

RFID

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EXHIBITION**

**SAN DIEGO
CALIF.
APR. 15-17
2015**

WORLD'S LARGEST RFID EVENT

Revolutionary New High Precision Structural Health Monitoring RFID Strain Sensor

Presentation for
Best New Product at RFID Journal Live 2015

by Scott Dalgleish, CEO

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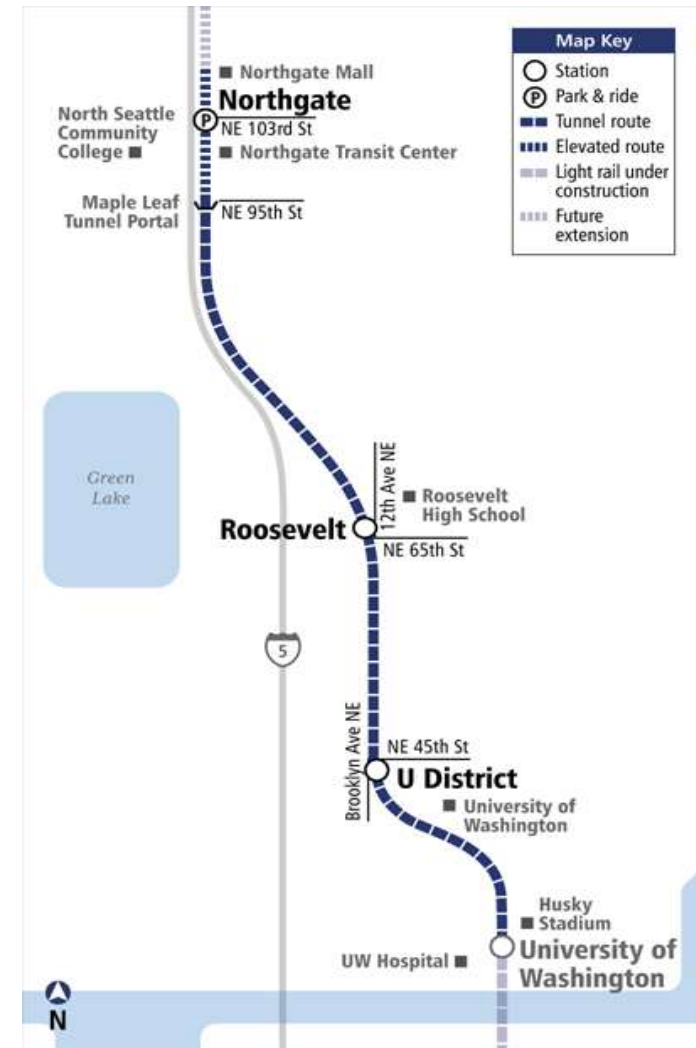
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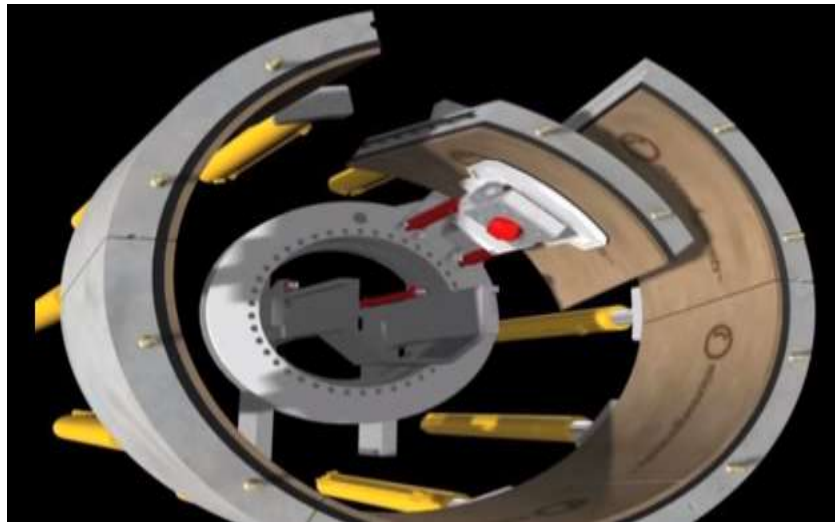
Seattle Northgate Tunnel



2 parallel tunnels, each 3.5 miles long
Not the “Big Bertha” tunnel experiencing problems



Tunnel Boring Machine & Liners



Seattle North Gate Tunnel



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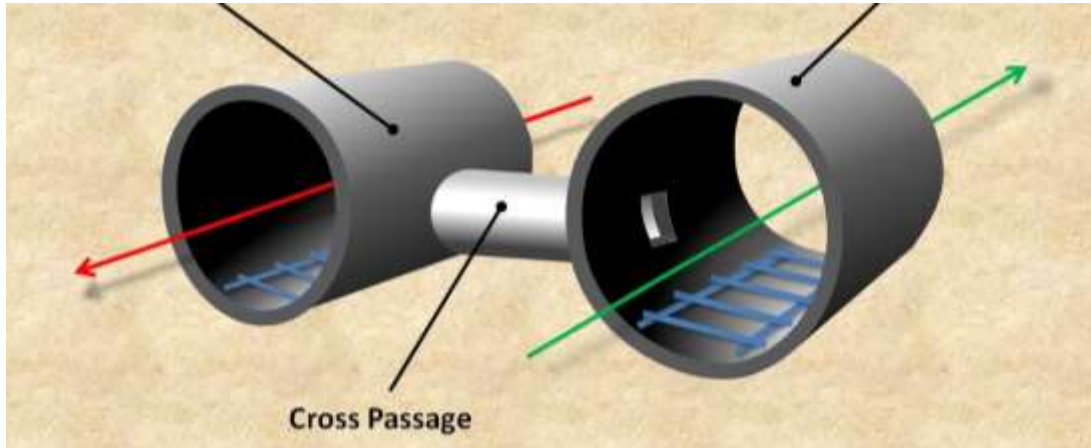
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The Challenge: Cross Passages



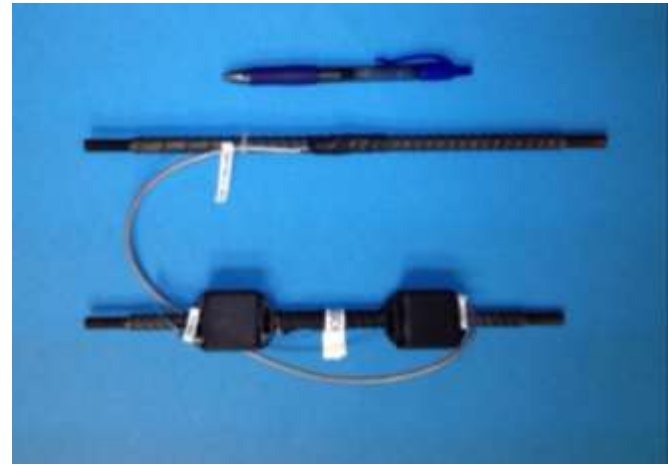
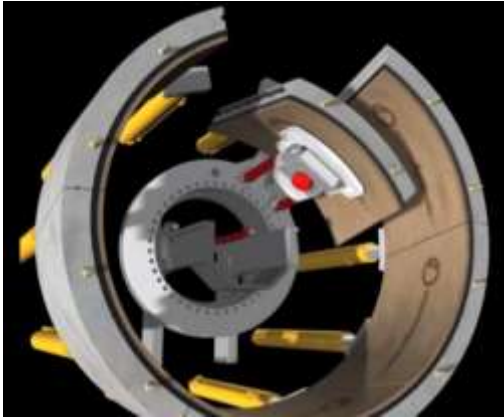
Cross passages from other similar tunnel projects.

Problems with Existing Methods

- Fiber Optic and Vibrating Wire Strain Sensors
 - Requires a large junction box for a wired connection to the sensor. Highly susceptible to damage. Must last decades.
 - Extensive cabling and large electrical boxes. Impacts structural integrity.
 - Cabling and boxes must be designed-in.
 - Can be difficult to get the sensor rigidly attached to read the low strain levels.
 - 0.0150 % change in length at full scale
 - Data logging requires permanent installation of a large-bulky precision instrument with large batteries that will last only 1 year.
- Battery-powered wireless strain sensors?
 - Can't "read now"
 - Very limited life vs. 100 year tunnel life.



Embedded UHF RFID Strain Sensor



Back Pack Reader



What's So New about RFID Strain Sensors?

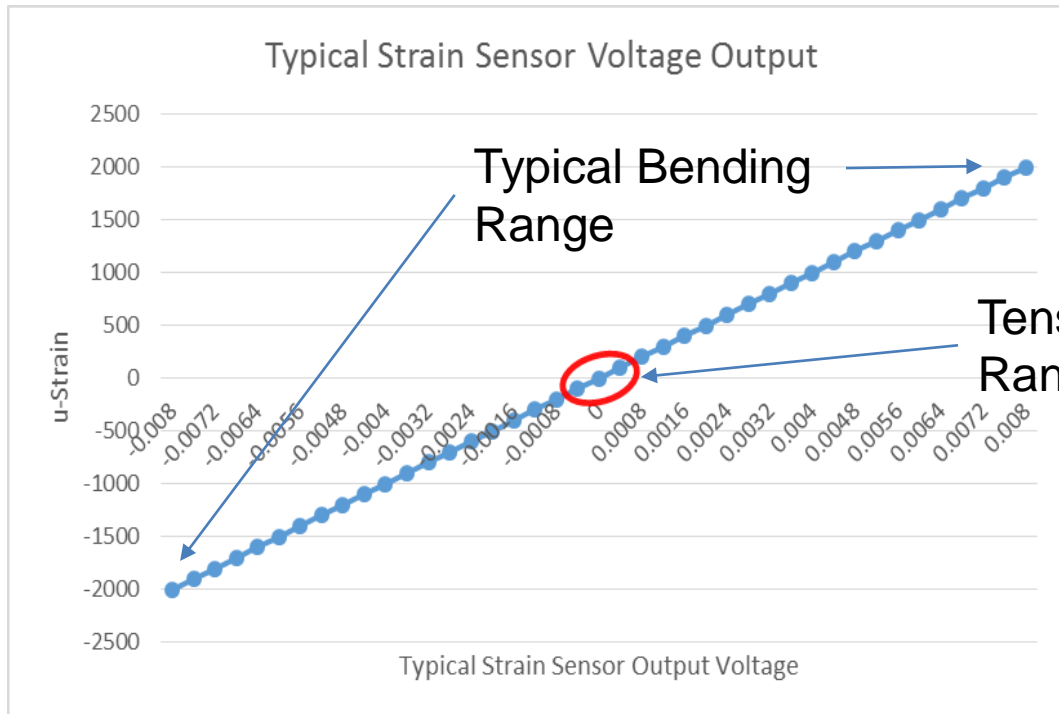
Precision & Repeatability *in Tension and Compression...*



900 lb. to create 120 u-Strain
(0.0150% stretch in rebar.)

- Features that make a viable **PRODUCT** in real applications...
- Most strain sensors – 0.000004 Volts / u-Strain. 0.0006V at full scale.
- High precision and repeatability across a small window of +/- 150 u-Strain (to *measure* 5 u-Strain – a 0.00150% change in length, 0.00002 V change)
 - Many demonstrations done in the 2000 u-strain span
- Precision individually calibrated Sensor.
- Very precise reference voltage.

Technical Challenge of a Viable Structural Health Monitoring Sensor



exactly what you need, please contact us.



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What's So New About RFID Strain Sensing?

...Metal-Mount, Low Cost, Read Range, Size

- Metal Mount
- Low Cost
- Fast and very easy to install – no extra design time.
- Read Range – over 1 foot through a few inches of concrete w off-the-shelf UHF RFID EPC reader.
- Small inclusion - Antenna and electronics < 1 sq. inch
- Embedded/protected by the concrete structure itself.



Multiple Customers → Multiple Modes

- NOW - Short term customer – cross passage cuts
 - Instant read-now capability – before, during, and after cuts
- NEXT 10 YEARS - Longer Term Customer (Sound Transit)
 - Long-Term Structural Health Monitoring (SHM)
 - 10+ year battery included for **data logging strain**
 - **3 readings a day for 4 months**, then oldest data is over-written
 - Download Strain vs. Time with **same RFID reader & software** – after earthquake, fire, impact...
- 10 TO 100? YEARS - Battery-free Read-Now capability when the battery dies in 10+ years.
 - Pseudo-data log by writing readings to tag memory.

Other Embedded Battery-Free RFID Structural Health Monitoring Sensors

- Embedded temperature sensors
- Bridge Deck Moisture Monitoring
- Crack monitoring
- Load/force monitoring
- Many more



Iowa State University
Center for
Nondestructive
Evaluation



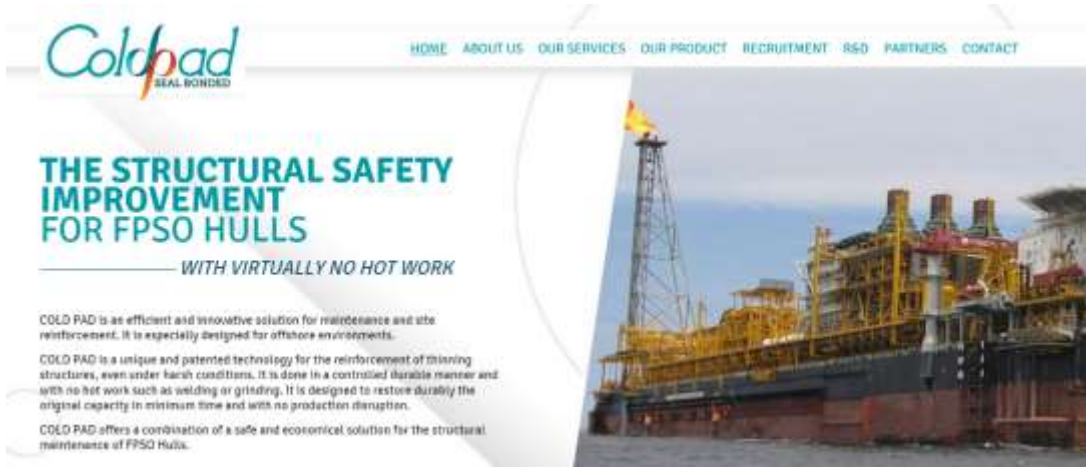
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RFID is Now a *Innovative* Game-Changer in the Huge Market of Structural Health Monitoring - Beyond Tunnels



Coldpad
REAL BONDED

HOME ABOUT US OUR SERVICES OUR PRODUCT RECRUITMENT R&D PARTNERS CONTACT

THE STRUCTURAL SAFETY IMPROVEMENT FOR FPSO HULLS

WITH VIRTUALLY NO HOT WORK

COLD PAD is an efficient and innovative solution for maintenance and site reinforcement. It is especially designed for offshore environments.

COLD PAD is a unique and patented technology for the reinforcement of thinning structures, even under harsh conditions. It is done in a controlled durable manner and with no hot work such as welding or grinding. It is designed to restore durably the original capacity in minimum time and with no production disruption.

COLD PAD offers a combination of a safe and economical solution for the structural maintenance of FPSO Hulls.



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Questions?

Scott Dalglish, CEO

sdalglish@phaseivengr.com

Rich Pollack, Founder and CTO

rpollack@phaseivengr.com

303-443-6611

23 Years of Leadership in the RFID Technology that We Invented.

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THANK YOU

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