

SMART Bearings for Optimizing Structural Health Monitoring

Client:

Techstar Inc.

Locations:

Fabrication - Findlay, OH
Installation - Houston, TX

Product Provided:

Custom-designed instrumentation to provide a SMART structural component that is pre-calibrated to measure forces and loads on high capacity bearings starting from the earliest stage of construction.

Value Provided:

- Evaluated component performance
- Evaluated structure performance
- Ability to be integrated into comprehensive Structural Health Monitoring System (SHMS)

Background & Project Challenges

As bridge structures are now being designed with expected service lives beyond 100 years, structural health monitoring systems in combination with bridge rating systems

have been specified to provide rational bases for prioritization of inspections and maintenance of primary and secondary structural components. For most of these signature bridge structures bearing movement and loads, as well as cable forces, are just a few of the required measurement parameters that provide feedback from these systems into finite element models of the structure to show real-time dynamic response. If the components themselves (bearings and cables) are designed to provide this information, the systems become that much more efficient.



Geocomp Role & Accomplishments

Geocomp, working with bearing manufacturer Techstar Inc., provided integrated measurement technology into these structural components at the earliest stage of fabrication. This provided a SMART structural component that was pre-calibrated to measure forces and loads on bearings starting from the earliest stage of construction.

A project is currently under way where 3900-kip capacity fixed and sliding bearings are uniquely instrumented during bearing fabrication and calibrated to measure load changes as well as rotational and sliding movements under long-term service loads. Eight high-capacity bearings were custom-instrumented during the fabrication process to measure load, displacement, and rotation over the life of the structure. Once instrumentation was installed, calibration runs (as part of the acceptance testing for the bearings) verified operation and established calibration factors for each bearing. Calibration runs of up to 4,500,000 million pounds were repeatable even with rotational wedge plates inserted to simulate actual rotational response.

These components can be monitored as stand-alone components to evaluate component performance or integrated into a comprehensive Structural Health Monitoring System to provide an overall response of the structure.