



## DID YOU KNOW?

THERE ARE ONLY THREE MONTHS LEFT FOR STRESSWAVE 2008



## Advances in Dynamic Foundation Testing

By Garland Likins (PDI)

For over 40 years, engineers all over the world have tested driven piles, drilled shafts and augered cast-in-place (CFA) piles with the Pile Driving Analyzer® (PDA). Many codes and specifications recognize the reliability and usefulness of the PDA. Today the PDA is probably the most common tool for deep foundation quality assessment.

Typically, for a routine test, the PDA test engineer arrives on site and attaches accelerometers and strain transducers to the foundation shaft, connects them to the PDA with a long cable, and inputs parameters such as sensor calibrations and foundation properties into the PDA. Upon hammer or drop weight impact, sensor signals are sent through a cable to the PDA for processing, screen display, and data storage.

The PDA model PAX is changing this routine. The PAX is equipped for Wireless Data Transmission, eliminating the main cable and the connection cable that, if damaged, cause data quality problems. Small, lightweight transmitters, suspended from the foundation and powerful enough to cover a 330 ft (100 m) distance, send the data to a receiving antenna on the PAX. Each independent transmitter services one accelerometer and one strain transducer; no cable connects the sets of sensors. PAX sensors are "smart"; they remember their calibration sensitivity and transmit it to the PAX, eliminating errors. The advantages of wireless technology are clear: lighter weight, reduced equipment damage, fewer errors, no cables to clean and maintain, less time spent attaching sensors, and faster installation of monitored driven piles (with no connection cable, sensors are installed with the pile on the ground, eliminating climbing of leads).



GRL OH Staff Engineer Matt Nagy enjoys using the PAX without having to deal with cables

Remote testing, conceived and patented several years ago by PDI, was incorporated in the PDA model PAL using cell phone technology. In the PAX remote testing is accomplished through the Internet, resulting in a simpler, more reliable, and typically 3 times faster data transmission.

Clients may ask: "If I am accustomed to having the PDA engineer on site, what advantages do I have with this new technology? Will I get the same quality result that I have come to rely upon? Can I have the same relationship with my PDA tester? Assuming I am willing to step out of my comfort zone and try the new technology, how do I implement it?"

In answer, first consider the cost advantage: In the traditional test with an engineer on site, a good portion of the testing charges are for travel time and expenses and waiting times at the jobsite. Remote testing eliminates those, and the engineer's time is used more productively.

Even when cost is not an issue, if the engineer does not travel to the site, data analysis and report preparation may begin immediately. Getting results to develop driving criteria or other recommendations quickly is often the most important consideration to construction professionals and their schedules.

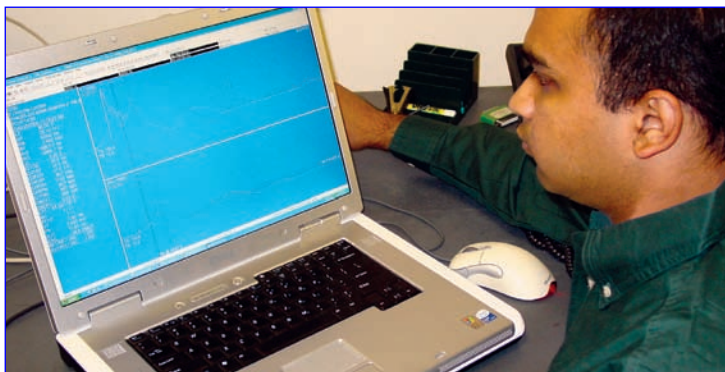
As for quality of results and the relationship with the tester, when the PAX is on site and an unusual occurrence calls for a test, a quick phone call is all that is needed. Tests that involve restrikes to observe how the ultimate capacity evolves with time can be easily accomplished at the contractor's convenience. During a test, the PDA engineer in the office sees the same data as if on site, assesses data quality and transfers analysis results and other findings instantaneously during testing to the responsible engineers on site.

Implementation, particularly on larger projects, includes having a PDA test engineer on site at the beginning of the project to train the crew and explain the process. The PAX is left on site for restrike testing (to investigate set-up), and for potential testing of production piles during installation. A job inspector becomes the PDA test engineer's eyes and ears, answering questions as needed.

The wireless and remote procedures simplify foundation testing, thus encouraging more testing and resulting in leaner design (some codes allow for decreased safety factors or increased resistance factors with increased testing because more measurements reduce risk). Wireless and remote dynamic foundation testing help keep projects on schedule and under budget.

## While "WIRELESS TESTING" improves the data acquisition process, "REMOTE TESTING" has even greater advantages.

While "Wireless Testing" improves the data acquisition process, "Remote Testing" has even greater advantages. Remote testing usually involves the field crew attaching sensors to the foundation and turning on the PDA. A PDA engineer then monitors the PDA test from the engineer's office, communicating with the remote PDA anywhere in the world.



Murai Ravi, GRL PA Staff Engineer, follows test as if on site

## 2008 Calendar of Events Highlights

For a complete listing visit [www.pile.com/events](http://www.pile.com/events)

June 1-4, Point Clear, AL: Tri-State Engineering Society Conference. **Mohamad Hussein will present.** Contact Brenda Gajan at [les@les-state.org](mailto:les@les-state.org).

June 5-6, Atlanta, GA: Deep Foundations: Design, Construction & Quality Control. Sponsored by ASCE. **Mohamad Hussein will present.** [www.asce.org/conted](http://www.asce.org/conted)

June 8-14, Sequatchie, TN: ADSCs 2008 Civil Engineering Faculty Workshop with Field Day & Technology Exhibits. **Visit the PDI booth.** [www.adsc-iafd.com/files/public/FacultyWorkshop080407.doc](http://www.adsc-iafd.com/files/public/FacultyWorkshop080407.doc)

**June 20, Istanbul, Turkey: Seminar on Foundation Testing and Analysis.** Sponsored by PDI and Forsen. **Frank Rausche will present.** Download brochure at [www.pile.com/events/pdievents](http://www.pile.com/events/pdievents)

August 7-8, Cleveland, OH: ASCE Deep Foundations: Design, Construction & Quality Control. **Mohamad Hussein will present.** [www.asce.org/conted](http://www.asce.org/conted)

**September 8-10, Lisbon, Portugal: The 8th International Conference on the Application of Stress Wave Theory to Piles.** Sponsored by ISSMGE, the Portuguese Society for Géotechnique, and Instituto Superior Tecnico of the Technical University of Lisbon. [www.stresswave2008.org](http://www.stresswave2008.org)

**September 10, evening, Lisbon, Portugal: Integrity Testing Workshop.** Sponsored by GSP. Contact Dr. Oswald Klingmüller at [ok@gsp-mannheim.de](mailto:ok@gsp-mannheim.de). Integrity Testing Certification Exam Offered. Date is tentative.

**September 11-12, Lisbon, Portugal: Workshop on Foundation Testing and Analysis.** Sponsored by Pile Dynamics, Inc. **Frank Rausche, Garland Likins and Julian Seidel will present.** FQA High-Strain Dynamic Pile Testing Examination offered on September 13. Download brochure at [www.pile.com/events/pdievents](http://www.pile.com/events/pdievents)

September 23, New Orleans, LA: Design and Installation of Cost Efficient Piles. Sponsored by Pile Driving Contractors Association. Date is tentative. [www.piledrivers.org](http://www.piledrivers.org)

October 1-6, Goa, India: 12th Conference of International Association for Computer Methods and Advances in Geomechanics. Sponsored by IACMAG. [www.12iacmag.com](http://www.12iacmag.com) **Visit the booth of PDI representative Earth Products India**

October 15-17, New York, NY: DFI 33rd Annual Conference on Deep Foundations and 11th International Conference on Piling and Deep Foundations. **Visit the PDI booth.** [www.deepfoundations08.org](http://www.deepfoundations08.org)

**October 20-22, Cleveland, OH: 2008 GRL - Case Dynamic Foundation Testing Seminar and Workshop.** **Frank Rausche, Garland Likins, CWRU Faculty and guests will present.** FQA High-Strain Dynamic Pile Testing Examination offered on October 22. Download brochure at [www.pile.com/events/pdievents](http://www.pile.com/events/pdievents)

November 3-5, São Paulo, Brazil: Seminário de Engenharia de Fundações Especiais e Geotécnica. Sponsored by ABEF. [www.acquacon.com.br/sefevi/index.html](http://www.acquacon.com.br/sefevi/index.html). **Visit the booth of PDI representative CARMIX do Brasil.**

December 1-4, Charlotte, NC: Highway Geophysics - NDE Conference. Sponsored by NCDOT Geotechnical Engineering Unit. **Ed Pristov will present.** [www.ncdot.org/~geophysicsconference/](http://www.ncdot.org/~geophysicsconference/)

## PAX WEBCASTS GET RAVE REVIEWS –WATCH OUR WEB SITE FOR NEXT DATE!

"Thank you for a great presentation.....pile driving monitoring is certainly moving forward", Rodrigo Herrera, P.E., Florida Department of Transportation "Garland, it was great to hear you on the web. A fantastic way to get out information. Thanks!" Carl-John Grävare, Palanals.

## GRL ADDS, RELOCATES ENGINEERS

GRL Engineers continues to grow and adapt to better serve its clients. Please welcome Gregg DeVan, who will join the Orlando team later this year. Murali Ravi is now part of the Pennsylvania Office, while Anna Klesney is staffing the Colorado Office. Both were formerly part of the GRL Main Office (headquarters) in Cleveland Ohio.

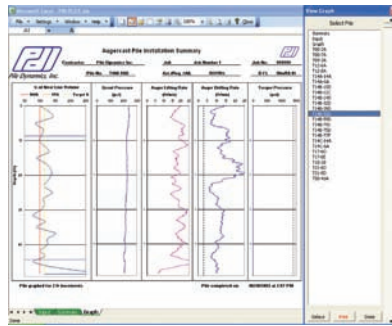
## PILE DYNAMICS CREATES NEW COMPANY

Pile Dynamics, Inc. has created a new company – Inspection Instruments, Inc. – to better serve market segments not associated with deep foundations. The company is currently marketing the Acoustic Concrete Tester (previously marketed by PDI), an instrument that measures the thickness of slabs, tunnel linings and other concrete elements, while also checking their quality.



**Inspection Instruments, Inc.**

## PILE INSTALLATION RECORDER – NEW NAME, SAME QUALITY



The popular Pile Installation Recorder for Augercast Piles, PIR-A now has a simpler name – Pile Installation Recorder. The name change reflects the fact the PIR is an automated monitoring equipment suitable not only for auger cast-in-place, but also for Continuous Flight Auger (CFA) and Drilled Displacement Piles. The instrument is now furnished with the PIR-PLOT report generating software,

that produces graphs of quality control variables versus depth and summarizes production information for inspection and payment.

## PDI ADDS REPRESENTATIVE IN RUSSIA

PDI welcomes NPV Avek to its network of world wide representatives. NPV will help PDI expand its presence in the critically important Russian market. PDI now has more than 20 representatives covering almost 50 countries throughout the world.

## NOTABLE PUBLICATION

The book "From Research to Practice in Geotechnical Engineering," Geotechnical Special Publication No. 180, published by American Society of Civil Engineers honors Dr. John H. Schmertmann, P.E. and Professor Emeritus, University of Florida, for his contributions to civil and geotechnical engineering. The book investigates the installation and testing of piles, pile-structure interaction, liquefaction and its mitigation, case histories of settlement and landslide mitigation and capping a superfund landfill, and computer modeling. Aimed at students and professionals.



Visit us at [WWW.PILE.COM](http://WWW.PILE.COM)



### GRL Engineers, Inc.

Main Office: 4535 Renaissance Parkway  
Cleveland, Ohio 44128 USA  
E-mail: [info@pile.com](mailto:info@pile.com)

Phone: +1-216-831-6131  
Fax: +1-216-831-0916



### Pile Dynamics, Inc.

4535 Renaissance Parkway  
Cleveland, Ohio 44128 USA  
E-mail: [info@pile.com](mailto:info@pile.com)

Phone: +1-216-831-6131  
Fax: +1-216-831-0916