

Preventing shoaling in ship berths

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Many deep draft ship berths experience shoaling, gradually filling in with fine silt and clay sediments. Traditionally, the response has been to periodically dredge, an expensive and environmentally impacting process. SedCon Technologies, Inc. has developed the SedCon® Turbo System that prevents shoaling in a berth and eliminates the need for maintenance dredging. Benefits include substantial savings in maintenance costs and increased revenues for the facility. After a system is installed, the berth will have full water depth at all times, increasing its availability for ship traffic and total cargo throughput.

Problems with dredging

Estuarine waters have a natural depth of five or six metres. At that depth, passing water currents are moving fast enough to prevent shoaling. When a berth is dredged, the increased water depth causes currents to slow down allowing sediment to fall out of suspension and accumulate.

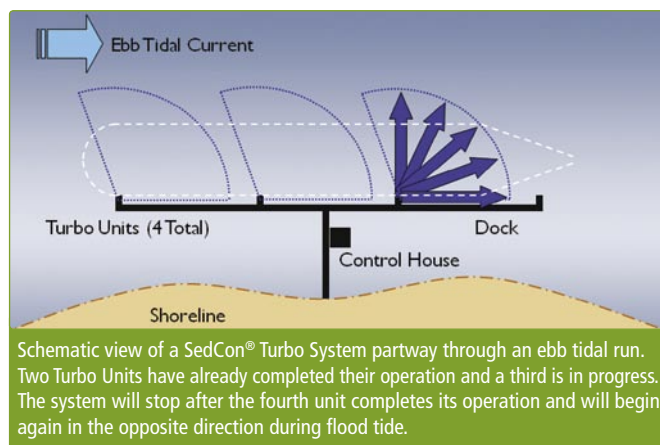
Periodic maintenance dredging is a costly and inefficient way to deal with shoaling problems in berths. First, as shoaling proceeds, water depth decreases, eventually limiting the draft of visiting ships. Second, dredged material disposal areas are filling up and new ones are no longer being created. When a disposal area becomes unavailable, dredging costs can rise, sometimes dramatically. Third, permits for dredging are becoming difficult to obtain due to stricter environmental regulations. This consumes staff time and drives up costs. Finally, maintenance dredging can significantly impact water quality, benthic and wetland habitats, degrading the environment.

System description

The SedCon® Turbo System consists of a series of submerged water pumps, called Turbo Units that are installed along the face of a ship berth. The Turbo Units are connected to a hydraulic power source via a system of header pipes, riser hoses and control valves. A computer controller, inline heater and heat exchanger complete the system.



Turbo Units produce near-bottom water jets that boost the speed of passing currents, preventing sediment from settling. This unit has been raised to the surface for viewing.



Schematic view of a SedCon® Turbo System partway through an ebb tidal run. Two Turbo Units have already completed their operation and a third is in progress. The system will stop after the fourth unit completes its operation and will begin again in the opposite direction during flood tide.

The SedCon® Turbo System operates by boosting the speed of passing water currents just enough to prevent shoaling. The Turbo Units operate in sequence during ebb and flood tidal flows, beginning with the furthest-most up-current unit. During operation, an impeller draws water downward into the intake of the Turbo Unit and discharges it horizontally across the bottom of the berth as a powerful jet. At the same time, the direction of discharge is slowly rotated through a 90-degree angle. Turbo Unit operation begins with the discharge pointed perpendicular to the face of the berth and ends with it pointed down-current. The jet discharge is designed to be strong enough to prevent sedimentation but not to cause erosion of the consolidated mud bottom. For this reason, the berth must be fully-dredged prior to system installation.

Existing installations

SedCon® Turbo Systems have been installed at a variety of sites within the United States. Clients include: CITGO Asphalt Refining Company, CITGO Petroleum Corporation, INVISTA, Georgia Ports Authority, South Carolina State Ports Authority and the US Navy. Installations vary in size from a 600 foot-long, three-unit system to an 1,800 foot-long, ten-unit system. As an example, INVISTA installed an eight-unit system in 1997 at their terminal in Wilmington, NC. Before the installation, the site had been experiencing more than three metres of shoaling per year. Following the installation, there has been no further shoaling and maintenance dredging has been completely eliminated.

SedCon® is a registered trademark and patented product of SedCon Technologies, Inc.

ABOUT THE AUTHOR

Russell Arnold is Vice-President of SedCon Technologies, Inc. A mechanical engineer by profession, Russell has been involved in marine design and manufacturing for over 20 years.

ABOUT THE COMPANY

SedCon Technologies, Inc. was formed in 1994 and specialises in the design and manufacture of shoaling prevention systems.

ENQUIRIES

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