

Project Case:



Offshore pile monitoring

Precast steel piles in the East China Sea



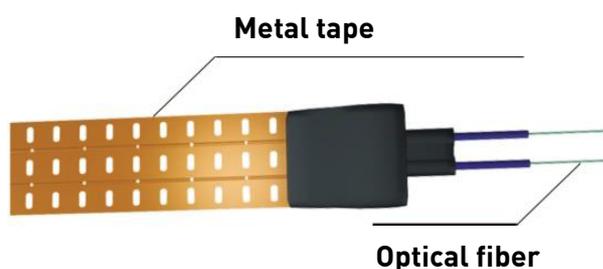
Traditional pile sensors only provide readings of a limited number of points. With fibrisTerre's fTB 2505 system, strain data can be collected throughout the pile. In cooperation with fibrisTerre's partner in China - NZ Sensing, fiber optic cables were integrated and monitored for a series of precast steel piles installed in the East China Sea.

The Project

NZ Sensing (renowned Chinese company specialized in structural health monitoring) was commissioned to apply distributed fiber optic strain sensing technology to several piles at an offshore installation. The fiber optic cables were integrated into the pre-cast steel pipe piles before they were transported and installed off the coast of China in the East China Sea.



Cable integration



The cable used for this project was manufactured by NZ Sensing, specially made for testing strain profiles of steel structures. Its metal tape provides reliable strain transfer from the steel structure to the optical fibers and its robustness provides proper protection of the fibers during construction.

The fiber optic sensing cables were attached to the piles at an onshore storage facility.



Precast steel pile in the onshore storage facility

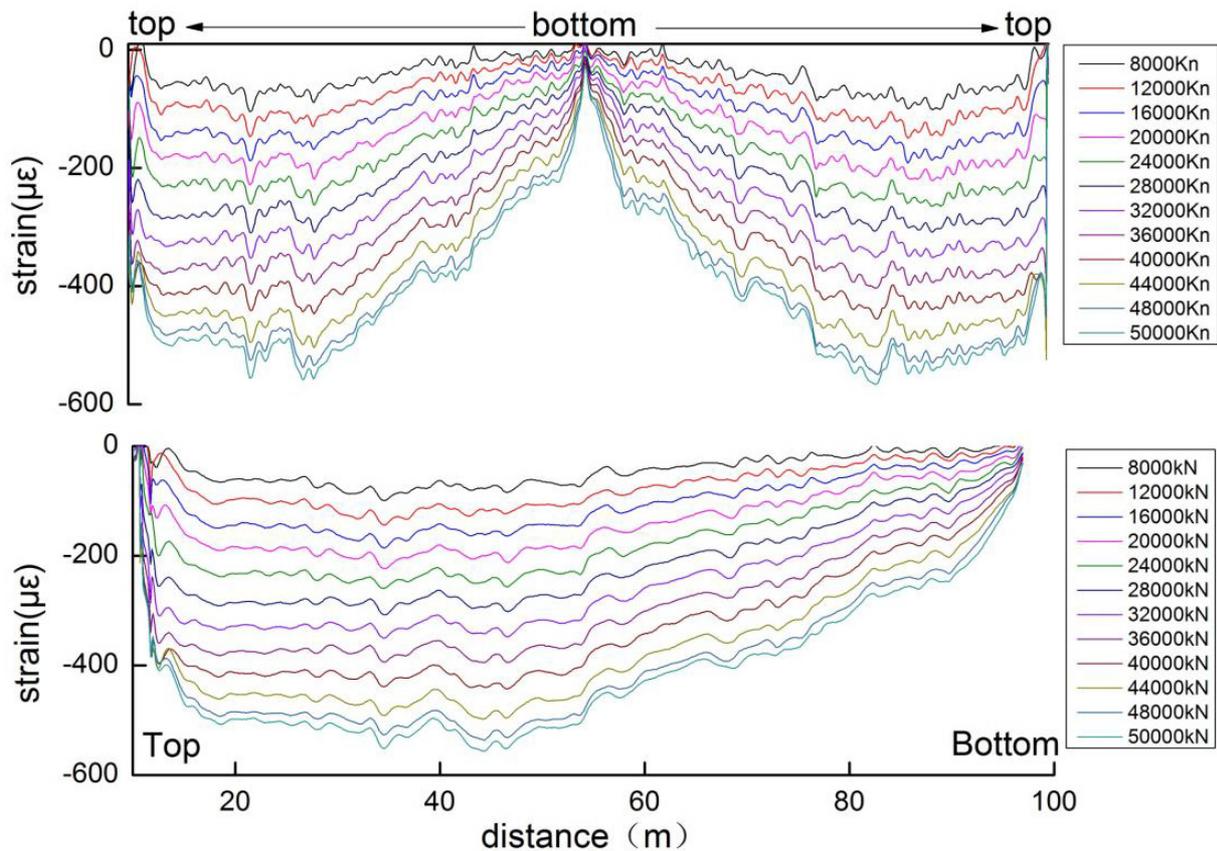
The cables were secured along the inner surface of the steel pipe piles. A combination of welding and industrial gluing was used to ensure the proper adherence between the cables and the metal surface.



Welding the cable baseband to clean pile surface



Welded cable protected using epoxy resin



Testing and results

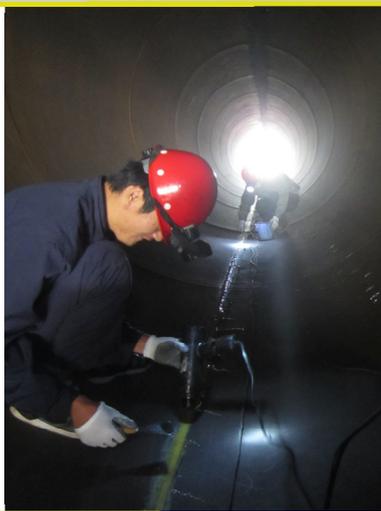
After the fiber-embedded steel pipe piles were installed offshore, they were subjected to testing. Through the testing process, the pile was subjected in incremental loads, ranging from 8000 KN to 50000 KN.

The fTB 2505 monitoring system monitored the internal strain profiles throughout the testing process. The graph above shows strain versus location, displaying progressively larger amounts of strain in the pile. The distributed strain information helped engineers to make calculated decisions.

Conclusion

The fTB 2505 monitoring system answers the need of a detailed and continuous strain profile for foundation piles. It is able to provide its end users with consistent and highly accurate strain profile throughout the entire pile testing process.

The project showed how distributed fiber optic sensing can be reliably applied to the relatively harsh offshore environments. Further, the combination of welding and gluing also proved to be a robust solution of integrating cables to steel structures.



About fibrisTerre

fibrisTerre provides next generation fiber optic monitoring systems for structural health monitoring. With its pioneering BOFDA fiber optic sensing technology, fibrisTerre answers the industry's demand for truly distributed and economically viable monitoring solutions for critical engineering structures.

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