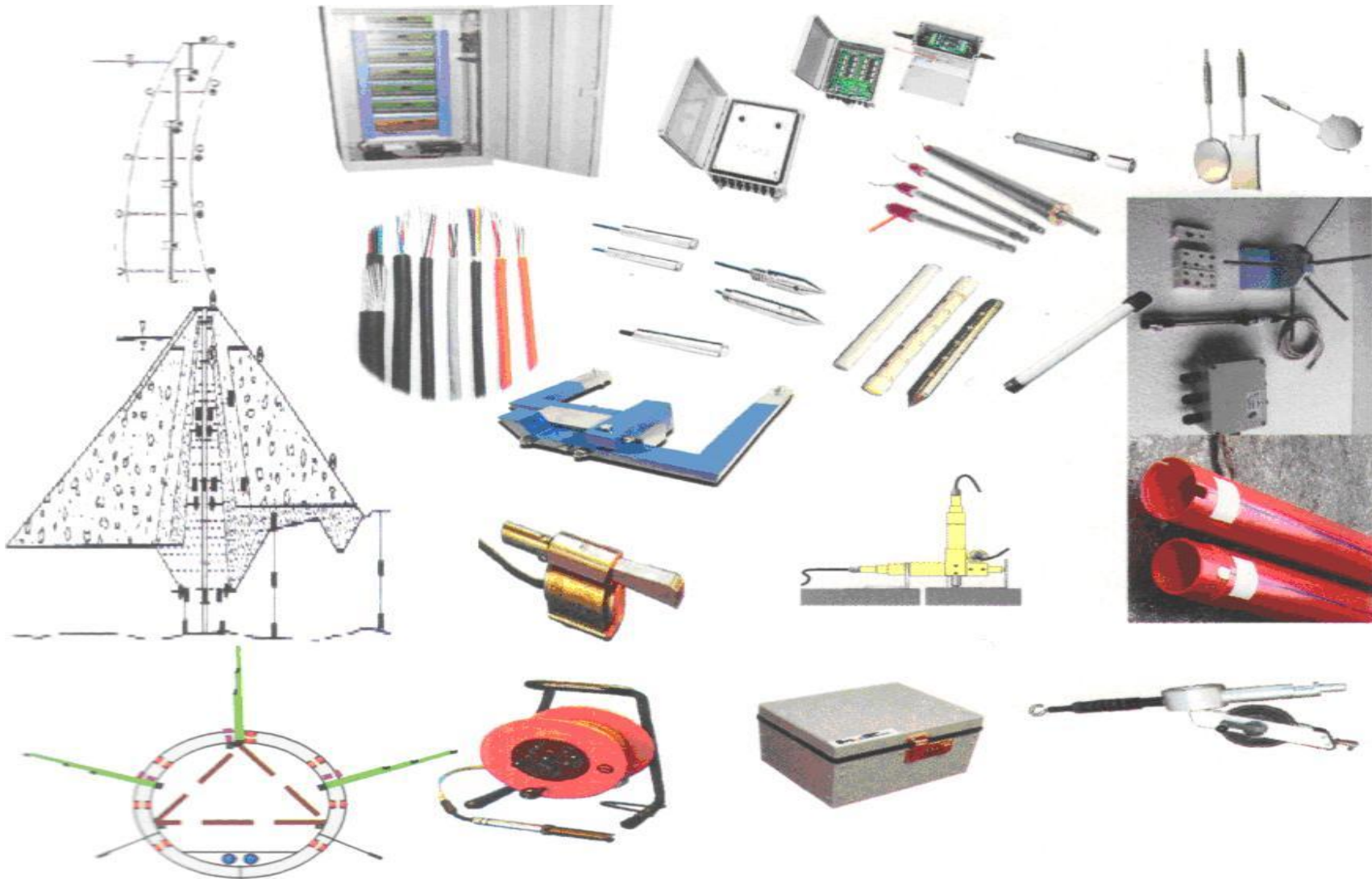




Systel Instrumentation Services Pvt. Ltd.

IAS-ANZ
SG
ISO 9001-2008 Certified Company



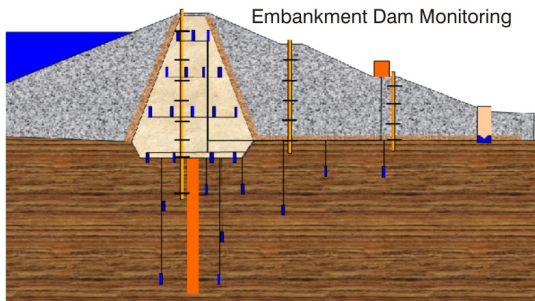
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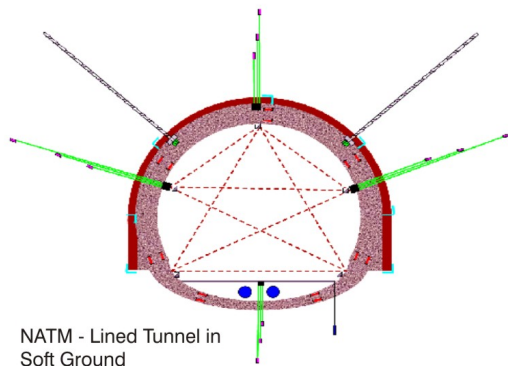
Systel Instrumentation Services Pvt. Ltd.

ISO 9001-2008 Certified Company

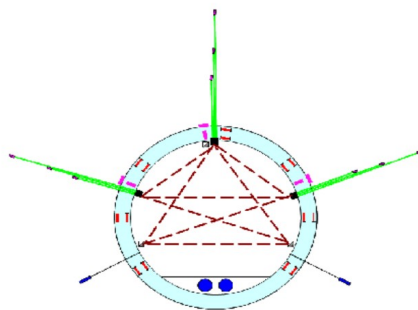
GEOTECHNICAL INSTRUMENTATION



Embankment Dam Monitoring



NATM - Lined Tunnel in Soft Ground



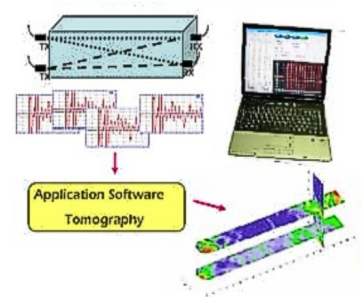
Tunnel in Medium and Hard Ground

SEISMIC PRODUCT / SERVICES



Multichannel Cross-Hole Analyzer performing

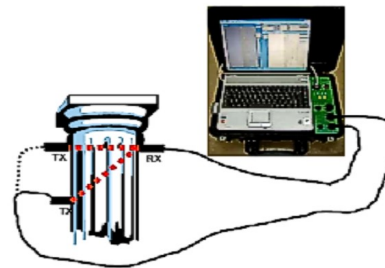
Tomography of measurements



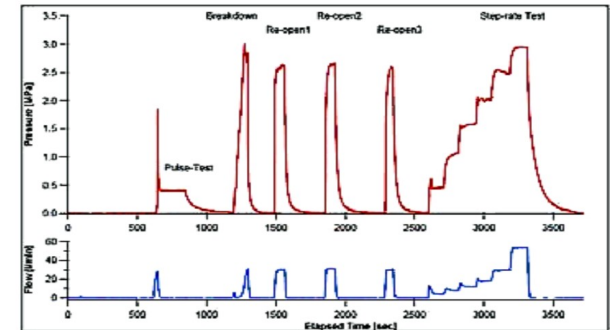
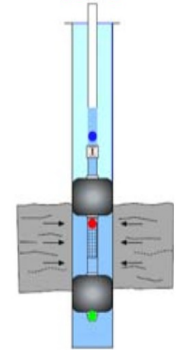
Application Software Tomography



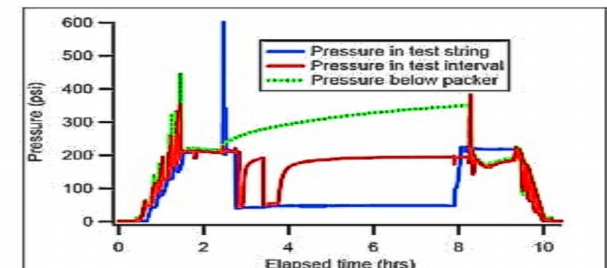
sonic and ultra-sonic investigations in concrete and masonry



Specialized field service Stress Field Logging



Hydrofracturing test with a breakdown cycle, three re-open cycle and a step-rate test



DST with straddle packer system and three memory gauges measuring the pressure in the drill string above valve (blue) inside the test interval (red) and below the lower packer (green)



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SYSTEL INSTRUMENTATION SERVICES PVT. LTD. ISO 9001-2008 CERTIFIED COMPANY WORK WITH FOLLOWING COMPANY FOR THE GEO TECHNICAL INSTRUMENTATION & SPECIALIZED SERVICES

PLANNING AND EXECUTION OF INSTRUMENTATION & AUTOMATED DATA COLLECTION SYSTEM



SISGEO INTERNATIONAL SA , VIA Passeggiate1 CH-6828
Baelrna N.IV : 729927 CH www.sisgeo.com

VIBRATING WIRE INSTRUMENTS DAMS, LANDSLIDE, TUNNELS & UNDERGROUND WORKS, BRIDGES AND STRUCTURES
DIGITAL WATER LEVEL RECORDER/DATALOGGER
WATER VELOCITY & WATER TEMPERATURE RECORDER
WEATHER STATION THERMOGRAPH, HYGROGRAPH, VELOCITY RECORDER , DIGITAL THERMO-HYGRO METER & DATALOGGER



Solgeo Srl , Via Pastrengo 9, 24068 Seriate , Bergamo www.solgeo.it



Stump FORATEC AG , Madetswilerstr. 33 , 8332 Russikon,
<http://www.stump.ch>

Products

ACCELEROMETER FOR SEISMIC MONITORING
Communication & Accessories
Sensors multichannel dynamic signal
Energizer seismic hole Geophysical equipment
Equipment for sonic and ultrasonic
measurements on concrete, masonry, stone

Service provider of following

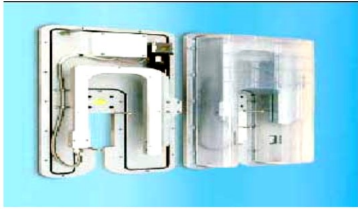
Monitoring networks, seismic, micro seismic and accelerometer
Seismic refraction , Sonic and Ultrasonic Tomography
Surveys television forum, BIPS & Electrical tomography and SEV
High-resolution seismic reflection land and sea
Direct measurements of sonic velocity, ultrasonic, impact-echo
GPR surveys & Measures of deviation of boreholes
Control method with echo-sounders marine pilings & mechanical
admittance

High Pressure Dilatometer Test
Stress Field Logging
Acoustic/Optical Imaging in Borehole
Permeability Logging for Coal Bed Methane Borehole
Temperature Gradient Logging
Digital Caliper Logging
Hydro-Jacking Test
High Pressure Injection Test for Stimulation



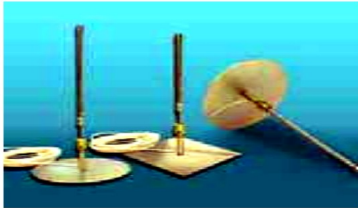
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DAMS



Telecoordinometer (TEL-310S):

It is an optical device designed for automatic measurement of the coordinates of the pendulum plumbines. All TEL-310S units are water proof so temporary submersion do not damage instruments



Embankment Extensometers (D232):

They are utilized to measure strain in large earth structures at the construction stage. Embankment extensometers are usually embedded in the filling material.



Vibrating Wire Piezometers (PK45):

Their construction technology makes them particularly suitable for long term monitoring. They are commonly employed to control water pore pressure available both with HAE & LAE filters.



Earth Pressure Cells (L140):

Aimed to monitor the total pressure in an earth fill dams & embankments or on the interface between the structure and the excavation wall. Available both in vibrating wire or electrical model.



Data Acquisition System (ADK100):

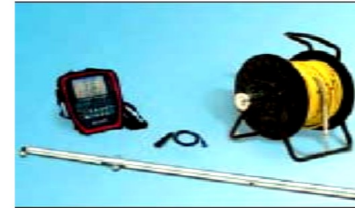
It is designed for field use, available in different models. All versions are housed in water resistant IP65 stainless steel enclosures. ADK-100 is suitable also for alarm notification & remote data transmission.

TUNNELS AND UNDERGROUND WORKS



Borehole Rod Extensometers (D222):

They are installed in boreholes in order to monitor displacement at various depths, using rod of different material and lengths. Available both with vibrating wire and potentiometer transducers.



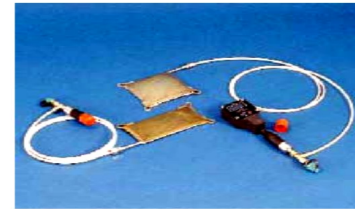
Removable Extensometer (T-REX):

T-Rex is a removable extensometer which has been designed for incremental measurements along the axis of inclinometer casing with magnetic ring. Supplied with software data analysis.



Vibrating Wire Strain Gauges (VK400):

They are utilized to monitor strain in steel or reinforced concrete and mass concrete structures. SG are particularly durable and thermally-aged to minimize long term drift and changes in calibration.



NATM Stress Cells (L112):

They consists of pressure pad connected to a transducer through a hydraulic line, filled with de-aired oil. NATM stress cell are supplied with C6002 readout that display reading directly in MPa.



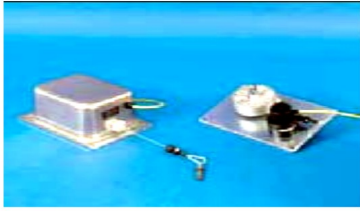
Readout Units (CRD-400):

CRD-400 is the new hand-held universal readout designed to read any kind of instruments. Amongst many features the color graphic display, the Ni-MH rechargeable battery and the splash proof casing.



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LANDSLIDE



Wire Crackmeter (D241):

Aimed at monitoring changes in the distance between two anchor points located at up to 30 meters apart. The wire crackmeter consists of a stainless steel transducer box and an expansion anchor target.



Inclinometer Probes (S200 & S400):

Available both in removable and in-place versions, they are able to measure lateral earth movements in land-slide and in stable areas. In-place MEMS model is supplied with built-in thermistor.



Casagrande Piezometer (P100):

Intended for measuring pore water pressure. The filters are made of high density polyethylene with a threaded cap joint for two 1/2" tubes or one 1 1/2" tube.



Dex in-place Extensometers (DEX):

They are designed for automatic monitoring of settlement or heave. DEX probes can be placed at different depths where the settlement occurs with reference points at the top or bottom of the casing.



Jointmeters (D300):

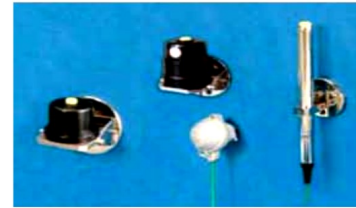
They could be installed for cracks and/or joint relative movement monitoring. Jointmeters are available both with vibrating wire and potentiometer transducers in order to suite to any application.

BRIDGES AND STRUCTURES



Anchor Load Cells (L200):

They consist of a ring shaped steel body which incorporate from 8 to 16 electrical resistance strain gauge in a full bridge configuration. Typical applications are testing of anchor systems in tunneling or deep excavations.



Surface Inclinometers (S500):

They are employed for inclination/rotation monitoring of bridge decks and piles. Inclinometers are available in uniaxial and biaxial versions, equipped with solid-state or force-balanced servo accelerometer sensors.



Spot Weldable Strain Gauges (VK410):

They measure strains in steel structures and can be quickly and easily installed in the field. They only require the use of portable spot welder or epoxy bonding for installation procedures.



Thermometers (T111):

They are of critical importance to evaluate the influence of thermal effect on measurements and structures. We use two types of devices to monitor temperature: thermistors and PT-100.



Differential Settlement Monitoring System (DSM):

Relying on the principle of communicating vessels, they are able to measure variation in differential subsidence of the structure, which they are installed on.



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SEISMIC PRODUCTS



DYMAS high resolution dynamic acquisition system can operate as vibrational or microseismic unit in standalone or multi-station configuration. They fully respect international standards DIN4150-3, DIN45669-1 & UNI9916 requirements.



DYMAS typical employing is dynamic monitoring of civil and industrial structures as bridges, viaducts, chimneys, plants for rock noise and movements caused by natural seismic events or generated during excavation or blasting. DYMAS is integrated with **VIBROSOFT** configuration, Communication, processing and visualization software.



The main components of the SolGeo ultrasonic CMS **Measurement System** are:
1xCentral Data Acquisition Unit with HP-IPAQ PDA and the pre-installed SolGeo-PocketSonic

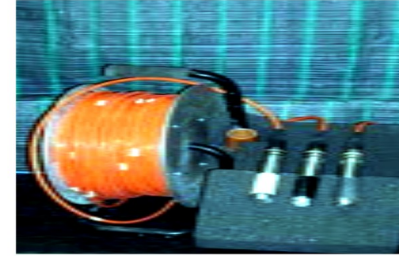
Software

2xEmitters - Piezoelectric transducer > 1,6 kV, 55kHz, 20kHz
1xHammer – Piezoelectric transducer for low frequency (sonic) signals
1xReceiver – piezoelectric transducer: 55 kHz (optional il 20-80 kHz)



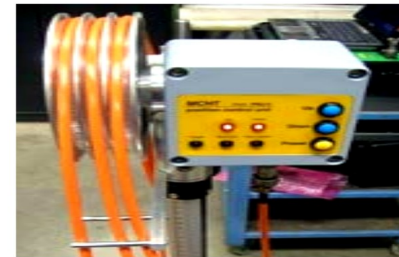
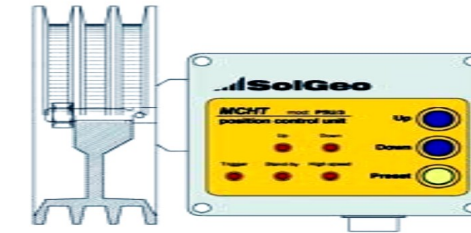
Transducers-Sensors:

A)- piezoelectric Receiver (internally pre-amplified, 20dB, 10x) 55kHz res. freq. (optional 20-80kHz)
B)- piezoelectric Transmitter with adjustable transmission pulse (up to 1.6kV)



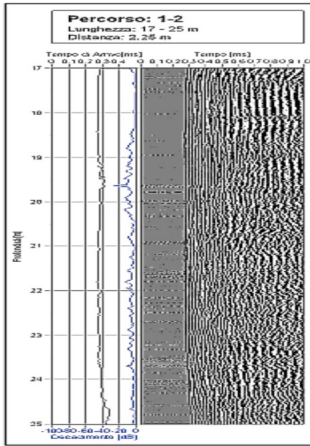
Piezoelectric Transducers.

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



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SEISMIC SERVICES SOLGEO has a team of technicians with more than 20 years experience in geophysical survey



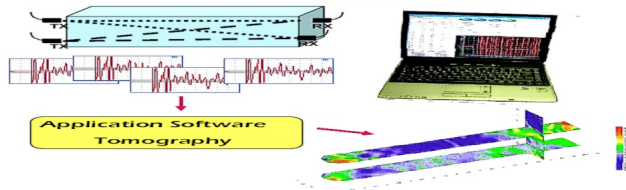
SolGeo's main Business Activities



Multichannel Cross-Hole Analyzer performing

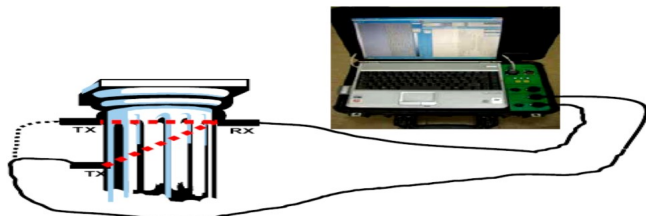
Cross-Hole and Down-Hole: P, SV and SHH waves for soil site characterization. We use spark generator for compression wave transmission and lectrodynamics energy source "GEOS" (by ISMES) for shear wave; receivers like hydrophone (P-waves) or tridirectional velocity transducers (S-waves); high frequency multichannel system for digital acquisition.

Tomography of measurements



Tomography examination of dams: we adopted our sonic acquisition system and our tomographic analysis software in more than 140 dam in Italy for ENEL

sonic and ultra-sonic investigations in concrete and masonry

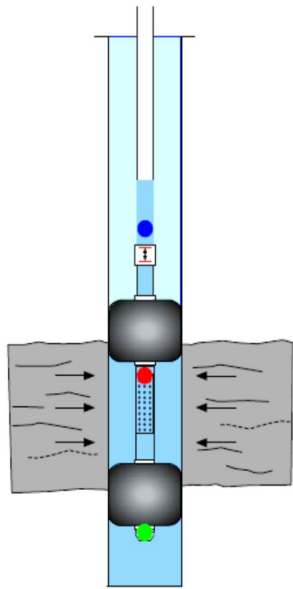


Non-destructive investigations on structures and foundations: we adopt sonic and ultrasonic testing methods for the evaluation of quality and consistency of concrete foundations (i.e. piles, walls or concrete injections) and for the control of the material degradation status in rock masses and monuments. Surveys are based on the measure of velocity and propagation modality of the elastic waves between two or more transducers: sonic well logging, cross-hole and tomography.



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STUMP AG & POLYMITRA Specialized field service - packer testing, stress measurements, Downhole instrumentation, borehole survey

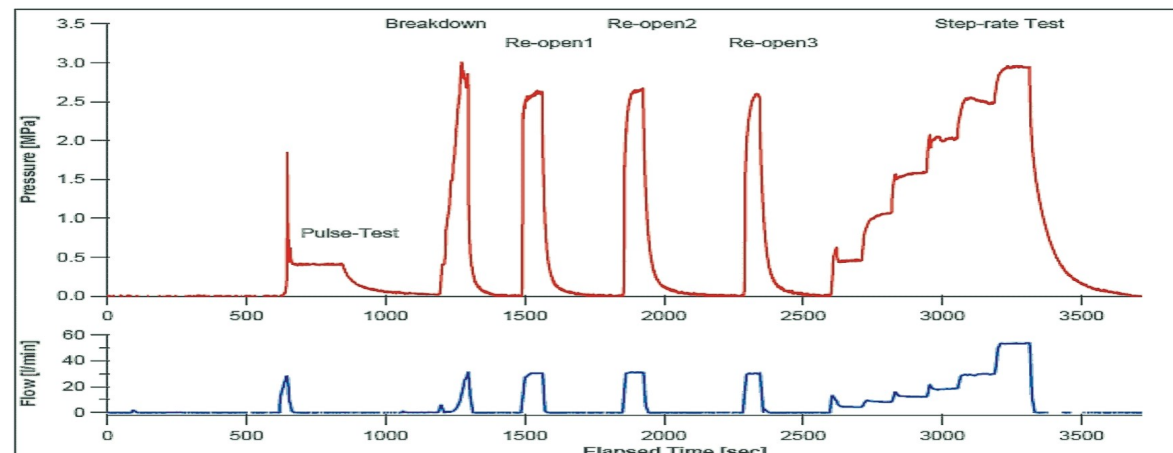


Hydraulic fracturing is a technique for measuring in situ stresses in boreholes. For many years, a main application was determination of the minimum horizontal stress for hydro power pressure tunnels. However, this technique is more and more applied for the exploration of other underground excavations and construction.

Hydraulic fracturing is conducted with a robust double packer system on short borehole intervals which are free of natural fractures (Haimson and Fairhurst, 1967). Following the inflation of the packers, the interval is pressurized until an axial fracture is induced. The interval is shut-in shortly after the breakdown pressure is reached and the pressure decline is monitored. The fracture is then subjected to several re-opening and draining cycles by injecting small fluid volumes (typically 5 - 15 l). The objective is to define the pressure at which the walls of the fracture are just supported by a fluid cushion. This pressure represents the rock stress component normal to the plane of the fracture, and is variously referred to as 'closure pressure' or 'jacking pressure'.

The equipment consists of a robust double packer system (IPI DST-tool) to isolate a test section in the borehole with a test interval length of 1.67 m and length of the packer elements of 1.0 m. The packer system is lowered down the boreholes on small diameter drill rods (e.g. BQ). This rods string is also used for opening and closing of the downhole valve. A stainless steel line for packer inflation and injection of water into the isolated borehole section is run along the drill rods.

The test pressure is measured downhole in the test interval with two memory gauges with high record sampling (10 Hz). Flow rate and an additional measurement of the test pressure are made on the flowboard at the surface. Data is recorded at the surface using an A/D-converter connected to a PC which provides a graphical display of the pressures and flow rates as they are recorded using a special software which allows high sampling rate during the injection phase.



Hydrofracturing test with a breakdown cycle, three re-open cycles and a step rate test.



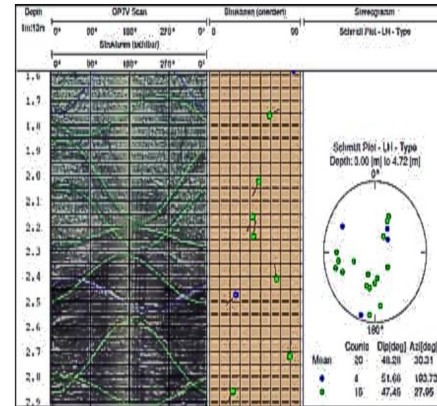
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STUMP AG & POLYMITRA SERVICES



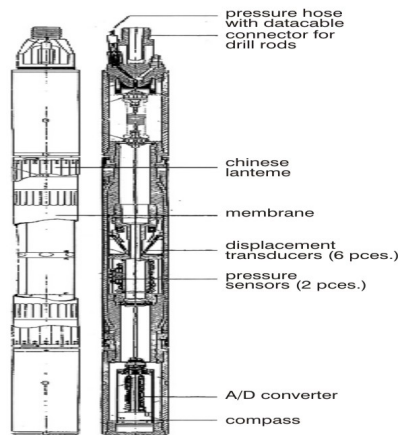
Well Logging for Groundwater Surveys (GFTC-Probe)

Natural Gamma , Flowmeter, Temperature Conductivity
 Geophysical borehole surveys provide geological and hydro-geological information. While running through the borehole, the probe continuously transmits data on natural gamma, temperature, conductivity and fluid velocity to a portable computer representing the data in form of a borehole log.



Borehole Televiewer

optical (OPTV) and acoustic (BHTV),
 Oriented image (360°)
 High resolution
 Starting at 75mm borehole diameter
 100% colour fidelity (OPTV)
 Borehole televiewing provides lithological characterisation of the borehole wall (clefs, stratum inclination, schistosity) or it is used to define the quality assurance of the drilling works. The probe is run into the borehole on a winch and is providing real-time digital values.



High Pressure Dilatometer Cambridge Insitu, 93/95mm

The high pressure dilatometer CAMBRIDGE INSITU was developed to determine the stiffness of soils (e.g. for stiff clays, solid sands) and of rocks. During the test, the dilatometer is measuring the expansion of the borehole diameter by means of a rubber membrane inflated by compressed air. Six transducers regularly placed on a horizontal level determine the deformation of the underground. The measurement data is digitized already in the probe. An integrated electrical compass supplies data about the geographical orientation of the transducers.

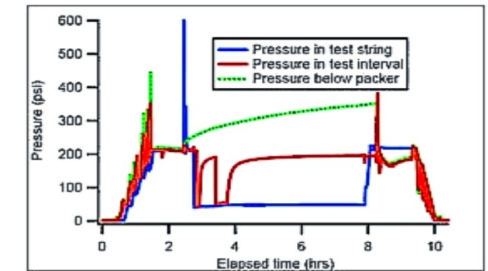
Multi-Position Groundwater Monitoring

Monitoring of groundwater at different levels
 Sampling of groundwater
 Measuring of hydrochemical parameters
 This sampling system is designed to observe groundwater at different levels. It allows taking precise samples and defining their hydro-chemical parameters. It is particularly suitable for analysing contamination or for planned engineering construction sites in the groundwater.



Borehole Geometry Survey Multishot magnetic, Maxibor

Borehole verticality surveys provide information on borehole inclination and direction:
 vertical angle = inclination
 horizontal angle = Azimuth vertical deviation
 horizontal deviation coordinate = x / y / z



DST with straddle packer system and three memory gauges measuring the pressure in the drill string above the valve (blue), inside the test interval (red) and below the lower packer (green)



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