

Cleveland Electric Labs Advanced Technologies Group - Project Profile:

Norfolk Southern Railway Bridge - Portageville, New York



Bridge Owner: Norfolk Southern Corporation

Project Description

Comprehensive fiber optic structural health monitoring system combining surface attached strain and temperature sensors as well as one Z axis accelerometer. Bridge has been in place since 1875. System placement is in response to recently discovered cracked eye-bar.

Project Duration

Installed July/August 2010

System Use

The system will serve long term as a tool to monitor and evaluate performance of the structure, specifically steel eye-bars, until the bridge is replaced. It will also act as a real time structural warning system tied directly to Norfolk Southern dispatch.

System Details

- 78 - Surface mounted strain sensors
- 22 - Temperature Sensors
- 1 - Single axis optical accelerometer

Optical interrogator is housed on-site with a PC using remote access via LAN connection. The system will be activated as trains approach the span and will take continuous measurements until the train has passed. Typical traffic can include up to 14 trains per day.

Project Photos:

Sensor Placement



Site Photos



Summary:

The Portage rail bridge spans the Genesee River in Letchworth State Park about an hour east of Buffalo, New York. This single track line of the Norfolk Southern Corporation is a critical route that links the New York cities of Buffalo, Binghamton and Albany. The over 200' high cast iron bridge has been in nearly continuous service since being quickly constructed June and July of 1875 to replace the original wood structure that had burned down a few months prior.

In mid-2009 during a routine inspection it was discovered that one of the steel eye-bars was fractured in two places around the upper pin. The fractures were in an area that made visual inspection impossible, so as the fractured eye-bar was being replaced a complete inspection was performed by cutting away small sections of steel plate above the upper junctions.

Norfolk Southern engineers then made the determination to use a monitoring system to analyze how the structure performs over a several year period as they work toward a replacement bridge. After an evaluation of numerous monitoring technologies CEL's fiber optic system was chosen due to the inherent benefits of long life, high accuracy and the ability to move virtually all of the system to another structure at the end of the monitoring period.

The optical monitoring system now in place gathers real-time data as trains pass over the bridge and it is also tied directly into Norfolk dispatch as an early warning system if a structural problem should arise. Norfolk Southern engineers access the system remotely and have complete control over strain level warning set points and data reporting output.

Historically, electronic strain gages have been widely used to gather short term structural analysis, but due to the many limitations of these gages they typically aren't reliable for long term use. Fiber optic sensors are the only monitoring technology available that can offer the benefits of nearly limitless distance, environmental immunity, simultaneous static and dynamic measurement and up to 40 sensors per single fiber.

The CEL optical sensing system on the Portage Bridge is one of the first truly comprehensive structural analysis/warning systems in use in the United States.

CLEVELAND ELECTRIC LABORATORIES Advanced Technologies Group Fiber Optic Sensing Solutions

www.clevelandelectriclabs.com

Ohio Sales Office

1776 Enterprise Pkwy.
Twinsburg, OH 44087

Jim Zammataro

330-425-4747 x219
jz@cel-atg.com

Arizona Sales Office

361 S. 52nd St.
Tempe, AZ 85281

Brad Taylor

480-967-2501
btaylor@cel-atg.com

Installation Services Provided By:

