

# Seabed scour remediation at cruise ship terminal

## Scour protection

- 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





Fig. 1: Storage of sand containers at the terminal

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 650m<sup>3</sup> void at the eastern side and a 350m<sup>3</sup> 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.



Fig. 2: Installation of Secutex® Soft Rock sand containers

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

Naue put forward a geosynthetic solution involving the supply of approximately 1,000 Secutex® Soft Rock sand containers. Each container measures 1.45m x 2.38m when flat and contains 1m<sup>3</sup> of sand, weighing 1.7 tonnes. Due to high elongation capability, needle-punched Secutex® nonwoven geotextiles can handle critical stress within the material and at the seams.

Secutex® Soft Rock sand containers were chosen for two reasons: significant cost savings compared to traditional hard rock armour, which is expensive to transport, and improved performance. Hard rock armour reflects wave energy into the host sediment, reducing its shear stress. Combined with the rock's density, this leads to sinking and makes it an impermanent solution. Sand containers, by contrast combine filter and ballast layers. They retain subsoil and absorb wave energy. A permanent homogeneous pressure on the harbour bottom keeps sediment undisturbed and shear stress high. This, combined with the filter function and lower density of the sand containers, ensures they remain in situ.

Raymond Brown Construction Ltd was appointed to carry out the works, including off-site filling and triple stitching of the containers with correctly graded sand supplied by Raymond Brown Minerals. Using a plumbine, the varying void depths were charted on a 1-metre grid so the containers could be placed in known positions without divers. A 35-tonne crane with a specially adapted grab lowered each container 22m to the seabed from the quay wall. Remedial works were paused during cruise ship activity to avoid disruption.

In total, 1,160 Naue Secutex® Soft Rock sand containers were placed into the two voids alongside the quay wall, delivering effective seabed remediation without the cost and handling issues of rock armour.