

Hybridnamic Load Test

The Hybridnamic Load Test[®] is a rapid load testing method using a drop ram to strike the pile head and does not need reaction force to help evaluate the “bearing capacity” of the pile. The ideal use of Hybridnamic cushion, PDA system, PSD camera makes high quality rapid load testing possible, provides a quick and cost-effective method for verifying that working pile meets performance specifications.



Jibanshikenjo Co., Ltd.

Hybriddynamic Test is a very accurate rapid load testing method to evaluate the bearing capacity of pile. The estimated Capacity is almost identical to that of static load test.

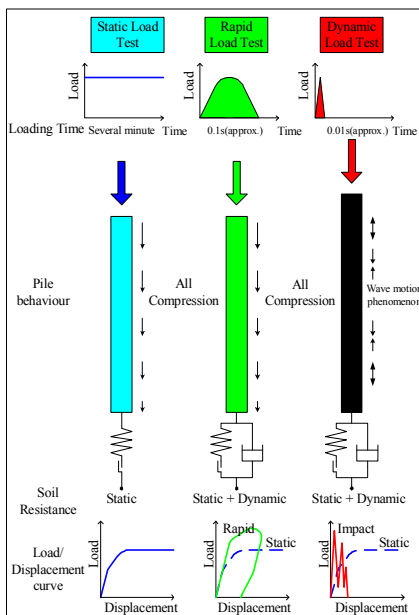


Hybriddynamic 70t System

Hybriddynamic cushion is a honeycomb structure consisting of steel plate, air cell and elastomer.

What is Rapid Load Test?

Rapid load testing method has been incorporated in *Standards of Japanese Geotechnical Society for Vertical Load of Piles* (The Japanese Geotechnical Society 2002). In this method, practically the wave propagation generated at the pile can be ignored, so that the stress given to the pile at the time of testing is very similar to that in the static load test.



Pile behavior during load test.

Hybriddynamic Test

The Hybriddynamic Test is a new rapid load test method developed to help engineers evaluate the load bearing capacity of pile. Impact force is introduced into the pile head using a drop ram and this test requires no reaction force.

Using the Hybriddynamic Cushion, it gives an ideal rapid load test result, longer loading duration in comparison with the conventional dynamic load test. In addition, displacement is accurately measured with the PSD camera.

It makes high quality load test with an accurate and ideal measurement of pile load and displacement come true.

What is new in this test is the first application of rapid load test in the world, in which the test load is greater than 10MN, and the Static pile Ultimate Bearing Capacity is derived from soil resistance at Fully Mobilized Unloading Point obtained from multi-cycled test.

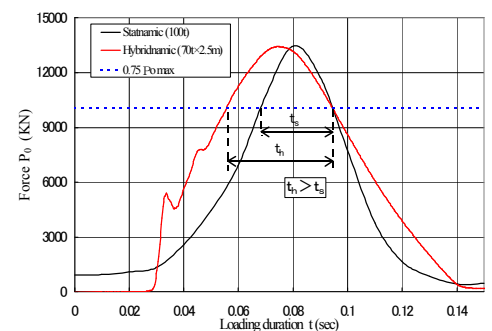
Hybriddynamic Cushion

The Hybriddynamic Cushion originally developed by Jibanshikenjo (patent pending), has a honeycomb structure consists of steel plate, air cell, and elastomer, in which the drop ram energy is transformed into a rapid load and transmitted into the pile head. This has the following advantages.

- Longer loading duration
- Low repulsion
- Multi-repeatable use
- Avoid pile damage

In accordance with the Japanese

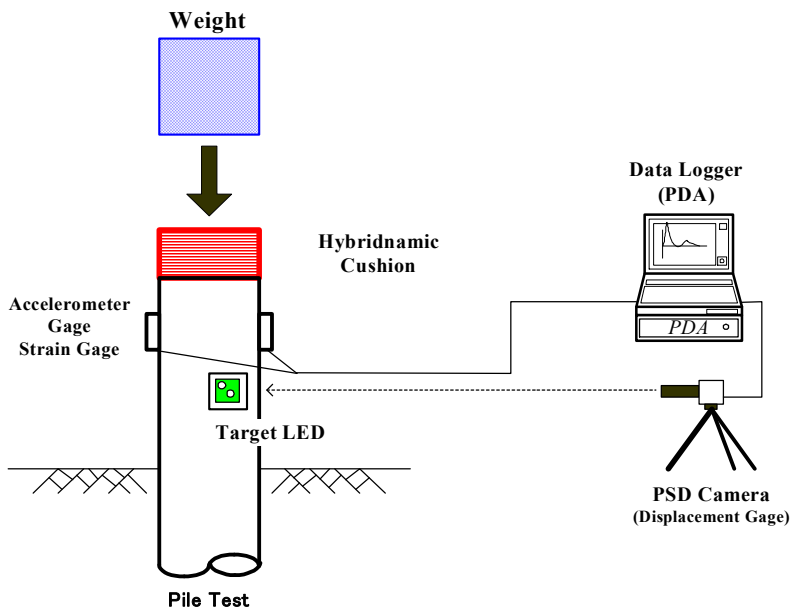
Geotechnical Engineering Society standard, the rapid load test is dynamic test with the relative loading time of 5 or more rounds of wave travel. The longer the loading time around the maximum load, the motion of pile during the test becomes more similar to that of the static load test. Hybriddynamic Test method prolongs load duration as compared to the conventional dynamic load test method, as air in the honeycomb structure is being pushed out while the load increasing.



Rapid load test waveform

During unloading process, the recovery to original configuration of the cushion is delayed due to the effect of the negative pressures acting on the air cell, which give low repulsion of the drop ram, and result in small rebounding.

The lateral deformation of the elastomer is restrained at the time of loading by the presence of the steel plate. It also helps prevent the load energy on the material to go beyond its maximum stress, with almost no deterioration even if used repeatedly.



Hybriddynamic Test Equipment



PDA System



Strain/ Accelerometer gage



Displacement Measurement Target LED



PSD Camera

PSD Displacement Measuring System

The PSD Displacement measuring system developed by Jibanshikenjo is a very accurate sensing device used to measure pile displacement. PSD (Position Sensitive Detector) is an optical sensor that can detect two-dimensional displacement (vertical and lateral) simultaneously. It consists of a LED target and optical detector sensor. In addition to the above, PDA (Pile Driving Analyzer) system of PDI (Pile Dynamic Inc.) are used to accurately measure the strain and acceleration.

Analysis of Rapid Load Test Results

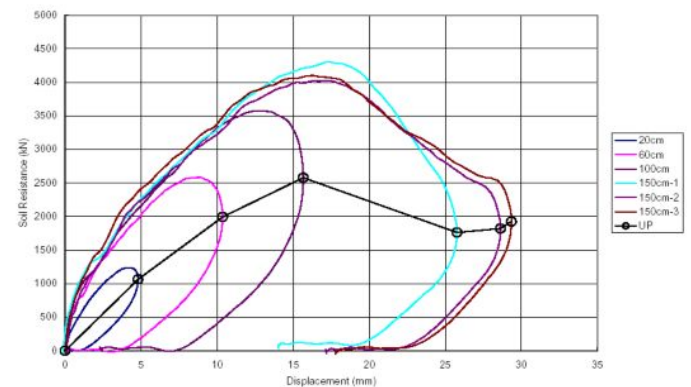
Dynamic signals derived from rapid load testing can be analyzed using relatively simple interpretation methods such as the Unloading-Point Method in each test blows, and then the unloading points for each blows are connected to obtain the load vs. settlement curve. Also, it is possible to implement more detailed analyses using CAPWAP (PDI's waveform-matching analyzing program).

The soil resistance for Fully Mobilized Unloading Point is very close to the static ultimate bearing capacity of pile.

Actualization of Rapid Load of 45 MN at Maximum

Since the inclusion of the rapid load test in the Standards of Japanese Geotechnical Engineering Society in 2002, the demands are increasing year after year. To satisfy the extensive market needs, a full range of heavy drop ram from 2 – 70 tons, which can applies a rapid load ranging from 1 MN to 45 MN maximum has been made available. There are quite few cases in which conventional static load test is difficult to carry out for reasons of cost, reaction force, time, and etc. Hybriddynamic Test method is cheap, short testing period, and quick reporting of test results. It is a brand new rapid load testing method of piles that can contribute to the streamlining of construction management as well as quality assurance.

With our high expertise and abundant experience, we can satisfy our customer's extensive needs.



Soil Resistance – Displacement curve with Fully Mobilized Unloading Point



15t System

2t System