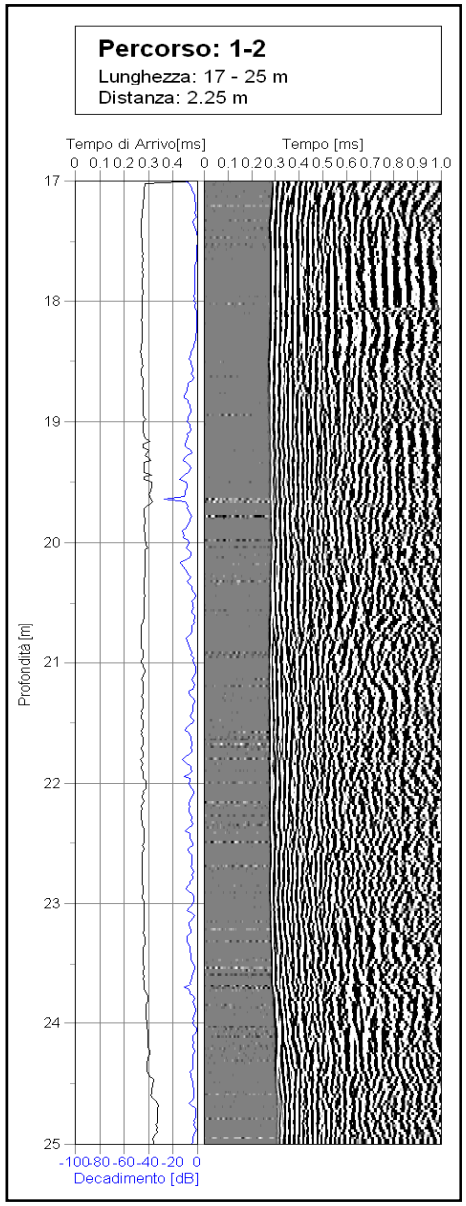

SolGeo
Soluzioni geofisiche

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24068 Seriate (BG) Italy

Phone +39 035 4520075

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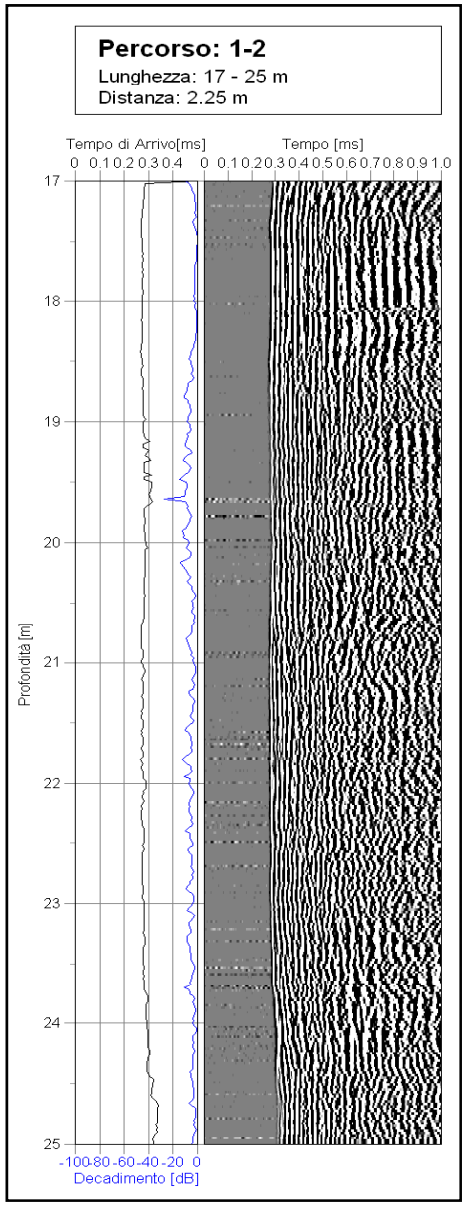


SolGeo's main Business Activities

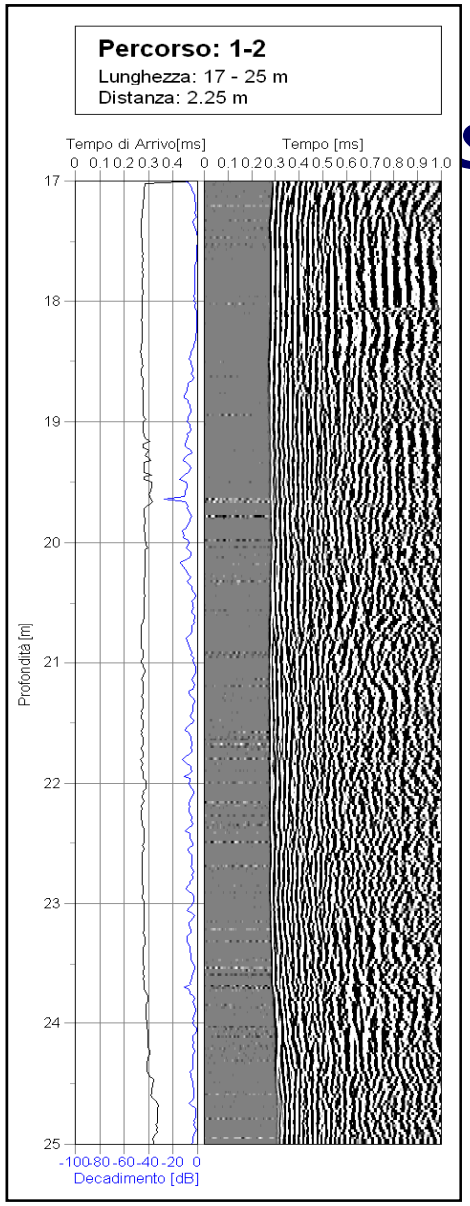
Geophysical Services and Tomography

Seismic

Down Hole & Cross Hole

3rd Party equipment

Geo-Radar



SOLGEO's Main Focus in Geophysical Surveys

is structured along **3 distinctive offerings**:

- ***engineered & specialized Products***

  Digital multi-channels recorders

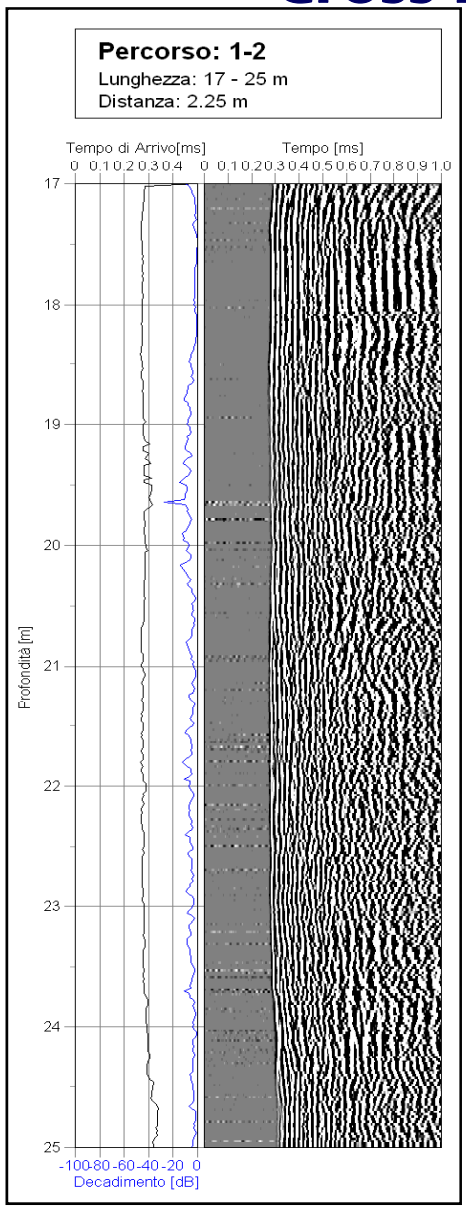
- **Services corroborated by the use of SolGeo's proprietary sensors**

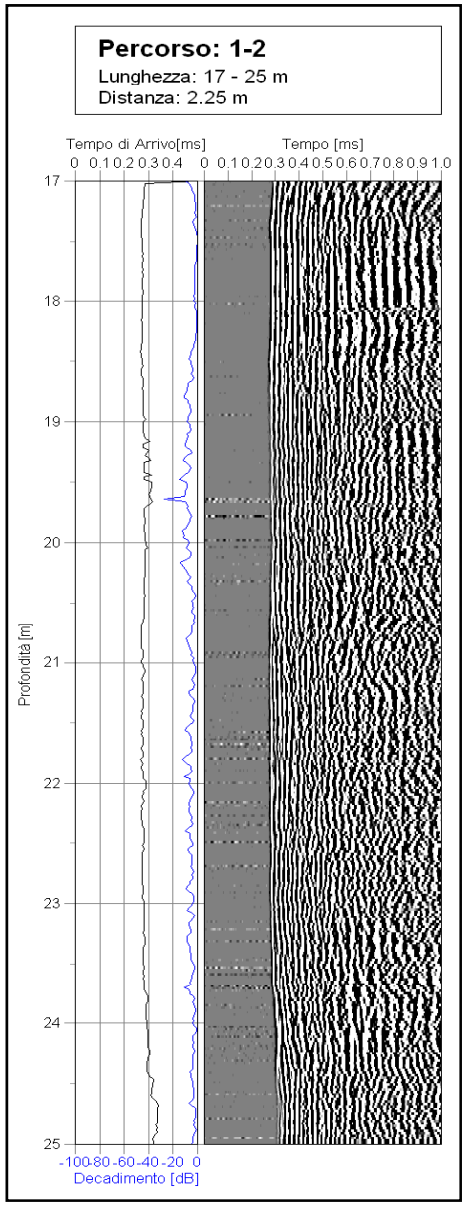
  manyfold Geophysical Surveys

- ***Advice & Consulting Services***

  multi-annual expertise

Cross-Hole Measurement System – MCHA



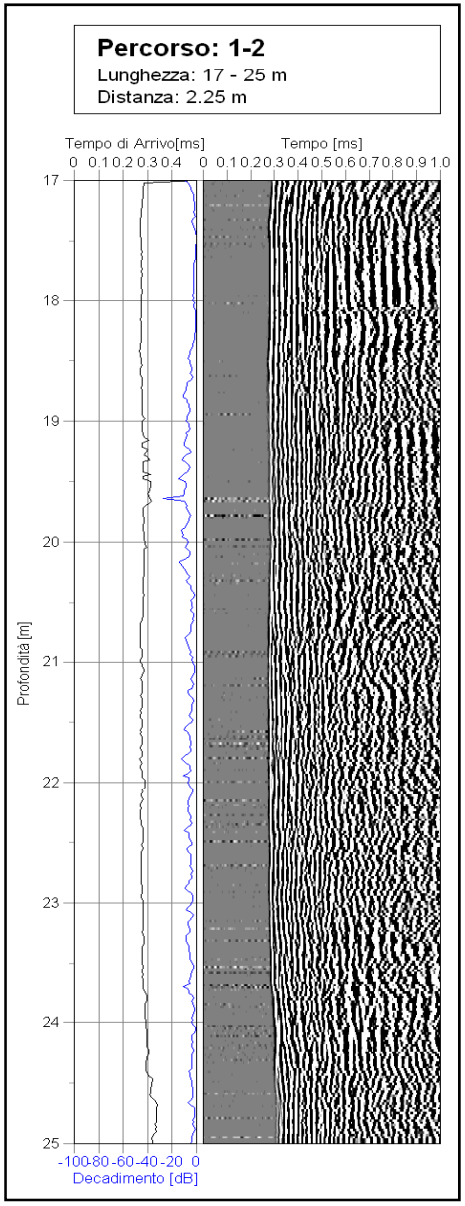


Cross-Hole Measurement System – MCHA

Multichannel Cross-Hole Analyzer performing simultaneously cross-hole measurements along three paths.

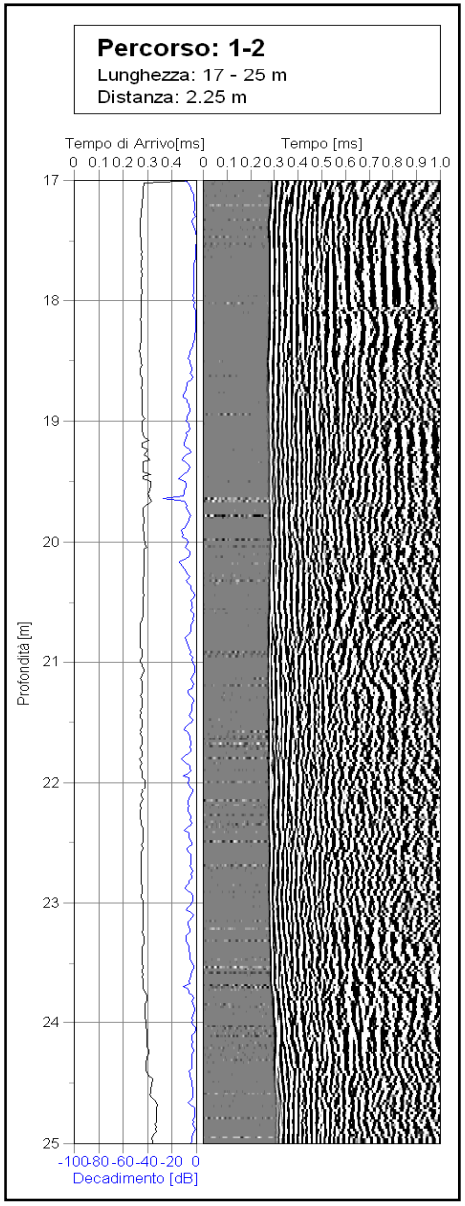
The System can also be used for sonic and ultra-sonic investigations in concrete and masonry.

The System complies to the Norms: ASTM D6760-02 and UNI 9524



MCHA – key benefits

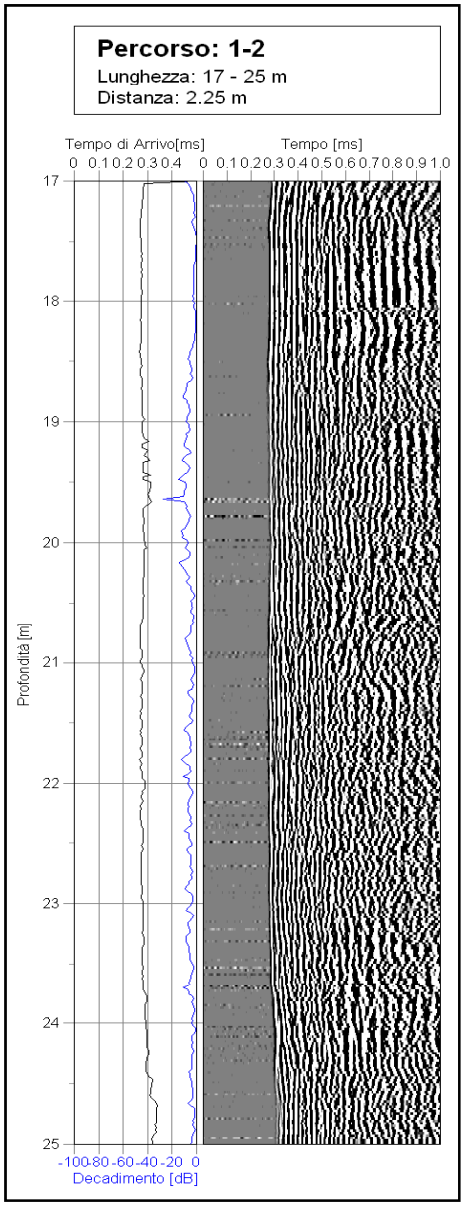
- Highly powerful Pulse-Transmitter (>1.6kV) allowing measurements in foundations rods > 3m in diameter.
- The 16 bit sampling guarantees high quality of data.
- Performing simultaneously cross-hole measurements along three paths.
- Shortening ,where applicable, the time of measurement by 2/3.
- Preamplified sensor allows tests at any depth
- Encoder allows easy handling of the measurement's
- All measurement data and graphics of the signal are stored in a database, allowing thus a „post process" - analysis and -management of the stored profile information's.
- The System can be used for sonic and ultra-sonic investigations of concrete and masonry.

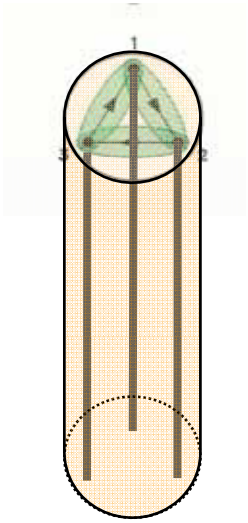


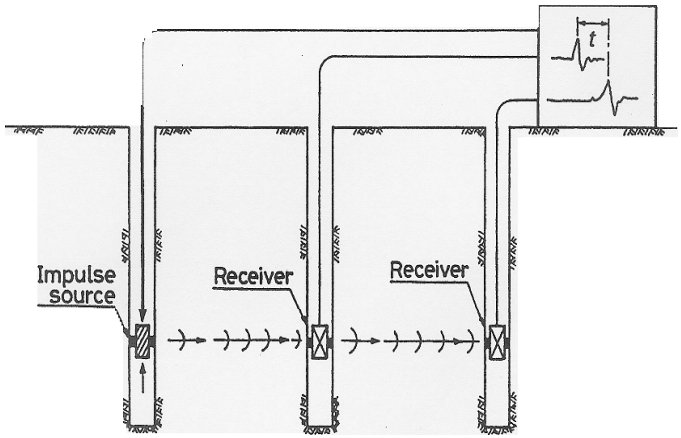
MCHA – key benefits

- Pulse echo test and Low strain method (PIT test) with optional kit.
- Sonic log test with optional probe.
- Special cable with internal kevlar and high resistance .
- Internal battery for 8 hours of operation and external battery auto cable.
- Prompt Assistant and support directly in Solgeo lab in Bergamo Italy.
- All parts made in Italy by Solgeo.
- Training in site by expert technicians

MCHA – key benefits



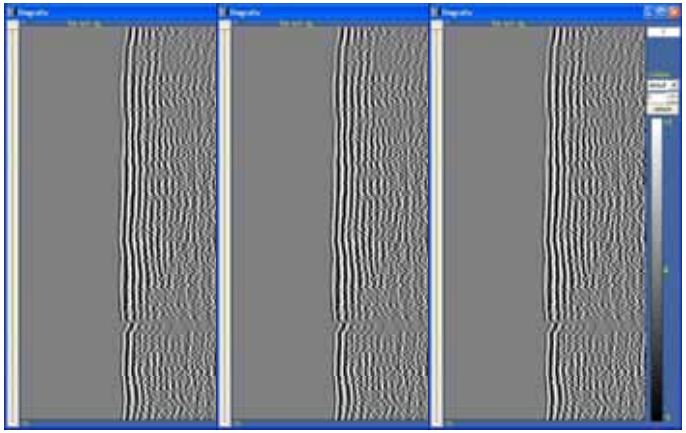


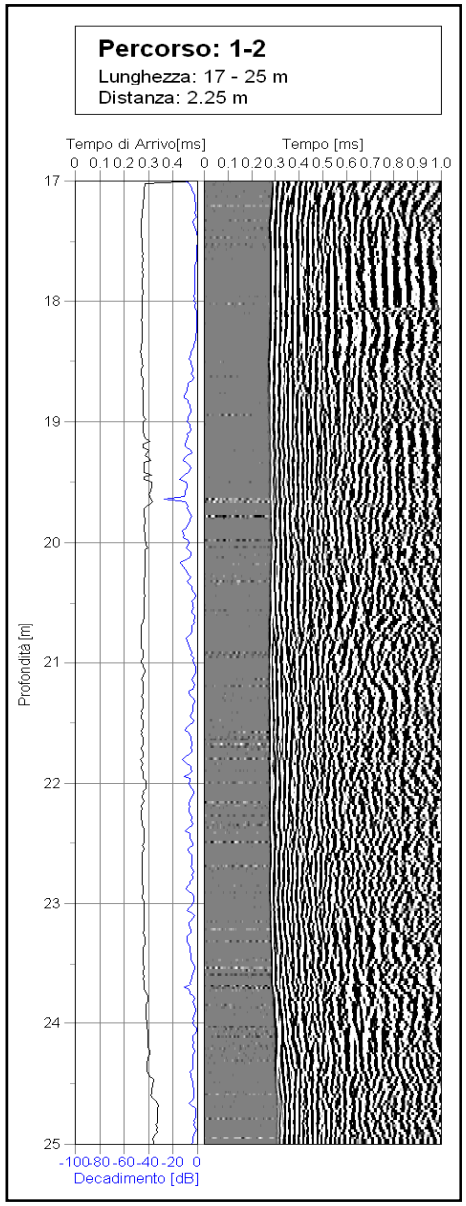


Pulse-Transmitter >1.6kV allows for diameters >3 mt.

Simultaneous measurement along three paths.

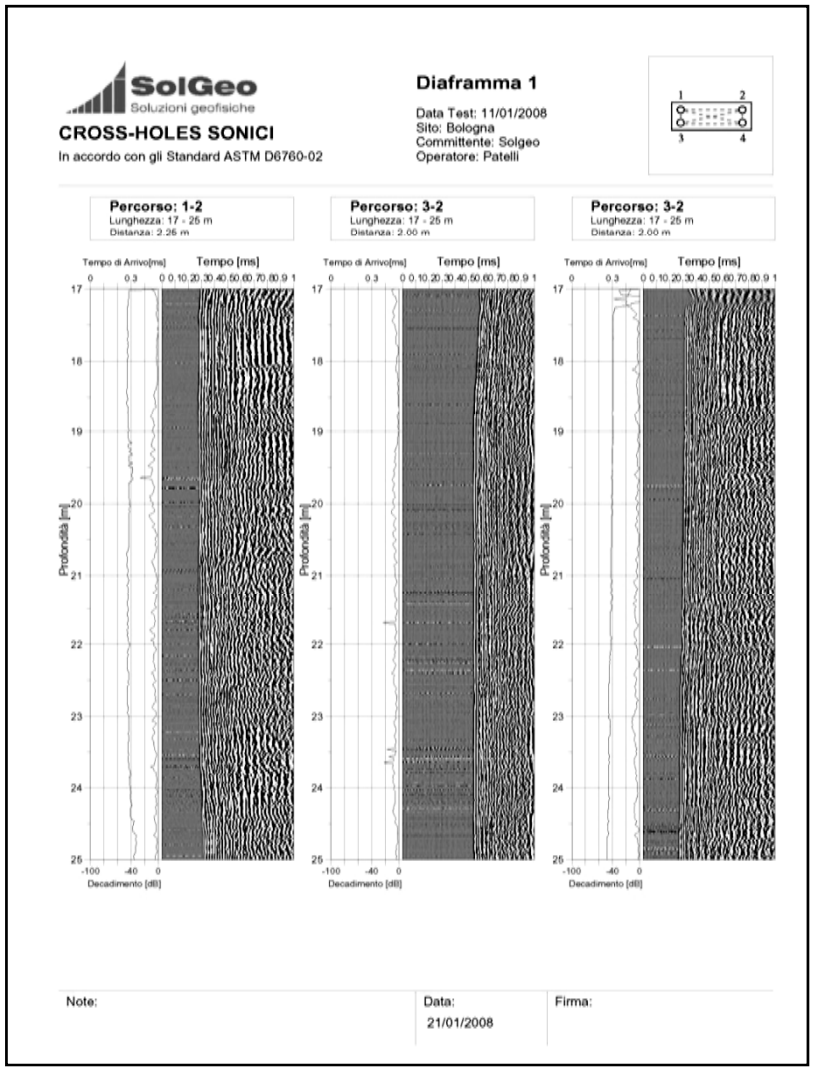
Diagraphies are presented next to each-other.

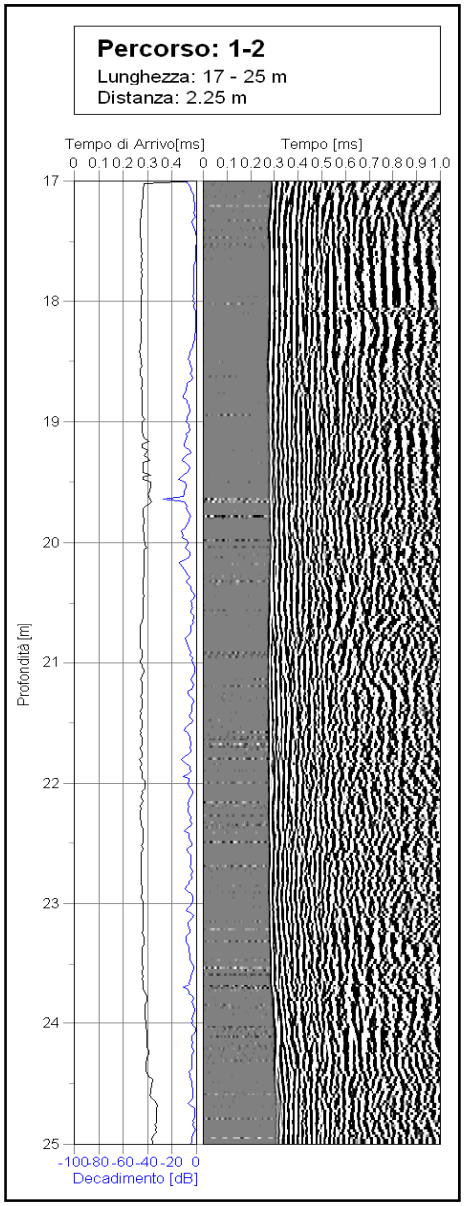




MCHA – key benefits

Customized Measurements Report

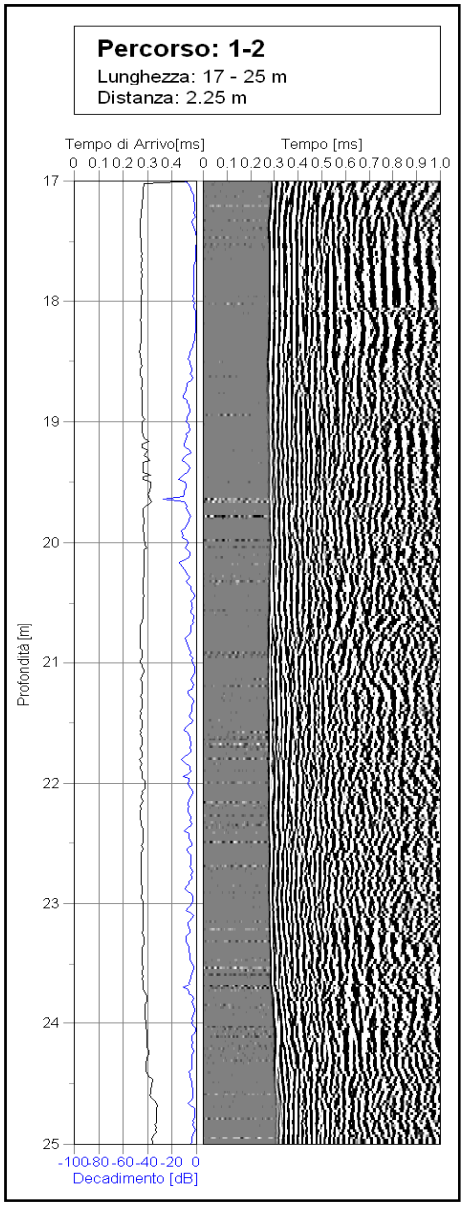


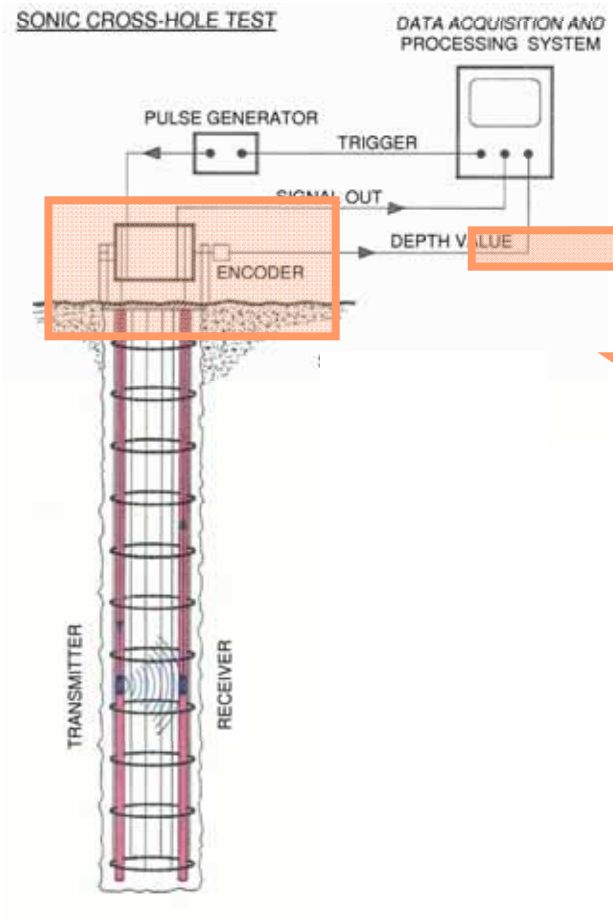


MCHA – components: Central Unit

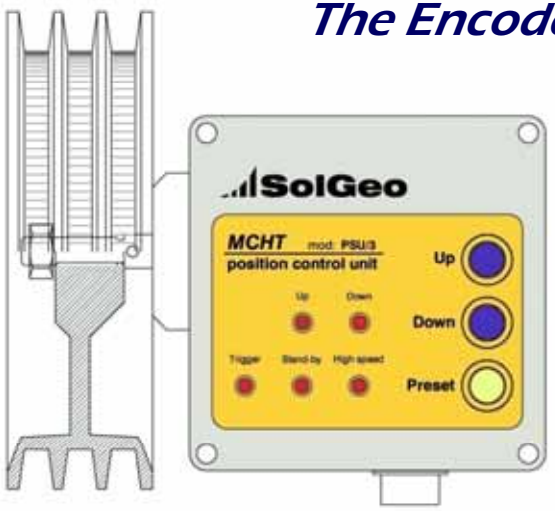
- *2 x A/D 16-bit channels.*
- *Gain: software controlled (10x to 10240x).*
- *Sampling frequency from 1kHz up to 2MHz.*
- *Buffer of 32000 samples.*
- *Trigger internal/external , software selected.*
- *PC I/O: Ethernet 10/100.*
- *Battery buffered*
- *IP67 Heavy duty case*

MCHA – components: Encoder

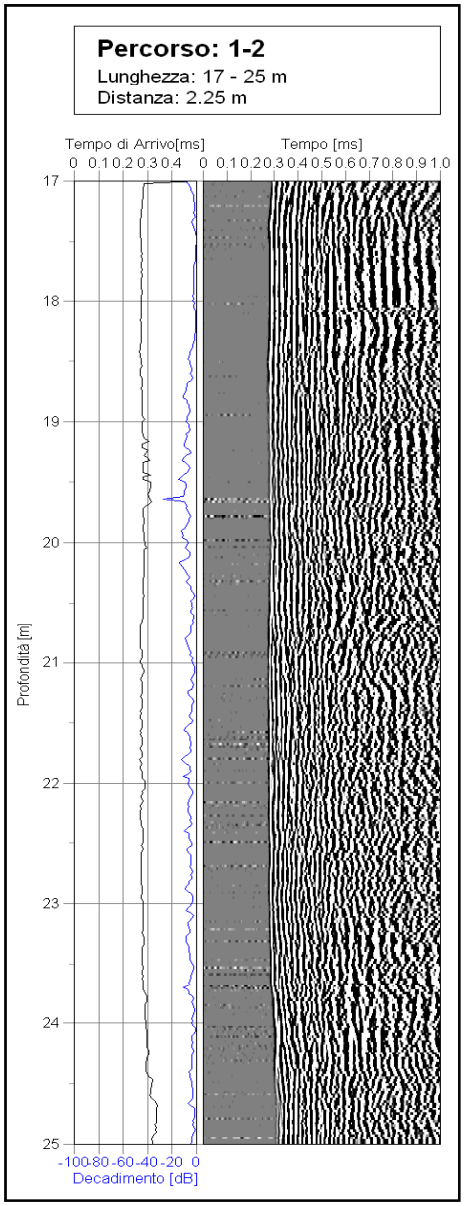


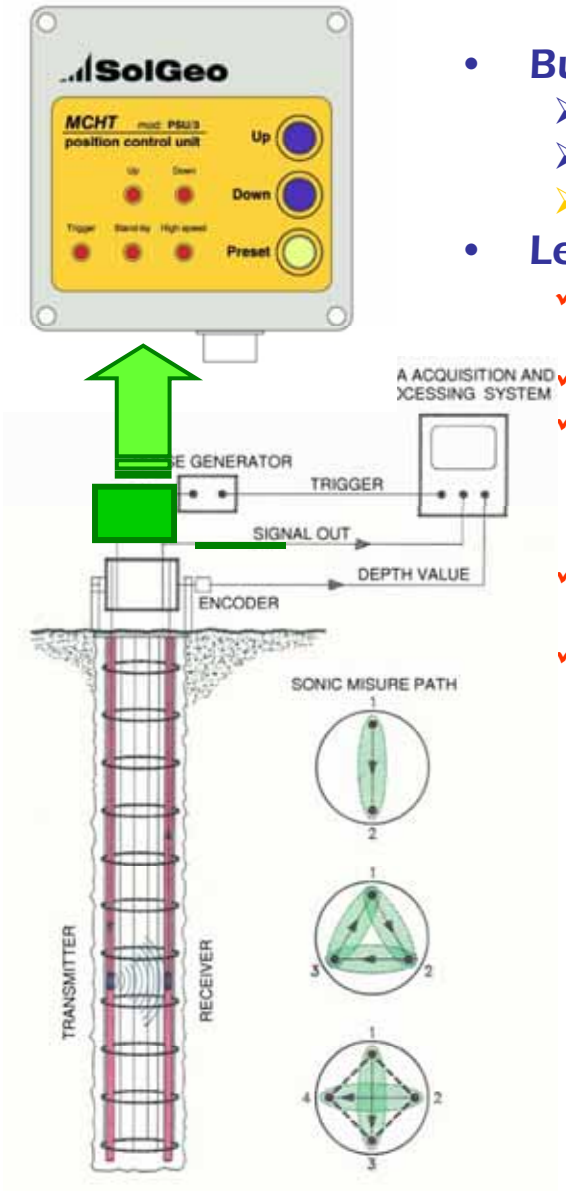


The Encoder



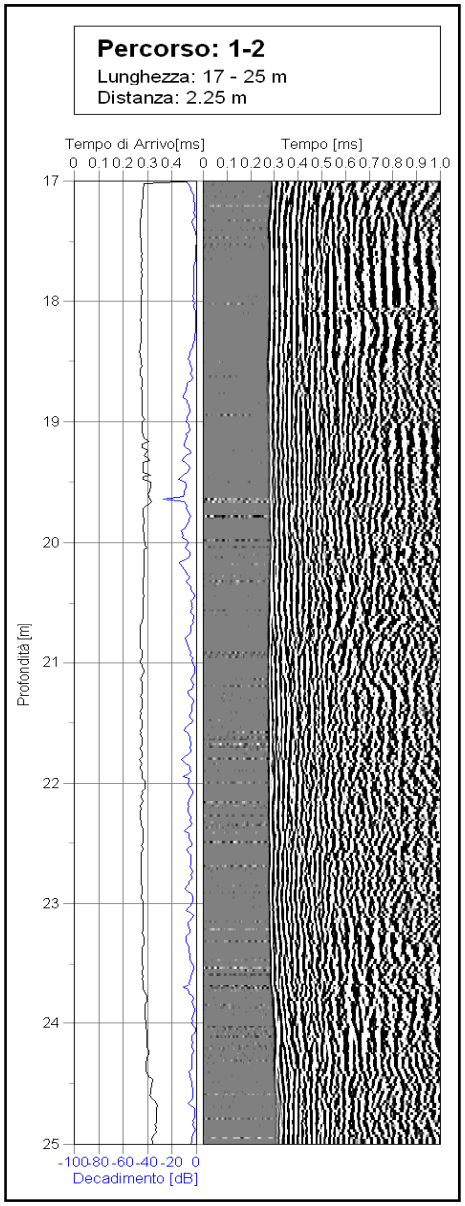
MCHA – components: Encoder





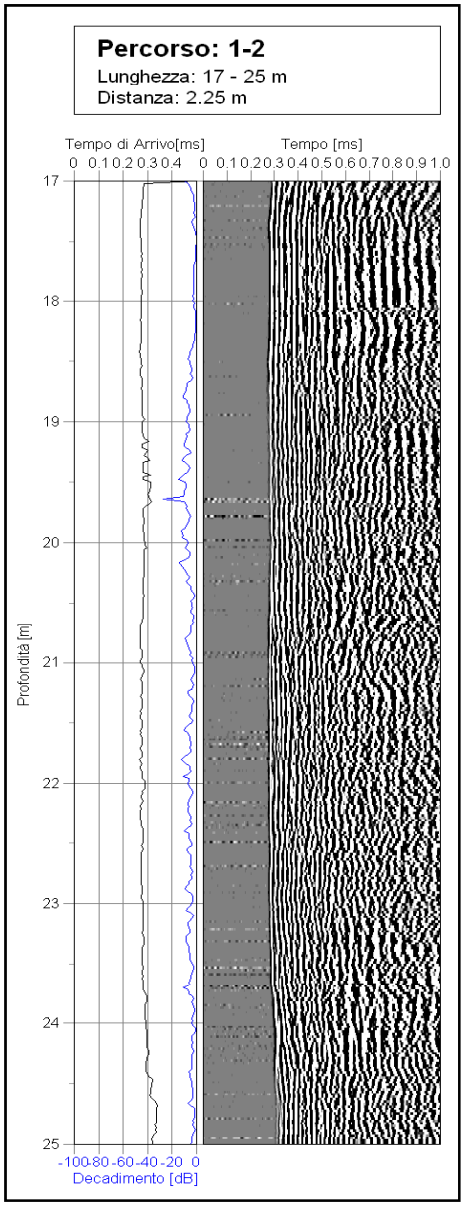
- **Buttons:**
  - UP
  - DOWN
  - PRESET
- **Led:**
  - ✓ **Up –** the sensors are correctly ascending
  - ✓ **Down –** the sensors are descending
  - ✓ **Trigger –** the transmitter is emitting on average every 2cm (default setting) a high frequency signal along the ascension path.
  - ✓ **Stand-by –** standby condition of the system
  - ✓ **High speed – Warning:** the sensor's ascension speed is to high. The system stalls and the sensors must be lowered to the level of which the high speed was detected.

    The System senses automatically the various levels of intervention.



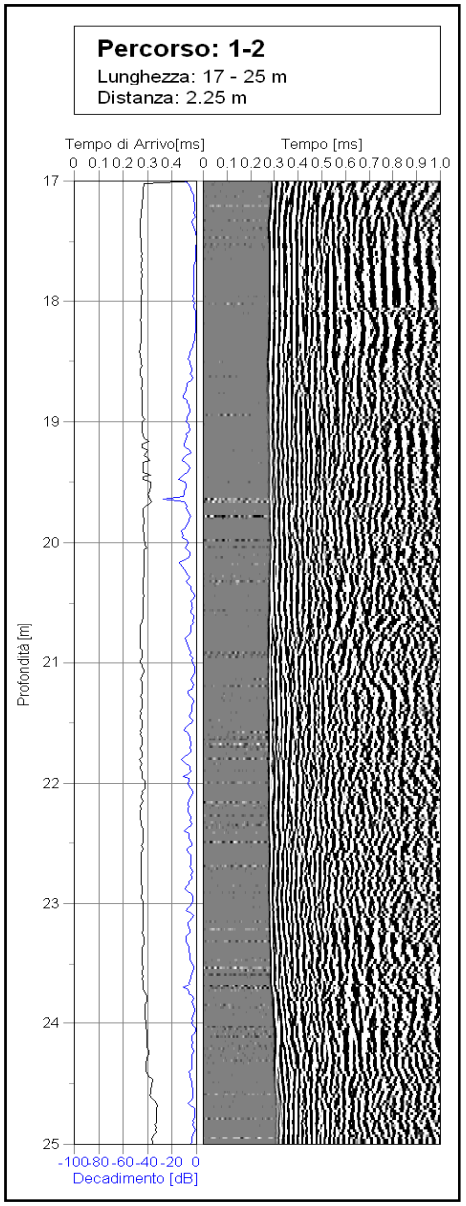
MCHA – components: Sensors

- *Piezoelctric Transducers.*
- *Transmitter: 1.6kV @80kHz.*
- *Receiver: 80kHz , pre-amplified.*
- *Transmitter/Receiver: 1.6kV @ 80kHz. (pre-amplified)*
- *Diameter - 28 mm.*
- *Length - 175 mm.*
- *Weight - 0.420 kg*



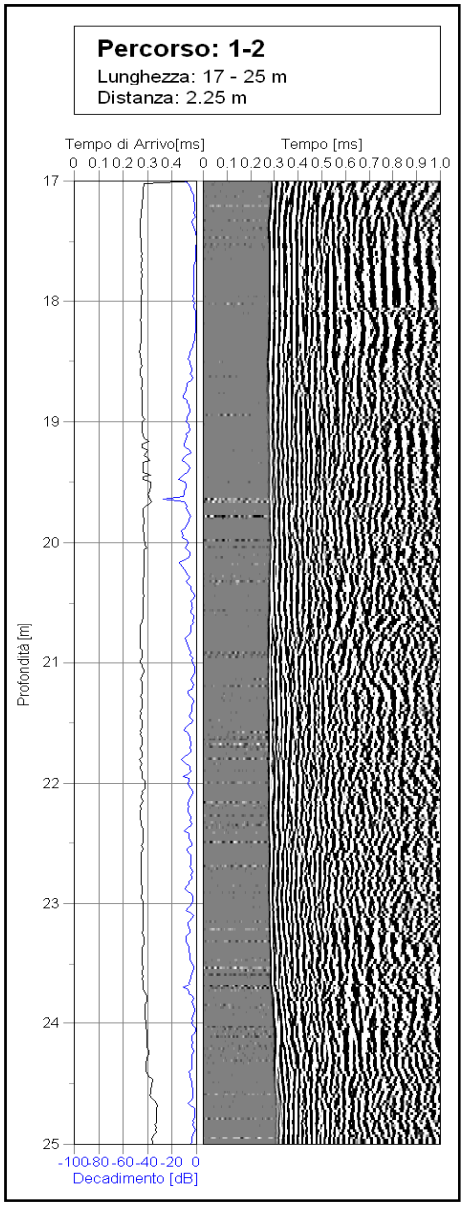
MCHA – components: Cable rolls

- ***Standard length 60 mt.***
- ***Graduation with a meter-step.***
- ***Kevlar reinforced cables.***



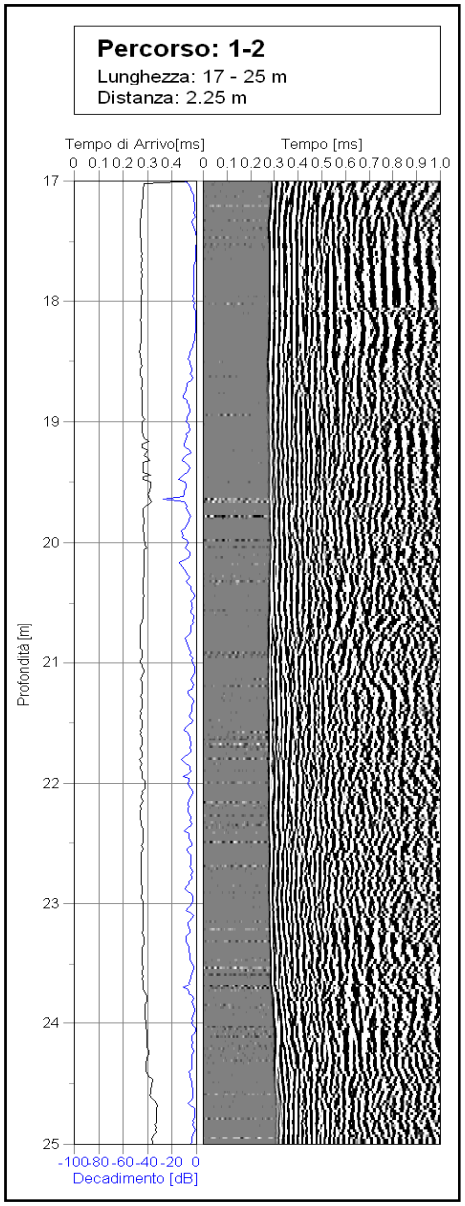
MCHA – components: Tripod

- ***Light metal***
- ***Suitable for field operation***



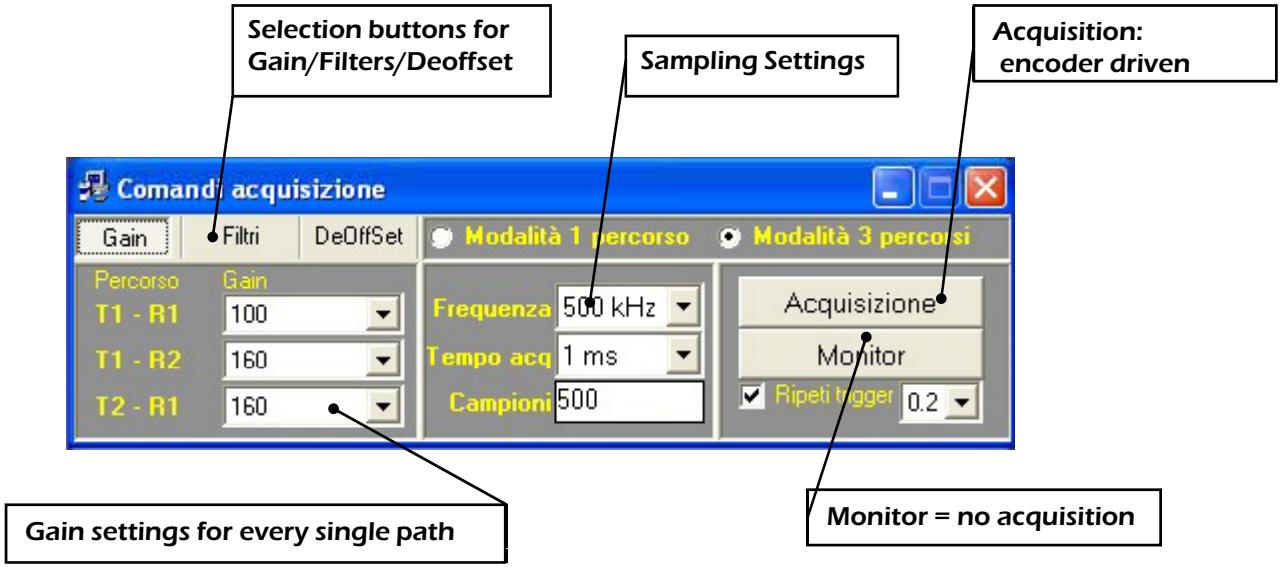
MCHA – components: Software – MCH-sonic

- ***High-speed communication interface between the PC and the Central Unit based on the IP protocol.***
- ***Encoder communication package.***
- ***Data Acquisition, Storage and Visualization.***
- ***Diagraphy presentation.***
- ***Analysis of First Break Time and Energy Decay***
- ***Report Generator***



MCHSonic – Data Acquisition Panel

The Acquisition Panel is driven by the attached Central Unit MCH

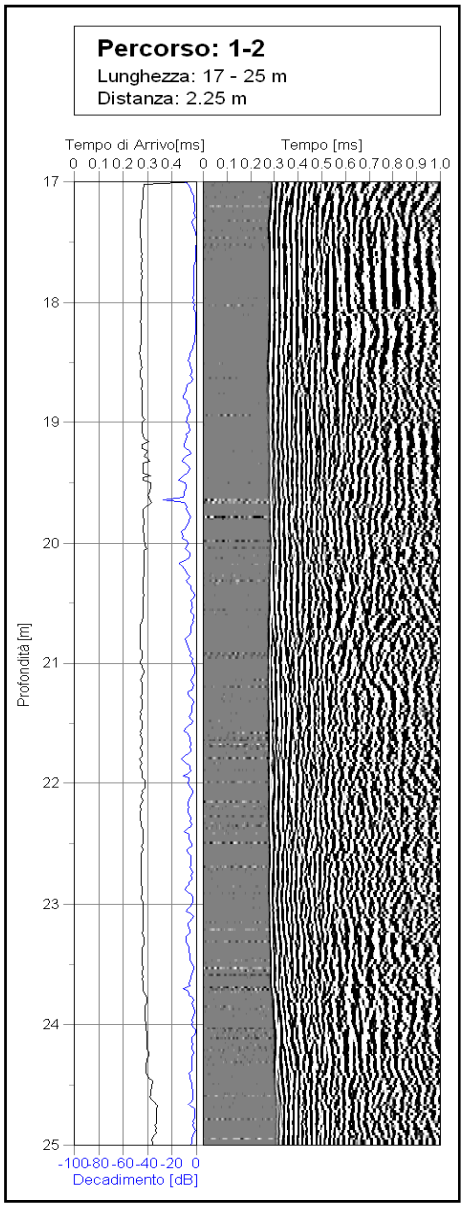


Menu driven setting of Gain- and Filter-Values for every single measurement path.

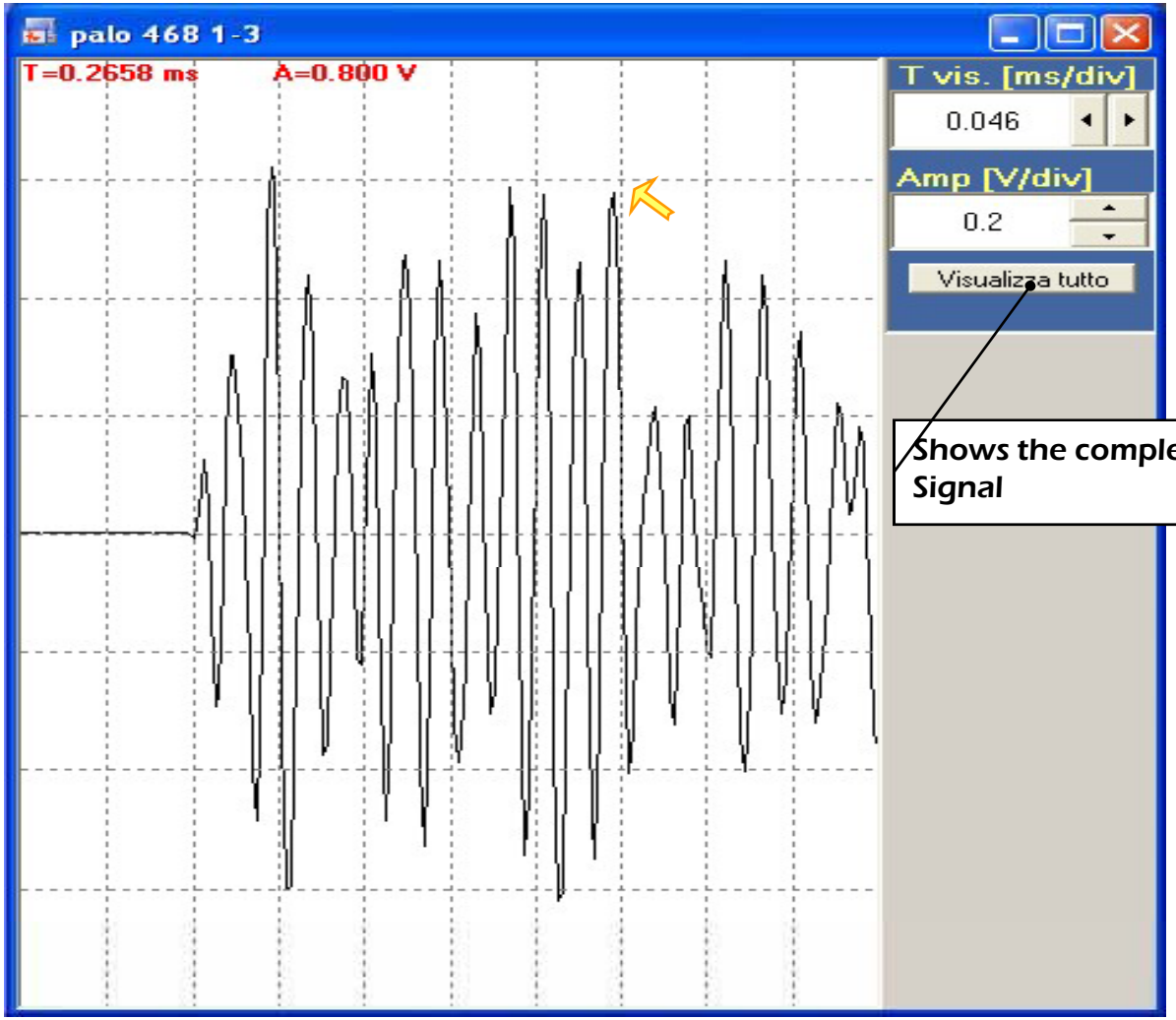
Menu selection of either one or three measurement paths and pertinent sampling settings with respect to frequency, time and sample quantity.

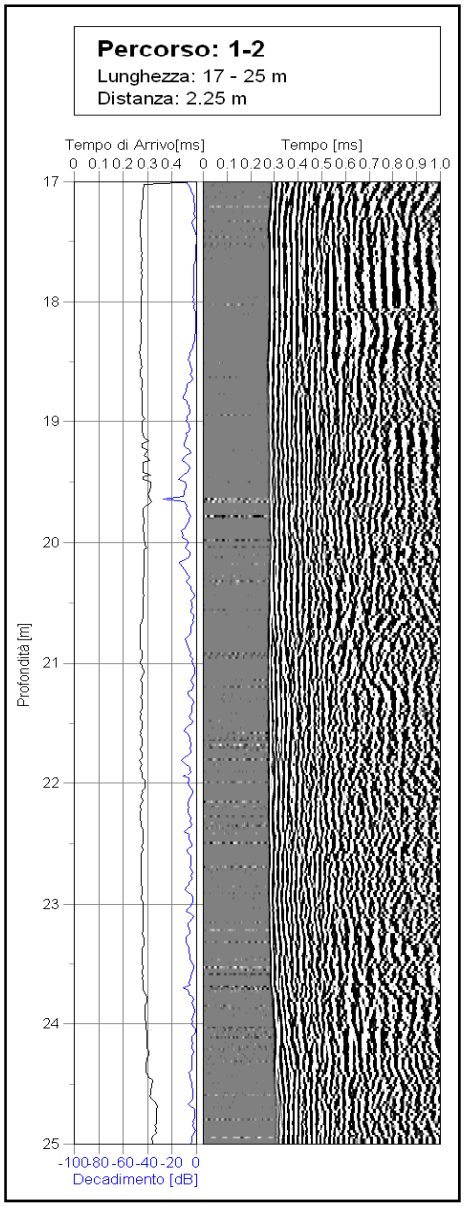
Offset compensation provision for every measurement path.

MCHSonic – Data Visualization



The size of the Visualization Window is determined by the Amplitude (V/div) and by the Time-Period (my/div) selected.

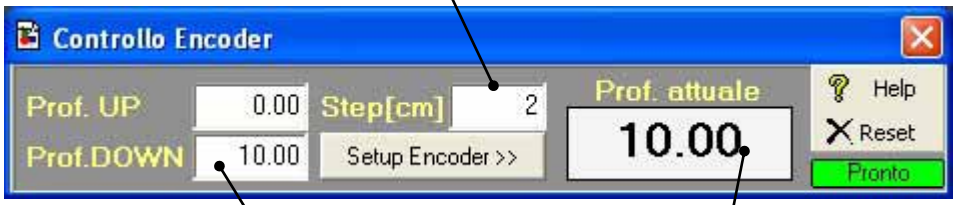




MCHSonic – Encoder Control Panel

The Encoder Control Panel allows setting up the Encoder parameters with respect to starting-point and the ending-point of the depth of measurement and the interval-step between two contiguos measurements.

One measurement every 2 cm. Considering 10 mt of depth, the total number of possible measurements is 10 x 50 = 500.

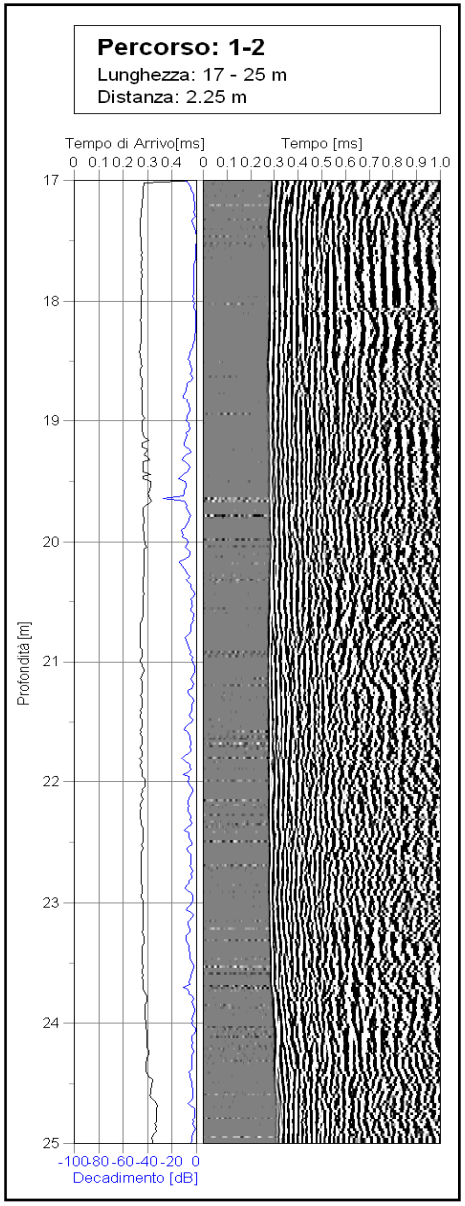


Actual depth where the transducer is.

Lowest depth of the measurement path.

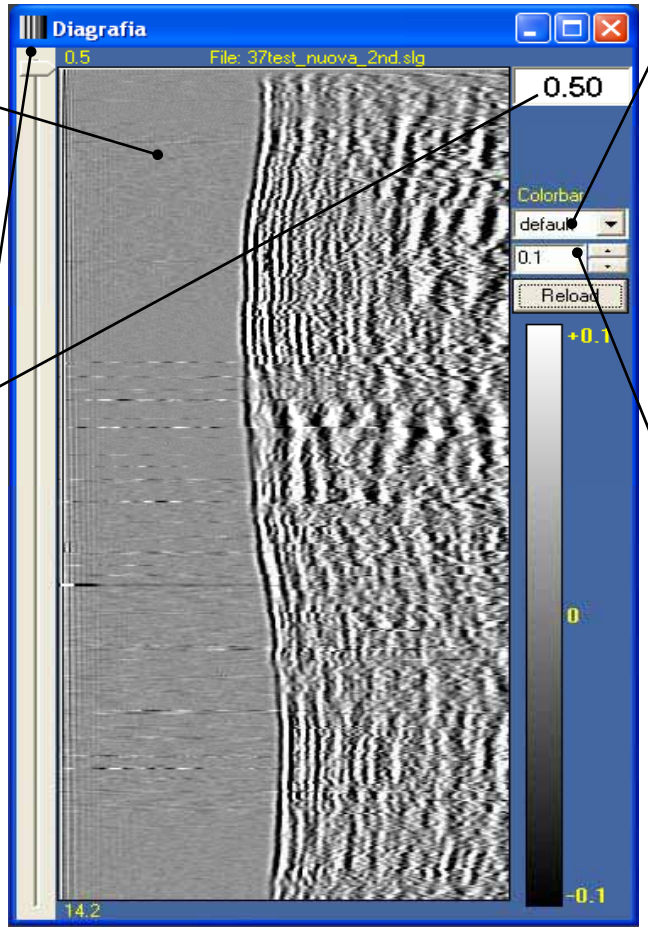
MCHSonic – Diagraphy

The Diagraphy, a diagram of variable intensity, shows for every measurement at a specific depth, the modulation of the amplitude and phase of the acquisition signal as a function of the traversed material.



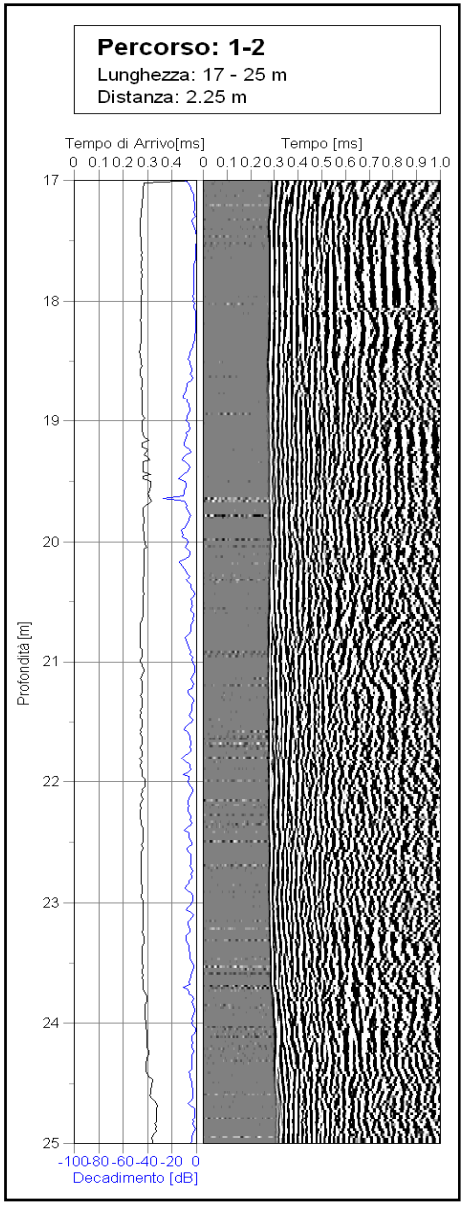
diiagraphy

Actual depth where the depth pointer is positionned.
In this example the measurements used for diagraphy were from -14.2mt to -0.5mt.
The measurements interval-steps annot be seen on this presentation, but will be presented in the “Report di Misura” report.



Colour-bar selection

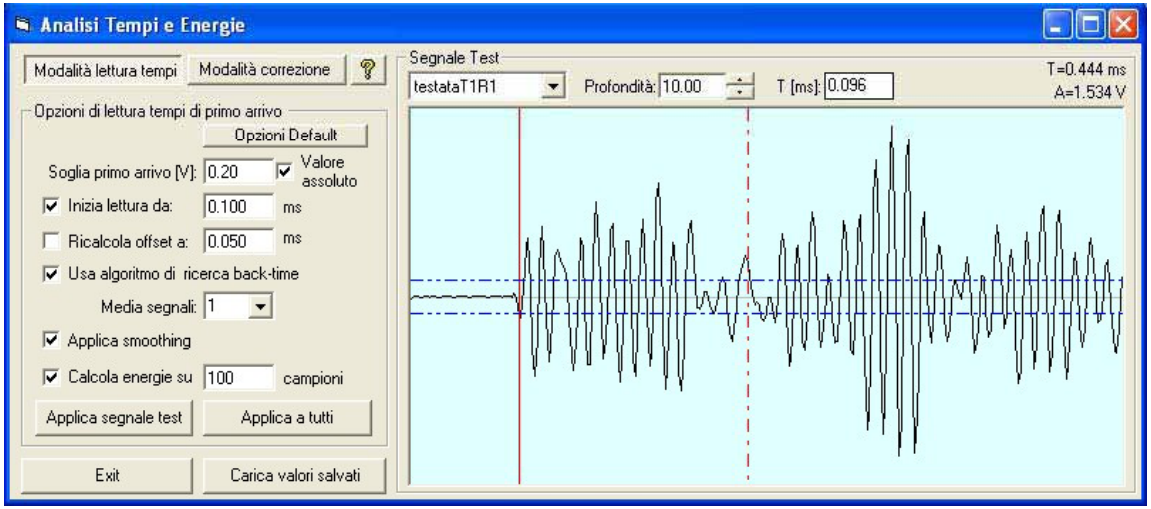
Colour-bar benchmarks



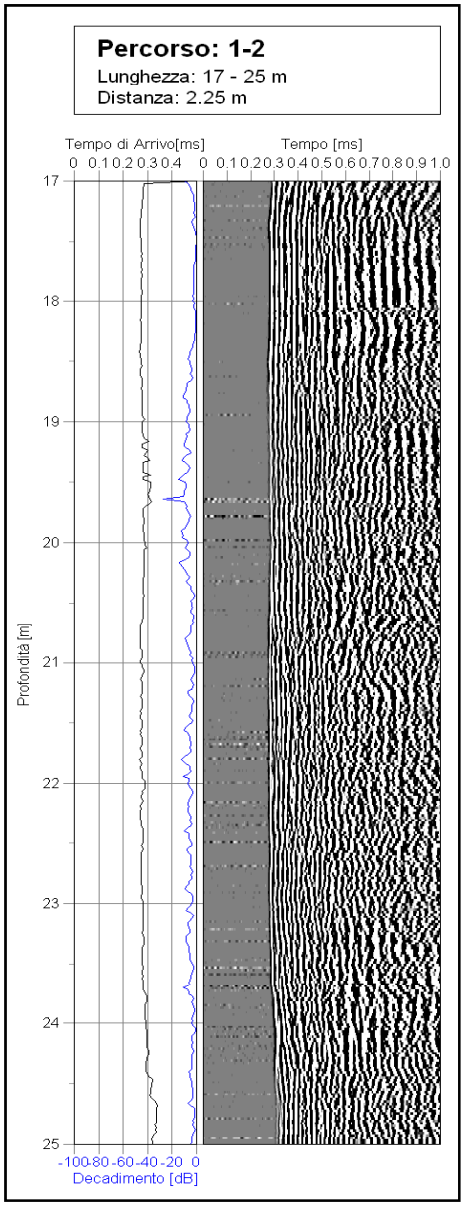
MCHSonic – Analysis of time of First Break and Energy decay data

The Analysis of First Break and Energy decay is used to locate discontinuities, e.g. faults or even cavities in the concrete object under exam.

The identification of the time of First Break is based on the signal's trespassing of a defined amplitude threshold.



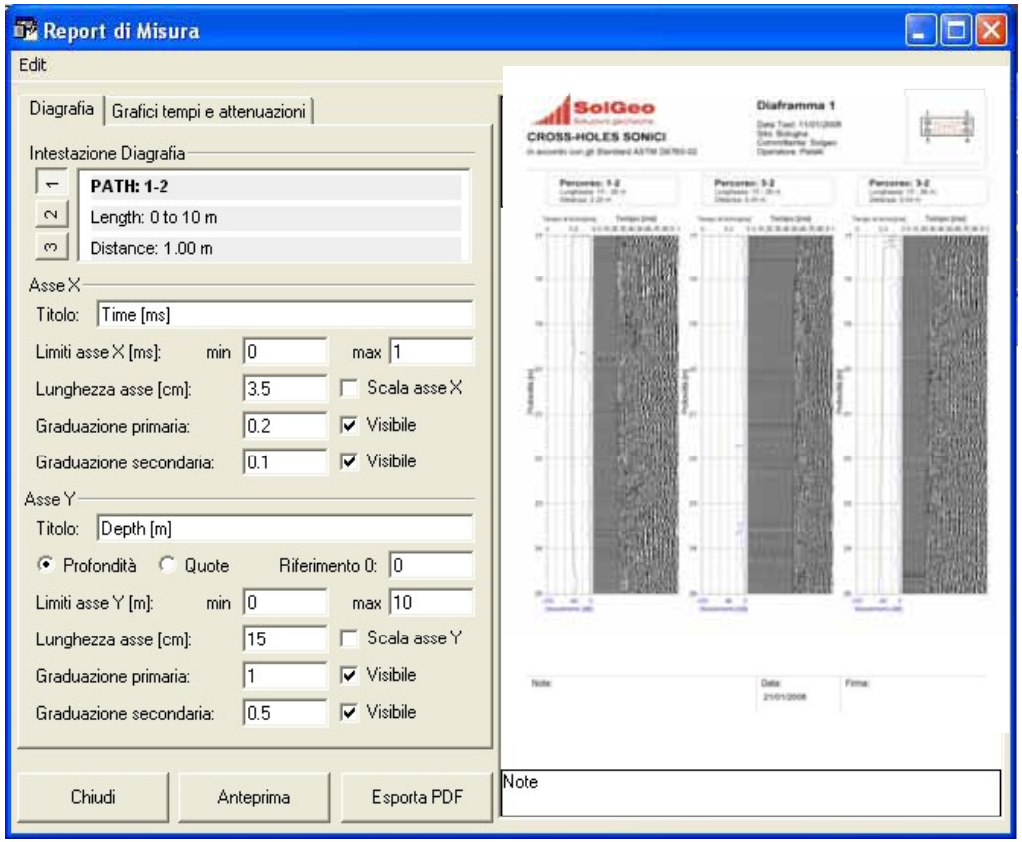
By varying a set of definable parameters the determination of the time of First Break can be refined. A further refinement can be obtained by selecting the " Use back-time search algorithm" parameter. In this case the software will automatically "backwards" compute the intersection of the measured curve with the x-axes before the threshold level was triggered.

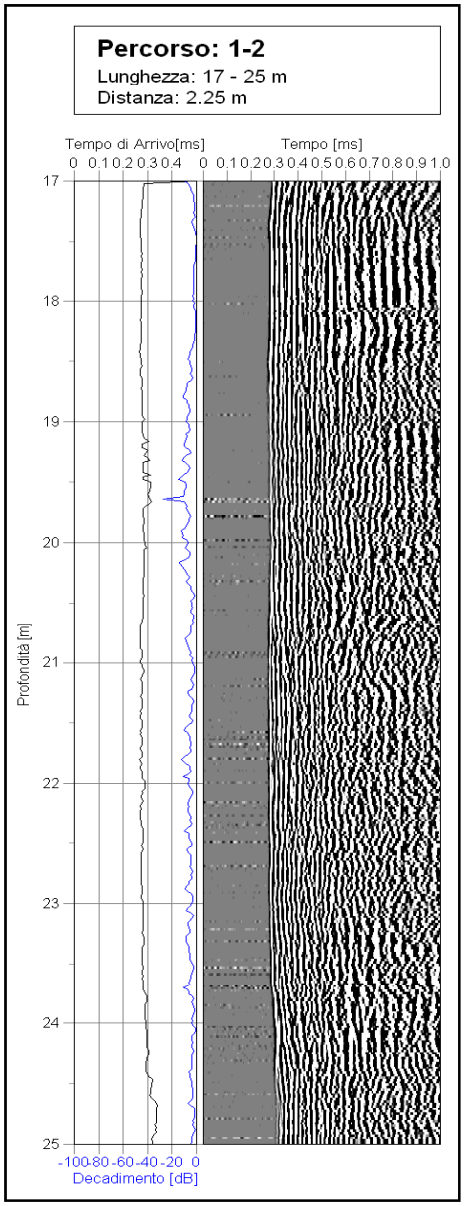


MCHSonic – Measurements Report

The Measurements Report can be plotted for one to three Diagraphies, together with the graphic of time of first break and of the correspondent energy absorption.

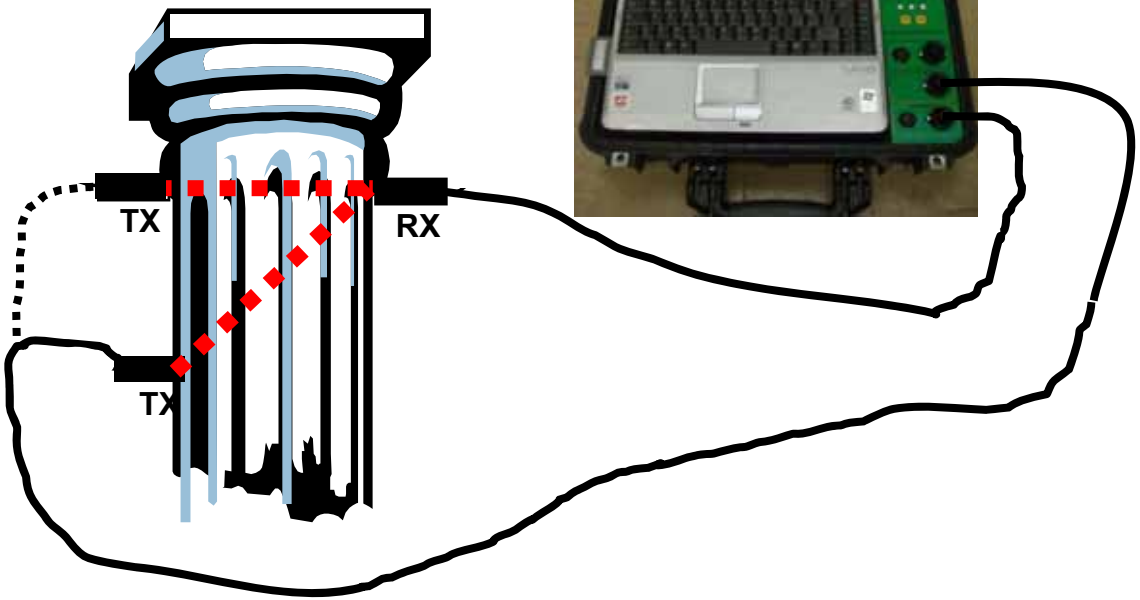
A customized Header including company's logo can be defined.

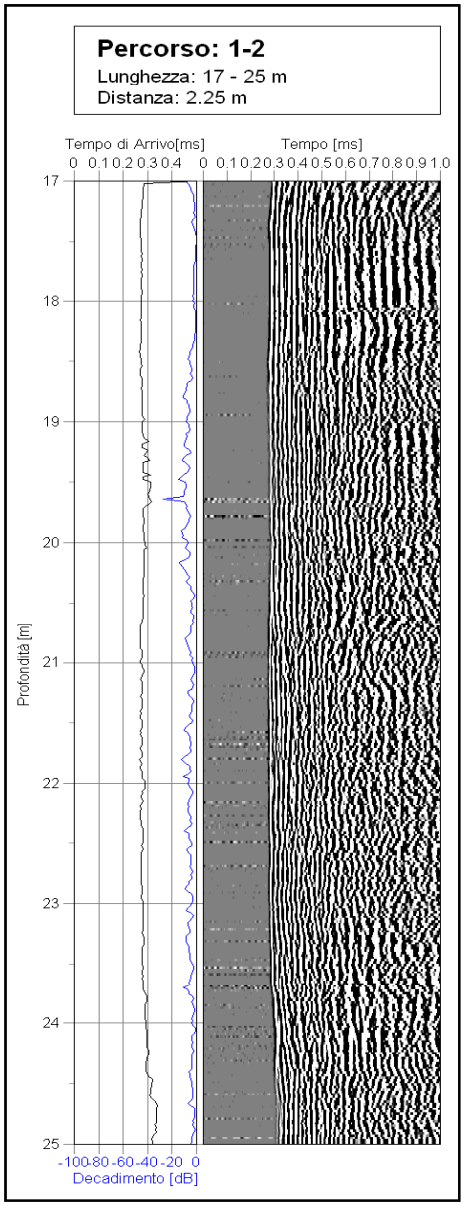




MCHA – key benefits

Use of the MCHA for sonic and ultra-sonic investigations in concrete and masonry



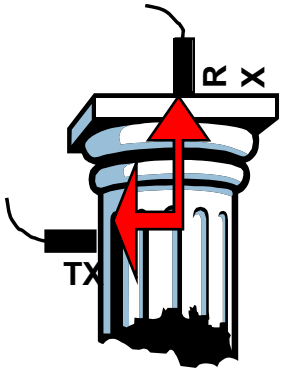


MCHA – key benefits

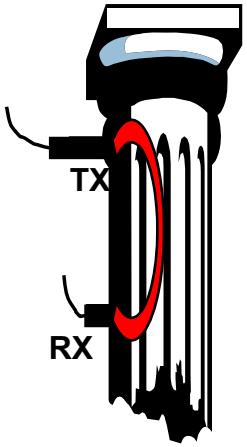
Use of the MCHA for sonic and ultra-sonic investigations in concrete and masonry

Setup for ultrasonic measurements:

direct



indirect

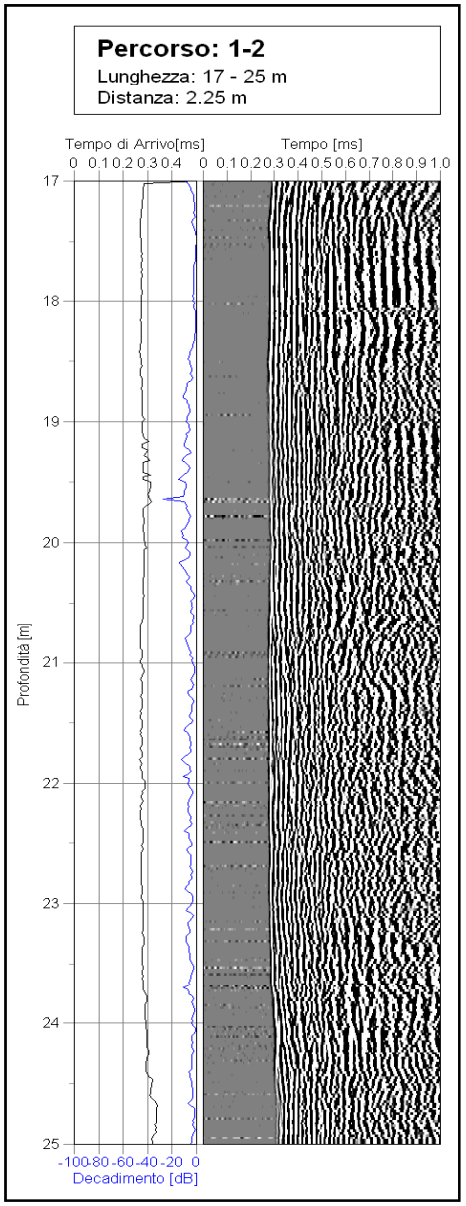


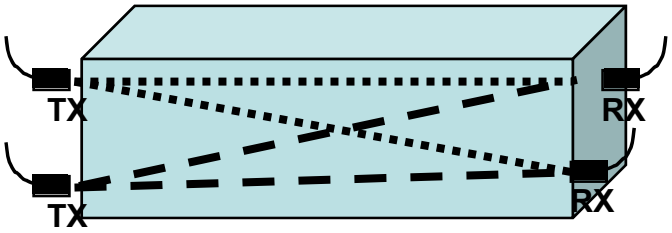
non-direct

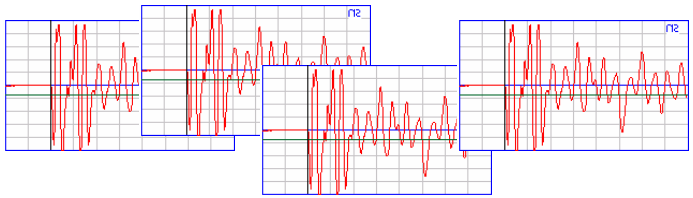
MCHA – key benefits

Use of the MCHA for sonic and ultra-sonic investigations in concrete and masonry:

Tomography of measurements

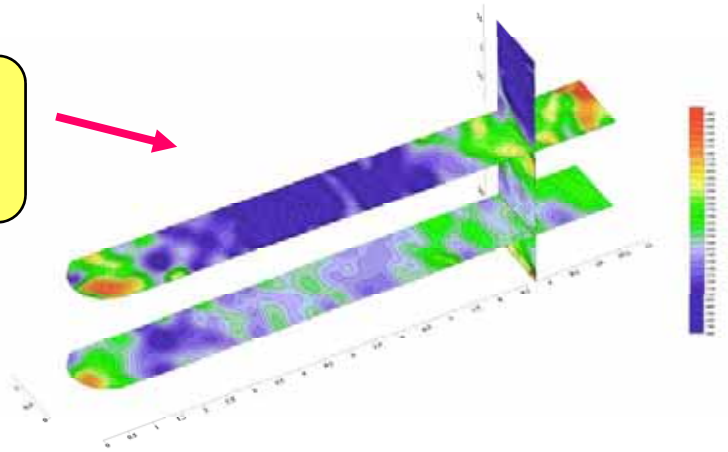


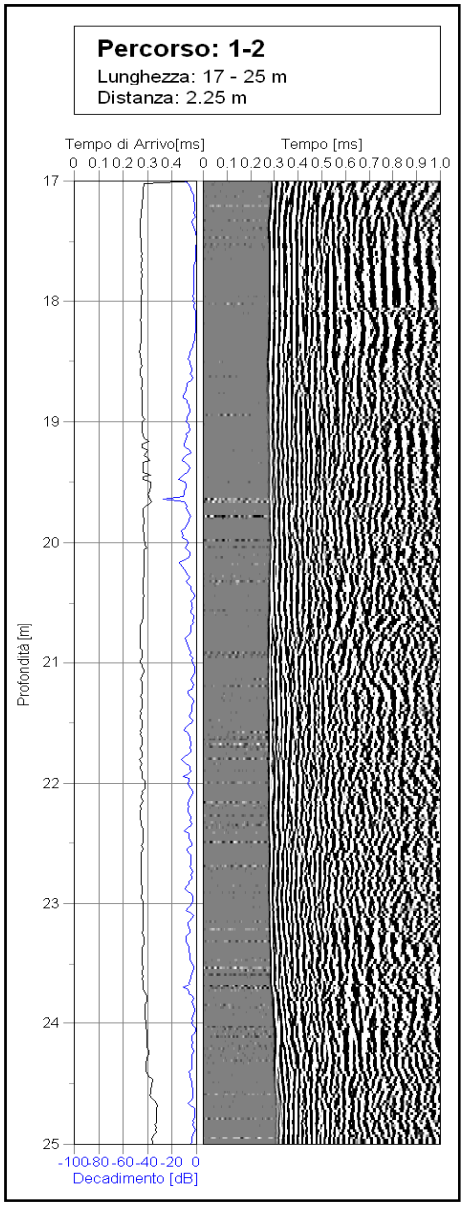




Application Software

Tomography



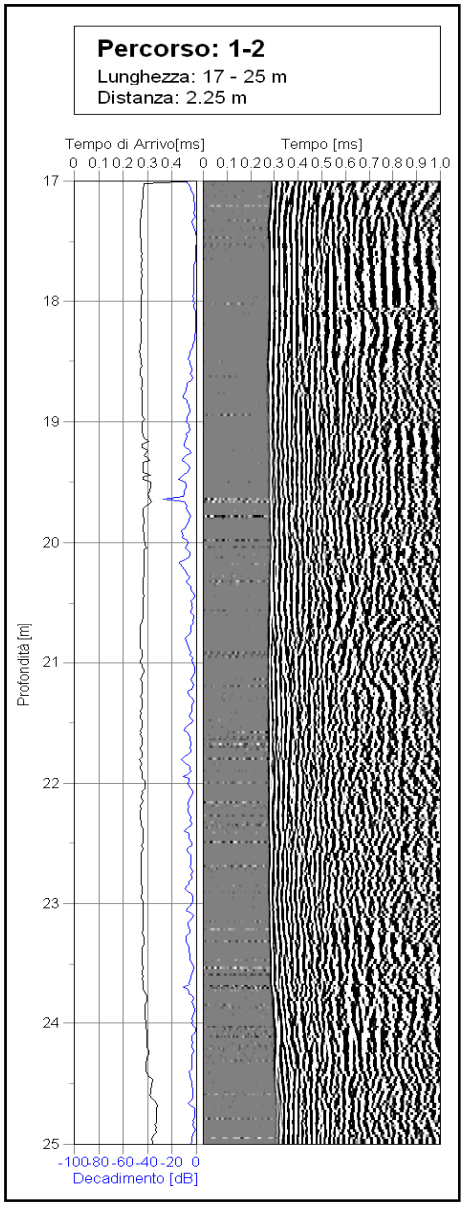


MCHA – key benefits

Use of the MCHA for sonic and ultra-sonic investigations in concrete and masonry

Transducers-Sensors:

A)- piezoelectric Receiver (internally pre-amplified, 20dB, 10x)
55kHz res. freq. (optional 20-80kHz)



(CMS transducer)

Transducers-Sensors:

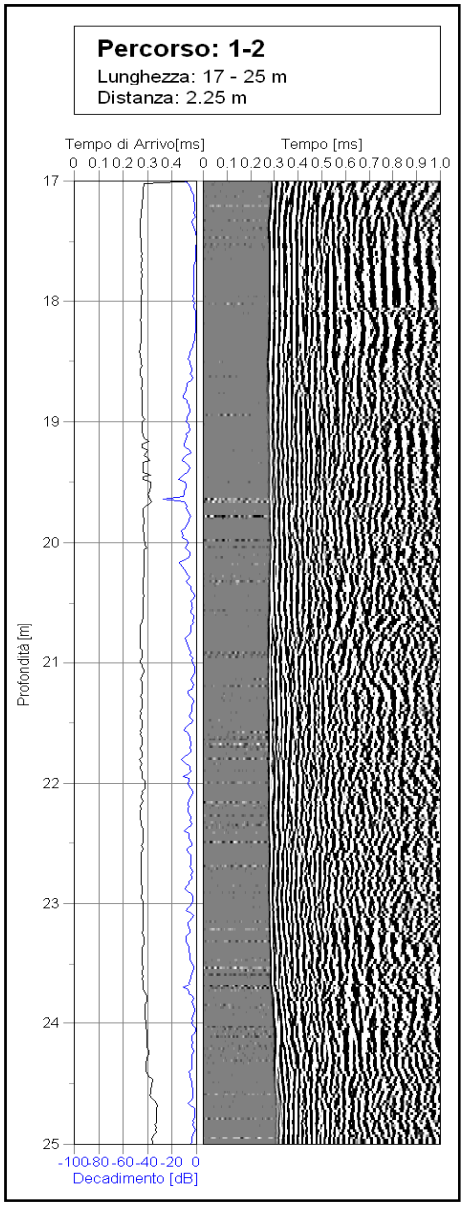
B)- piezoelectric Transmitter with adjustable transmission pulse (up to 1.6kV)

Transmitter Sensor's Remote Push-button:

The push-button on the transmitter allows the operator the handling from a "remote" position of the freeze - and of the store - function.

If the push-button on the transmitter is pressed once, the signal acquisition on the PDA switches from continuous to the "one shot mode".

If the push-button is press-touched and hold for at least 3 sec, than when released, the data storing function is performed.



(CMS transducer)

Transducers-Sensors:

C)- piezoelectric Hammer-Transducer for low frequency / high energy signals

SolGeo
Soluzioni geofisiche

MCHA

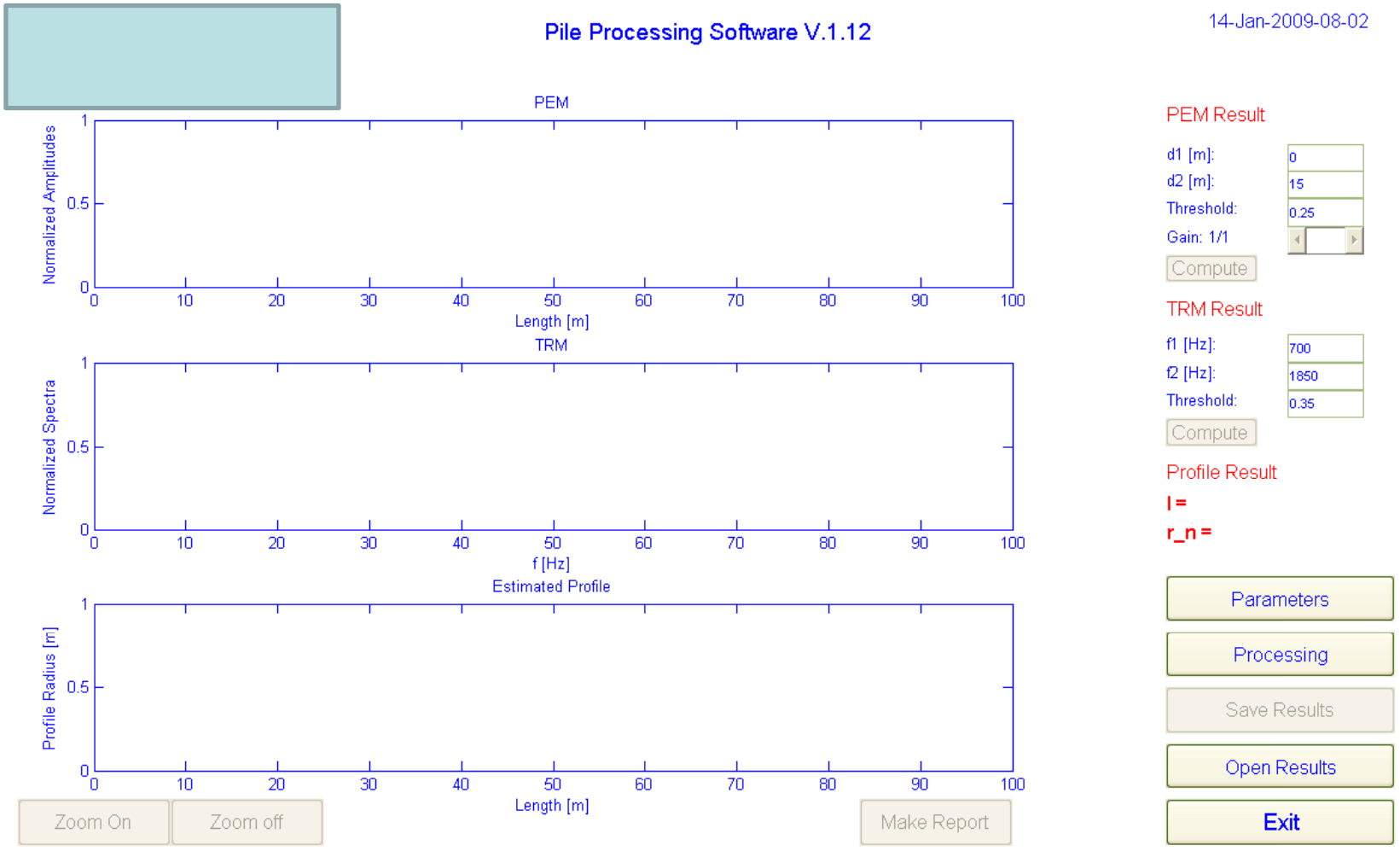
Use of the MCHA for Pulse echo test and Low Strain Method

Pile Processing Software V.1.12

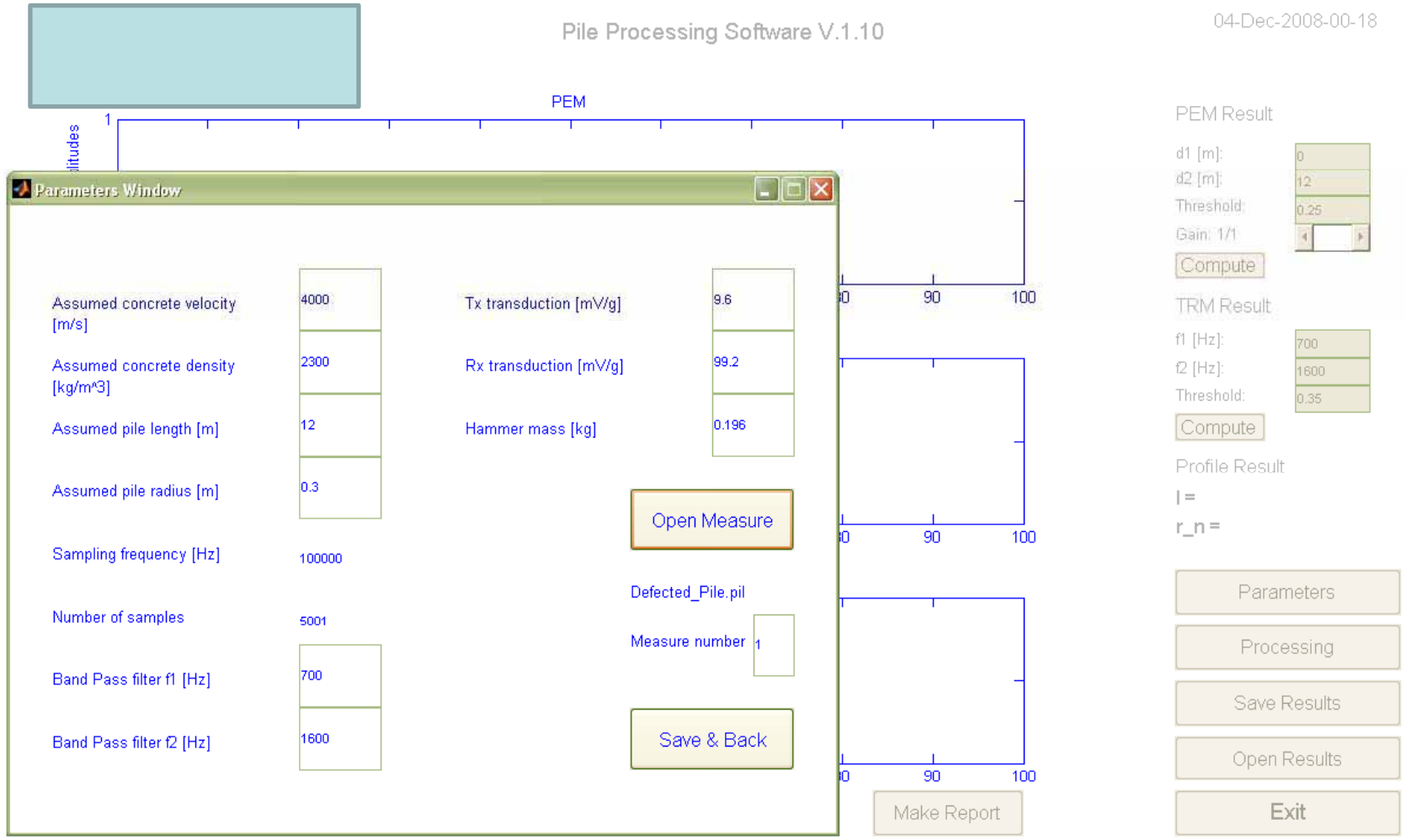
SolGeo
Soluzioni geofisiche

- Introduction
- Metod PEM
- Metod TRM (FD/TD)
- Pile Processing Software
- Example

Pile Processing Software (start window)



Pile Processing Software (setup parameters)



SolGeo
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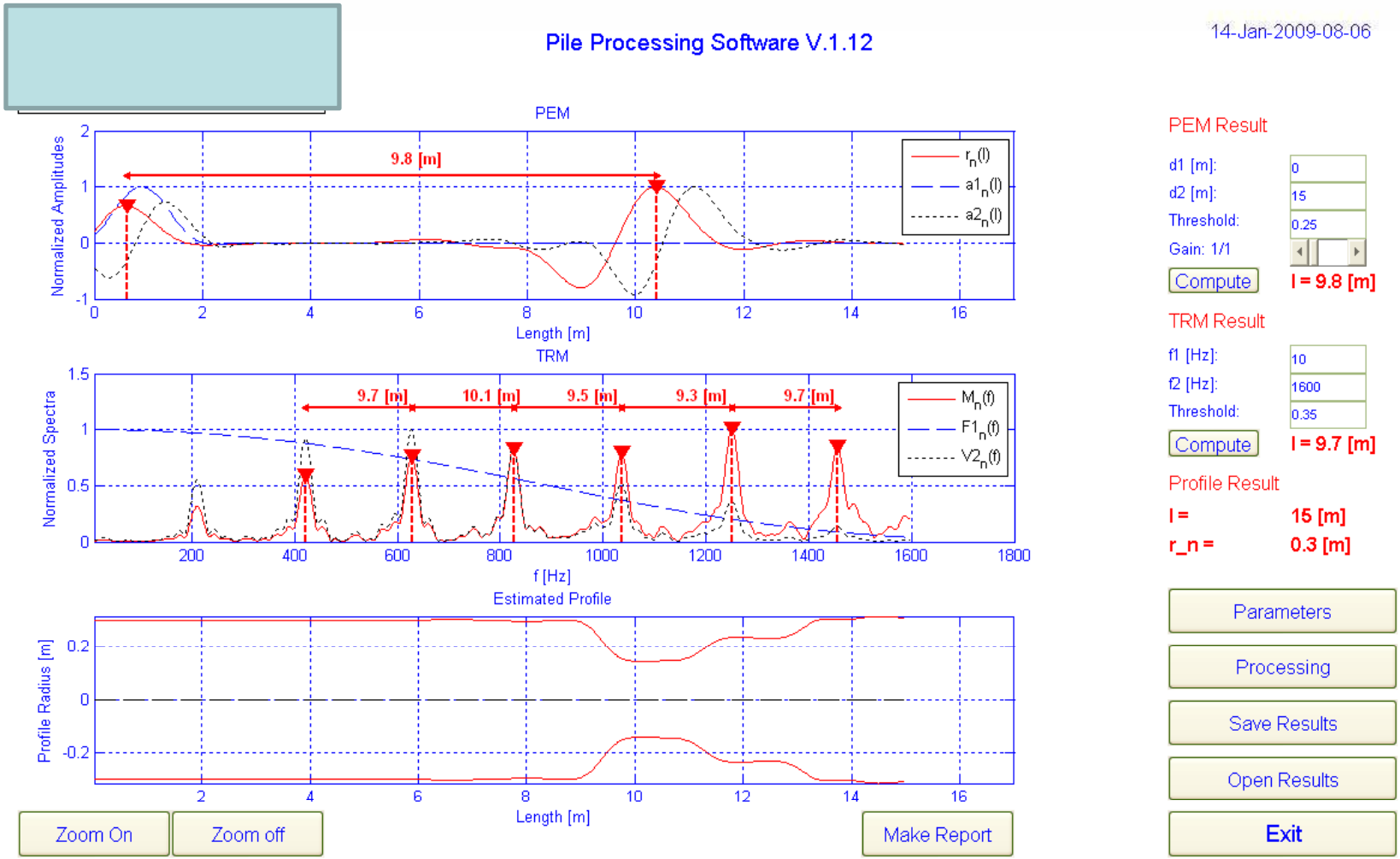
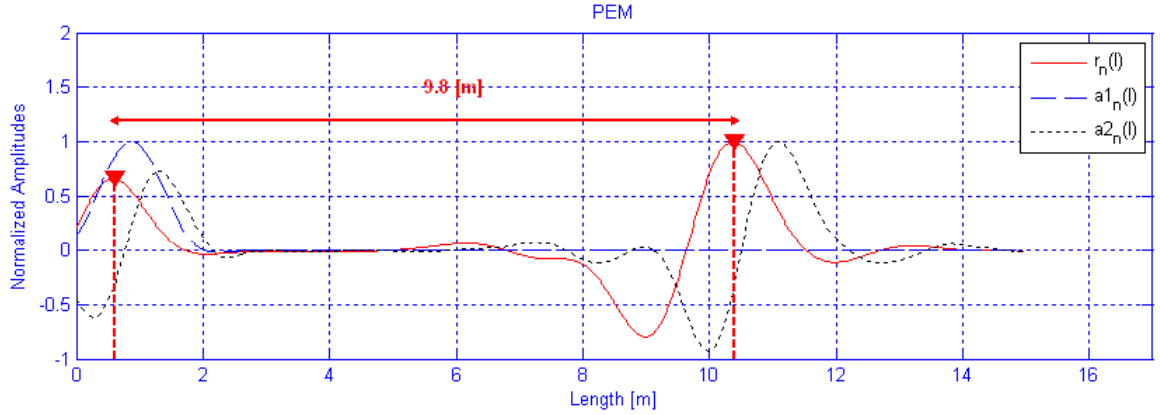
Pile Processing Software

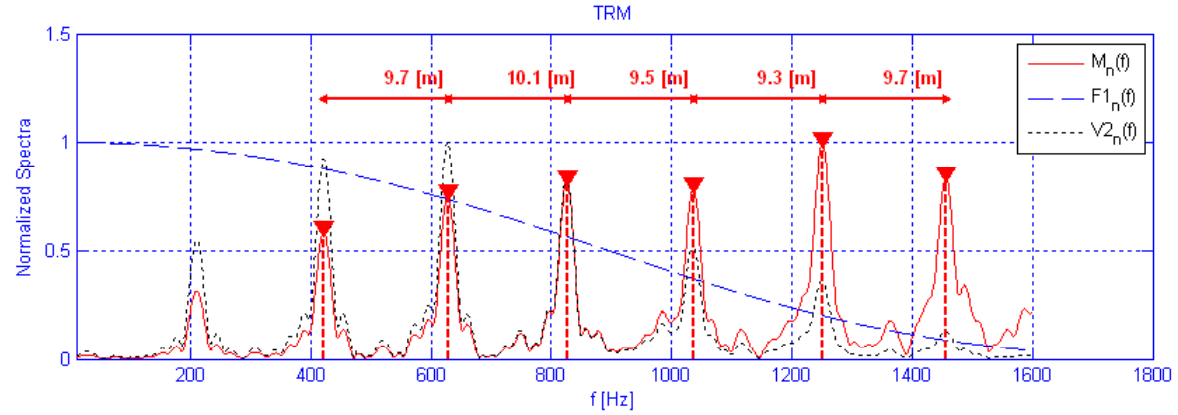


Pile Processing Software (report 1/2)

Report 1/2

Solgeo srl	18/09/2008 15.05
Seriate	standard_pile
standard_pile.pil	Note:





Assumed concrete properties:

v = 4000 [m/s]
rho = 2300 [kg/m^3]

Assumed hammer properties:

m = 0.196 [kg]

Filtering properties:

f1_BP = 10 [Hz]
f2_BP = 1600 [Hz]

Assumed pile geometrycal properties:

l = 15 [m]
r_n = 0.3 [m]

Observed signals properties:

Bl-6dB = 896 [Hz]
F_p = 33.6 [N]

Estimated pile geometrycal properties:

l_PEM = 9.8 [m]
l_TRM = 9.7 [m]

Save Results

1/2

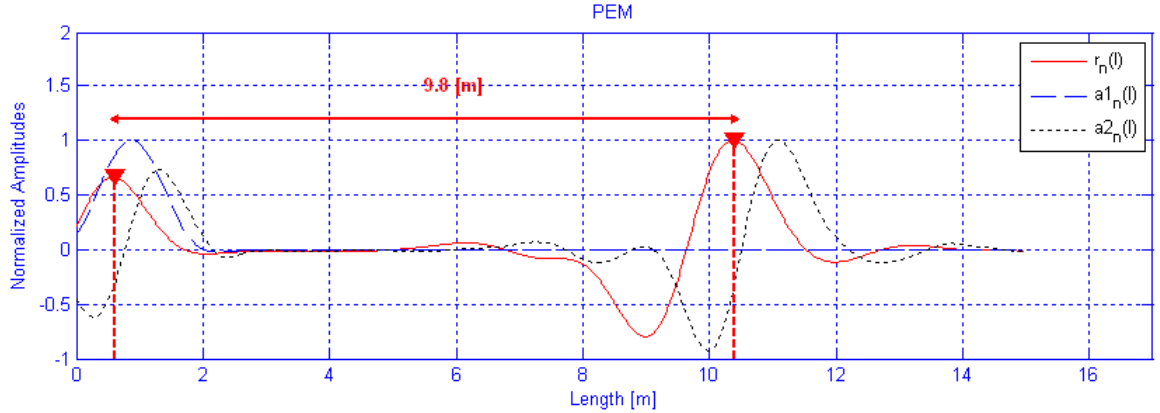
Back

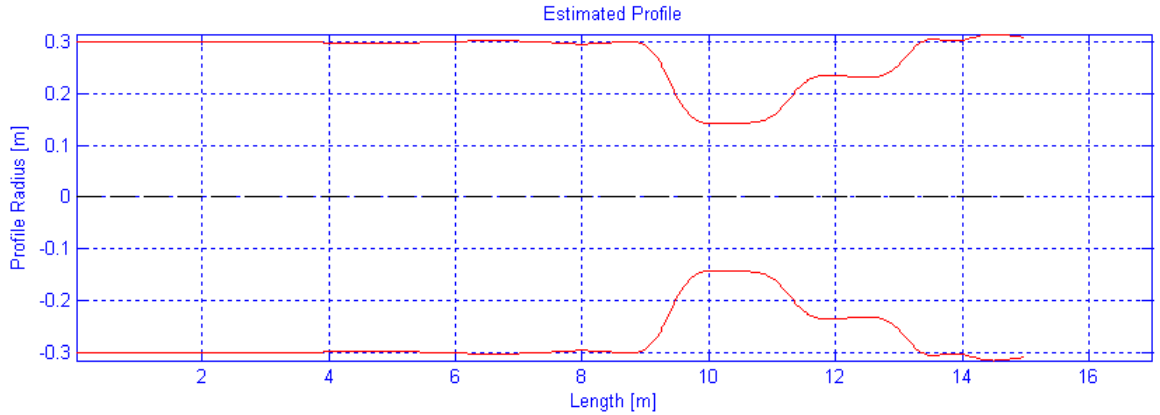
Processed by Pile Processing Software V.1.11

Pile Processing Software (report 2/2)

Report 2/2

Solgeo srl	18/09/2008 15.05
Seriate	standard_pile
standard_pile.pil	Note:





Assumed concrete properties:

v = 4000 [m/s]

rho = 2300 [kg/m^3]

Assumed hammer properties:

m = 0.196 [kg]

Filtering properties:

f1_BP = 10 [Hz]

f2_BP = 1600 [Hz]

Assumed pile geometrycal properties:

l = 15 [m]

r_n = 0.3 [m]

Observed signals properties:

B|-6dB = 896 [Hz]

F_p = 33.6 [N]

Estimated pile geometrycal properties:

l_PEM = 9.8 [m]

l_profile = 15 [m]

r_n_profile = 0.3 [m]

Save Results

2/2

Back

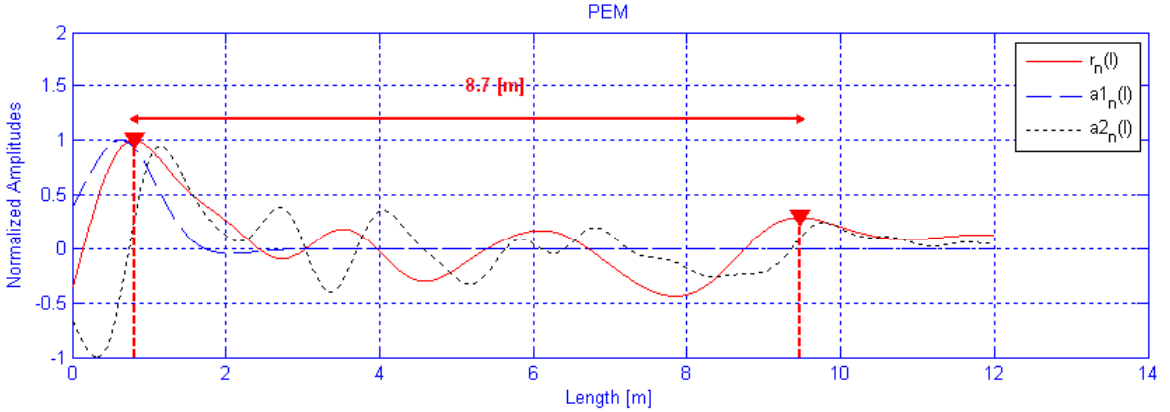
Processed by Pile Processing Software V.1.11

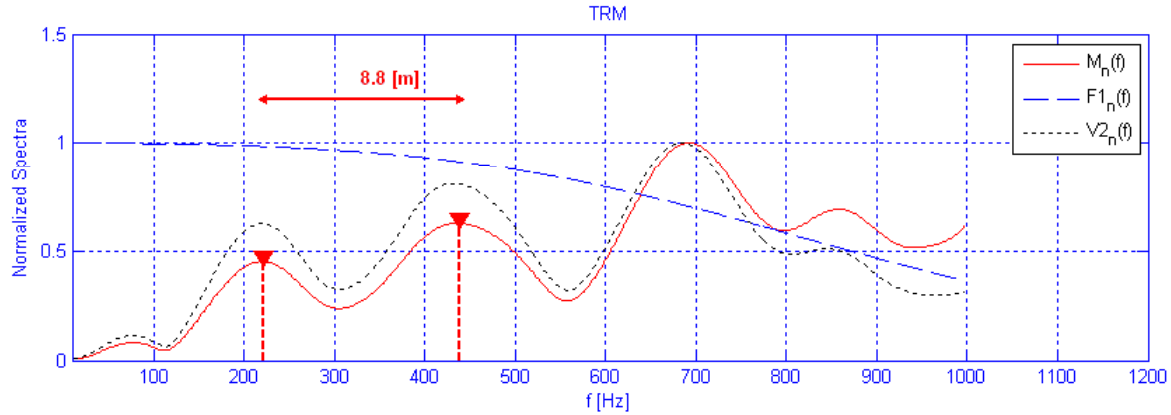
SolGeo
Soluzioni geofisiche

Example 1

Report 1/2

CEB	15/12/2008 17.00
Savio	H
H.pil	Note:





Assumed concrete properties:
- v = 3800 [m/s]
- rho = 2300 [kg/m^3]

Assumed hammer properties:
- m = 0.32 [kg]

Filtering properties:
- f1_BP = 10 [Hz]
- f2_BP = 1000 [Hz]

Assumed pile geometrycal properties:
- l = 12 [m]
- r_n = 0.615 [m]

Observed signals properties:
- B|-6dB = 872 [Hz]
- F_p = 1113.6 [N]

Estimated pile geometrycal properties:
- l_PEM = 8.7 [m]
- l_TRM = 8.8 [m]

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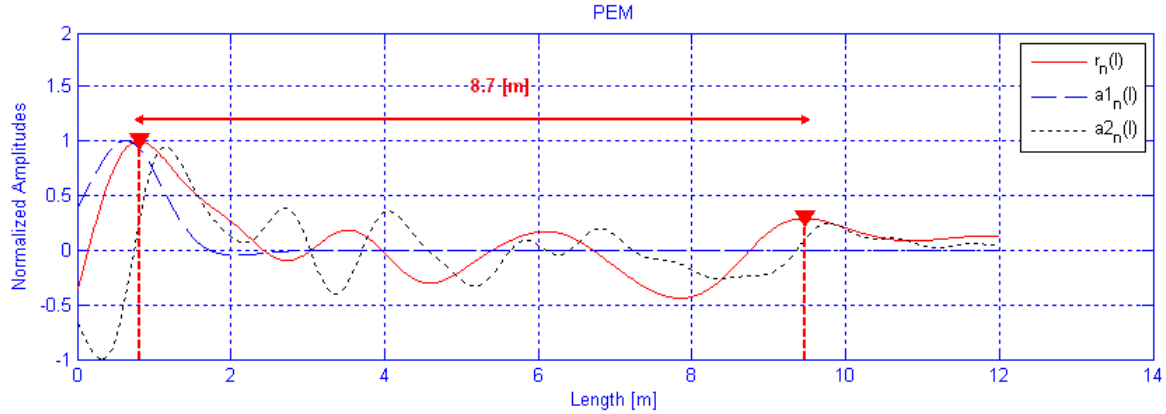
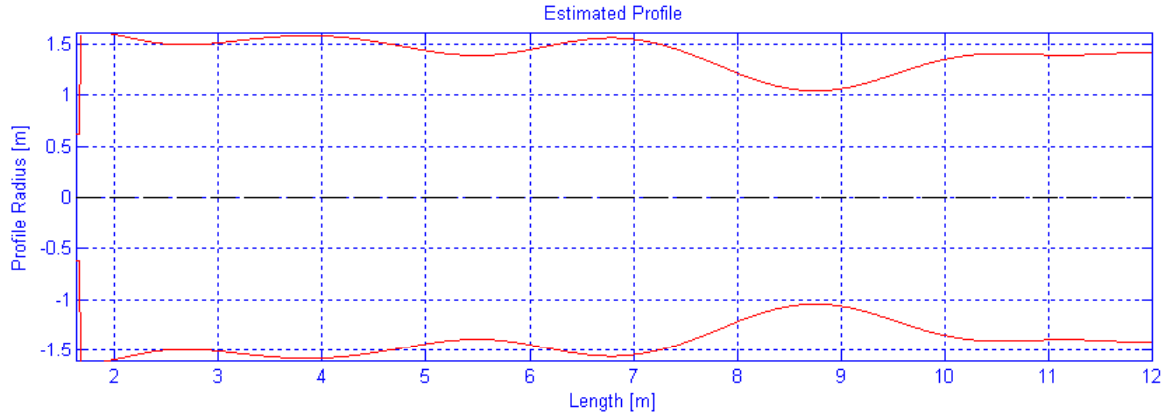
SolGeo
Soluzioni geofisiche

Example 1

Report 2/2

CEB	15/12/2008 17.00
Savio	H
H.pil	Note:





Assumed concrete properties:

v = 3800 [m/s]
rho = 2300 [kg/m^3]

Assumed hammer properties:

m = 0.32 [kg]

Filtering properties:

f1_BP = 10 [Hz]
f2_BP = 1000 [Hz]

Assumed pile geometrycal properties:

l = 12 [m]
r_n = 0.615 [m]

Observed signals properties:

Bl-6dB = 872 [Hz]
F_p = 1113.6 [N]

Estimated pile geometrycal properties:

l_PEM = 8.7 [m]

l_profile = 12 [m]
r_n_profile = 1.6 [m]

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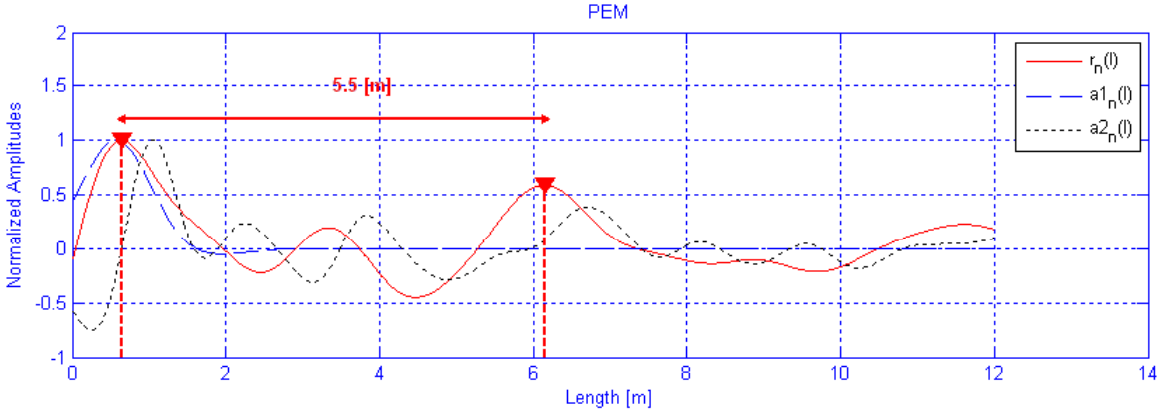
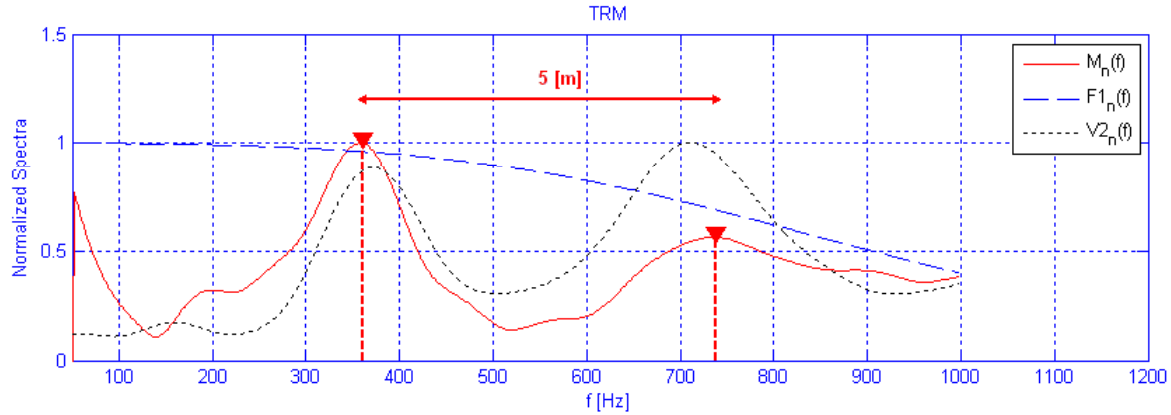
Example 2

Report 1/2

CEB	15/12/2008 17.00
Savio	H
H.pil	Note:





Assumed concrete properties:

v = 3800 [m/s]
rho = 2300 [kg/m^3]

Assumed hammer properties:

m = 0.32 [kg]

Filtering properties:

f1_BP = 50 [Hz]
f2_BP = 1000 [Hz]

Assumed pile geometrycal properties:

l = 12 [m]
r_n = 0.615 [m]

Observed signals properties:

Bl-6dB = 906 [Hz]
F_p = 1238.8 [N]

Estimated pile geometrycal properties:

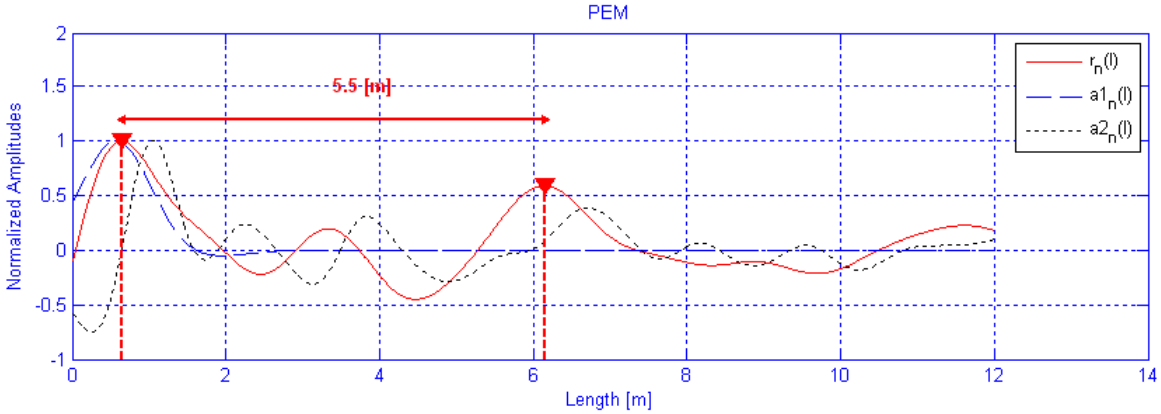
l_PEM = 5.5 [m]
l_TRM = 5 [m]

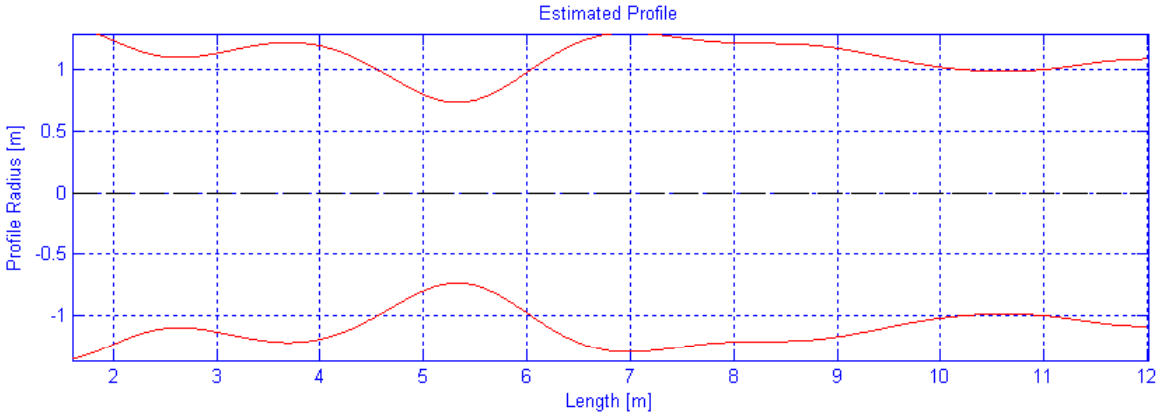
Processed by Pile Processing Software V.1.11

Example 2

Report 2/2

CEB	15/12/2008 17.00
Savio	H
H.pil	Note:





Assumed concrete properties:

v = 3800 [m/s]

rho = 2300 [kg/m^3]

Assumed hammer properties:

m = 0.32 [kg]

Filtering properties:

f1_BP = 50 [Hz]

f2_BP = 1000 [Hz]

Assumed pile geometrycal properties:

l = 12 [m]

r_n = 0.615 [m]

Observed signals properties:

Bl-6dB = 906 [Hz]

F_p = 1238.8 [N]

Estimated pile geometrycal properties:

l_PEM = 5.5 [m]

l_profile = 12 [m]

r_n_profile = 1.4 [m]

Processed by Pile Processing Software V.1.11