

GL-GARRAD HASSAN
106714 ALCANTARA WIND FARMS, Fondachelli, Sicily, Italy
TECHNICAL DUE DILIGENCE ON FOUNDATIONS OF SELECTED WTGs
**NOTE: SONIC TESTS
PARALLEL SEISMIC TEST REQUIRED**
Date: 2013-10-03

GL Garrad Hassan



*ALCANTARA WIND FARM
PROVINCE OF MESSINA, SICILY
TECHNICAL DUE DILIGENCE ON FOUNDATIONS OF
SELECTED WTGs*

NOTE

Date: Oct 03, 2013



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1. Executive Summary

Come evidenziato nei nostri documenti di commento sulle relazioni ricevute da GEOCIMA e da GEOLAB, i test sonici SIT (Sonic Integrity Test) non hanno fornito ragionevole certezza sulla lunghezza dei pali delle fondazioni oggetto di verifica sia nel lotto ALCANTARA SUD che in quello di ALCANTARA NORD.

SCANGEA ritiene che sia necessario un minimo di evidenza sperimentale per l'accettazione di detti pali. L'opzione più ragionevole, escludendo i test di tipo distruttivo come la demolizione del collegamento dei pali ai plinti, oppure la trivellazione lungo l'intero palo, è quella di ripetere le prove soniche non piu' con il metodo SIT ma con il metodo Parallel Seismic Test.

Il Parallel Seismic Test si basa infatti su un rilevamento di energia all'esterno del palo, e dunque non postula che il palo sia isolato dal plinto, come nel caso del metodo SIT (ricordiamo che il metodo SIT consiste nel rilevare effetti della propagazione dell'energia all'interno del palo con algoritmi che non tengono conto del contributo degli altri elementi strutturali della fondazione. Il metodo SIT infatti è idoneo per testare i pali prima della costruzione del plinto o delle travi di fondazione).

Seguono informazioni sul Parallel Seismic Test tratte fonti specialistiche.

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2. Succinct description of the Parallel Seismic test (source: PileTest, UK)

A **pile integrity test** (also known as **low strain dynamic test**, **sonic echo test**, and **low strain integrity test**) is one of the methods for assessing the condition of [piles](#) or shafts. It is cost effective and not very time consuming.

The test is based on [wave propagation theory](#). The name "low strain dynamic test" stems from the fact that when a light impact is applied to a pile it produces a low strain. The impact produces a compression wave that travels down the pile at a constant wave speed (similarly to what happens in [high strain dynamic testing](#)). Changes in cross sectional area - such as a reduction in diameter - or material - such as a void in concrete - produce wave reflections.

This procedure is performed with a hand held hammer to generate an impact, an [accelerometer](#) or geophone placed on top of the pile to be tested to measure the response to the hammer impact, and a data acquisition and interpretation electronic instrument.

The test works well in concrete or timber foundations that are not excessively slender. **Usually the method is applied to recently constructed piles that are not yet connected to a structure.** However, this method is also used to test the integrity and to determine the length of piles embedded in structures. Widely used in Australia now on existing structures.

This method is covered under [ASTM D5882-00](#) - Standard Test Method for Low Strain Integrity Testing of Piles.

References

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Ankesh Kumar Gupta (Electronics Engineer), October 2010, Rajasthan, India.

70% failures of structures occur due to foundation failure http://en.wikipedia.org/wiki/Integrity_Testing

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Overview

PSI uses the well-known Parallel Seismic method to establish the depth of existing foundations (specifically piles) where the superstructure precludes access to the pile heads.

The test requires the installation of a plastic access tube in parallel, and as close as possible, to the tested pile. The tube should be carried down to a depth exceeding the assumed pile length by a margin of 8-10 m and filled with water. In unsaturated soils the tube should be firmly grouted in the hole to achieve good coupling with the surrounding soil.

System Components:

1. PSI instrument
2. Sledgehammer equipped with a trigger switch
3. Digital depth meter (Optionally wireless)
4. Hydrophone

Operation:

As the hydrophone is lowered in stages inside the access tube, the superstructure is hit with the hammer and the pulse arriving at the hydrophone is recorded in the PC that is connected to the instrument. When all the pulses thus collected are plotted versus the respective depths, they show a typical break in the slope at the depth where the pile tip is located.

Fig. 01

Estratto dalla presentazione del metodo PS della società PSI

Nota:

Le rilevazioni possono anche essere fatte in assenza di acqua, facendo scorrere un geofono, invece di un idrofono, nel tubo inserito a fianco del palo.

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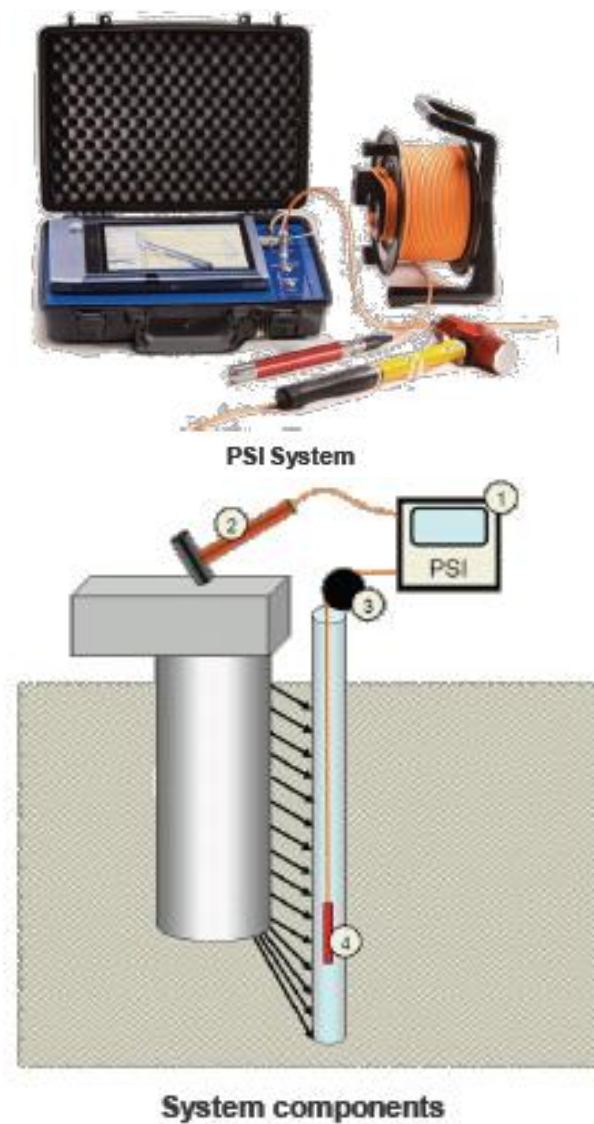


Fig. 02
Strumenti per la prova PS

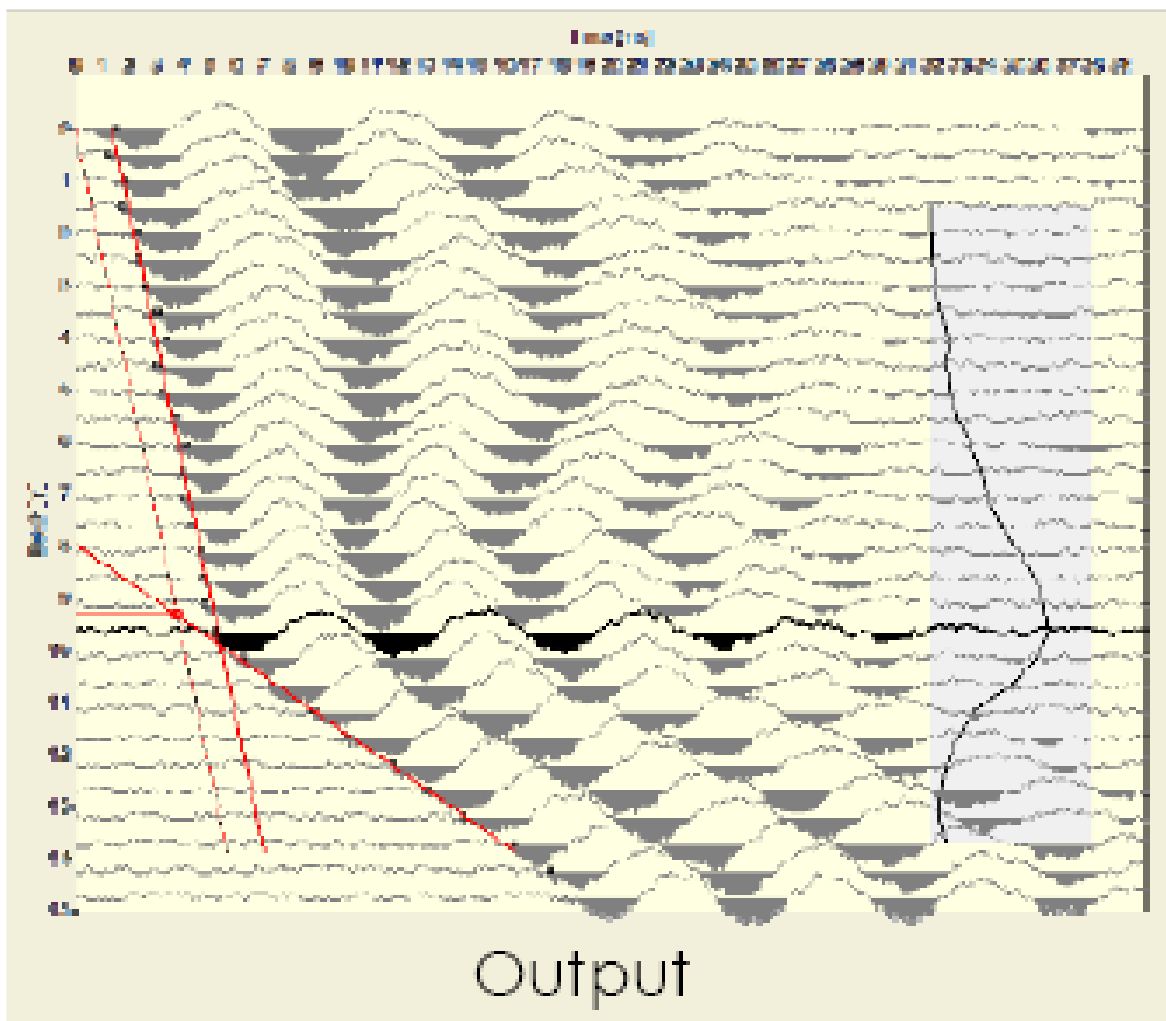


Fig. 03
Restituzione del test PS

Come si può vedere facilmente, il diagramma risultante dalla prova è assai più facilmente interpretabile di quello delle prove con il SIT tester.