

Pile Driving Analyzer® (PDA) Model PAX

For Dynamic Load Testing and Dynamic Pile Monitoring

Bearing capacity of all types of deep foundations.

The Pile Driving Analyzer (PDA) acquires data from **accelerometers** and **strain transducers** attached to a pile or shaft. The tests require the impact of a pile driving hammer or, if that is not available, of a suitable drop weight.

High Strain Dynamic Tests per ASTM D4945 - quick, reliable and non-destructive

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

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

PAX Wireless Mode

- All cables from the test pile to the PDA are eliminated
- 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)
- Reduced volume and weight of the PDA system, simplified field setup

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

Site Link™ (Remote Testing)

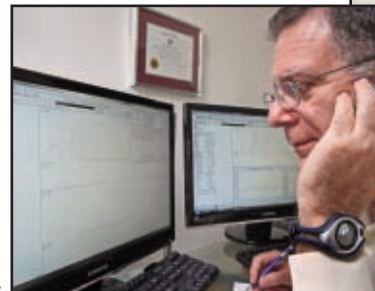
- The engineer performs High Strain Dynamic Tests from any office
- Real time field to office data transmission via Internet (PDA-R mode)
- All field measured signals and results on a computer running PDA-W software
- Simple PAX field setup may be performed by a technician
- Improves testing efficiency:
- Eliminates engineer's travel time, delays and expenses and down time on the job
- Allows immediate data analysis with CAPWAP and faster reporting of results

Pile Dynamics introduced the idea of collecting dynamic testing data from a job site and immediately transmitting it to a remote office computer back in the late 1990s, and was granted a patent for the first remote data transmitting PDA in 2001.*

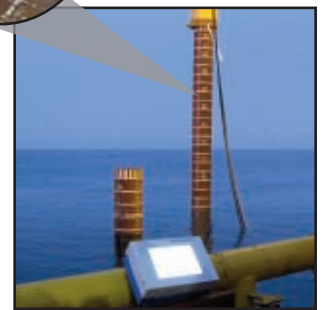
*Remote Pile Driving Analyzer U.S. Patent No. US 6,301,551 B1

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 (PDA-L mode with iCAP).

Receiving test data with SiteLink.



Smart accelerometer and strain transducer, offshore version.



PAX in Wireless Mode at Offshore job.



PAX arrives at job for SiteLink.



Quality Assurance for Deep Foundations

30725 Aurora Road Cleveland Ohio 44139 USA
tel: +1-216-831-6131 fax: +1-216-831-0916
Email: info@pile.com www.pile.com

Pile Driving Analyzer® (PDA) Model PAX

For Dynamic Load Testing and Dynamic Pile Monitoring

Available as 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-in-place / 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

The Pile Driving Analyzer is furnished with:

PDA software suite: PDA-W with iCAP™, PDILOT, PDI-Curves

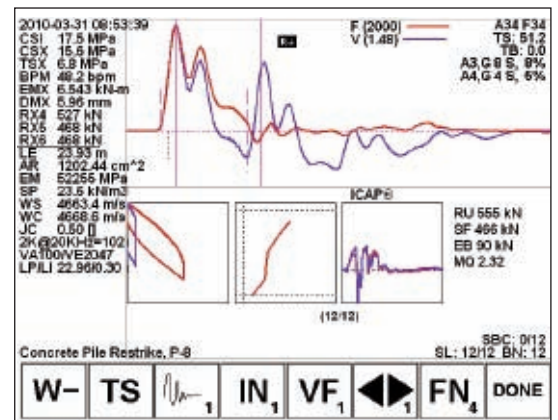
- **PDA-W** processes PAX data files, either in real time or after the conclusion of the test. PDA-W data is interpreted for soil resistance at the time of the test, and, for driven piles, compression stresses induced at top and bottom, tension stresses along the shaft, energy transferred to the foundation 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 a step 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.
- **PDILOT** 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.

• **PDILOT** 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.

Engineers around the world have been using the PDA for more than 35 years. High Strain Dynamic Tests performed with the Pile Driving Analyzer are standardized by ASTM 4945 and are recognized by, among others:

- National Codes of Australia, Brazil, Canada, China, Egypt, Qatar, United Kingdom and Eurocode 7
- International Building Code (USA)
- Specifications of the American Association of State Highway Officials, US Federal Highway Administration and most US Departments of Transportation
- Specifications of regional, provincial or municipal governments in Argentina, Mexico and the Philippines
- Manuals and Codes of Practice of US organizations such as American Society of Civil Engineers, Deep Foundations Institute and Pile Driving Contractors Association.

Please contact Pile Dynamics for information on compliance with standards from other countries.

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.



Quality Assurance for Deep Foundations

30725 Aurora Road Cleveland Ohio 44139 USA
tel: +1-216-831-6131 fax: +1-216-831-0916
Email: info@pile.com www.pile.com