

Building ports from recycled materials

A Scandinavian consortium is mixing contaminated sediment with special binders to produce a construction material for ports as a sustainable alternative to dumping at sea or landfill.

Stricter regulations have reduced use of hazardous chemicals and heavy metals in industrial activities, but their legacy lives on in polluted soils and sediments. This is a particular headache for the maritime industry, where dredging routinely turns up sediment contaminated with carcinogenic PCBs, cadmium, lead and mercury. Port owners are caught between constraints on dumping sediment at sea, the cheap but polluting option, and removing it to landfill, an expensive alternative.

A Swedish-Norwegian consortium established a EUREKA project to treat polluted sediments and other dredged material. The partners had already worked on a study into stabilisation and solidification techniques for the Swedish environment protection agency. The STABCON project tested the method and drew up guidelines for use.

The first step was to compare the alternatives for handling sediments – dumping, solidification and stabilisation, and dredging and disposal on land. Stabilisation and solidification proved to be sustainable and cost-effective. Contaminated sediments are mixed on site with binders to create a solid material that contains the hazardous substances.

Tests identified the most suitable binder compositions and mixing procedures for a variety of contaminants and sediment types. The binder used was a mixture of cement and Merit 5000 – a by-product from steel-making. The slag is able to bind heavy metals chemically at the same time as it cures.

The final step translated the results into a report and guidelines for port authorities, to enable them to assess options for using stabilisation and solidification and select the best binder for their local conditions, while providing design principles for using treated sediments in harbour structures, such as paved areas, loading zones and buildings.

STABCON carried out the pilot study at the Swedish port of Oxelösund, itself a partner in the project. The port needed to remove contaminated sediment to build a new harbour area, while at the same time respecting Sweden's strict environmental regulations.

The aim was to dredge a section of harbour and treat the sediment for use in the new land area. The team dredged about 500 m³ of soft sediment, and strengthened it with a mix of cement and Merit 5000. The results were impressive. Once stabilised, there was no chemical degradation and no physical damage. The new material also proved durable.

STABCON has already translated into new contracts for the participants. A number of ports in Sweden have taken a keen interest in the cost-effective 'stabilisation and solidification' method, and many are undertaking tests with their own sediments, consulting STABCON partners for their know-how. Meanwhile, a more extensive R&D project has been launched for the whole Baltic Sea region, thanks partly to the work achieved in the EUREKA project.

More information:

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