VIBROMETRIC

PS-8R
HIGH-DEFINITION SEISMIC SYSYEM

KEY FEATURES

The PS-8R is a **highly specialized** tool, intended for mapping cracks and very faint local variations of the rock and concrete properties. The investigation depth is around 10 m.

The PS-8R is designed for smooth holes with diameters of 56 mm or higher, water-filled or dry.

The PS-8R can be used as a **single-hole or as a cross-hole instrument**.

The main components of the PS-8R system are the **borehole source** and the **borehole multi-receiver probe**. Both devices can be clamped hydraulically to the borehole, the hydraulic pressure being produced by an out of hole pump and conveyed to the probes by hoses attached to the lead-in cables. The operation of the two devices is controlled from the same control unit.

The **source** module consists of a main body housing the piezoelectric transducer and the hydraulic pistons, for clamping. The **power** module provides high voltage (1000 V) needed for driving the piezoelectric transducer. The charge-discharge cycle is controlled from a out-of-hole controller.

The **receiver** module contains eight / sixteen piezoelectric transducers, placed at 150 mm intervals, each equipped with a charge preamplifier with fixed gain of 100, and a variable gain digital amplifier, with gain levels between 1—128.
The piezoelectric transducers are perpendicular to the hole axis. The hydraulic clamping system is similar with the one used for the source module. Two pistons are used to press the whole array of receivers against the borehole. The frequency range response is between 10—100 kHz.

The system is capable of imaging single fractures at a distance of 10 to 20 m, by emitting and recording frequencies up to 60 kHz.

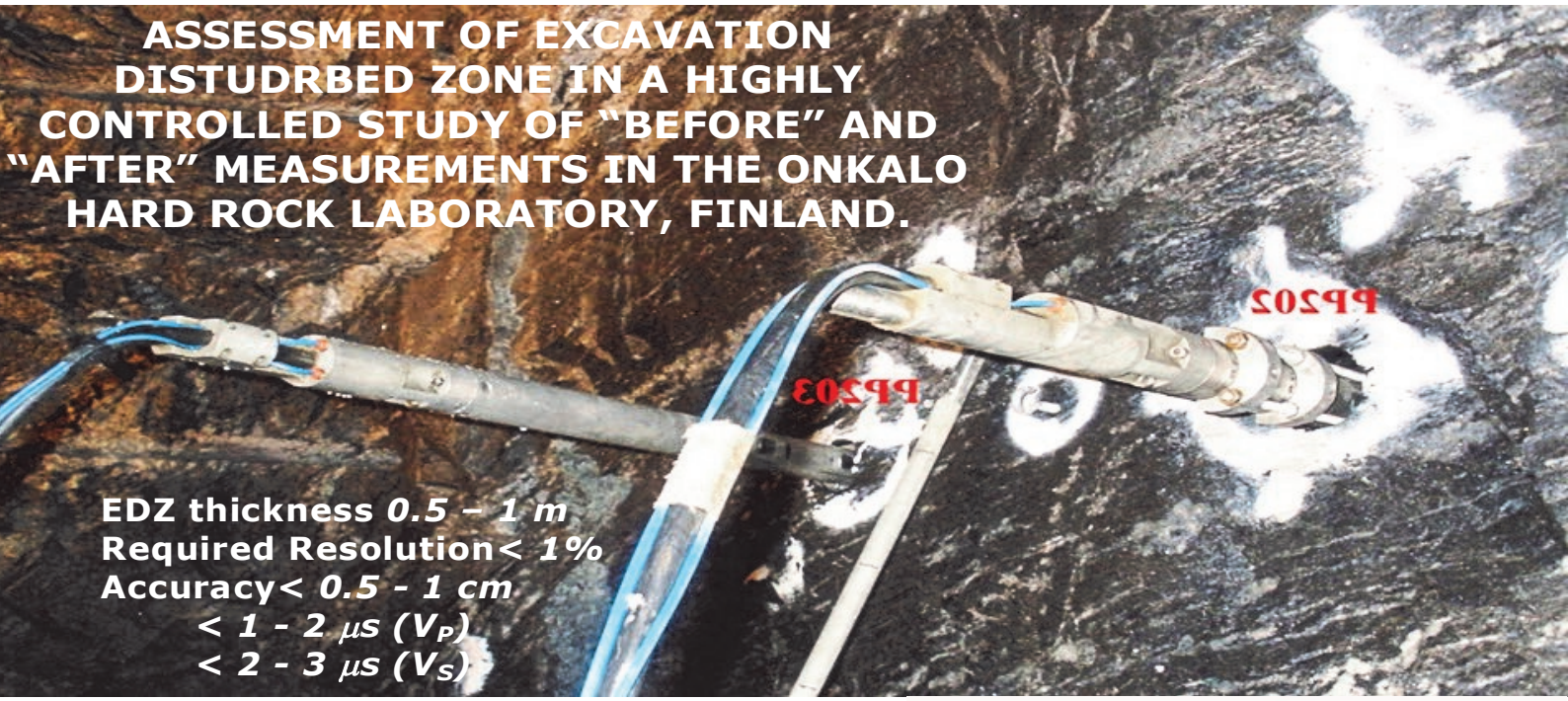
APPLICATIONS

Single-hole and cross-hole seismic investigations for:

- *Rock integrity assessment*
- *Dam wall characterization*
- *Assessment of the excavation damage zone around tunnels or boreholes*
- *Geologic storage*
- *Geotechnical applications*

SYSTEM FOR ULTRA-HIGH

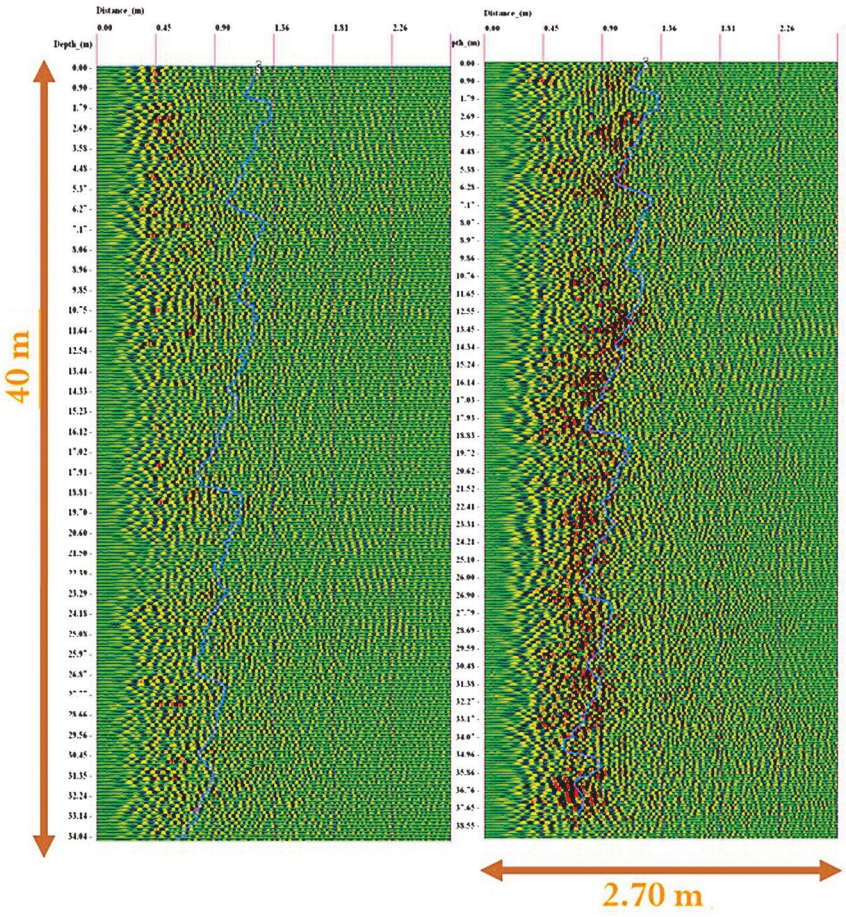
ASSESSMENT OF EXCAVATION DISTUDRBED ZONE IN A HIGHLY CONTROLLED STUDY OF "BEFORE" AND "AFTER" MEASUREMENTS IN THE ONKALO HARD ROCK LABORATORY, FINLAND.



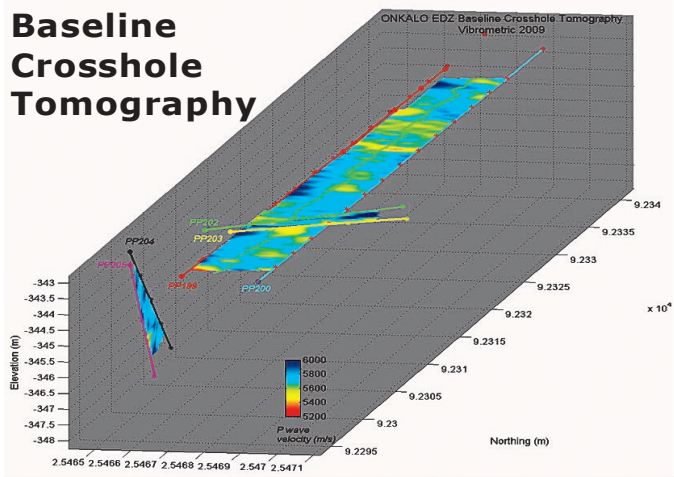
EDZ thickness *0.5 – 1 m*
Required Resolution< *1%*
Accuracy< *0.5 - 1 cm*
< 1 - 2 μs (V_P)
< 2 - 3 μs (V_S)

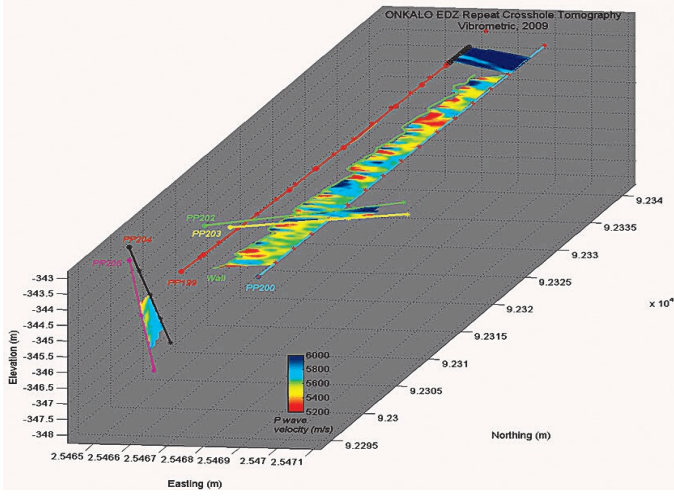
Baseline Crosshole Reflection

Repeat Crosshole Reflection, after excavation of the tunnel



Baseline Crosshole Tomography





Repeat Crosshole Tomography, after excavation of the tunnel

H RESOLUTION SEISMICS

SYSTEM MODULES

The **high voltage generator & controller** transfers to the piezoelectric source the pulse control sequence provided by a programmed sequence.

The **piezoelectric borehole source** generates the seismic signal according to a coded sequence.

The borehole **accessories** used for positioning and fixing (including a hydraulic pump and clamping systems attached to both source and receivers).

For programming purposes a **laptop** is required, but not included with the PS-8RR system.

An additional specialized **high resolution acquisition** system is required for data recording and if a PC-based one is chosen, this can also be used for programming the PS-8R system.

ACQUISITION SYSTEM (optional)

Due to the fact that the recorded frequencies are in a range of tens of KHz, the acquisition system must have the following characteristics:

- sampling rate/ per channel : 250 KSamples/second;
- online stacking;
- 8/16 channels;
- ability to export the data into a standard format (SEG2, SEGY);

SPECIFICATIONS

Power supply: 115 V/60 Hz
230 V/50 Hz
Operating temperature: 5-50 °C
Maximum operating depth: 100m

CONTROLLER

- Programmable, using RS-485 interface, using a desktop or a laptop
- Can store up to 5 different pulse sequences, 99 pulses per sequence;
- Stand-alone operation, once programmed, the functional parameters are stored into a nonvolatile memory. The basic operations can be initiated from its console.
- Has a self test display (LED) for correct operation acknowledgement.

Output voltage: up to 1000V
Dimensions: 300 x 120 x 60mm
Weight: 7 kg

SOURCE

Programmable sequence of pulses: 5 different sequences, pseudo-random using 10ms, 11.5ms, 14.5ms, 19ms, and 25ms time constants.
Number of stacks / second: 10—20
Impact frequency band:
approximately 10 to 60 kHz
Peak power: 150 W
Diameter*:* 52 mm

RECEIVER

No of channels: 8/16
Down-hole preamplifier gain:
programmable in 8 steps
Frequency band: up to 100 kHz
Diameter: 52 mm

Lead-in cable: include**s** both electric and hydraulic cables.
Length: *upon request*

THE PS-8R

OPERATES WELL IN CONFINED SPACES

The reduced number of modules makes the PS-8R portable and highly mobile system. It allows jobs to be done faster in difficult conditions.

It can be used in boreholes with a diameter higher than 56mm, up to 102mm. Easy to operate, available in a rugged configuration, the source can be used by one person. For larger boreholes, an additional set of adapters is required.

PS-8R is a **highly specialized** tool, intended for detecting minute variations of the rock properties, in the immediate vicinity of the excavation works.

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