# Straight into the seabed

AP van den Berg, designer and supplier of advanced equipment for onshore, offshore and near-shore in-situ soil investigation, recently released its SingleTwist-Rods (ST-Rods), the foldable cone penetration test (CPT) string, which can now also be applied to offshore applications with the ROSON-ST system

*AP van den Berg's ST-Rod, the foldable CPT string*

**Q Describe your digital Icone data-acquisition system, the ST-Rods and ROSON seabed system.**

The demand to build a comprehensive and accurate picture of the subsoil by using additional parameters from in-situ soil investigation is increasing.

For example, it may be required to derive the in-situ properties of both soil stratigraphy and soil elasticity to design a foundation that is subject to vibration; or both the soil density and soil electrical conductivity to allocate contaminated layers and predict future distribution.

In general, these parameters can only be acquired by separate systems and in subsequent tests. Apart from being time consuming, this process may also negatively affect the accuracy of the information obtained.

A data-acquisition system that eliminates these drawbacks was developed by AP van den Berg in 2006. It consists of a digital data logger (Icontrol) placed near the computer on which the data is recorded, and a digital cone (Icone) which is pushed into the soil, measuring the four standard parameters: cone tip resistance, sleeve friction, pore water pressure and inclination.

The Icone is easily extendable by click-on modules to measure additional parameters, without the need for changing cones, cables of data loggers.

The ST-Rods rods were introduced in 2016. They can be in one of just two states, twisted or untwisted, and it takes very little to transform them from one state to another.

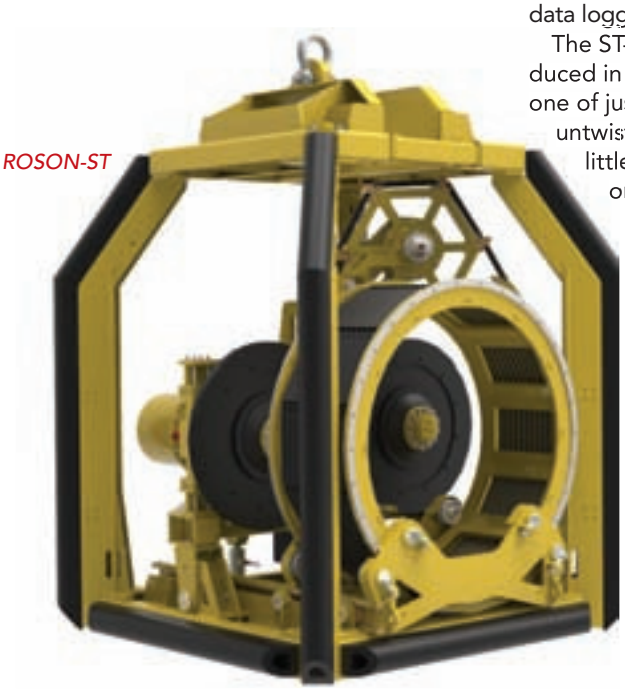
Untwisted, the ST-Rods behave a bit like a pearl necklace and can be easily folded onto a reel. Once twisted, the rods form a solid CPT string with a push/pull/buckle performance equal to a string of standard CPT rods. Because the rods have a self-seeking bayonet thread, they close effortlessly and require just a final, short, single twist to become firmly interlocked, hence the name SingleTwist-Rods.

All it takes to put together an automated CPT system – one that performs a full CPT and a subsequent complete reel-in of the string on a single operator command – is a folder, a twister and a sprocket, and a wheel to connect the two.

This automated CPT system can be mounted on virtually any AP van den Berg pusher, including onshore COSON penetrometers and offshore ROSON seabed systems.

AP van den Berg has been selling its ROSON seabed CPT system since 1982. A ROSON is deployed from a vessel with an A-frame or crane over the side or through a moon pool. The electrical wheel drive system pushes the pre-assembled CPT string into the seabed. Wheel friction is imposed by hydraulic force. A self-tensioning electric winch with heave compensation feeds the umbilical for power supply and data communication.

All ROSON systems work in conjunction with the digital Icone data-acquisition system. ROSON systems are available for CPT cones of all sizes and vane tests



*The ROSON-ST*

at water depths ranging from 0-4,000m. The systems can also be used for seismic, magneto and conductivity tests at water depths up to 1,000m.

**Q How was the ROSON-ST system created?**

The ROSON-ST builds on the track record of AP van den Berg's existing ROSON and Icone technologies. The fully digital Icone has been around for more than 10 years, and the ROSON technology has proven itself for robustness, reliability and CPT quality over the last 30 years. The remaining challenge has been to eliminate the need to support the CPT string, particularly with ever-increasing CPT penetration depths. This external string support makes a ROSON system heavier, more difficult to handle and time consuming to set up. Compact solutions available today introduce shortcomings of their own, concerning achievable penetration depth, data reliability, cone sizes to choose from and increased wear and tear. With the ROSON-ST we provide the answer to these issues.

Through the compact design, the ROSON-ST is easy to handle from most vessels. It can be deployed for projects from shallow to ultra-deep water. The ROSON-ST does not require any exterior CPT string support, assuring fast deployment and high productivity. The use of the patented 36mm ST-rods ensures the straight push that customers may expect from a CPT system. It is suitable for 50m penetration at water depths up to 4,000m.

**Q Could you give an example of an application for the ROSON-ST?**

As an example, the design of wind farms requires a broad range of geotechnical parameters from in-situ soil investigation. Due to the length and weight of each individual wind turbine, deep CPTs are required to obtain an accurate soil stratigraphy and reliable soil properties as an input for the foundation design. For the stability aspect of these vibrating structures, seismic tests are increasingly requested to obtain elastic soil properties, also important for offshore structure behaviour during wave loading. In Western Europe we see a growing demand that, prior to any activity on the project location, a pre-screening needs to be performed to make sure the area is free of UXOs.

The ROSON-ST would be a suitable system to deploy for in-situ soil investigation involved with an offshore wind farm project. The ROSON-ST can perform the required deep CPTs, and because Icone is integrated into the ROSON-ST, seismic testing and UXO pre-screening can be performed with this single piece of equipment.

*An extreme example of CPT string support*