LOADTEST
O-Cell® Technology in South Africa

Project:	**Richards Bay Dry Bulk Jetty**
Location:	Richards Bay, South Africa
Client:	National Ports Authority of South Africa
Main Contractor:	LTA-Interbeton-DIC Joint Venture Group
Specialist Engineers:	ARQ
Geotechnical Engineer:	Ground Engineering Limited
Piling Contractor:	Interbeton
Project Description:	

Pile construction offshore

Pile cage showing O-cell assembly

Installation of Pile Cage with O-cell assembly attached

Pile test in progress

Project Summary

Situated on KwaZulu-Natal's fertile south coast, Richards Bay, once a holiday town, has developed into a major port. Today, Richards Bay is a thriving industrial site with a direct rail connection to the mines for coal and other mining exports. The Port of Richards Bay is relatively young, having opened in 1976, and is presently South Africa's leading port in terms of cargo volumes; handling in excess of 80 million tons per annum and representing approximately 55 % of South Africa's seaborne cargo trade. Approximately 1644 commercial ocean going vessels call at the port's five terminals annually.

As part of continuing development and expansion, a dry bulk terminal was planned. This required a large jetty to be constructed to allow deep-water access. The piling contract involved the installation of 116 piles in four rows, extending 300 m from the existing quay into the harbour. The central two rows were 1.8m diameter while the two outer rows were 1.2m diameter.

Load testing program

Using conventional top-down testing systems would have meant mobilising and building a kentledge arrangement offshore or construction of expensive reaction piles.

Two single level O-cell tests were performed on one 1200mm and one 1800mm nominal diameter piles constructed wet to depths up to 66 m by Interbeton.

Pile Testing

The cretaceous siltstone was overlain by silty sandy overburden. The O-cell assemblies were located within the siltstone at a level calculated to provide a balance between side shear upwards and combined side shear and end bearing acting downward. The mobilised capacity for the two preliminary pile shafts was 17.3 MN and 24.3 MN respectively.

Conclusion

Bi-directional techniques eliminated the associated problems of conventional top-down testing in an offshore environment. By using the O-cell to apply the load and by placing strain gauges at strategic elevations in the shaft, Loadtest were able to assess side shear characteristics in specific zones, as well as isolate end bearing and total skin friction loads.

Aerial view of Richards Bay *Source: www.grindrod.com*