

MML Universal Testing & Engineering is a specialist in Instrumentation & Monitoring Works, (I&M), offering the best manual (on-site) and real-time monitoring solutions for any geotechnical and structural application in Civil Engineering field.

Instrumentation and monitoring technologies are used to monitor existing or under construction structures or infrastructures. In many cases, these structures are monitored for evaluation of performance-based-design and also for early warning system.

Our service include;

Geotechnical

Inclinometer

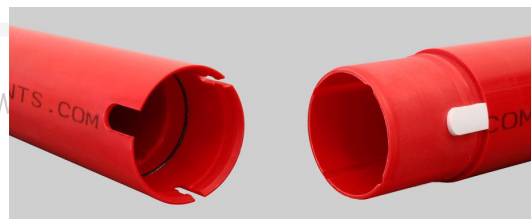
Inclinometer are used to measure displacements in ground and in structure that lie below the ground level (e.g retaining wall).

Manual (on-site) : Inclinometer reading carried out manually on site.

Real-time : Real time monitoring using **In-place Inclinometer (IPI)**, where the IPI employs a fixed chain of sensors and does not require an on-site operator, providing real-time and remote monitoring.



Inclinometer



Inclinometer Casing

Piezometer

Piezometer are used for measuring pore pressures in ground to understand ground behavior, before,during and after construction.

Manual (on-site) : Piezometer reading carried out manually on-site.

Real-time : Real time piezometer monitoring provide data in real-time and does not require an on-site operator.



Piezometer

Extensometer

Extensometer is used to measure settlement or heave of soft ground under the influence of loading or unloading due to the construction of embankments, fills, buildings, foundations, and structures.

Extensometer available for manual (on site) and real-time monitoring.



Structural

Settlement

Settlement monitoring typically carried out to monitor vertical displacement of existing building infrastructure or road due to ground excavation and construction activities.

Manual : Manual settlement monitoring carried out by using **Surface Settlement Marker (SSM)**.

Real-time : Real time settlement monitoring using **Liquid Leveling System** allows for accurate real-time measurement of the structure of vertical movement, be it either settlement or heave.

Load Cell

Load Cell are used to measure load or strain, providing permanent means of monitoring the load throughout the life of the tieback, rockbolt, struts, supports, etc.

Load Cell available for manual (on site) and real-time monitoring.

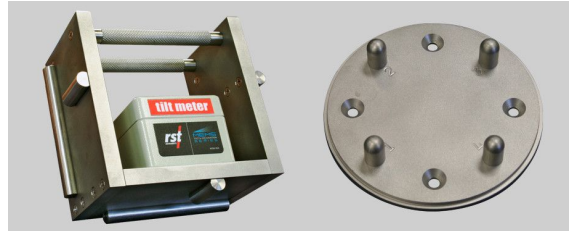


Load Cell

Tiltmeter

A Tiltmeter is a sensitive Inclinator designed to measure very small changes from the vertical level, either on the ground or in structures. Submersible Tiltmeter also available for under water application.

Tiltmeter available for manual (on site) and real-time monitoring.



Tiltmeter and Tiltplate

Vibration

Accelerometer/Acceleration Transducer

Accelerometer is an electromechanical device used to measure acceleration of motion of a structure.

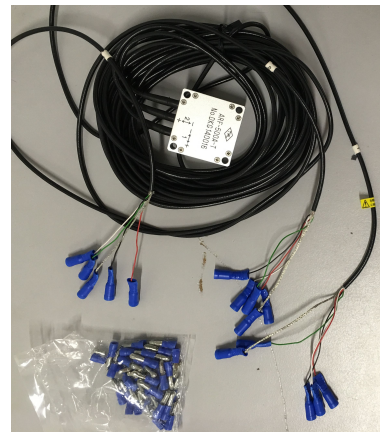
Strong Motion/Seismometer

Seismometer is a Seismic Sensor which are sensitive to vibrations along three orthogonal directions. Ideal for applications in seismology and in the structural field.

This vibration monitoring system offer a real time monitoring. It does not require an on-site operator and providing real-time and remote monitoring.



Strong Motion



Acceleration Transducer

Crack Meter

Crack Meters are used to measure displacements across cracks and joints in buildings, bridges, dams, pipelines and similar structures. They can measure both the opening and closing of cracks or joints.

Crack Meters available for manual (on site) and real-time monitoring.



Crackmeter

Fiber Optics

Fiber Optic Monitoring system, provided by our partner **Optosensing**, produces distributed optical fiber sensors and systems for temperature and strain measurement at high temporal and spatial resolution. Continuous reading, even in remote, is performed all along the structural element or the material to which the fiber is attached.



Glued fiber optic on Bridge

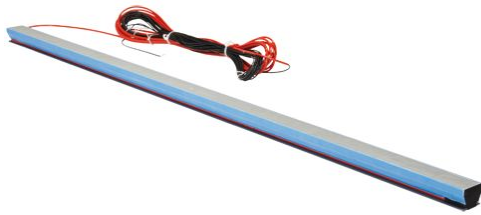


Instrumented bridge

Geotechnical and Structural monitoring can be carried out by connecting the fiber sensing cable to the structure or the structural elements to monitor. In this case, the sensing element must adhere to the selected element to allow the perfect recording of any strain.

Weight-in-Motion

Weigh-In-Motion (WIM), provided by our partner, **Kistler**, offer automated real-time traffic monitoring without affecting the traffic flow. It mainly used for traffic data collection, weight enforcement and toll collection.



Lineas WIM Sensor



Kistler WIM System

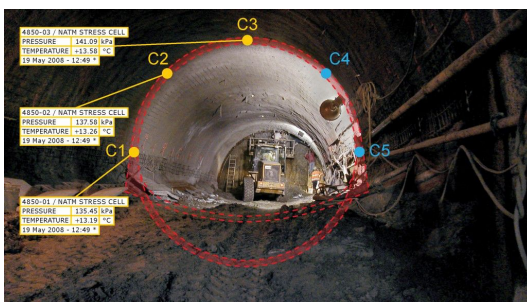
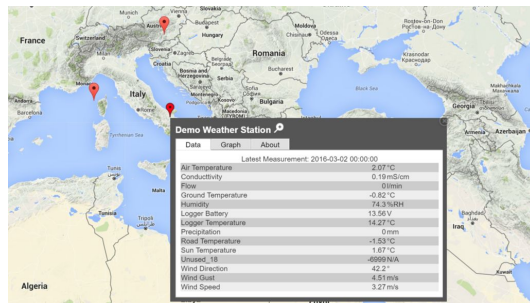
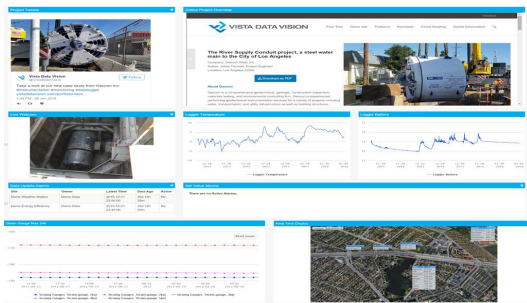
Integrated Management System (IMS)

Vista Data Vision (VDV)

VDV is a comprehensive **Data Management System** for data collected from dataloggers. VDV loads the data into its powerful database and offers web service for most of its functions. This includes data visualization, alarm handling and reporting.

By using the advanced and robust VDV the time to deployment will be shorter and the data handling operational cost lower. Most importantly, however, is the easy and quick access to sensor data presented in such a way that time to understanding and decision becomes shorter.

All instrument data can be stored or access in a single location where we can view data in real time anywhere and any time. No need to manually plot or analyze data again as all project data can viewed online.



Vista Data Vision (VDV)