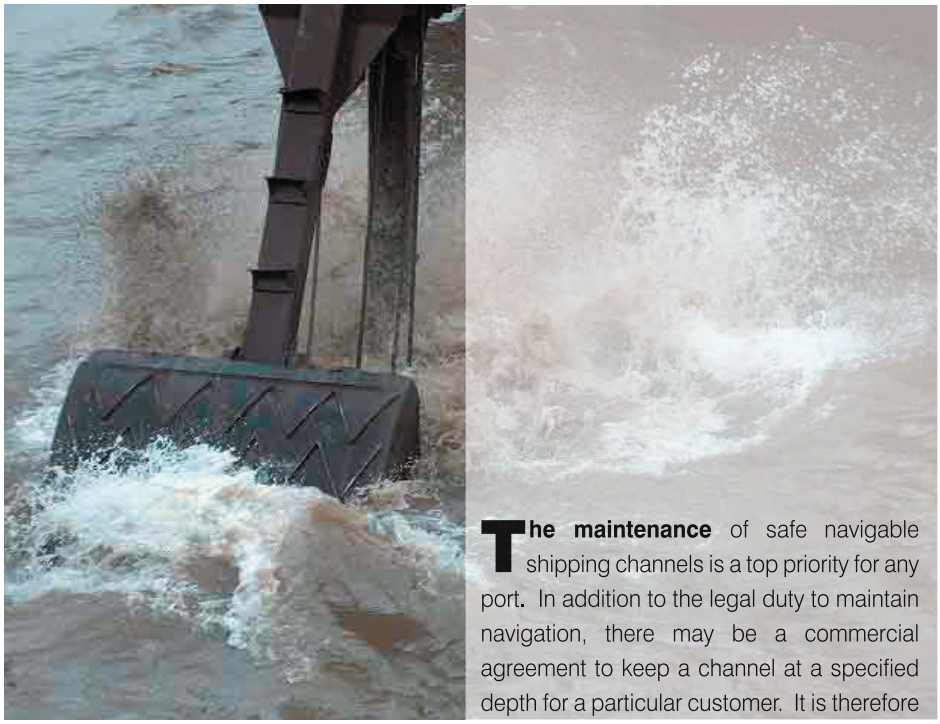
Dredging not required?



The maintenance of safe navigable shipping channels is a top priority for any port. In addition to the legal duty to maintain navigation, there may be a commercial agreement to keep a channel at a specified depth for a particular customer. It is therefore essential for ports, harbours or marinas to carry out maintenance dredging to remove recently accumulated material.

An accurate density profile of the fluid mud is an invaluable tool in determining the need to dredge.

However, it is also desirable to avoid unnecessary dredging. The operation itself is costly, the spoil must be disposed of, and there are associated environmental concerns. From both the economic and environmental viewpoints there is a clearly recognised need to keep maintenance dredging to a minimum.

Over the last few years changes in dredging practice and port operations have led to some reduction in the amount of material taken. There is now greater emphasis on conducting continuous surveys of the channels, and dredging has become a more "scientific" process.

The depth of water available for shipping in a channel is called the "nautical depth", usually defined as the maximum depth with respect to chart datum which, for navigational purposes, is considered safe to accept as the bed of the channel.

When determining the nautical depth, two criteria must be satisfied: first, the ship's hull must suffer no damage even if its draught were to reach the full nautical depth, and second, the navigational response of the vessel must not be adversely affected.

For the purposes of hydrographic surveying, it is necessary to decide on a parameter for determining the nautical depth. Such a parameter must be capable of being measured relatively easily in the marine environment. The parameter most widely used is the density (specific gravity) of the bed material. An accurate density profile of the channel is therefore an invaluable tool in determining the need to dredge.

One metre deeper

Port and harbour authorities regularly carry out hydrographic surveys to determine whether, or how much, dredging will be required to maintain a safe navigable depth. In practice, however, ascertaining the "true" navigable depth of a channel is not always easy. In particular, it can be difficult in the presence of fine suspended sediments, often called "fluid mud", which is the situation in many ports. An ordinary lead line will always indicate the greatest depth, usually at a mud density of 1300 kg/m^3, while echo sounders tend to indicate the least depth, where the density is around 1060 km/m^3.

Experience in the Netherlands and elsewhere indicates that although manoeuvring characteristics may change somewhat, ships can still navigate safely through fluid mud up to a density of around 1200 kg/m^3. However, acoustic measurements cannot provide a high-resolution profile of the fluid mud density.

This means that the true navigable depth of a channel may be as much as one metre deeper than that indicated by the first reflection of the echo trace — an important consideration when deciding whether or not dredging is required. That makes the measurement of fluid mud density a key part of modern harbour management. The Hydramotion **MudBug** has evolved to meet the demand for a convenient system for making these measurements.

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