Pile Driving Analyzer®

System for dynamic load testing and pile driving monitoring

Pile Dynamics, Inc.

Bearing capacity of all types of deep foundations.

The PILE DRIVING ANALYZER (PDA) system acquires data from **accelerometers** and **strain transducers** attached to a pile or shaft so that High Strain Dynamic Tests (ASTM D4945) may be performed. The tests require the impact of a pile driving hammer or, if that is not available, of a suitable drop weight.

High Strain Dynamic Load Test

- Results: **Bearing capacity, structural integrity assessment**
- PDA data analyzed with the CAPWAP® software
- Excellent correlation with static load tests
- Performed on drilled shafts, continuous flight auger, cast-in-situ or driven piles on a restrike

Pile Driving Monitoring

- Results: **Capacity at the time of testing (Case Method and iCAP®), driving hammer performance, driving stresses, pile integrity**
- Performed during driving
- Helps establish the Driving Criterion
- Contributes to safe and economical production pile installation

The PDA may also evaluate the energy of SPT Testing Equipment by force and velocity measurements, per ASTM D4633 (optional SPT program).

The PDA may meet Rapid Load Test standard (ASTM D7383) when a ram of sufficient mass is used.

Smart accelerometer and strain transducer, offshore version.

PAX Wireless Mode

- No cables from the test pile to the PDA
- Uses Pile Dynamics Smart Sensors and Wireless Transmitters
- Smart Sensors communicate their calibration value to the PAX, eliminating entry errors
- Signal transmission of up to 100 m (330 ft)

The PAX may also be used with cabled (traditional) accelerometers and strain transducers.

PAX in Wireless Mode at Offshore job.

Site Link® (Remote Testing*)

- The engineer performs Pile Driving Monitoring or Dynamic Load Tests from any office
- Real time field to office data transmission via Internet
- All field measured signals and results on a computer running PDA-W software
- Simple PAX field setup may be performed by a technician

The PAX may also be used by a field engineer on location, displaying results, measured signals and all variables of interest on the PAX screen.

*Remote Pile Driving Analyzer U.S. Patent No. US 6,301,551 B1

PAX arrives at job for SiteLink.

Receiving test data with SiteLink.

Quality Assurance for Deep Foundations

PAX-4 or PAX-8

Most High Strain Dynamic Tests require only 2 strain transducers and 2 accelerometers installed near the top of the foundation. These 2 pairs of sensors are sufficient to obtain the force and velocity records needed for the PDA calculations, thus making four channels of data acquisition (as in the PAX-4) adequate for the test.

Eight channels of data acquisition (PAX-8) – 4 strain transducers and 4 accelerometers - are recommended for dynamic tests of augered cast-inplace / continuous flight auger piles, drilled shafts and spiral-welded pipes. Eight channels are also essential for dynamic measurements to be made simultaneously on follower and pile, and when a pair of accelerometers and strain transducers is installed at a second location along the length of the foundation (for example by embedding sensors near the toe of a concrete pile). If a drop weight is to be instrumented to measure force by Newton's Law, then eight channels are also required. The PAX-8 has both PE and PR accelerometer connections.
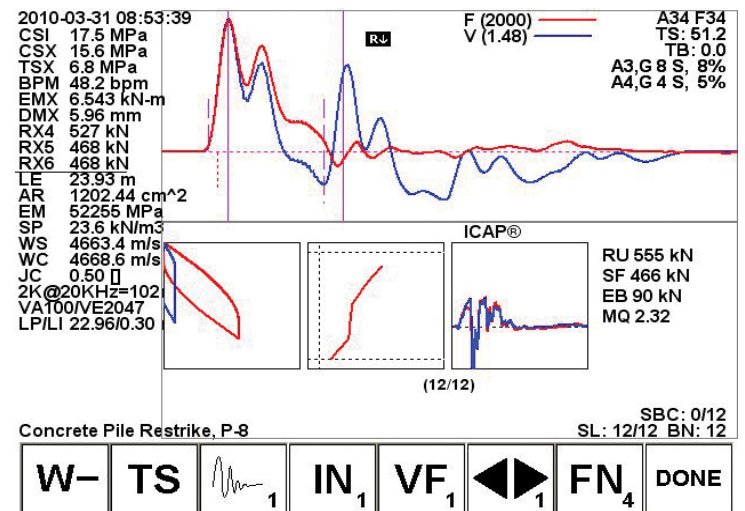
Software:
PDA software suite: PDA-W with iCAP®, PDIPLOT, PDI-Curves

- **PDA-W** processes PAX data files, either in real time or after the conclusion of the test. PDA-W data is interpreted for soil resistance at the time of the test, and, for driven piles, compression stresses induced at top and bottom, tension stresses along the shaft, energy transferred to the foundation and pile integrity. PDA-W calculates over 200 parameters in real time and compares them with user specified target values. PDA-W also permits the creation of a driving log, and issues quality alerts during data acquisition.

- **iCAP** calculates capacity at the time of testing through a signal matching procedure performed during Pile Driving Monitoring. Because it is based on CAPWAP® logic, it is astep beyond capacity determined by the Case Method. With no user interaction, iCAP extracts the soil behavior from dynamic measurements, computes capacity at the time of test, and produces a simulated static load test graph in real time.

- **PDIPLOT** generates tables and plots of up to six PDA results versus blow number, length or elevation. It provides the statistical summary output required by ASTM D4945.

- **PDI-CURVES** combines plots of Force-Velocity versus time (required by ASTM D4945), and of other quantities from multiple PDA-W files in one single document.

CAPWAP uses force and velocity records measured by the PDA sensors to, by signal matching, determine resistance distribution and dynamic soil response and simulate a static load test. Hundreds of comparisons demonstrate the excellent correlation of CAPWAP analysis with static load testing results. CAPWAP analysis of PDA data is standard practice for Dynamic Load Testing.

GRLWEAP is a wave equation analysis program that simulates pile driving. It can be used to select the hammer for pile driving or to evaluate the suitability of a drop weight system for the Dynamic Load Test of a drilled shaft.

iCAP screen in the field.

Other PAX Features: Small, weighs about 5 kg, 6 hour internal battery. High visibility touch screen display doubles up as control panel and keyboard. For complete current specifications visit www.pile.com/specifications.