

## **Harmonic Footprinting LLC Applies Thermal Cycling to Bridge Maintenance for 24/7 Monitoring**

*By Barbara Cohen*

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*Harmonic Footprinting LLC. and Frank Masyada announce new science designed to monitor bridge joint metal fatigue 24/7 providing early detection of metal fatigue that could result in an eventual bridge collapse.*

Harmonic Footprinting LLC. and its founder, Frank Masyada, today announce the release of Harmonic Footprinting and Thermal Cycling for bridge maintenance, a new science for the early detection of bridge collapse due to metal fatigue. For more detailed explanation, see Frank Masyada's website: [http://www.harmonicfootprinting.com/bridge\\_pictures](http://www.harmonicfootprinting.com/bridge_pictures)

First, let's review the problem: Metal Fatigue is one of the most destructive factors leading to the catastrophic failure of bridge joints. On August 1st, 2007, the eight-lane Interstate 35W Bridge in Minneapolis, Minnesota, collapsed. 4 people died instantly, 13 in total. Why? Because of metal fatigue on the bridge joints from exposure to heavy traffic, wind, rain, snow, and general overall wear and tear.

The US Department of Transportation released its national bridge inventory in 2006, showing that there are 73,764 bridges that have been identified as "structurally deficient". The Minneapolis bridge that collapsed was on that list.

Imagine if we were able to monitor an entire bridge every day, 24/7 and send out an alarm that identifies the exact location of any bridge joint that was about to break. Instead of having to inspect the entire bridge, the bridge inspector could know the exact location to check. Or imagine monitoring an entire bridge 24 / 7 with alarms issued whenever a bridge joint fractured because the bridge joint's metal was so corrosive (it had experienced metal fatigue) that it could no longer perform its function.

If the Minneapolis interstate bridge had been under Harmonic Footprinting monitoring, 13 lives could have been saved, along with tens of millions of dollars in reconstruction.

How does Harmonic Footprinting magically monitor an entire bridge?

Harmonic Footprinting and Frank Masyada have developed Smart Sensors and associated software that can analyze, measure and monitor the condition of bridge joints 24/7.

Metals have a unique molecular structure that if they are exposed to environmental stimulants (daily traffic, hurricane, wind, snow), create a dominant resonant Frequency, a number of minor resonant Frequencies and Amplitude that can be catalogued. These Frequencies and Amplitudes are dependent on a number of elements, such as the forming process, heat treatment and quench, machining, elemental exposure and other environmental factors.

SmartSensors are placed at metal joints throughout the bridge. When the joint is struck by a stimulant, the resulting Amplitude is transmitted by the SmartSensor to be cataloged in the Harmonic Footprinting software database. Each transmission provides a unique Harmonic Footprint for a particular bridge joint.

Once a set of Harmonic Footprints is catalogued for the bridge, the bridge joints are monitored 24/7, with new Footprints being transmitted constantly. Should the new Harmonic Footprint fail to match the cataloged Footprint (within an acceptable range), an alarm is issued by the software displaying the precise

location of the bridge joint in question for manual inspection by the bridge inspector.

Bridge Assistance: How could Harmonic Footprinting assist bridge inspectors, especially after a Hurricane or Tropical Storm? Harmonic Footprints would be available before, during, and immediately after a tropical storm or hurricane. There would not be any reason to wait until the storm had passed for the bridge inspectors to manually inspect the entire bridge before allowing traffic to continue. Bridge inspectors would know exactly what needed to be inspected and/or replaced, even before the storm finished. This would dramatically reduce the overhead for local departments of transportation connected with bridge inspection.

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Harmonic Footprinting LLC provides new science to retard metal fatigue.. Metal fatigue is one of the most destructive factors leading to the eventual catastrophic failure in vehicle brakes, bridge joints, oil rigs, pipelines, high rises, etc.

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Tags	frank masyada, frankmasyada, thermal cycling, harmonic footprinting, metal fatigue, bridge joints, bridge collapse
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