Boskalis

CAPABILITY SHEET

CUTTER SUCTION DREDGER (CSD)
A SUCTION DREDGER EQUIPPED WITH A ROTATING CUTTERHEAD

INTRODUCTION

A Cutter Suction Dredger (CSD) is a suction dredger equipped with a rotating cutterhead at the end of the cutter ladder. The CSD is positioned on spuds and anchor wires during dredging operations. A CSD is suitable for dredging silts, sand, clay and rock. The dredging process consists of cutting the seabed (loosening the soil) with the cutterhead, then transporting a mixture of soil and water by the dredge pump through a discharge pipeline for further transport to a discharge location, such as reclamation areas or loading barges. Some CSDs are self-propelled while other CSDs require towage between work sites.

MAIN PARTS CSD

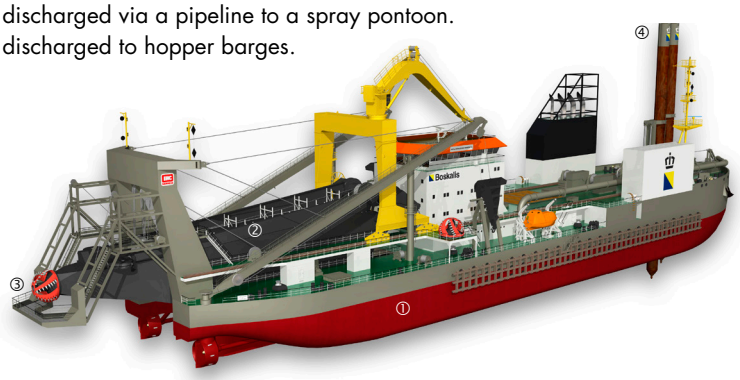
The main parts of a CSD are:

- the hull (3), containing the engines, (propulsion),pump(s), the crew quarters, the bridge with the dredging and navigational control, etc.
- the cutter ladder (2), containing the cutterhead (1), suction pipeline and first dredge pump (optional).
- the discharge system, consisting of dredge pump(s) and pipeline(s).
- the spud poles (4 & 5) and spud carrier which provide a stable position and forward/backward movement; the anchors and side winches which provide the sideward movement in the cut.

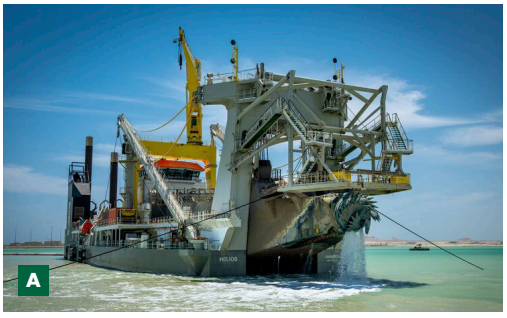
WORK METHOD

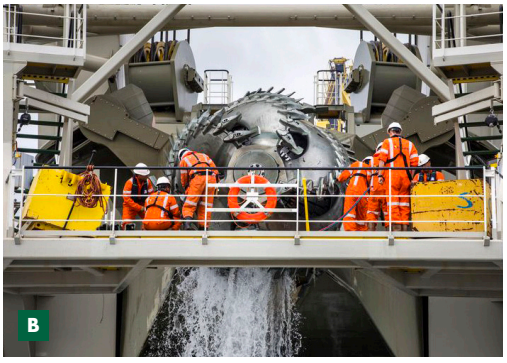
Before the start of dredging operations, the CSD will sail or be towed to the dredging location. The CSD maintains its position with its spud(s) and the two side wires. The working spud or main spud is dropped onto the seabed securing the stern of the dredger. During dredging, the CSD makes a pivoting movement around the main spud. To create the required swinging motion, the CSD deploys side anchors on both sides of the cutter ladder, these are connected by steel wires to the side winches onboard the CSD, which are simultaneously reeled in and out. Depending on the water depth and the length of the CSD, a CSD can dredge a cut width varying between 5 and 120 m wide. To begin dredging works the cutter ladder is lowered. The cutter head rotates, loosening the soil which makes up the seabed. The pump lifts a mixture of the loosened soil and water from this inlet through the suction pipe to the pump and out through the discharge system. The mixture flow can be:

- discharged via a pipeline to a reclamation area.
- discharged via a pipeline to a spray pontoon.
- discharged to hopper barges.



1. Hull
2. Cutter ladder
3. Cutter head
4. Spud poles





A CSD 'Helios'
B CSD 'Helios' cutterhead with working platform
C CSD 'Helios' via floating line pumping ashore

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A SUCTION DREDGER EQUIPPED WITH A ROTATING CUTTERHEAD


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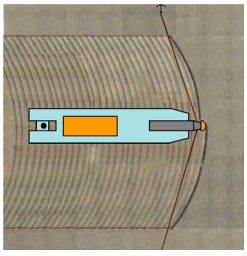

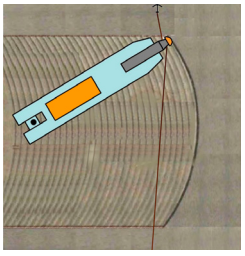

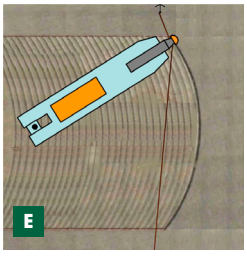
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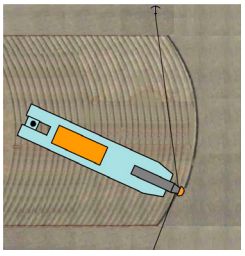

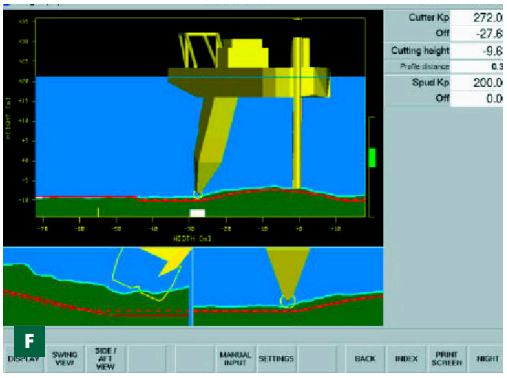

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SUITABILITY

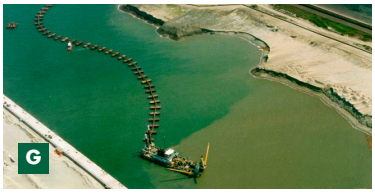
Different cutter heads can be fitted at the end of the cutter ladder depending on the expected soil conditions. Cutterheads are interchangeable on site, providing maximum flexibility when dredging differed soil types. CSDs maintain a stock of consumable cutting 'teeth', onboard. A CSD is generally used for the following types of works:

- capital dredging such as dredging of harbors, canals and land reclamation; maintenance dredging.
- loading barges for transport over long distances.
- dredging trenches for pipelines.

Dredging depths of 35 meters can be achieved. CSDs are capable of pumping dredged material over long distances. dredging accuracies are an accumulation of positioning accuracy, soil characteristics, swell, tidal data variances and operator skills. With the modern monitoring software and hardware systems of the dredging process high accuracies can be achieved.

FLEET OF BOSKALIS

Boskalis operates around 15 CSDs, including four large (self-propelled) rock CSDs: 'Taurus II', 'Ursa', 'Cyrus' and 'Phoenix'. Some of the CSDs of Boskalis are listed below, the complete list of CSDs operated by Boskalis can be found on our website: www.boskalis.com.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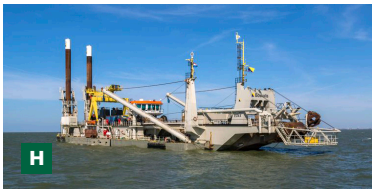
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SELF PROPELLED CUTTER DREDGERS

Large self propelled CSD's

Name	Installed power (kW)	Max dredging dept (m)
Taurus II	24,824	30.0
Helios	23,943	35.0
Krios	23,943	35.0

STATIONARY CUTTER DREDGERS

Some Stationary CSD's

Name	Installed power (kW)	Max dredging dept (m)
Phoenix	15,770	31.5
Edax	9,262	27.5
Seine	2,541	18.0

D CSD 'Helios' Y-piece loading 'Terraferre 701'.
E Sideward movement seen from above.
F Dredging control with image of spud and ladder on seabed.
G Aerial view CSD with floating pipeline
H CSD 'Edax' dredging at Marker Wadden, The Netherlands.
I Assembled dismantlable cutter in a dry pit.

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