FORCE MEASUREMENT SOLUTIONS

CASE STUDY

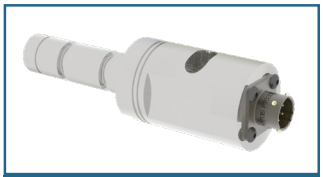
# Monitoring the Seismic Force of a Suspension Bridge




The array of use cases of force measurement are wide-ranging across many industries. Interface Mini Load Cells are frequently used to measure minute forces in precision medical devices, while our jumbo precision load cells rated for 2,000,000 pounds of force (lbf) are used to measure the force of rocket thrust.

Sensors are essential in innovation, with a dependency on accuracy and reliability that impacts lives and ingenuity.

Interface recently completed another extraordinary force measurement solution for a large-scale infrastructure project. Interface engineering and solution experts created custom load pins to measure the seismic force on the replacement of the Gerald Desmond Bridge. There are interesting details that give a perspective on how force is used to provide safe passages.



LP Stainless Steel Load Pin

WTSLP Wireless Stainless Steel Load Pin

CSC Inline Signal Conditioners


WTS-BS-4 Wireless Base Station USB Interface Industrial Enclosure

## Background

The Gerald Desmond Bridge, a bridge located in Long Beach, California, opened in 1968. It is a major commuting route for the region, and a major trade corridor carrying 15 percent of all containerized cargo imported to the United States. The bridge connects Terminal Island, the heart of the port complex, with the Long Beach Freeway as well as downtown Long Beach. In 2012, a heavy civil construction contractor was tasked with replacing the existing steel arch bridge with a new suspension bridge rising more than 200 feet over the water.

## Challenge

One of the construction contractors, an Interface customer, wanted to find a way to measure the force on the Gerald Desmond Bridge in the event of an earthquake. The goal was to continuously monitor the standard force created by regular traffic, as well as the seismic force before, during, and after earthquakes.

The monitoring sensors needed to be integrated into a dampener, which are attached to the structural tower. They also required a solution that would allow monitoring of force on a continuous, real-time basis. The emitted data can be used to cross-reference the standard traffic force with the seismic force to understand its effect on the bridge. Its purpose is to help with predictive maintenance and influence future bridge designs to better compensate for the forces of an earthquake or other natural disasters, which are common in this part of the world.

## Solution

Interface was engaged to create a unique infrastructure solution. It required a custom product that could handle the inimitable and considerable force of a bridge under all types of activity, volume and distress. Over the years, the contractor worked on the planning of the bridge with the City of Long Beach as Interface refined our load pin capabilities to meet the project requirements.

Interface engineers developed a custom load pin to handle the force of movement in the bridge in the event of an earthquake. The load pin is much larger than our standard version and is rated at 900,000 lbf. The large load pins are designed to be integrated into the dampener with data acquisition modules connected to the load pins. A computer is then connected to a base station to receive the data.

## Results

With the integration of Interface's custom load pins and data acquisition module, the contractor is able to collect data at all times. The sturdy construction of our load pins and 900,000 lbf rating allow for readings during all degrees of seismic activity. We are also able to ensure product durability because the failure rating of the custom load pins are maxed out to 2.7 million lbf. An added benefit of this project was the Interface R&D efforts applied to creating the data acquisition module, including a future use for wireless technology. This became part of a greater effort to develop an entire line of wireless force measurement products available from Interface.

## About Interface

Interface is the world's trusted leader in technology, design, and manufacturing of force measurement solutions. We guarantee the highest quality performance of load cells, torque transducers, multi-axis sensors, wireless telemetry, instrumentation, and calibration. We empower engineers around the world to measure force and performance at the highest degree. Our clients are the who's who in aerospace, automotive and vehicle, medical devices, energy, test and measurement, and industrial manufacturing.

Interface, Inc., was founded in 1968 and is a US-based, women-owned technology manufacturing company headquartered in Arizona.

For more information on how Interface can help solve your bridge seismic force monitoring challenges, please visit www.interfaceforce.com and also check out this application use for bridge seismic force monitoring solution: https://www.interfaceforce.com/solutions/industrial-automation/bridge-seismic-force-monitoring-solution/.

Photographs "Courtesy of the Port of Long Beach."