

## VSM – Vertical Shaft Boring Machines

### Technique for Offshore Purpose

Shaft installation in difficult ground conditions – especially under ground water – requires special equipment. HERRENKNECHT AG, as a well known supplier for tunneling machines and drilling equipment, has developed equipment which is able to work complete submerged, remote controlled and enables precise shaft installation by means of the sinking method - even under very difficult ground conditions.



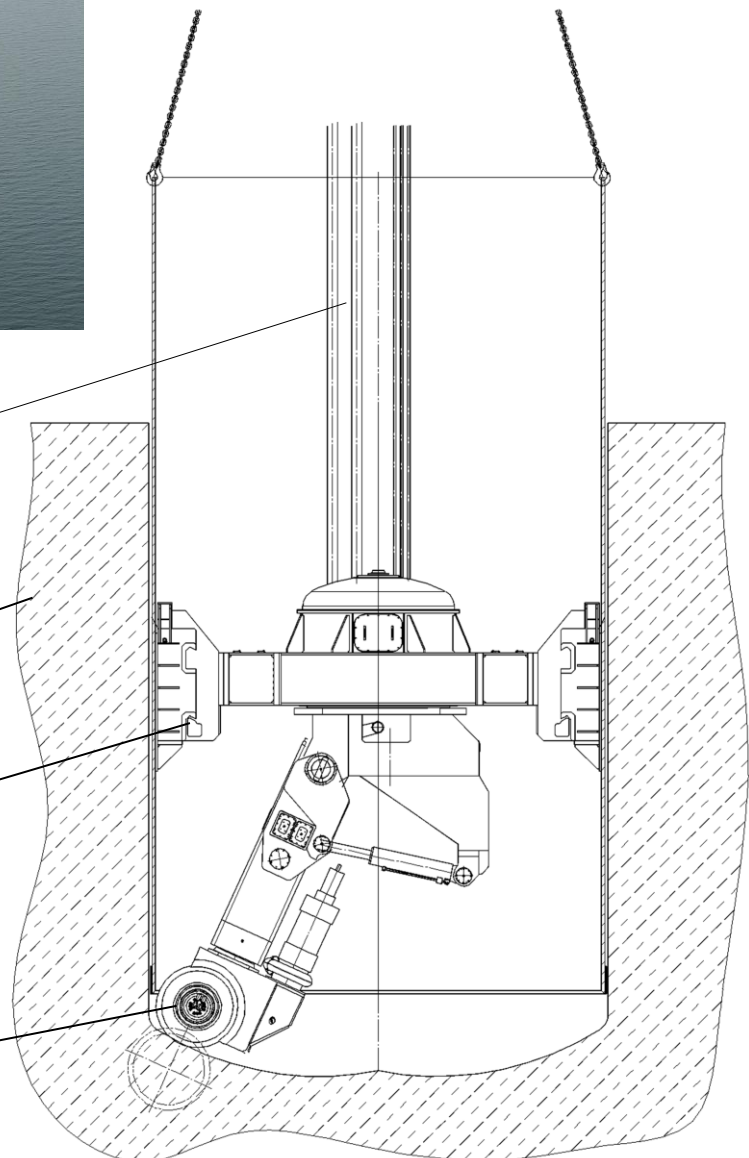
Power supply and slurry lines



sea bed

Vertical Shaft Boring Machine

roadheader

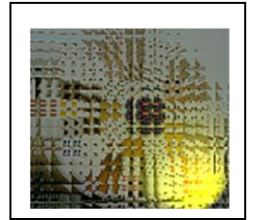


Till today, with the help of several Vertical Shaft Boring Machines (VSM) dozens of shafts have been sunken in a variety of ground conditions. They have a drill diameter of 5 to 10 meters and built shafts with a maximum depth of 65 meters. At the moment projects with a planned shaft diameter of 12 meters and a corresponding depth of 85 meters are in planning and under construction.



# NORDSEETAUCHER GMBH

Hyperbaric Tunnel Construction and Diving®



## Recent projects realized with HERRENKNECHT Equipment



### 1. Access and reception shaft for a sewer project in Kuwait

Lining:	Segments
Diameter:	8 m
Maximum depth:	30
Best performance:	5 m/ shift
Geology:	sand, cemented sand, coral



### 2. Access and reception shaft for a sewer project in Jeddah

Lining:	In Situ Casting
Diameter:	6,5 m
Maximum depth:	30
Best performance:	2,5 m/ day
Geology:	sand, cemented sand, coral

Already proven its functionality and productive efficiency by onshore projects but this equipment is also suitable for Offshore Subsea Operations. The modular design of the shaft sinking equipment enables an easy integration with the already existing Offshore Equipment. This fact will provide new opportunities to install foundations for alternative energy projects and Wind Farms, bridge foundations and other sea bottom installations also as Subsea Mining in an economical way.

As a main advantage, no further ground investigation is necessary as the Shaft Sinking Machine is capable to cut through soft ground as well as through boulders. The installation will be done in an environmental friendly manner by excavating the material over a closed slurry circuit; it will be stored for examination and then disposed in a safe manner.

Accommodating this technique to the special conditions of the North Sea will give a contribution to the already existing equipment and implement a complete new way of installing of Offshore foundations in an economic, fast and environmental friendly way.

A further look out for the VSM Technique is an application for Offshore Mining Purposes. Due to the cutting capability and the cutting transport system this equipment would give a promising look at this interesting new field of application.

NORDSEETAUCHER GmbH is uniquely to provide substantive analyses and sustained assessments of Offshore Projects. The services include technical surveys of ambient and environmental conditions for new structures, damage and hazard analyses for existing structures, as well as all maintenance, repair and overhaul work.