

INTRODUCTION

Dynamic load testing is a cost effective alternative to conventional static load testing for a wide variety of pile types and sites.

Instead of costly proof-loading with kentledge or anchor piles, the technique uses a heavy falling weight such as a piling hammer to impart a short duration impact to the pile head, whilst monitoring the pile response using temporarily attached transducers.

The pile response to dynamic loading may be used to provide the foundation designer with an interpreted pile capacity, and can usually provide additional information that is difficult to obtain via static load testing.



Instruments on Precast Concrete Pile



Pre-cast concrete piling rig



Dynamic Load Testing Equipment

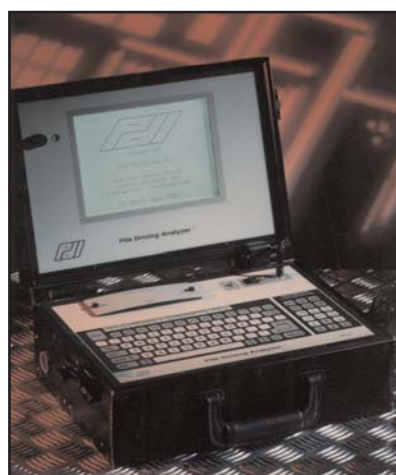
TECHNICAL BENEFITS

- Can provide information difficult to obtain with static pile load tests. For example data on skin friction and end bearing components of soil resistance.
- Can be used to confirm pile integrity.
- Provides check of operating efficiency of piling plant.
- Can be used to investigate anomalous driving behaviour.

OPERATIONAL BENEFITS

- Cheap and rapid to perform - Up to ten piles may be dynamically load tested for the cost of one static load test.
- Causes minimum disruption to piling operations
- No kentledge needed.
- Robust, compact equipment will fit in the back of a small van.
- Easily performed on piles installed over water.
- Piles do not need to be preselected for testing prior to installation.

Pile Driving Analyser

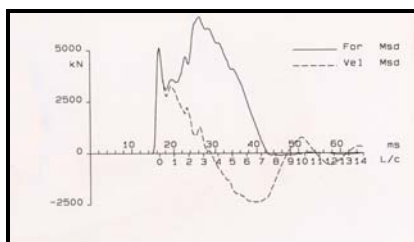


The Fugro Group is an international organisation with around seven thousand staff in over fifty countries. Our major disciplines are Geotechnics, Environmental Services and Survey.

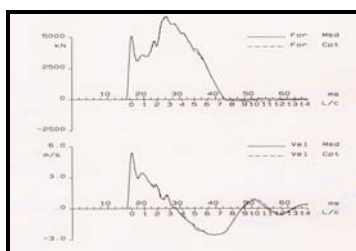
PROCEDURE

The test is performed by striking the pile head with a piling hammer or other suitable weight whilst monitoring response in terms of pile head force and velocity, using specially developed bolt-on reusable transducers. The test may be performed on any pile that can be prepared to accept the transducers and will withstand the impact from the falling weight.

The equipment used to energise the transducers, records their output and analyse the data, is rugged and portable and easily accommodated in the back of a small van or car. The testing engineer requires no assistance from the piling contractor other than attendance for approximately 15 minutes per pile to restrike the pile with the hammer.



Typical Measured Signals



CAPWAP Output

ANALYSIS

The measured pile head signals are analysed in real time to provide:

- an estimate of the soil resistance mobilised during the test.
- determination of maximum stresses in the pile and shaft integrity.
- measurement of the overall operating efficiency of the piling plant.

Additional analysis of each set of dynamic test data can be performed using the CAPWAP pile driving simulation computer program.

This program uses an iterative solution technique to optimise the parameters defining the soil resistance supporting the pile. This is done by matching forces at the pile head computed using stress wave theory with those actually measured during the test.

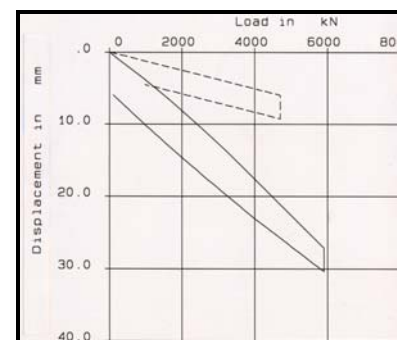
The CAPWAP program outputs many parameters valuable to the experienced piling engineer in the investigation of piling problems. The parameters of most value are generally the distribution of soil resistance down the pile shaft and beneath the pile toe, and the computed pile head load settlement curve.

This analysis is generally conducted in the office subsequent to the field testing but can easily be performed on site if rapid answers to anomalous behaviour are required, or to optimise driven pile lengths.

EXPERIENCE

Dynamic Pile Testing is a mature technique that has been offered by Fugro Ltd since 1974, and is widely accepted by the Civil Engineering Industry.

Fugro Ltd has over 20 years experience in the application of instrumentation technology to the Civil Engineering Industry, and the services it provides are supported by the international geotechnical engineering expertise of the Fugro group.



Pile Head Load Settlement Curve

Fugro Engineering Services Limited

Fugro House
Hithercroft Road
Wallingford
Oxfordshire OX10 9RB
Tel: +44 870 4021 400
Fax: +44 870 4021 499
Email: wallingford@fes.co.uk

Armstrong House, Unit 43
Number One Industrial Estate
Medomsley Road, Consett
Co. Durham DH8 6TW
Tel: +44 1207 581120
Fax: +44 1207 581609
Email: consett@fes.co.uk