

Secutex® Soft Rock

Seabed Scour Remediation

- **Project Name**
Port of Southampton Scour Protection, UK
- **Year constructed**
August 2012
- **Client/Project Manager**
Associated British Ports (ABP)
- **Main Contractor**
Raymond Brown Construction Ltd.
- **Product**
Secutex® Soft Rock Sand Containers





At ABP Port of Southampton's City Cruise Terminal, Naue geotextile sand containers have been installed to remediate scour holes in the harbour bottom and prevent further scour.

Southampton is the cruise capital of the UK, with over 430 cruise calls departing from the port each year. The port is one of the busiest deep-water ports in the UK and can accommodate any size of cruise ship. The port is also home to the UK's second largest container terminal.

The City Cruise Terminal (Berth 101) in the Western Docks is one of four cruise ship terminals at the port and is predominantly used by 'Royal Caribbean International' cruise ships. The 370-metre-long berth accommodates some of the world's largest liners such as 'The Independence of the Seas'; at 333 metres long with 15 decks and the capacity for 4370 passengers, it is the largest class of ship to operate out of a UK Port.

Cost-efficient and quick solution wanted for scour problems at the harbour bottom

When manoeuvring alongside berths, cruise ships use powerful bow thrusters which generate a huge amount of turbulence in the water and a high flow velocity, which can lead to localised scour problems at the harbour bottom. Routine bathymetric surveying carried out by the port authority had identified the presence of scour holes at both the eastern and western end of berth 101. The situation was monitored on an on-going basis and following further detailed surveys it was decided to carry out remedial work to fill a 650m³ void at the eastern side and a 350m³ void at the west.

The challenge for ABP's engineers was how to fill the voids economically in terms of cost and speed, with a material strong enough to absorb the propeller energy of the thrusters and prevent further scour.

1,160 Naue Secutex® Soft Rock sand containers for use in Southampton

Naue put forward a geosynthetic solution that involved the supply of approximately a thousand Secutex® Soft Rock sand containers. Each sand container measures 1.45m x 2.38m when flat and contains 1m³ of sand, weighing 1.7 tonnes. Due to the high elongation capability, needle-punched Secutex® nonwoven geotextiles can handle the critical stress within the material and at the seams.

Naue Secutex® Soft Rock sand containers were chosen for two reasons. They offer a significant cost saving compared to the traditional hard rock armour solution, as hard rock armour is very expensive to transport. They also improve performance; hard rock armour reflects the wave energy into the host sediment, reducing its shear stress. The reduction of shear stress combined with the high density of the rock leads to the rock sinking through the sediment. Therefore, rock armour is not a permanent solution to the problem. Sand container solutions as scour protection system combine the function of the filter and the ballast layer. Therewith, the subsoil sediment is retained and the wave energy is safely absorbed. Due to a permanent homogeneous pressure of the sand container solution on the harbour bottom, the sediment does not get disturbed, and the shear stress of the sediment remains relatively high. This, combined with the filter function and the much lower density of the sand containers, ensures the sand containers remain in situ.

Raymond Brown Construction Ltd was appointed to carry out the works, which included off-site filling of the Secutex® Soft Rock sand containers with correctly graded sand supplied by Raymond Brown Minerals and then triple stitching the containers ready for placement. Using a plumbine, the varying depths of the voids were charted on a 1-metre grid drawing so that the sand containers could be placed in known positions without the need for divers. Employing a 35-tonne crane fitted with a specially adapted grab, each sand container was lowered 22 metres to the seabed from the quay wall. The remedial works caused no disruption to normal port activity; installation work was temporarily halted when cruise ships were in port.

In total, 1,160 Naue Secutex® Soft Rock sand containers were placed into the two voids alongside the quay wall, providing sympathetic remediation of the seabed without rock armour which is both costly and difficult to handle on site.

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