

FreeFall-CPT

In situ geotechnical testing

Two FreeFall-Cone Penetrometer instruments, a shallow water (200m) and a deep water (3200m) lance, were designed and built by RCOM in collaboration with GEOMIL. Both devices penetrate the surface sediments by gravitational force and measure *in situ* strength and pore pressure (up to 6 m). The easy-to-handle systems provide an efficient way for geotechnical offshore exploration.

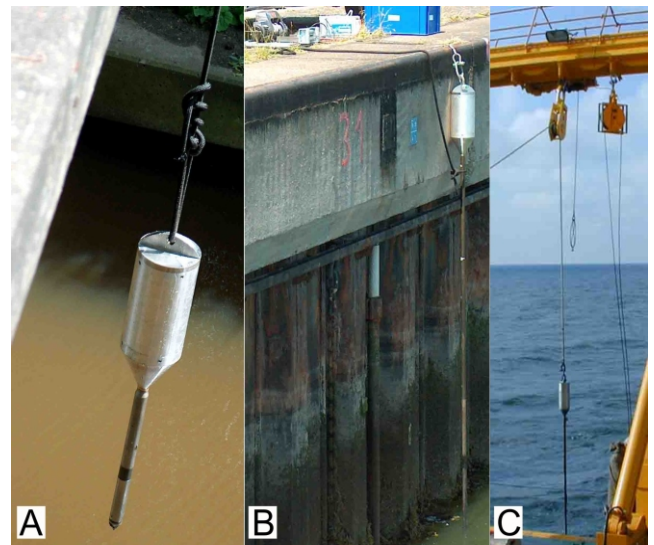


Figure 1 Deployment of the shallow water instrument

The **shallow water instrument** is a modular design where length and weight can be varied for flexible operation from different platforms (Fig. 1). A cone measures sediment strength (Fig. 2 B,C) and pore pressure in u_2 position (Fig. 2 D). Power supply and data acquisition are contained in the waterproof cylindrical housing. This autonomous lance was successfully deployed in harbours, brackish, estuarine and marine environments into fine- to medium-grained, muddy and gassy sediments and in lacustrine and marine realm to study slope stability.

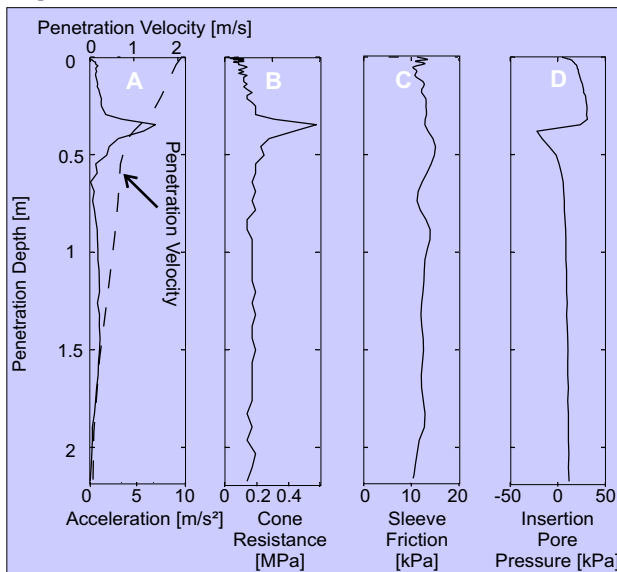


Figure 2 Parameters measured with the CPT

The **deep water instrument** was fitted with two pressure ports to measure differential pore pressure in u_1 and u_3 position. Real-time data-acquisition and power supply is provided by telemetry, however, the lance can also be run self-contained (Fig.3). This concept supports a time-efficient operation in water depths of several hundreds of meters. The lance was deployed on different research vessels to study slope stability.

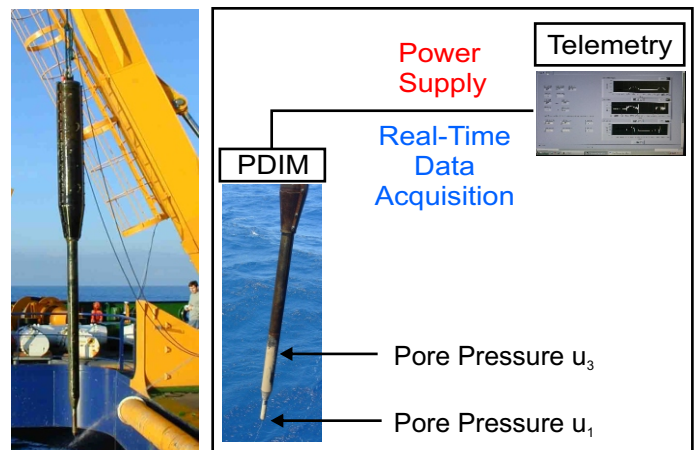
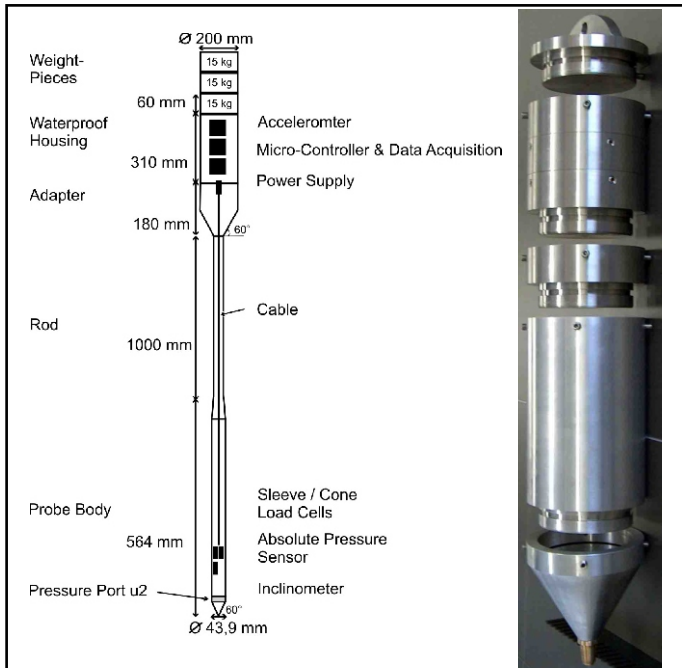


Figure 3 Configuration of the deep water lance

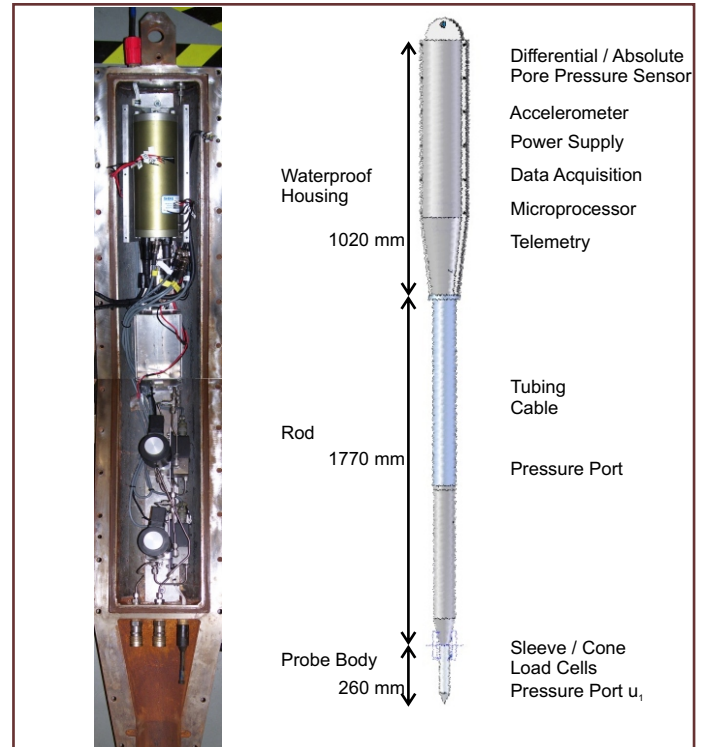
FreeFall Penetrometer System

Two powerful tools adapted to a variety of application for efficient geotechnical investigation

Shallow Water Penetrometer 200 m



Deep Water Penetrometer 3200 m



Technical Specifications:

CPT GEOMIL 15 cm² Subtraction Cone
Cone Resistance: 100 MPa
Sleeve Friction: 1 MPa
Pore Pressure: 2 MPa
Tiltmeter +/- 20°

Pore Pressure:

Accelerometer: Analog Devices ADXL (uni-axial)
 +/-1.8g, +/-5g, +/-18g, +/-100g

Power Supply: Rechargeable Battery 12 V
Data Acquisition & Micro-Processor Tiger Datalogger DL7000

Telemetry

Weight: 40 - 170 kg

Length Housing: 1 m

Length Lance 0.5-6.5 m

15 cm² Subtraction Cone
 25 MPa
 0.25 MPa

Absolute: Kobold 600 bar
Differential: Validyne P55 80 kPa
 2x Freescale Low G +/- 5g (uniaxial)

Rechargeable Battery 12 V / Telemetry
 Tiger Datalogger DL7000

SBE 36 / PDIM

300 kg

1.5 m

2.5 m

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