



## STATIC LOAD TESTING

The static load test (SLT) involves the direct measurement of pile head displacement in the response to a physically applied test load. It is the most fundamental form of pile load test and is considered as the bench-mark of pile performance. Testing has been performed in the load range 100kN to 12,000 kN. The SLT may be carried out for the following load configurations:

- \* Compression
- \* Lateral
- \* Tension (i.e. uplift)

For the SLT the load is most commonly applied via a jack acting against a reaction beam, which is restrained by an anchorage system or by jacking up against a reaction mass ("kentledge" or dead weight). The anchorage system may be in the form of cable anchors or reaction piles installed into the ground to provide tension resistance. The nominated test load is usually applied in a series of increments in accordance with the appropriate Code, or with a pre-determined load testing specification for a project. Each load increment is sustained for a specified time period, or until the rate of pile movement is less than a nominated value.

Static load testing methods are applicable to all pile types, on land or over water, and may be carried out on either production piles or sacrificial trial piles. Trial piles are specifically constructed for the purpose of carrying out load tests and therefore, are commonly loaded to failure. Testing of production piles however, is limited to prove that a pile will perform satisfactorily at the serviceability or design load, plus an overload to demonstrate that the pile has some (nominated) reserve capacity.

### THE TEST PROCEDURE

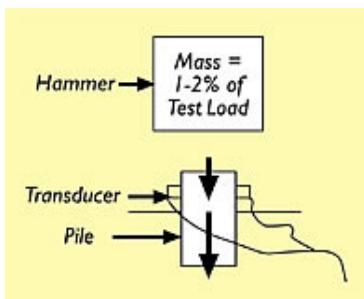
Loading is applied to the test pile using a calibrated hydraulic jack, and where required a calibrated load cell measures the load.

During the SLT, direct measurements of pile displacement under the applied loading are taken by reading deflectometers (dial gauges reading to 0.01mm) that are positioned on glass reference plates cemented to the pile head. The deflectometers are supported by reference beams that are founded a specified distance away from both the test pile and any reaction points.

Although SLT is generally held as the most reliable form of load testing a pile or pile group, it is important that interaction effects are minimised. These may result from interaction between the test pile and the anchorage systems, or between the measuring system and reaction points. For this reason, careful attention is given to performing the test in accordance with proper procedures.

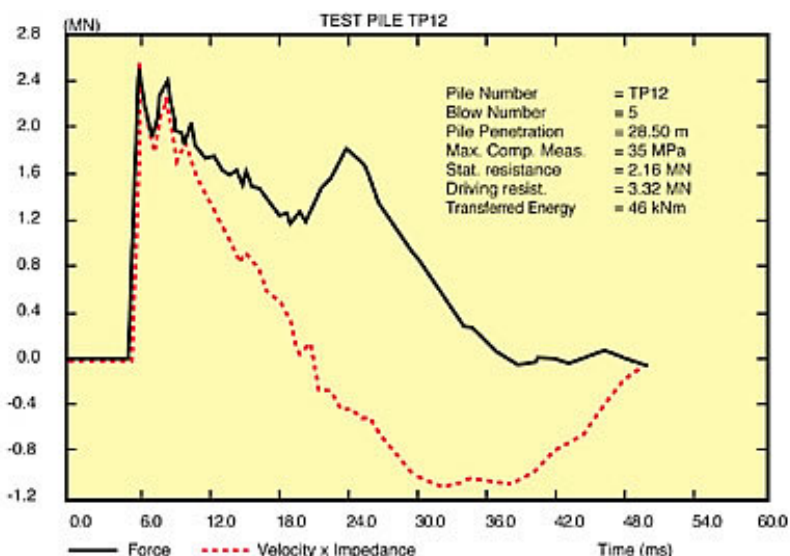
### TEST RESULTS

Test results are presented in conventional graphical format showing the applied load versus pile head displacement.



## HOW DOES IT WORK?

Dynamic load testing is carried out with two identical bolt-on strain and acceleration transducers attached to a section of pile. The pile is then struck with a driving hammer or a separate drop weight. A hammer mass of about 1 to 2% of the test load is generally sufficient. The generated compressive stress wave travels down the piles and reflects from the pile toe upward. The stress waves, which are picked up by the transducers, are processed and automatically stored in the computer for further analysis and reporting.



The analysis is carried out using the signal matching program CAPWAP. Pile and soil data are modelled and a response is calculated based on one dimensional wave equation theory. The signal matching process utilises an iterative method in which the results of each analysis are compared to the actual measured pile behaviour. Appropriate dynamic soil parameters are refined until a satisfactory match is achieved. The mobilised static shaft and toe resistance of the pile can hence be derived. The signal matching program also provides a prediction of the static load displacement performance of the pile on the basis of the refined pile and soil model.