

DREDGING - CASE STUDY 6

A dredged material processing plant in Europe

Overview

All Port's require a sufficient depth of water for ships to enter, for example, large container vessels.

In this particular case a river carries large amounts of suspended matter, which is deposited in the nearby Port. In addition to this the tides of the sea also bring more suspended matter into the Port. The level of pollution in the sediment is dependent on the source of the water. Sediments carried by the river are polluted whilst the sea tides bring mainly sand which contain no pollutants.

For the above reasons ongoing maintenance dredging is required to remove large volumes of sediments every year to ensure that it remains operational. Grab dredgers, Bucket ladder dredgers, barges and hopper dredgers are used in the operation and dredging pumps located on pontoons are used to load the dredged material and transport it to the processing plant.

In the past dredged material was dumped on land. However, due to the fact that the dredged material became increasingly polluted through industry, agriculture and effluent discharge a processing plant was established in order to treat and dispose of the dredged material.

Process Description

Depending on the dredged material involved, up to six times its own volume of water is added so that it can be pumped. The water and dredged material is pumped 2.5km via a pipeline to the processing plant. In the plant the polluted silt is separated from the clean sand. The sand is used as a construction material and the fine silt is dumped under strict environmental guidelines.

i) Pre-treatment

The dredge material is first placed in a collection basin and a drum filter removes stones and debris above 1 cm in size.

ii) Sand removal

Hydro-cyclones separate the fine silt (driven upwards) and the coarser sand (driven downwards). This sand containing a silt residue is then sent to a second separation stage, an upstream sorter, where the lighter silt is separated by the upward flow of water. This silt is passed to a thickening stage along with the silt from the hydro-cyclones. The sand from this sorter is passed through a dewatering sieve to produce a material, which has 85% dry solids. It is then further used as a construction material. The coarse sand represents around 50% of the dredged material.

iii) Silt removal

The silt containing water still contains some residual sand and so the silt is fed into smaller hydro-cyclones and the separated clean fine sand is removed. The fine sand represents around 15% of the dredged material.

For effective separation, the silt is mixed with a large volume of water and dewatered. The suspended solids are thickened and the thickened silt dewatered using belt and high-pressure filter press using flocculants.

Solution	<p>Ciba Specialty Chemicals was called upon to employ its expertise in solids/water separation and determined that for the contaminated silt, which contains a high level of organic material, a highly cationic charged flocculant was required.</p> <p>Also, especially for the high-pressure filtration application a low/medium molecular weight flocculant was needed, as opposed to the normal high molecular weight flocculants. This, in order to give the desired small compact & strong floc required for this particular application</p>
Results	Ciba® KRYVALIS® FC2802 was chosen as the optimum product for dewatering. Applied at a dosage level of 1 kg/tds, a cake dryness of 60% is achieved in a cycle time of 45 minutes.
Features and Benefits	<p>Floc size and strength are critical in the filtration process especially where high pressure is used. The benefits of using a flocculant able to achieve these effects are:</p> <ul style="list-style-type: none"> • Higher cake dryness • Reduced filter press cycle times
Technical Service	Full technical service and advice in all aspects of product selection, laboratory tests and plant trials will be provided.
Health & Safety	Detailed information on handling and any precautions to be observed in the use of the product(s) described in this leaflet can be found in our relevant Health and Safety information sheet.

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