SPT Analyzer

The SPT Analyzer Determines the Energy Transferred by SPT Hammers using Force and Velocity Measurements, for Improved Reliability of SPT N-values

Pile Dynamics, Inc.

What is SPT?

The Standard Penetration Test (SPT) is a widely employed soil exploration tool that involves using a SPT hammer to drive a split barrel sampler at the bottom of a drill string to obtain soil samples. The number of blows required to penetrate the last 300mm (1ft) is the "N value", which is related to soil strength.

Why Measure the Energy Transferred by the SPT Hammer?

Several different types of SPT hammers are used to conduct Standard Penetration Tests. Their varying efficiencies influence the N value. The measured N value is normalized by multiplying it by the ratio of the measured energy transferred to the rod to 60% of the theoretical potential energy. The normalization compensates for the variability of the efficiencies of different SPT hammer types, and improves the reliability of soil strength estimates used in geotechnical applications.

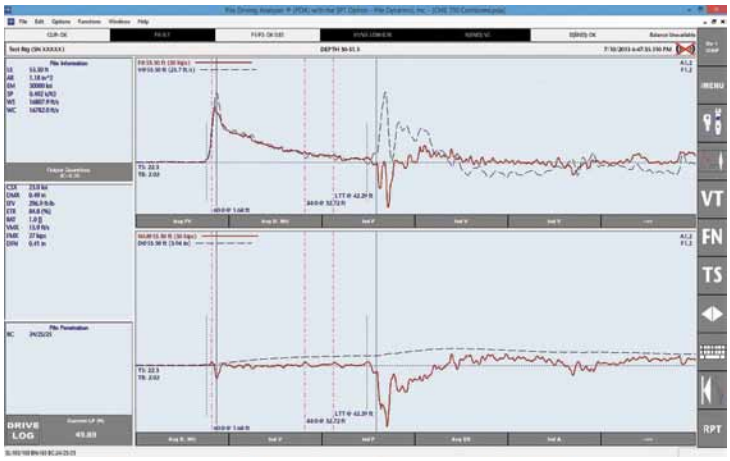
SPT hammer in the process of being calibrated with SPT Analyzer - notice instrumentation on the drill string

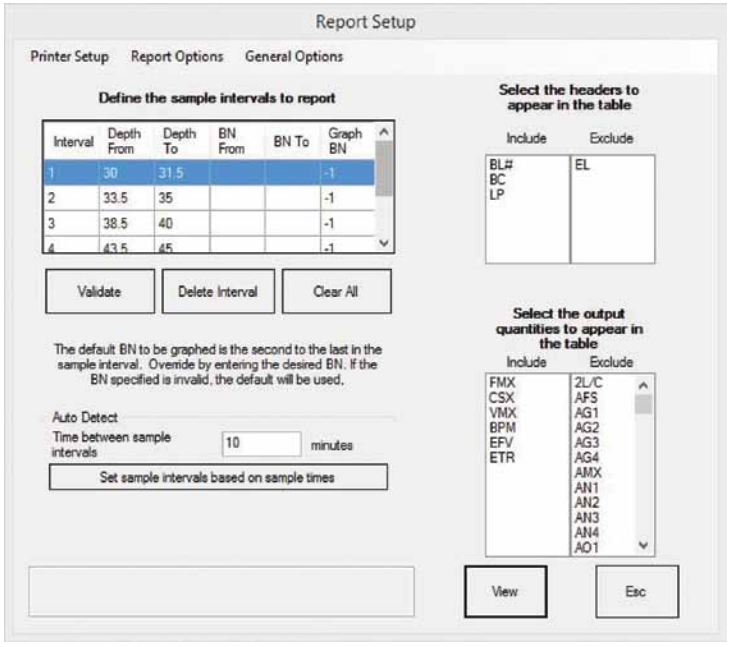
The SPT Analyzer is furnished with a 0.6 m sub assembly (or section) of an SPT rod (AW, NW or other type) instrumented with 2 strain gage bridges, and precisely calibrated by Pile Dynamics. Once in the field, two accelerometers are bolted to the rod section. The instrumented section is inserted at the top of the drill string between the hammer and the existing sampling rod. The rod is connected to the SPT Analyzer.

Smart Sensor technology allows the SPT Analyzer to read the rod instrumentation, obtaining the sensor calibration and rod cross sectional area. These quantities are input to the SPT Analyzer automatically without the operator having to enter them. This significantly simplifies the initial test setup.

The strain gages and accelerometers obtain the force and velocity signals necessary for the calculation of transferred energy as the SPT hammers drive the instrumented rod into the ground. The energy is displayed in real time on the SPT Analyzer screen.

The latest model of SPT Analyzer responds to multi touch gestures and have numerous color schemes available, making things like adjusting time scale or display to better view data in the field much simpler than previously. A pre-programmed set of output quantities tailored to SPT calibration is presented to the user, who can, however, modify it to fit a particular project need. Data quality checks are available.





SPT Analyzer:

- Conforms to American Society for Testing and Materials Standards:
  - Energy measurements are recommended to normalize results (N-values) from SPT tests (ASTM D1586)
  - Normalization of N-values based on energy measurements are required when SPT results are used to determine the liquefaction potential of sands (ASTM D6066)
  - The only ASTM accepted means of determining energy for normalization of N-values is by force and velocity measurements (ASTM D4633)
- Conforms to European Standard EN ISO 22476-3.

Output

SPT Analyzer data is stored and transferred to a computer via USB memory stick. The software furnished with the SPT Analyzer has been completely rewritten. The new software has a Report Creation Option that makes it quick and easy to summarize results and create outputs graphs of Force, Velocity, Energy and Displacement versus time, as well as numerical, statistical, and graphical results for each data set. The software is fully customizable and an invaluable time saver.

SPT Analyzer Specifications

Physical:

- Size: 320 x 250 x 68 mm (12.6 x 9.8 x 2.7 inches)
- Weight: 5 Kg (11 lbs)
- Temperature range: -10 to 40°C (14 to 104° F) operating; -20 to 65°C (-4 to 149° F) storage
- Display: High visibility 26.4 cm (10.4”), sunlight readable capacitive touch screen, resolution 1024 x 768
- Power: built-in 4 hour duration battery, 12 VDC car battery, or 100-240 VAC w/12 VDC converter
- Battery recharges in 6 hours

Electronic:

- Microsoft Windows® 7 Operating System
- 60 GB SSD internal drive
- Ethernet port
- 4 USB ports
- Analog signal conditioning filtering (frequency response) 5 KHZ (-3 dB)
- 16-bit A/D converter with sampling frequency of 10.24 MHz
- 4 channels with effective digitizing frequency up to 100 KHZ resulting in user selectable total sample time 82 to 205 milliseconds
- Basic unit accuracy 2%

Functional:

- Built in calibration test function
- 4 channels of traditional (cabled) data acquisition, universal (strain or acceleration on any channel) and Smart Sensor compatible.
- Automatic balancing of signals and signal conditioning
- Signal conditioning for force and acceleration have similar frequency response
- Internal calibration check of strain and acceleration
- Signal amplification capability

Other:

- Operates in English, SI, or Metric units
- Full one year warranty
- Technical manual included

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