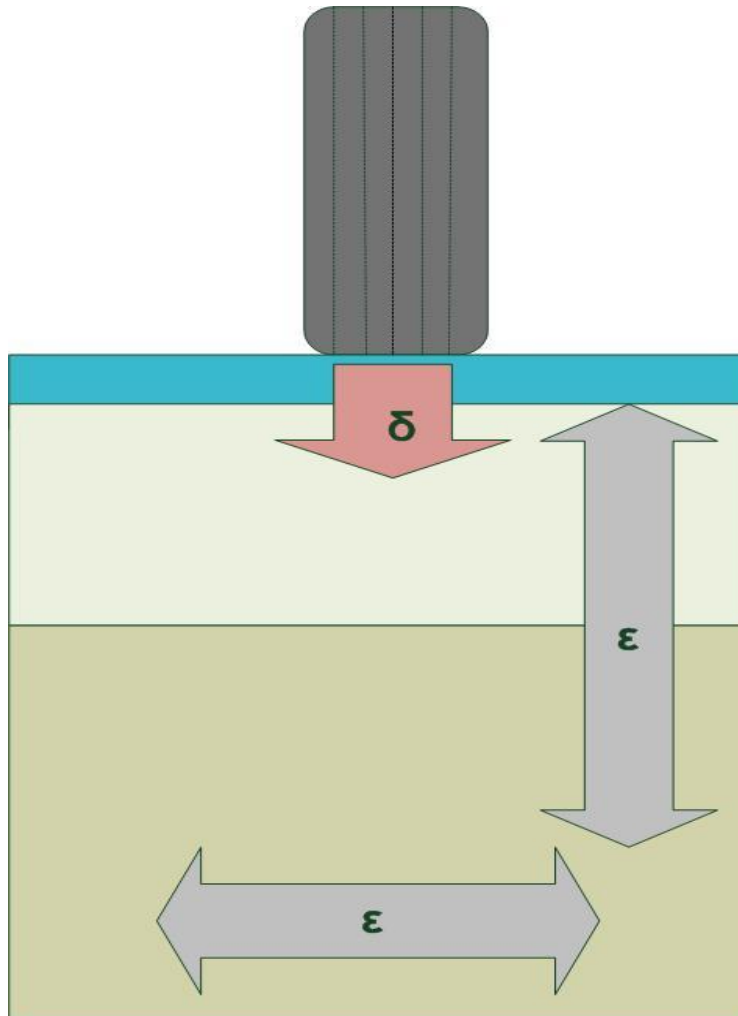


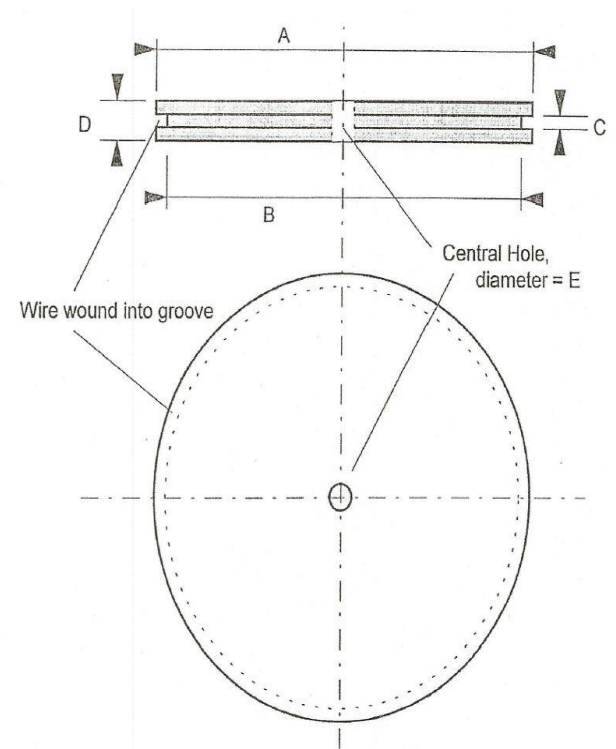
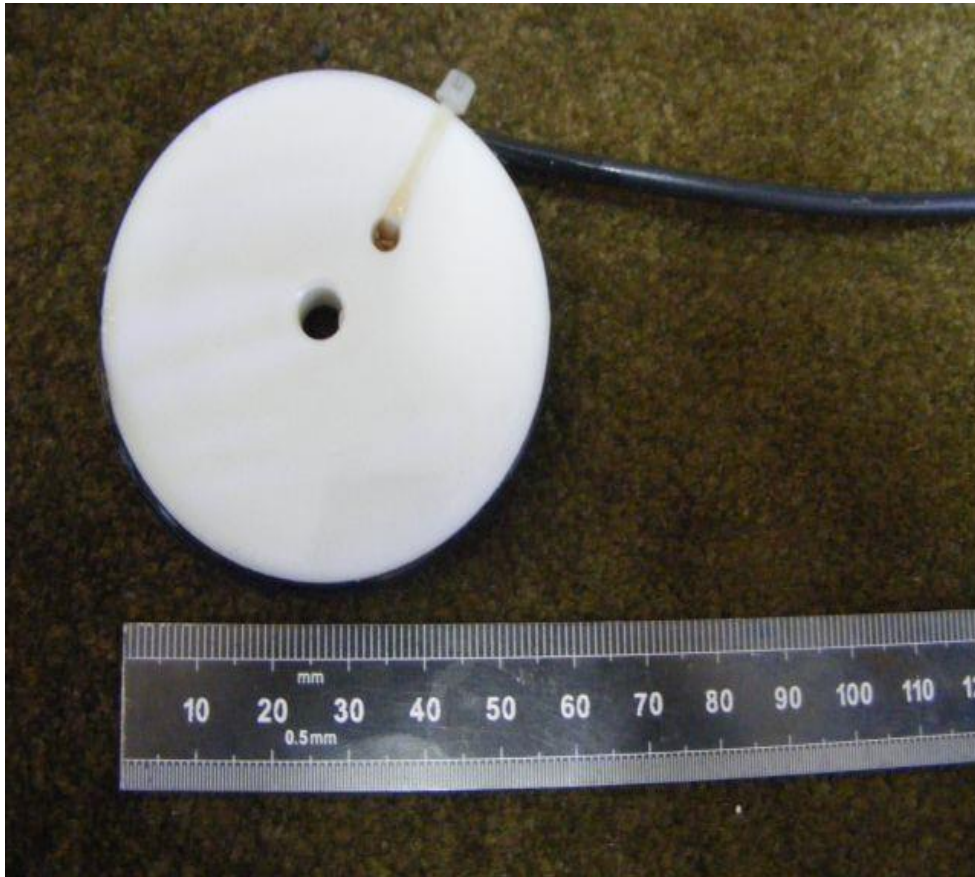
Why measure strain ?



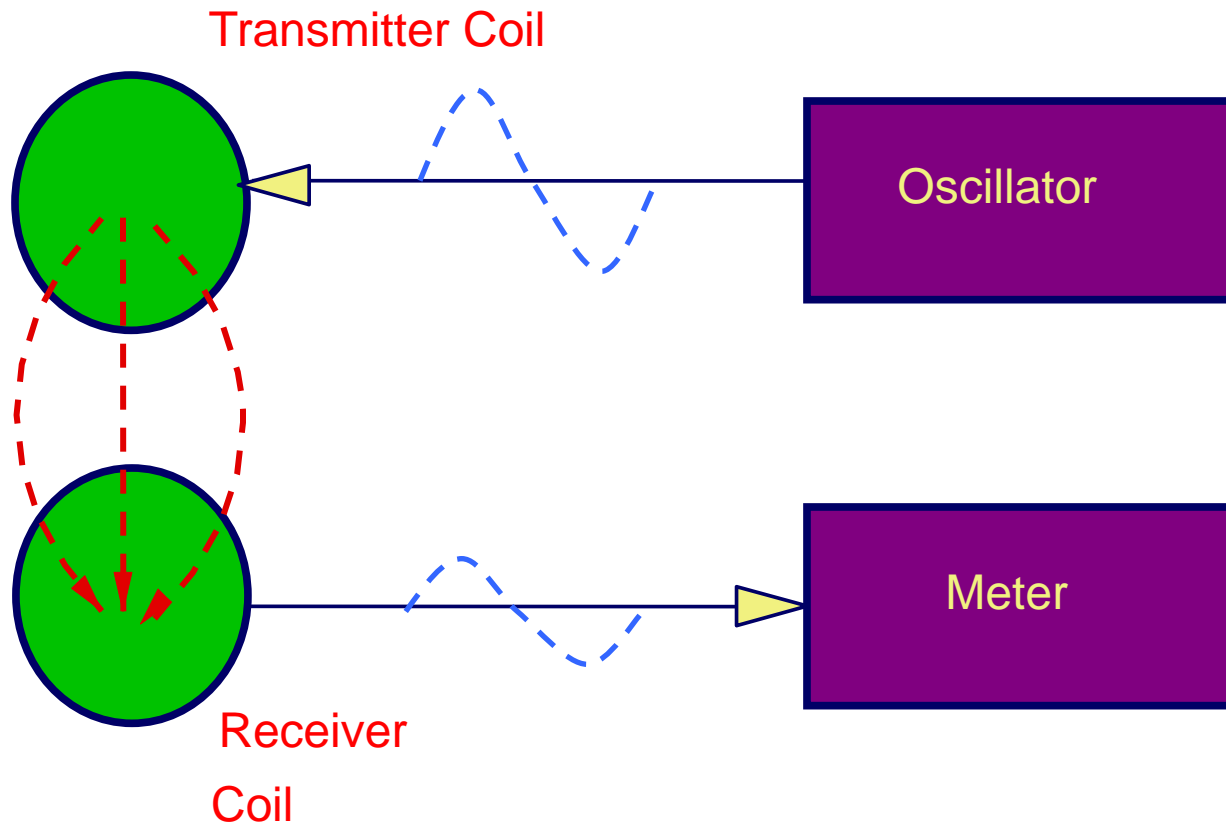
Strain Coils

- Validate and modify models
- No back-calculation
- Multi layer 3d
- Easy Installation
- Sensors cheap and disposable

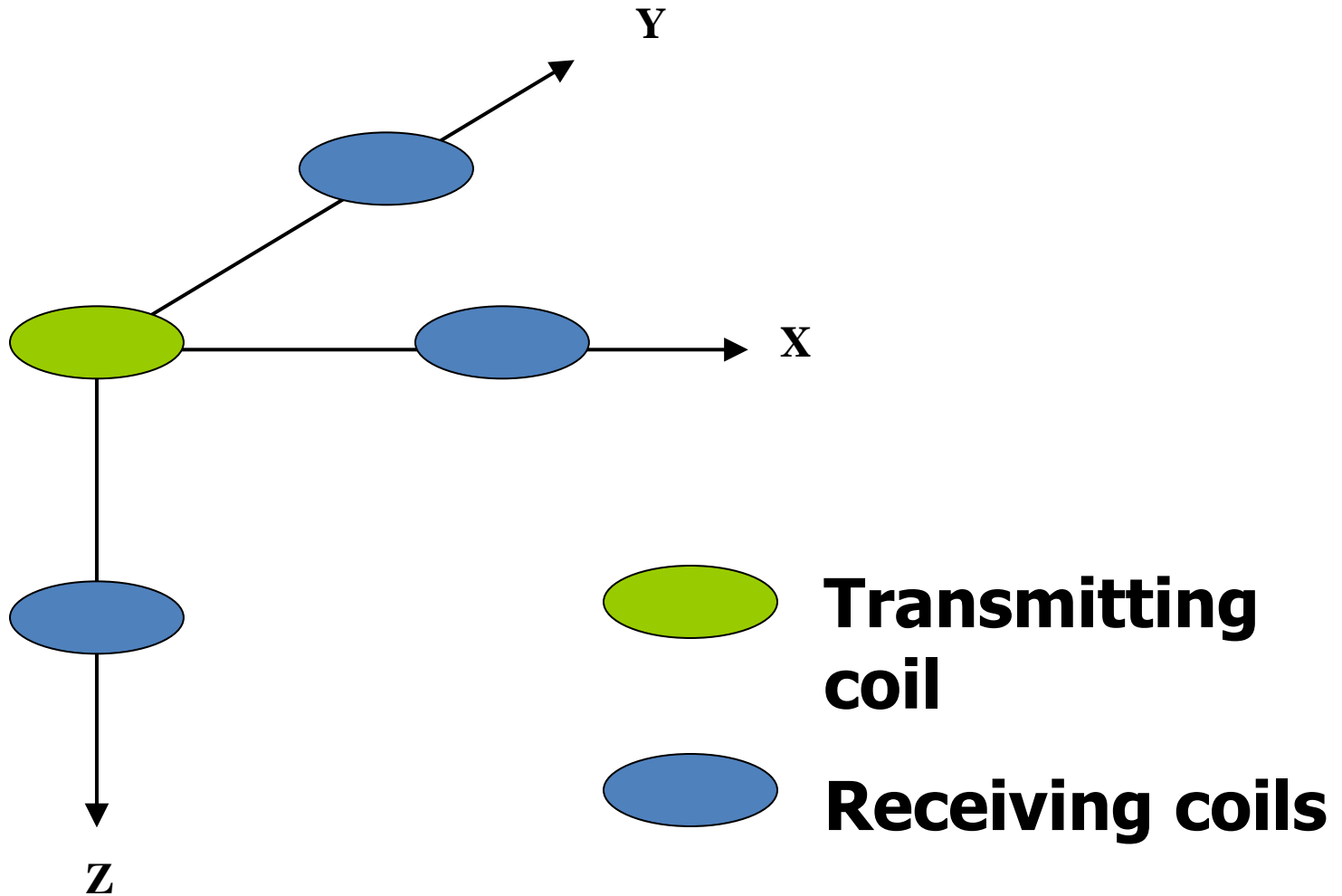
Strain coils



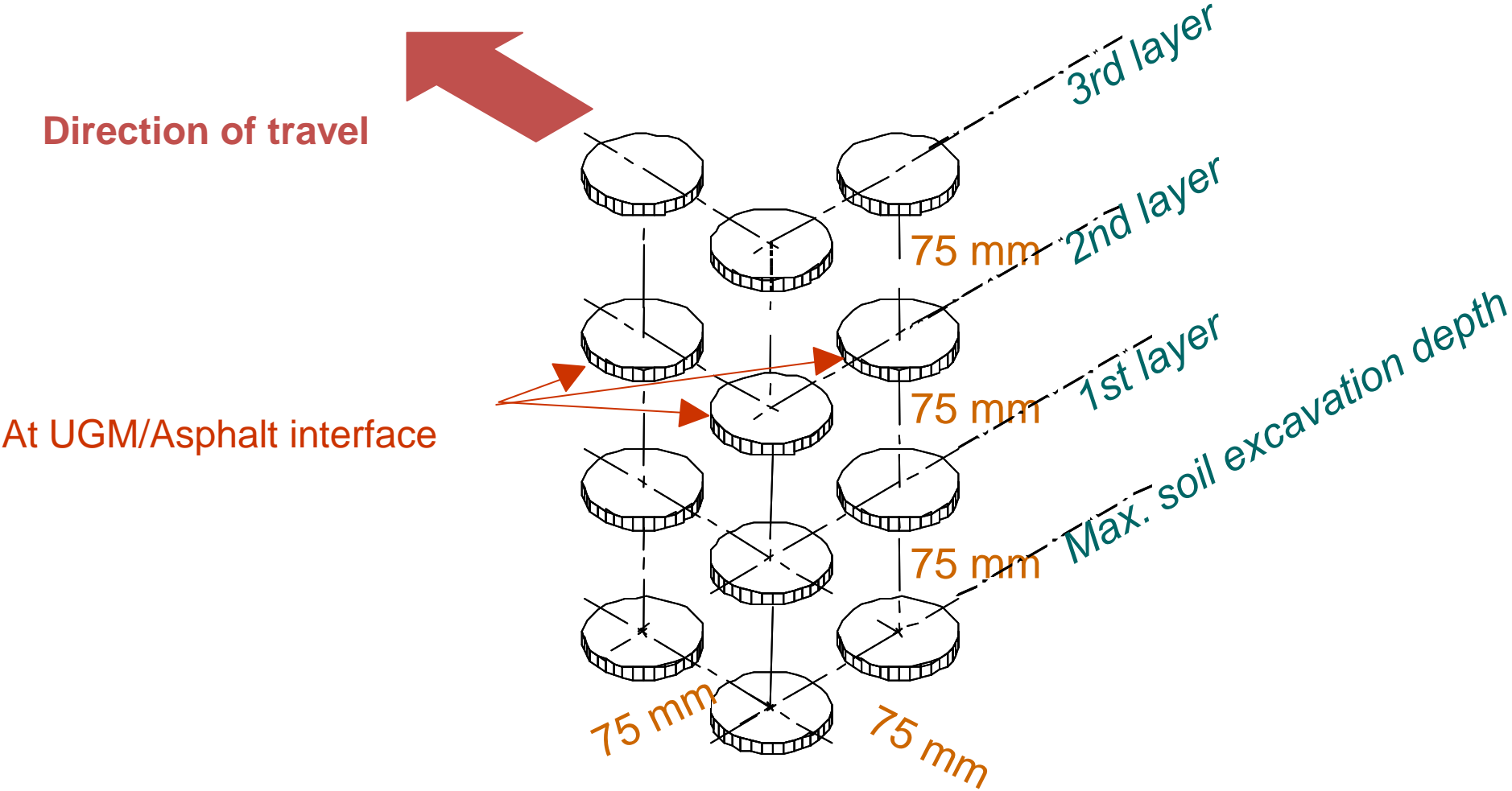
Magnetic Coupling



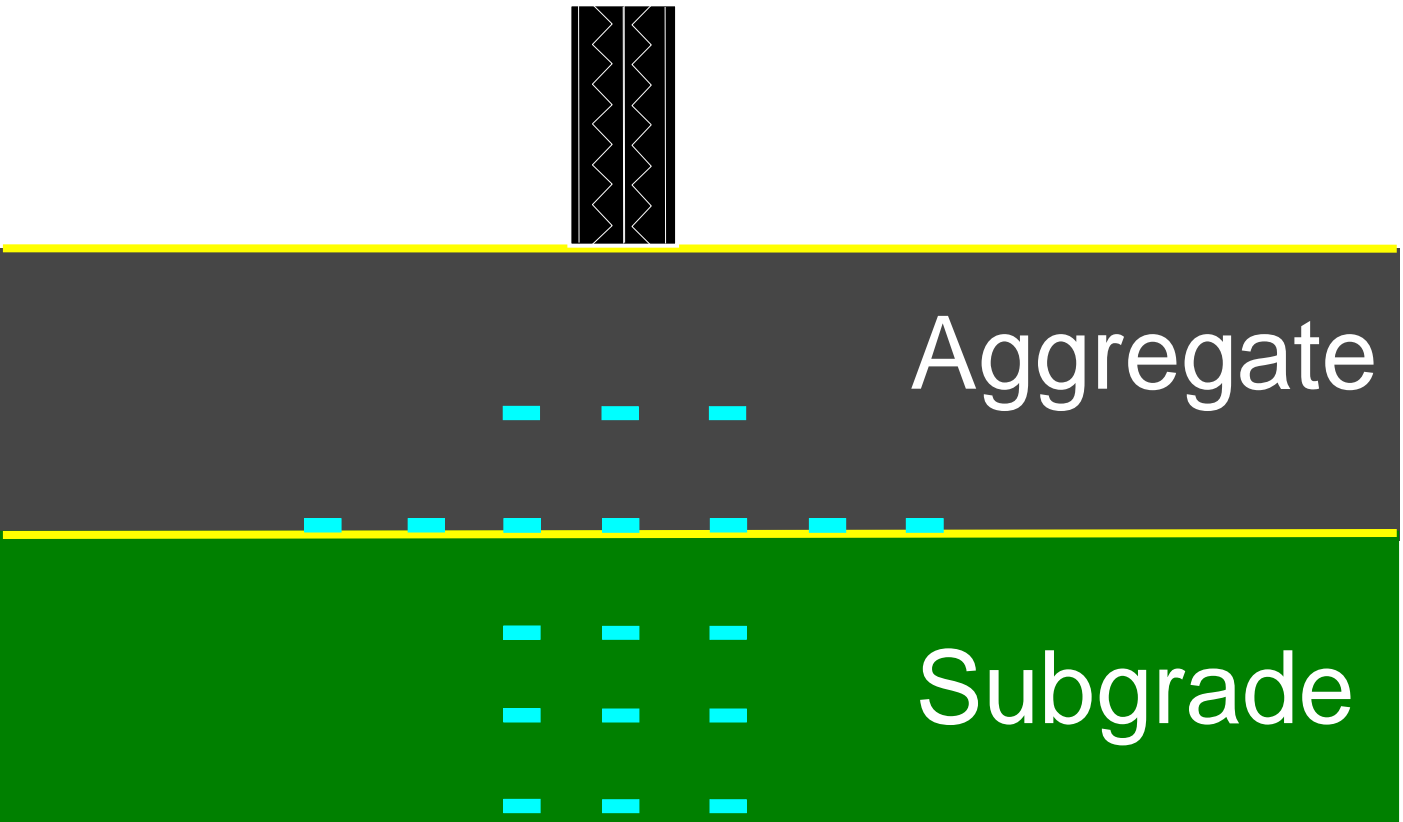
Strain Coil setup in 3d



Strain Coil 3d array stack



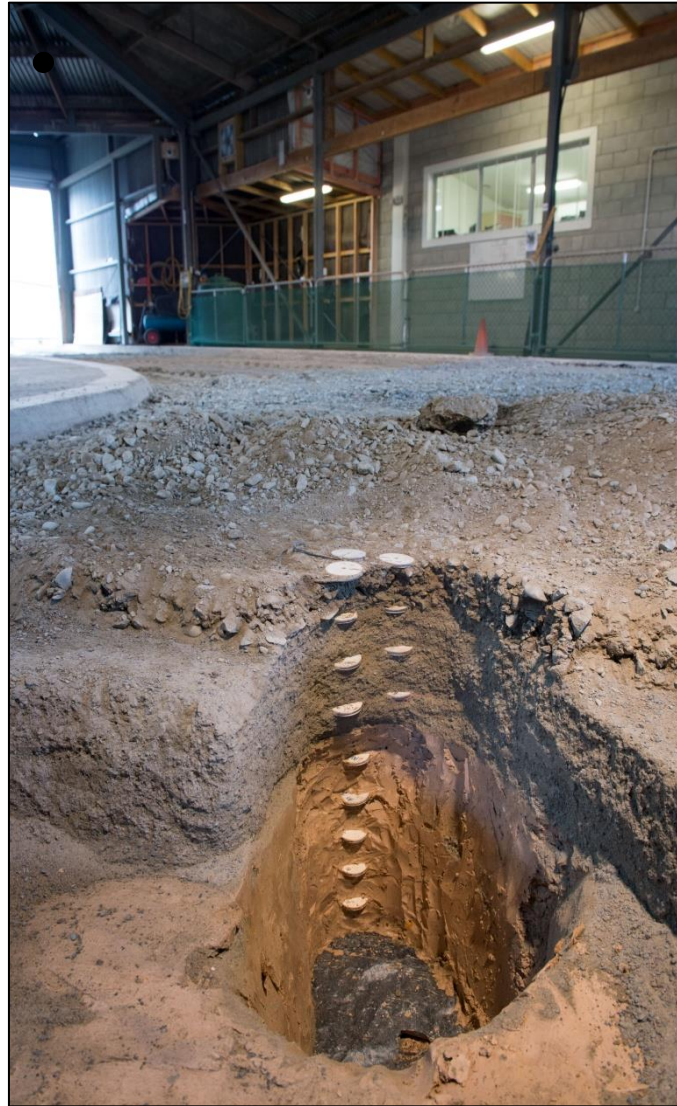
Strain Coil Stack Configuration



— Strain Coil



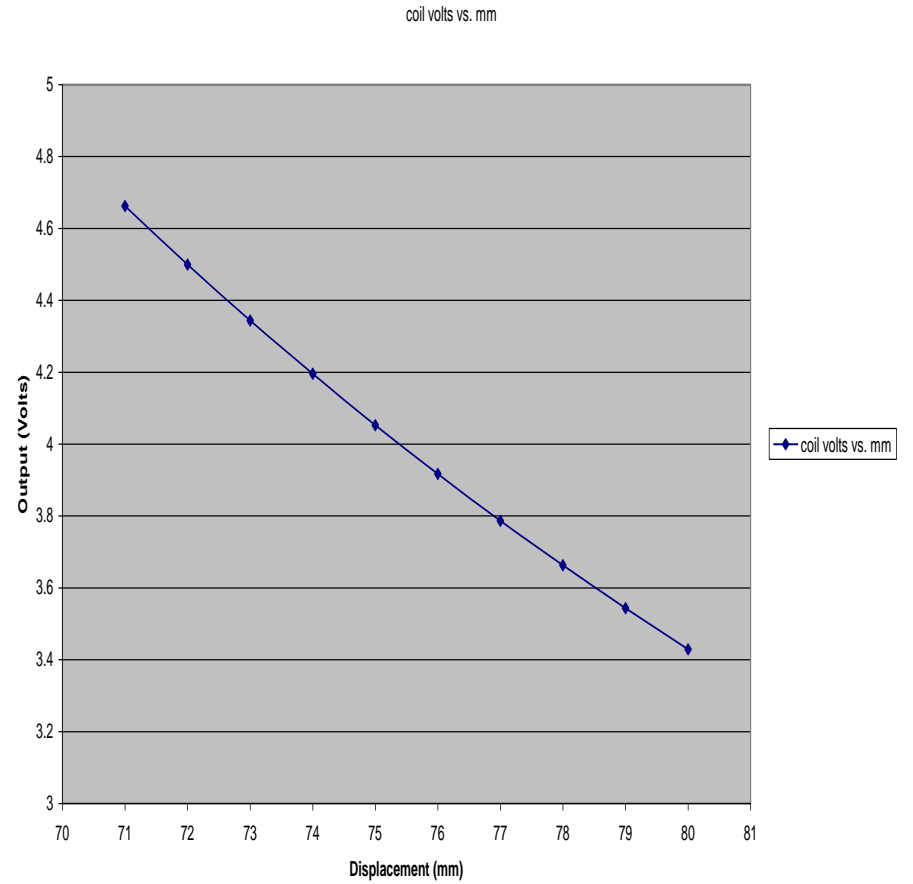
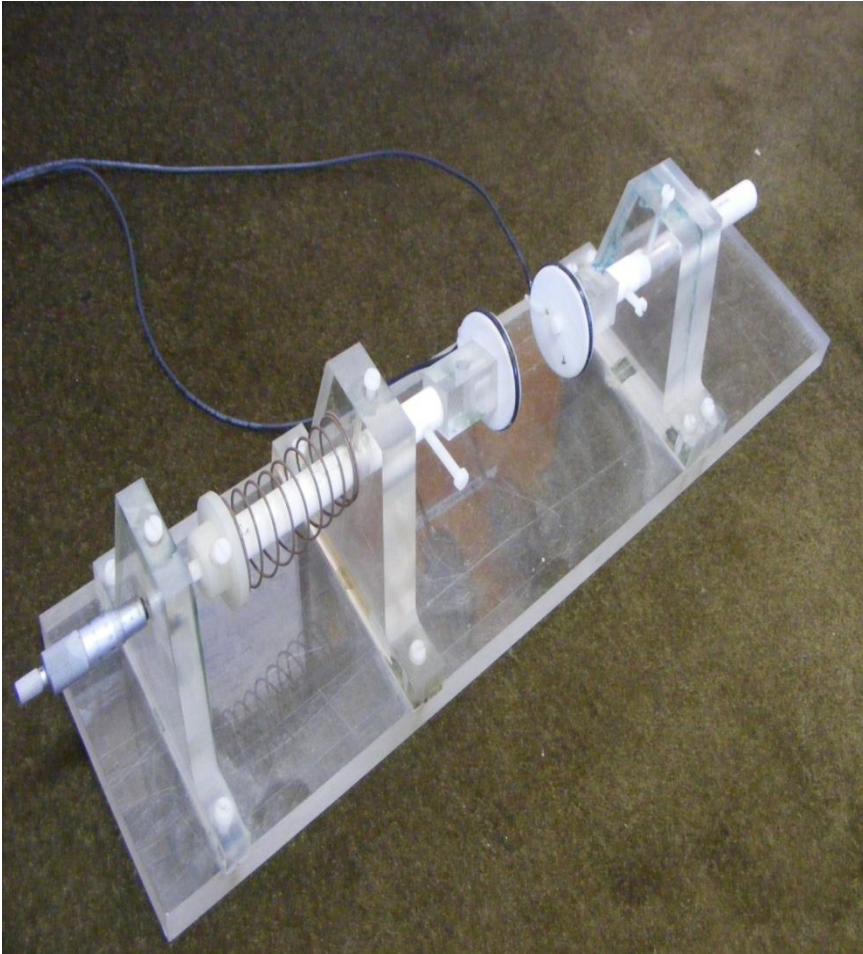
Strain Coil Array excavation



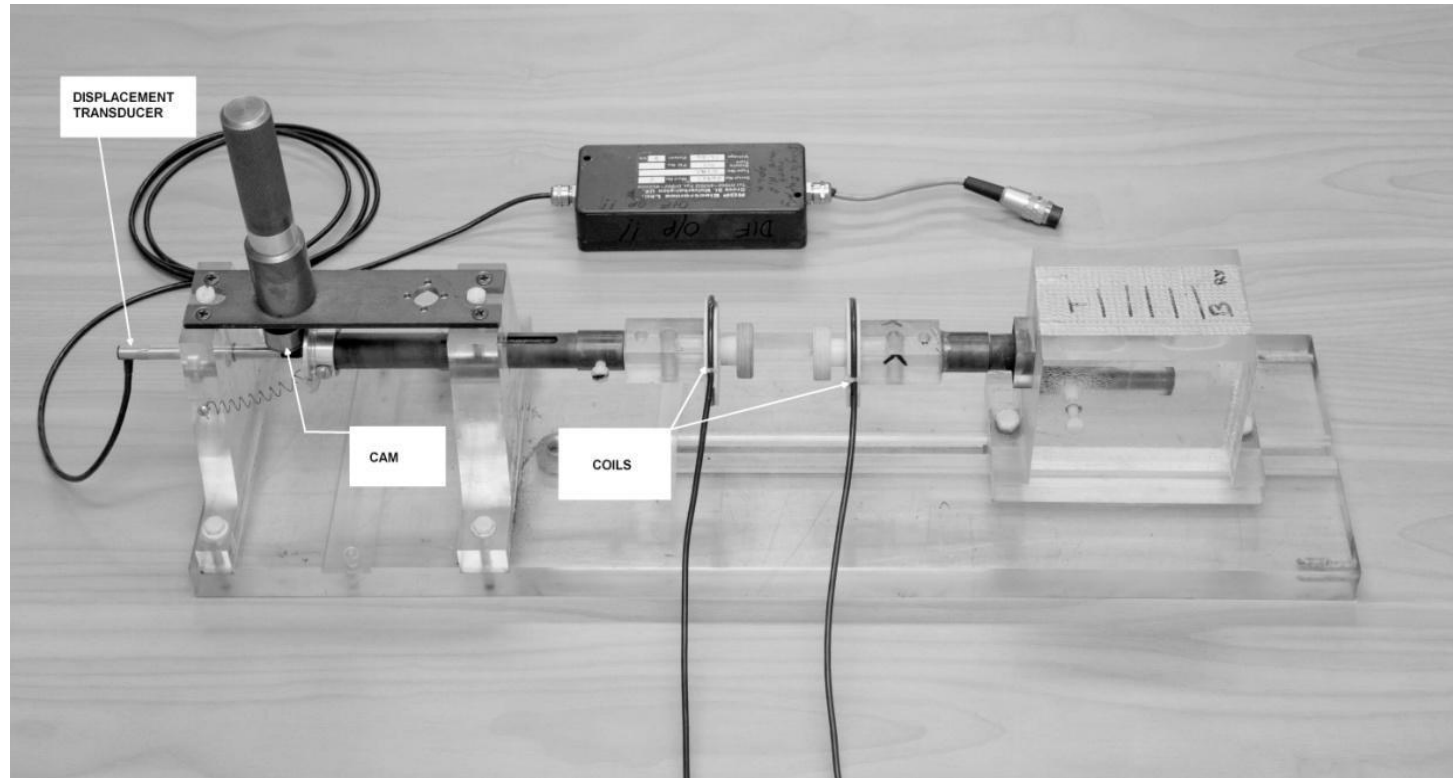
Strain Coil array up close



Strain Coil Calibration



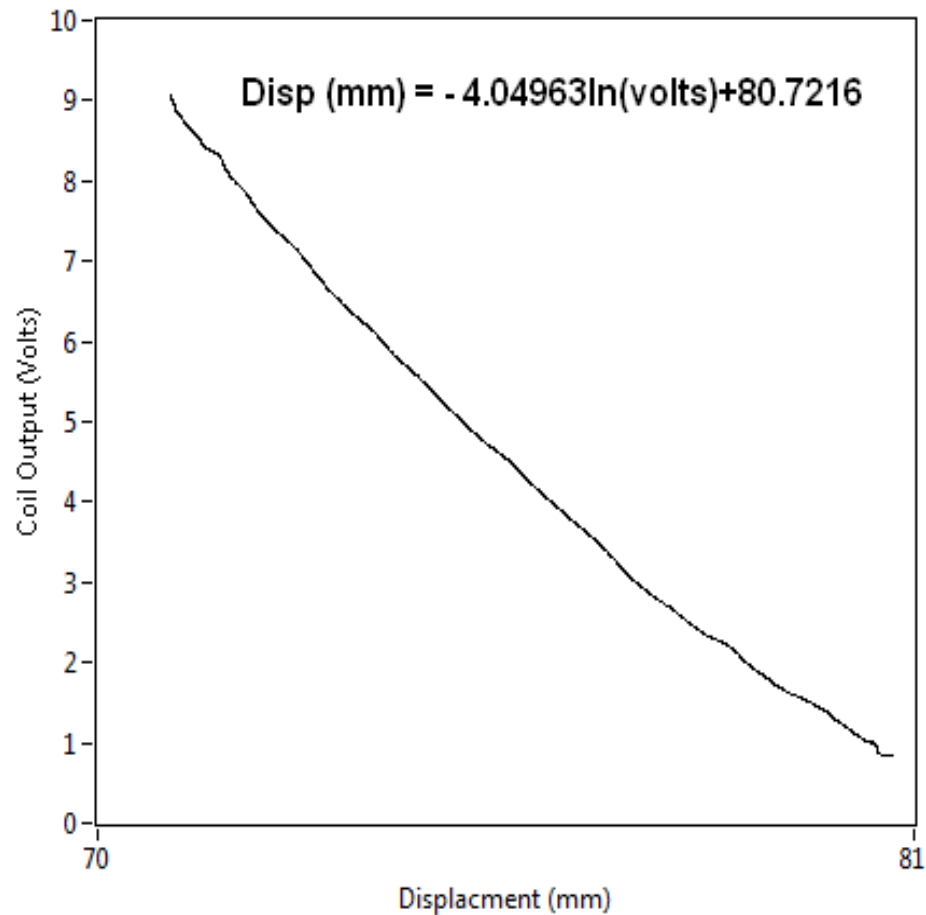
The Calibration Jig



Simple calibration with jig



Logarithmic transfer Function

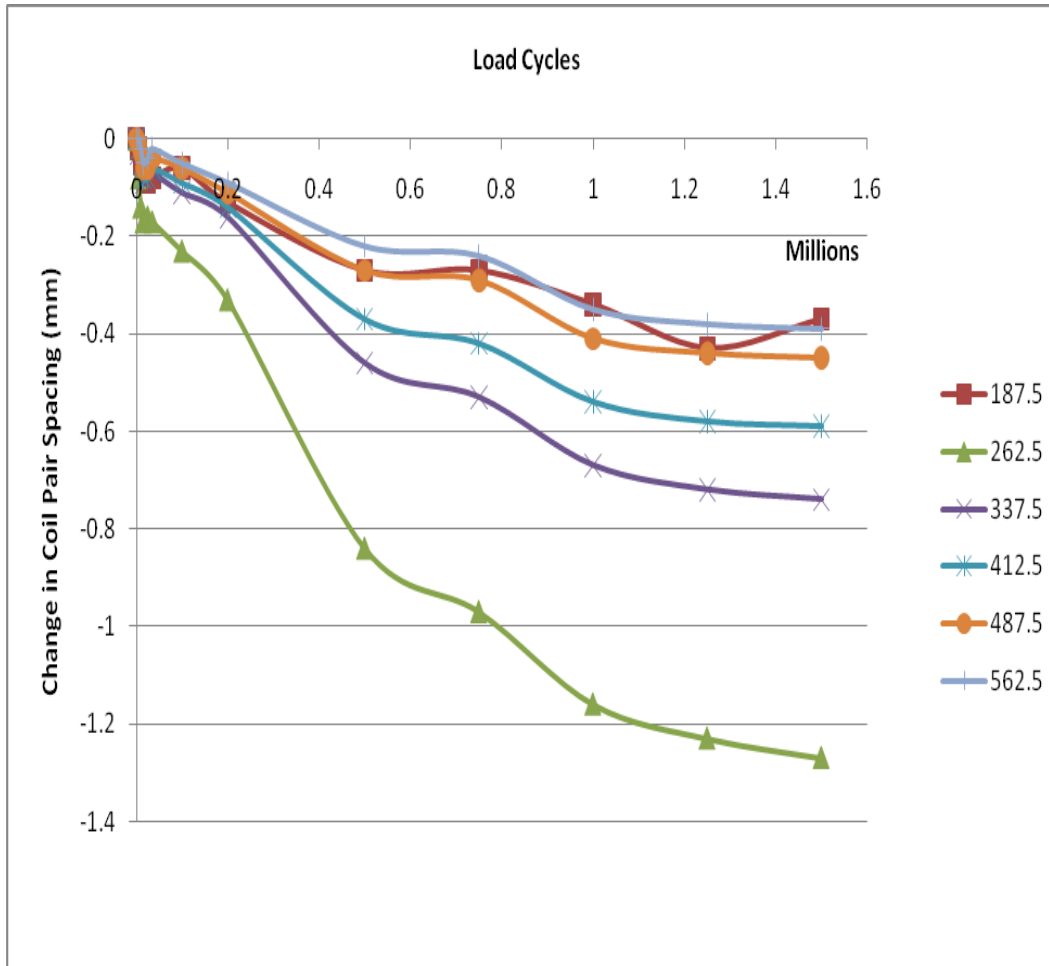


Strain Coil Electronics



- Based on NI Hardware
- 'Off the shelf' products
- Leverages on high quality measurement instrumentation
- Long term stability – no drift
- Coils use a similar principle to standard LVDT's
- Therefore can use NI LVDT module.
- Labview Software

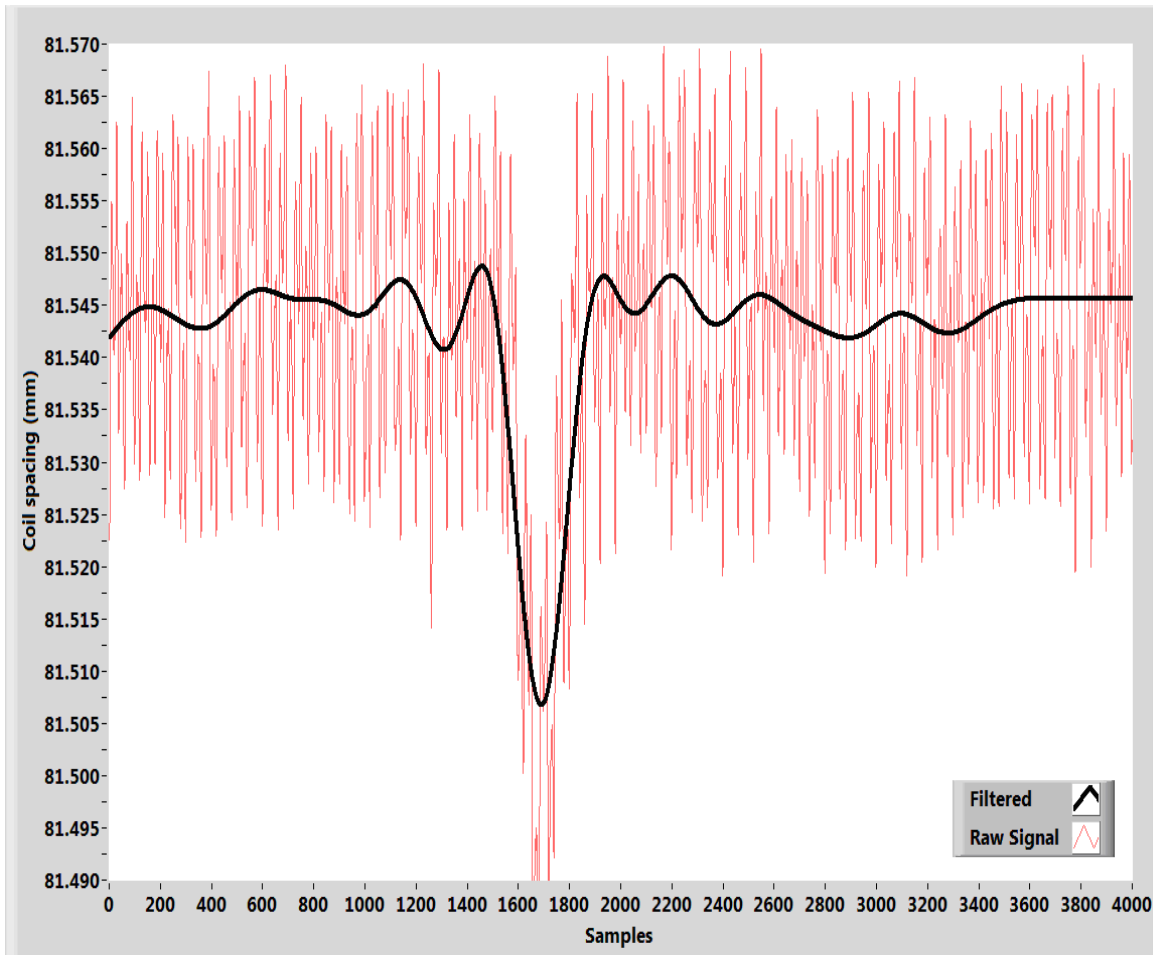
Modes of Operation: 1- Static



Static Mode

- Reads permanent (plastic) strain.
- NI hardware is stable
- Full set of coil stack readings taken at pre-defined lap or time interval

Modes of Operation: 2 - Dynamic

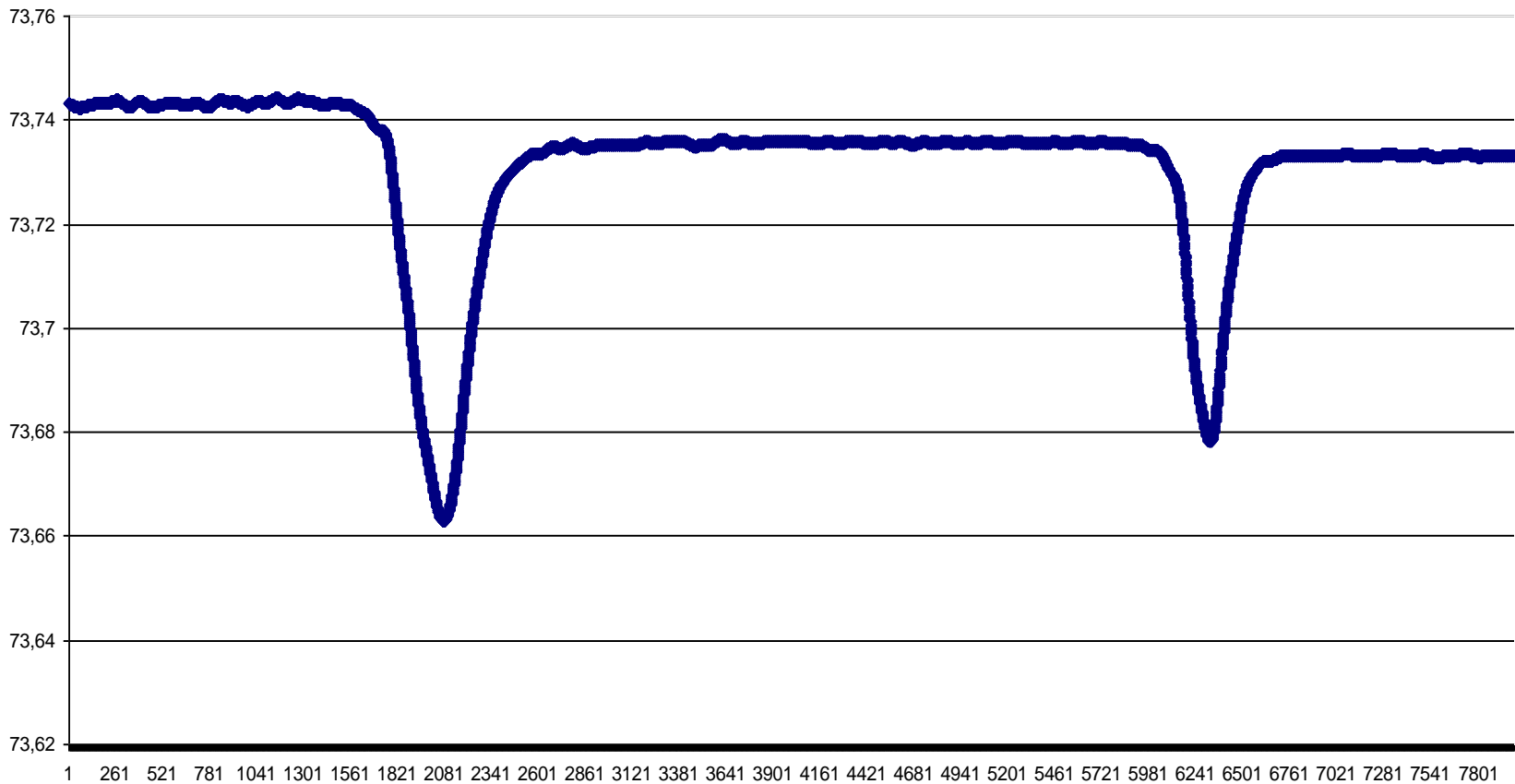


Dynamic Mode

- Reads elastic strains.
- Preset sampling interval and duration
- <20 microstrain resolution

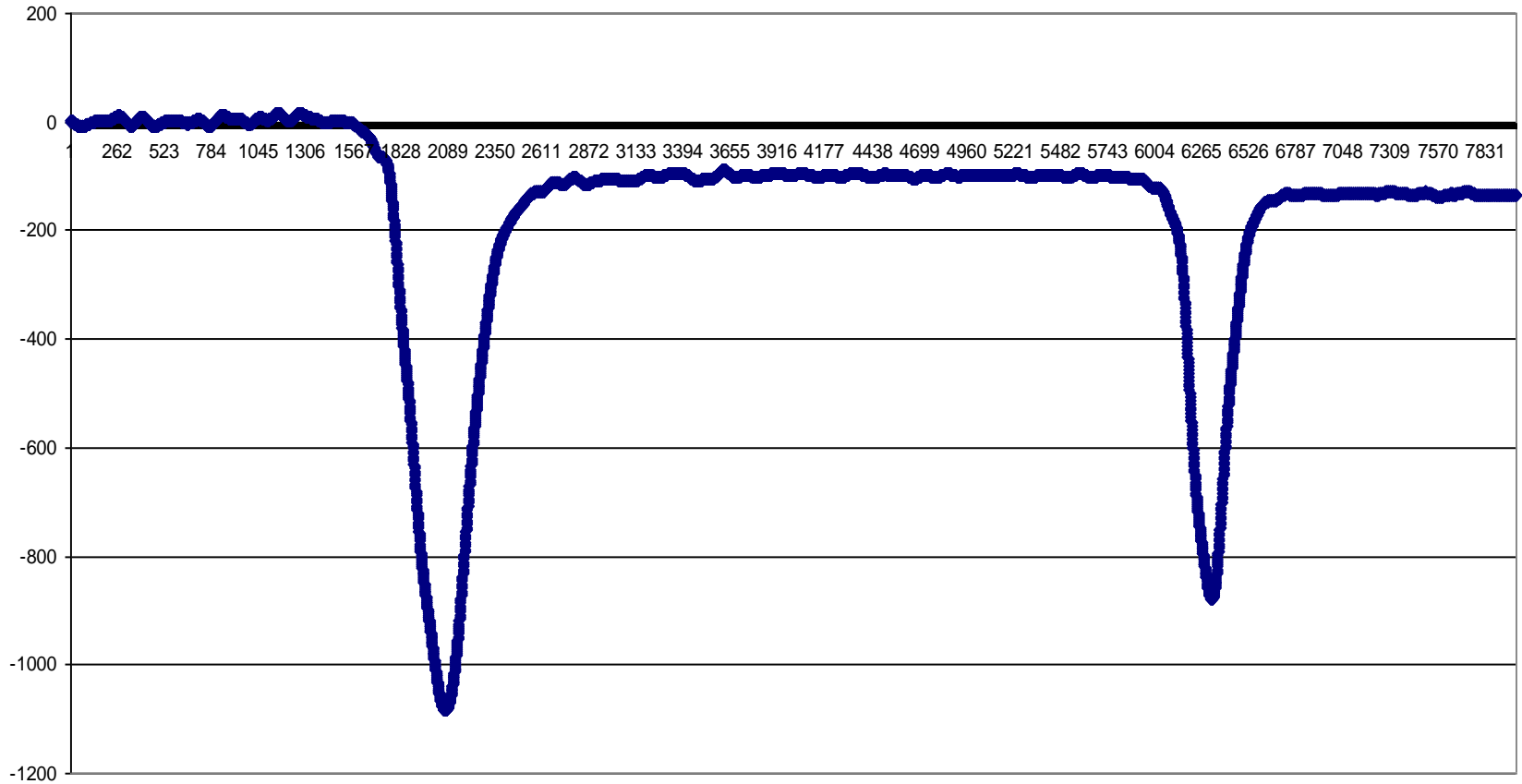
Vertical Displacement (mm)

11/12/2015 12:23 NaCl 1 Ignacio Barrios mm filtered



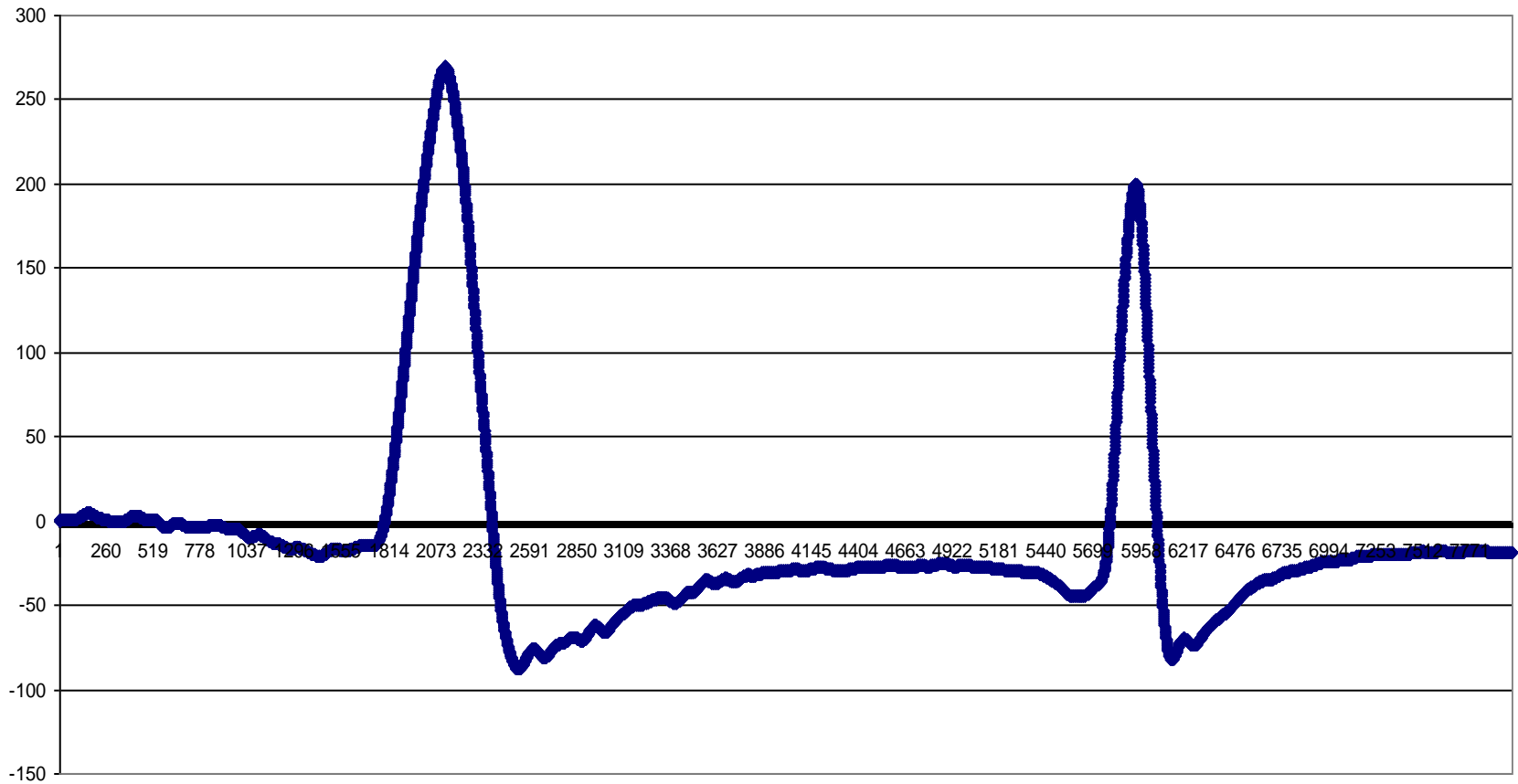
Vertical Displacement (Strain)

11/12/2015 12:23 NaCl 1 Ignacio Barrios



Longitudinal Strain

11/12/2015 12:23 NaCl 1 Ignacio Barrios



Transverse Strain

11/12/2015 12:23 NaCl 1 Ignacio Barrios

