

Flat Dilatometer


Seismic Dilatometer


Medusa DMT


Offshore Testing



 **EUROCODE7**
Part 2 (2007)

 **ASTM - Standard**
D6635 - 15 (2016)

 **ISO - ISO/TS 22476-11**
(2017)

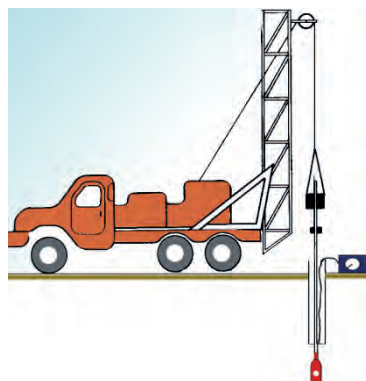
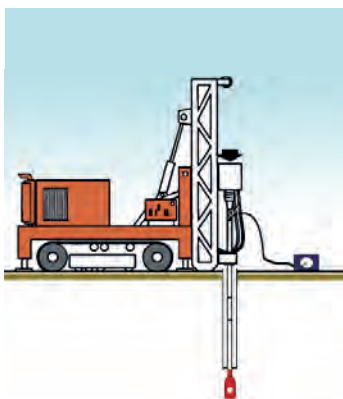
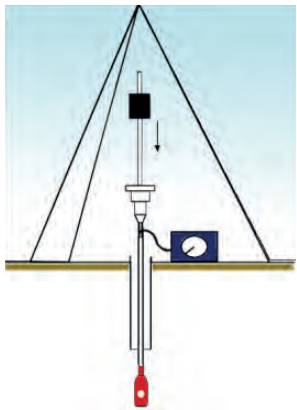
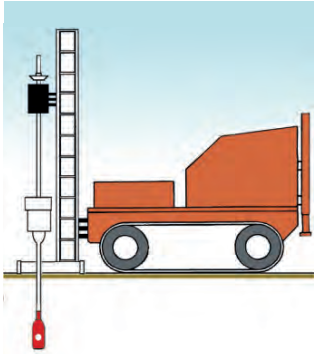
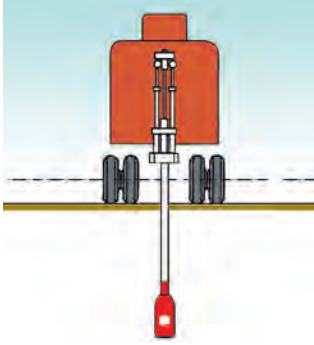
 **ISSMGE- TC16**
Report (2001)

In-Situ Direct Push Technology

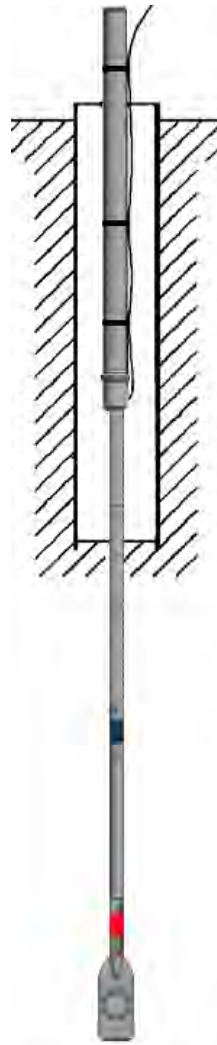


Penetration Methods

The DMT and SDMT equipment may be advanced with any field machine



Torpedo and Drill Rig downhole



Flat Dilatometer

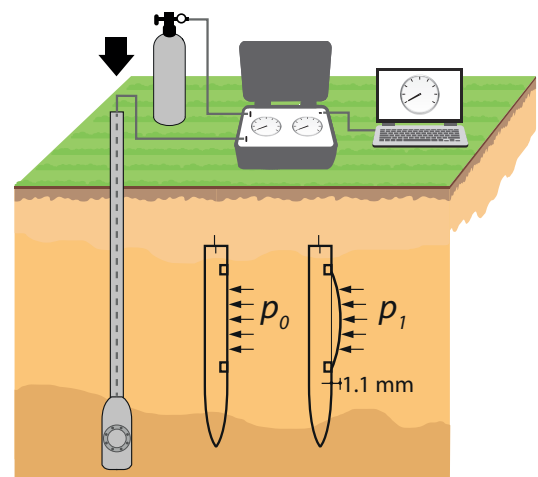


The **Flat Dilatometer (DMT)** is an **in situ test** for the determination of various key soil parameters used for geotechnical design. The test is rapid, accurate, simple and cost-effective. The results are highly repeatable and **independent from the operator**. The blade may be advanced with any field machine, including penetrometers and drill rigs. **DMT** measurements are performed in situ, directly on the soil in its original position and state. This eliminates the disturbance caused by drilling, sampling and transport to laboratory. The profiles of the **results are available real time during test execution**. The direct measurement of soil deformation enables accurate estimations of the elastic modulus. The K_D parameter provides stress history information of the soil, a very difficult property to assess with other testing methods.

Main Applications

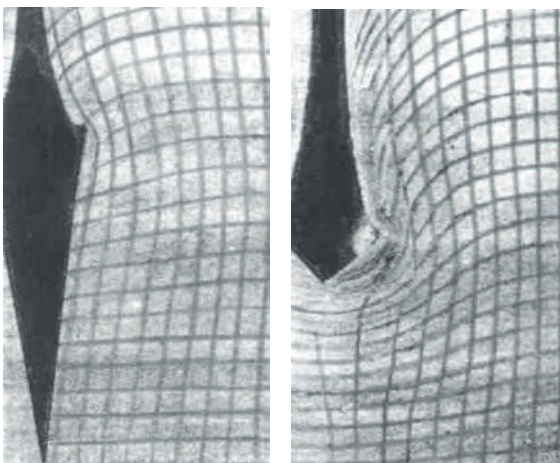
- Soil stratigraphy
- Stress history (OCR, K_0)
- Settlement prediction
- Soil Improvement quantification
- Slip surface detection in clayey slopes
- P-y curves for laterally loaded piles
- Liquefaction potential
- Permeability in clay
- FEM input parameters (ex. Plaxis)
- Subgrade modulus for pavements
- Subgrade modulus for diaphragm walls

Direct deformation measurement



Minimum soil disturbance

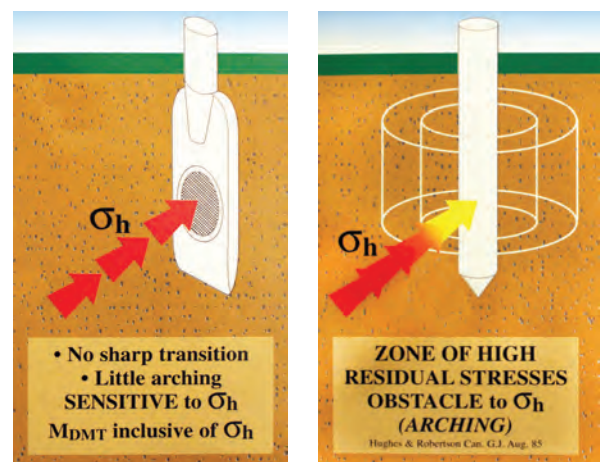
(Baligh and Scott ASCE GJ Nov. 1975)



Wedge

Cone

Sensitive to horizontal stress



• No sharp transition
• Little arching
SENSITIVE to σ_h
MDMT inclusive of σ_h

ZONE OF HIGH RESIDUAL STRESSES
OBSTACLE to σ_h
(ARCHING)

Hughes & Robertson Can. G.J. Aug. 85

Flat

Circular

Seismic Dilatometer

The Seismic Dilatometer (**SDMT**) is a probe for measuring the **shear wave velocity V_s** . The test provides **accurate and repeatable results** with a rapid, reliable and simple technology which does not require any geophysical background. The True Interval configuration is implemented with two sensors spaced 0.5 m. The electronic board provides very accurate AD signal conversion and uses digital data transmission. The high quality of the acquired seismograms enables **real time** shear wave velocity evaluation.

Main Applications

- Max Shear Modulus G_0
- In situ G-gamma decay curve
- Sample Quality Assessment
- Local Seismic Response
- Soil category (V_{s30})

enables **real time** shear wave velocity evaluation.

The V_s profiles are available up to the current test depth. Accelerometers monitor the inclination of the SDMT probe during penetration. The SPDMT is an enhanced version of the Seismic Dilatometer containing two additional sensors for recording **compression P waves**.

TRUE INTERVAL

$$V_s = \frac{(S_2 - S_1)}{\Delta t}$$

$$G_0 = \rho \cdot V_s^2$$

SDMT - V_s

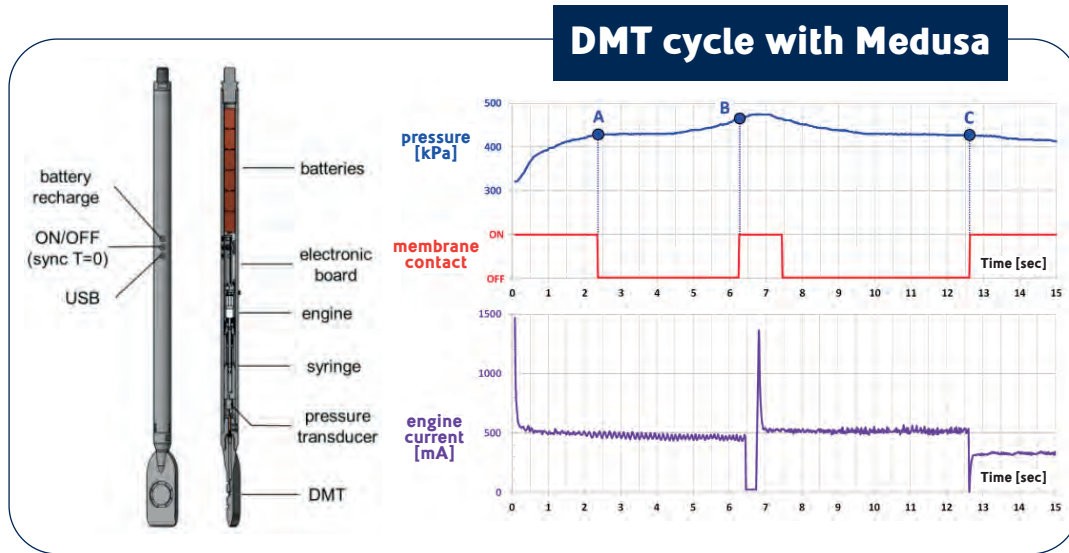
Z [DMT]	Z [m]	Vs [m/s]	Vs (Repeatability) [m/s]	Vor Coeff. [N]
	20.50	140	140, 140, 139	0.41

SPDMT - V_s & V_p

N	Z1 [m]	Z2 [m]	Vs [m/s]	Vp [m/s]
1	3.056	4.056	3627	
2	4.056	5.056	711	
3	5.056	6.056	979	
4	6.056	7.056	742	
5	7.056	8.056	2724	
6	8.056	9.056	3264	
7	9.056	10.056	1988	
8	10.056	11.056	3229	
9	11.056	12.056	2447	
10	12.056	13.056	2131	
11	13.056	14.056	1739	
12	14.056	15.056	2657	
13	15.056	16.056	2074	
14	16.056	17.056	426	
15	17.056	18.056	981	
16	18.056	19.056	852	
17	19.056	20.056	2339	
18	20.056	21.056	2922	
19	21.056	22.056	1928	
20	22.056	23.056	1770	
21	23.056	24.056	3713	

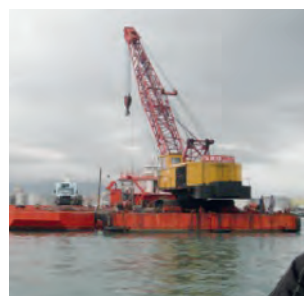
Medusa DMT

The Medusa DMT is an **automated dilatometer** probe able to autonomously perform the test. An electronic board, powered with rechargeable batteries, activates a **motorized syringe** for **expanding hydraulically** the DMT membrane. The blade has the same dimensions of the original standard flat plate dilatometer. The device may operate **without any cable** (MEMO mode) or with an electric cable for **real time results**.



Offshore Testing

Studio Prof. Marchetti has directed several world-wide offshore projects for performing DMT and SDMT measurements from the floors of **rivers, lakes** and **seas**. The know-how based on many **years of experience** has made the execution of such tests reliable, robust and efficient. A key step consists in determining the most cost-effective setup ensuring correct test execution. **Shear wave velocity** measurements are performed with a custom designed **seafloor hammer**.





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