**Dan Baima 10/5/14**

**Health Monitoring of Suspension Bridge Cables**

**Research**

General Clairborne Pell (Newport Bridge) Info:

Suspension Bridge with Deck Truss Approaches

Constructed 1966-1969 by  [Parsons, Brinckerhoff, Quade & Douglas company](http://en.wikipedia.org/wiki/Parsons_Brinckerhoff" \o "Parsons Brinckerhoff).

Total Length: 11,248ft

Width: 48ft

Main Span Length: 1,600ft

Height: 400ft (Towers) 200+ Ft Ship Clearance, 216ft Max Road Height

Traffic: 27,000 Daily

<http://shm.cs.illinois.edu/Full%20Scale%20Papers/5.%20Jang%20et%20al.%202010%20Deployment%20and%20Evaluation.pdf>

“Structural health monitoring of a cable-stayed bridge using smart sensor technology: deployment and evaluation”

* Wireless Smart Sensor Networks, using software from Illinois Structural Health Monitoring Project Services Toolsuite.
* Jindo Bridge, South Korea
* Largest deployment of wireless smart sensors to date
* Utilizes solar charging

<http://ascelibrary.org/doi/abs/10.1061/%28ASCE%29BE.1943-5592.0000399>

Corrosion of high-strength steel wires in a suspension bridge’s main cable has been attributed to the environment within the cable wrapping. A sensor network was developed to monitor and provide information in order to indirectly assess the environmental conditions and the deterioration of the interior of suspension bridge main cables. The overall functionality of both the individual sensors and the monitoring system was tested on a full-scale mock-up cable. The cable mock-up was covered in aluminum wrapping and an environmental chamber was built around it in order to subject the test specimen and sensor network to an aggressive corrosive environment created by cyclic temperature and humidity conditions. The temperature, relative humidity (RH), and corrosion rate levels were recorded by all sensors. The recorded data were analyzed in an attempt to determine general trends and correlations between the environmental variables themselves and their effects on corrosion rates. The recorded temperature fluctuations were highly dependent on the sensor depth within the cable; however, the RH levels were not. During cyclic testing, near-linear temperature increases and RH decreases were recorded close to the cable’s center. The baseline corrosion rate levels were affected by the RH levels, with significant increases in corrosion rates at RH levels greater than 50%. The temperature changes proved to impact the corrosion rates on a cyclic level, with high correlations between the temperature and corrosion rate readings recorded by linear polarization resistance corrosion rate sensors.  
  
  
Read More: <http://ascelibrary.org/doi/abs/10.1061/%28ASCE%29BE.1943-5592.0000399>

<http://proceedings.spiedigitallibrary.org/proceeding.aspx?articleid=982652>

”Dynamic monitoring of structural health in cable-supported bridges”

* Hong Kong Highways Department , Polytechnic University
* 900 sensors (accelerometers, strain gauges, displacement transducers, level sensing, weight-in-motion sensors)
* Doesn’t seem like much on cables

<http://www.hindawi.com/journals/tswj/2014/689471/>

* Recently built Zhijiang Bridge over the Hangzhou Qiantang River, China.
* Comprehensive Bridge Monitoring System (not specific to cables, but includes many sensors)
* Seems like a class report…not the best

<http://www.turnto10.com/story/26155222/a-newport-bridge-view-youll-see-only-on-10>

Video of News Crew going up Newport Bridge

(<http://en.wikipedia.org/wiki/Guyue_Bridge>) cool 800 year old stone bridge in China