

West Rhyl Coastal Defence Phase 3

North Wales, United Kingdom

The United Kingdom has seen increased coastal erosion, flooding and high wave activity, resulting in devastation to existing coastal defences using traditional reinforcement methods such as steel mesh. Where the steel has corroded causing the concrete it is encased in to spall and fail.



Project owner
Denbighshire County
Council

Product
Durus S400

Function
Used as non-corrosive
reinforcement in the
concrete in fills around
linked concrete matting

Contractor
Dawnus

Volume
2,400 kg Durus S400
600 m³ C40/50 Concrete

Challenge

Concrete sea defences are subjected to a very aggressive environment where continuous wave action - which often contains sand, stone and sea debris - can lead to the concrete suffering from severe degradation.

Combined with a highly chloride environment, not only will the concrete degrade, but also any embedded steel that has been used to reinforce the concrete. When this occurs, the traditional steel reinforcement begins to rust. It expands and causes the concrete to spall and fail.

Solution

- 4 kg Durus S400 Macro Fibre (polypropylene) per m³ concrete.

The inclusion of this fibre in the concrete is primarily to replace the reinforcing steel. In addition to this, it also improves the impact resistance of the concrete. With polypropylene not being susceptible to chloride attack there will be no spalling of the concrete caused by the failure of the steel reinforcement. The structure will have a longer maintenance free life span and keep its aesthetic look for much longer.



Fibre was used in the construction of the steps too.



Linked concrete blocking surrounded by C40 concrete containing 4 kg Durus S400. Protecting the land from coastal attack and erosion.

Benefits of the solution

By using Durus Macro Fibres on this project, the sea defence will have an extended life cycle and will need less maintenance than if traditional steel mesh had been used. Replacing the steel mesh with the Durus also saved time in constructing the project. The Durus S400 Macro Fibre is a recognised and accepted fibre for the Environment Agency's Minimum Technical Requirements for Marine Concrete.

Installation benefits

By using Fibre Concrete, the contractor, Dawnus, was able to save time by not having to fix steel into place. This was vital as they only had small daily windows of opportunity to pour concrete continually fighting against the tide. They were also thankful of not having to store steel mesh in their compound and having to transport it to the beach areas. Many Health and Safety issues were removed by not having to use steel.

Result

The client will now have peace of mind that the sea defences will remain in a good condition and have an extended life. Furthermore, the aesthetic look of the sea defence won't become unpleasant by spalling and rust-stained concrete. The beach was opened to the public much quicker than if they had used steel mesh which helped the local services and economy to get back to normal much faster. The Fibre Reinforced Concrete was able to save more than 50% in CO₂ emissions, when compared to steel reinforced concrete. In summary, the Durus fibre concrete made sure that the project worked not only a practical way, but also worked with the environment and in safe harmony with the nature of the coastline.

Products used



Durus S400 BS EN 14889 Class 2 Embossed Macro Fibre at 4 kg per cubic metre of concrete.