken wires and loss of cross-section along the full free length of a cable. It also provides a baseline of cable condition for comparison with future inspections.

Corrosion Detection

How It Works

MsS technology uses structure-borne elastic waves, called guided waves, which propagate along the structure confined and guided by its geometric boundaries. Guided waves in relatively low frequencies (under 200 kHz) can propagate a long distance along the structure at speeds of more than three miles per second. A good example of this is the sound of the train wheels we can hear from miles away by pressing our ears against a railroad track.

The MsS is a device that generates and detects guided waves electromagnetically in ferromagnetic materials.

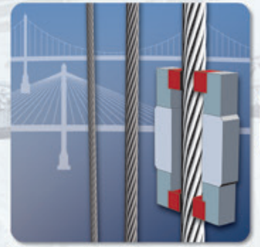
With MsS, a pulse of relatively low-frequency guided waves is launched along a structure from a fixed test location. When the propagating guided-wave pulse encounters defects, such as corrosion or fatigue damage, a portion of the waves is reflected back to the original test location, where it can be detected by the same sensor and analyzed for evidence of structural anomalies. Because these guided waves propagate at a high speed, MsS technology can rapidly inspect multiple ropes on a structure from the bridge deck and provide comprehensive structural condition information.

Proven Technology

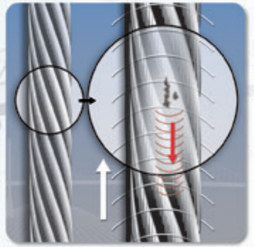
Under the SwRI internal research program, the application of magnetostrictive sensors was first proven in 1992 in an effort to find an efficient method for inspecting steel cables in highway suspension bridges. In 1998, with support from more than 10 industrial companies in the United States and abroad, staff in the Sensor Systems and Nondestructive Evaluation Technology Department at SwRI Applied Physics Division, developed a field-ready MsS system for piping inspection. The system received an R&D 100 award from R&D Magazine for being one of the most significant technical accomplishments of 1998.

In cooperation with the Federal Highway Administration and the Port Authority of New York and New Jersey, SwRI scientists used MsS to inspect the suspenders on the George Washington Bridge (GWB). The GWB is a major suspension bridge and it was particularly difficult to obtain a reliable assessment of the suspender ropes. The initial testing found that the MsS technology identified the level of corrosion damage better than any other techniques identified by the Port Authority. Following these results, the Port Authority conducted a large-scale testing program of the ropes on the GWB, and on a tied arch bridge - the Bayonne Bridge.

The CableScan Process

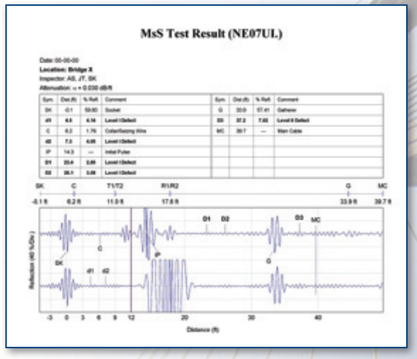


1 Guided waves are generated using Magnetostrictive technique from a single location on the wire rope



2 Defects and changes in cross-section cause reflected pulses detectable by MsS sensor

3 Comprehensive report includes quantification and location of individual defects



Reporting

The CableScan report presents a comprehensive and useful summary of cable condition. An estimate of cross-sectional loss is indicated at all locations along the free length of the rope or cable. The condition of each cable is ranked, and the locations of defects are identified. A preliminary report is usually provided prior to demobilization, so that cables can be selected for close-up visual inspection, removal, load testing and/or forensic analysis.

Corrosion and deterioration generally originates on the inside of the wire rope.

a significant breakthrough in bridge inspection technology.