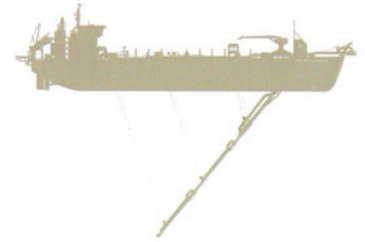


# Trailing Suction Hopper Dredger (TSHD)



## General dredge plant information

### Introduction

A Trailing Suction Hopper Dredger (TSHD) is a sea-going self-propelled vessel with one or two suction pipes, designed to trail along the side of the vessel. At the lower end of the suction pipe, a draghead is fixed. Suction is provided by a pump, which discharges the mixture of soil and water in the hopper. Discharge takes place either by bottom-door disposal or pumping out.

### Main parts TSHD

In principle the main parts of the TSHD are:

- the hull, containing the engines, propulsion, pump(s), the crew quarters, the bridge with the navigational & dredge control etc;
- the hopper where mixture of soil and water is pumped in, the soil settles and

- from where the water is discharged through an overflow system;
- the suction pipe through which the mixture is transported to the pump;
- the draghead, connected at the end of the suction pipe, which disintegrates the soil often with the aid of knives and/or a water jet system.

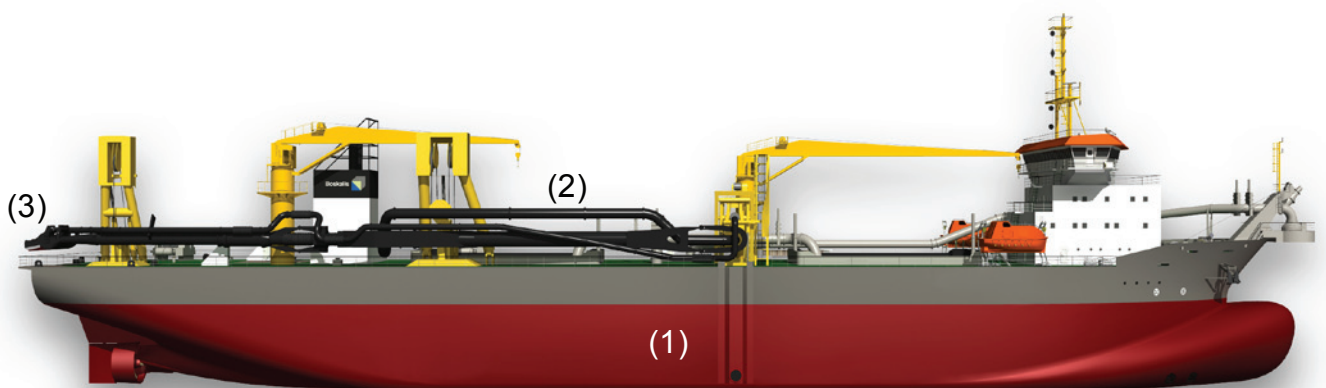
### Working method

To start the dredging operations, the Trailing Suction Hopper Dredger sails to the trench or area to be excavated. Once in the vicinity of its dredging area, the TSHD lowers the draghead(s) to the bottom and dredging can commence. The dredge pump, installed inside the dredge takes up a mixture of water and soil through the draghead and suction pipe and pumps the mixture into the hopper.



Rainbowing

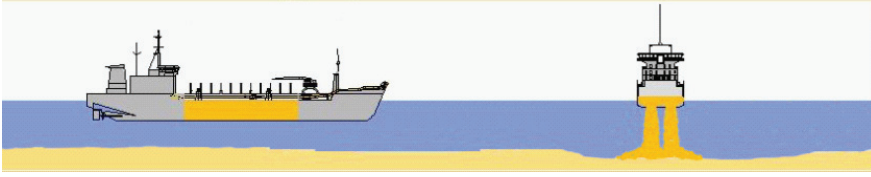
TSHD Willem van Oranje



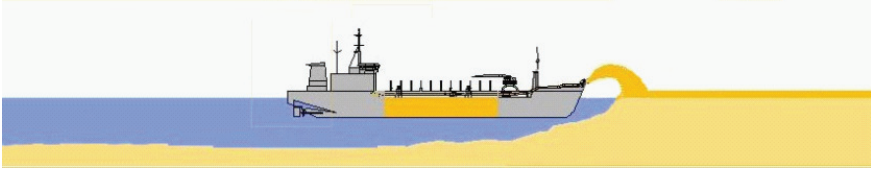
- |     |              |
|-----|--------------|
| (1) | Hopper       |
| (2) | Suction pipe |
| (3) | Draghead     |

## Discharge methods

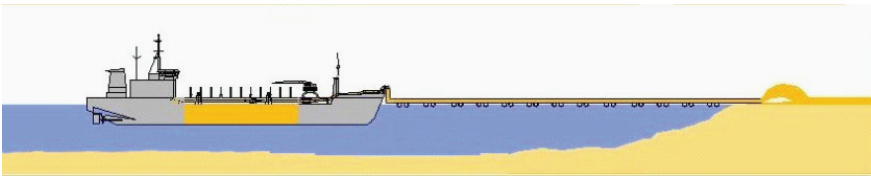
### Dumping



### Rainbowing



### Pumping ashore



Dredging control

A TSHD is often general used for harbour maintenance, large reclamation projects, pipe trenching and beach suppletion.

### Dredging control and tolerance

Dredging tolerances are an accumulation of positioning and tracking accuracy, soil characteristics, swell, tidal data, variances, skilled operation and accuracy of data. The working tolerances can vary from 3.0 to 10.0 m in the horizontal plane and from 0.5 to 0.75 m in the vertical plane.

### Fleet of Boskalis

Boskalis has around forty of these vessels, including two of the largest in the world, the Queen of the Netherlands. Some of the TSHD's of Boskalis are listed below. For the complete list of Trailing Suction Hopper Dredgers of Boskalis check on [www.boskalis.com](http://www.boskalis.com):

Name	Capacity (m3)	Max. dredging depth (m)
Queen of the Netherlands	35,500	100
Oranje / Prins der Nederlanden	16,000	82
Gateway / Willem van Oranje	12,000	62
Seaway	13,000	57
Cornelis Zanen	8,500	50
Crestway / Shoreway	5,600	33
Waterway / Coastway	4,900	28
Shoalway	4,500	30



Raised draghead



Large and small TSHD

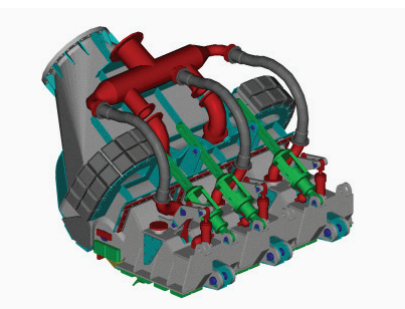
The soil will settle in the hopper and the water is discharged through an adjustable overflow system. When the draught of the vessel reaches the dredging loading mark or when circumstances do not allow for further loading, dredging will be ceased and the suction pipe hoisted on deck. When required for environmental reasons it's also possible to load without overflow, but often this will reduce the production efficiency. The vessel then sails with the dredged materials to the disposal area. Disposal is usually executed by:

- Bottom-door disposal, the load is released by opening the bottom doors or the split hull.
- Rainbowing, the load is mixed with water and is pumped through a spraying nozzle at the front.
- Pumping ashore, the TSHD is connected with a (floating) pipeline and the soil water mixture is pumped to the designated area. In more special projects the suction pipe is used as discharge pipe for accurate backfilling, for instance for covering pipelines.

Once empty, the vessel returns to the dredging area, completing the dredge cycle.

### Suitability

TSHD is suited to dredge a wide range of material like silt, clay, sand and gravel. Even strong cohesive and cemented soils can be dredged. Different types of dragheads can be fitted depending on soil conditions. Depths of more than 100 meters can be achieved by the larger dredgers, using a ladder mounted underwater pump. With it's manoeuvrability it is very suitable in harbors and fairway's with busy traffic.



Special type of draghead