Project: Bryghaus Projekt
Location: Christians Brygge, Copenhagen, Denmark
Foundation design: COWI A/S
Foundation Contractor: Zublin A/S

Project Summary
Bryghausprojektet is composed of a multi-functional building with a number of external activities, primarily initiated by the Danish Architecture Centre (DAC); with a café and restaurant, housing and offices for rent. In addition, there will be a large underground car park. The idea is to gather many activities around the development in one building; a building of outstanding architectural quality. At the same time, the building and its open areas, will help bring more life to the area around Bryghusgrunden, enhancing the link between the inner city and Copenhagen harbour.

As part of this project, located on Christians Brygge and beside the Frederiksholms Kanal, was a requirement to evaluate the pile capacity in the Limestone rock socket and an Osterberg Cell (O-cell) bi-directional load test was recommended.

Load testing program
A single-level O-cell test was scheduled for a 1200 mm pile installed by Zublin. An initial configuration of five x 405 O-cells was planned to provide a loading capacity larger than the required 40MN and the pile constructed to a total depth of 24.6 metres. Sister bar vibrating wire strain gauges were placed at 5 levels along the pile shaft allowing a profile of net unit skin friction to be determined as mobilised along the pile shaft. Concreting of the piles was carried out to cut off level and base grouting was carried out; pile movements and stresses were monitored by Fugro Loadtest.

Summary
By placing the O-cell at a strategic elevation in the rock socket, Loadtest was able to isolate end bearing and total skin friction loads, mobilising a total reaction of over 54 MN. This test provided evidence of the foundation design, technical merits and economic benefits of O-cell technology.