

Manoeuvrability

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Water Injection Dredging is often used in small ports and marinas because of the manoeuvrability of the vessels. Water injection dredgers are able to deepen shallow ports and dredge very close to the embankment and quay walls. These capabilities offer solutions to problems such as those being encountered by the many ports and marinas on the River Westerscheldt in the Netherlands, where there is unwanted and excessive sediment. As a result the Dutch Ministry of Transport and Public Works commissioned Van Oord to execute maintenance dredging using water injection at these locations on a regular basis.

Depth guarantee
A depth guarantee can be the basis of a maintenance contract with a client. Remuneration is received against a fixed fee to maintain the required depth. Such forms of contract have already been used for port maintenance in Itajai Brazil, Cuxhaven Germany and in several marinas in the Netherlands.

Transportable solutions
Van Oord employs easily transportable units for inland waters or wherever mobilisation time is limited. The HAM 922 is moved around the world in containers. Once arrived at the work site, the WID unit is assembled and launched. A powerpack on board supplies the required pumping power. Propulsion devices are not installed: locally a small tug or pushboat is employed to operate the unit. All it takes to mobilise the unit are four to nine containers, depending on the required depth.

Equipment	Dimensions (m)	Total power installed (kW)	Maximum dredging depth (m)
Norham Camorim	38.87 x 10.00 x 3.50	2,137	26
Sagar Manthan	40.60 x 11.20 x 4.00	2,106	20
Antareja	40.60 x 11.20 x 4.00	2,096	30
Iguazú	23.15 x 10.00 x 4.20	2,078	27
Jetsed	28.50 x 13.80 x 2.20	1,621	25
Njörd	29.00 x 8.24 x 2.48	1,584	19
HAM 922	14.54 x 6.06 x 2.40	542	20
Baldur	8.15 x 3.50 x 0.60	75	7



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Water Injection Dredging
The natural way of dredging

Water Injection Dredging is dredging with nature. Under the right circumstances and executed in a professional manner, it offers an economical alternative for maintenance dredging.

Van Oord
PO Box 8574
3009 AN Rotterdam
The Netherlands
T +31 10 4478444
F +31 10 4478100
E info@vanoord.com
I www.vanoord.com

contact
capabilities

Natural way of dredging



The method of Water Injection Dredging (WID) removes the sediment in exactly the same way it came: 'the natural way'. Van Oord developed this efficient and cost effective technique, which removes sediment with the help of gravity. For a number of years Van Oord has been using this technique to execute maintenance dredging in ports and access channels around the world.

Versatility

In addition to general maintenance dredging, Water Injection Dredging can remove soil where other equipment is unable to operate:

- from slopes and slipways;
- from aprons at locks and dry-docks;
- underneath jetties and moored vessels.

Or dredge where other equipment is not suitable:

- levelling of the sea bottom for pipelines and sections of tunnels;
- increasing the depth of cables and pipelines;
- levelling dredged areas to reduce overdepth and therefore costs.



The method

Over the years Van Oord has attained valuable theoretical and practical knowledge in the mechanisms of sediment transportation. Settled sediment can be brought back in suspension by injecting it with water. The cohesion between the grains is eliminated and the sediment forms a mixture with the injected water. The mixture turns into a density current, which, being a fluid, will move under the influence of gravity and density gradients. The density current will flow away horizontally, taking the sediment particles with it.

Water Injection Dredging makes practical use of this phenomenon. Large volumes of water under low pressure are injected into silt or fine sand sediments. The appropriate equipment in the hands of experienced crew is capable of removing large quantities of sediment within contractual specifications.

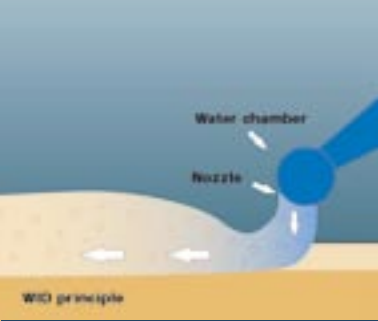


Photo legend

- 1 Jetsed, Breskens, the Netherlands
- 2 Antareja, Brani Terminal, Singapore
- 3 Jetsed, River Thames, United Kingdom
- 4 Njörd, Cuxhaven, Germany
- 5 Antareja, Karwar, India
- 6 Iguazú, Itajai, Brazil
- 7 Sagar Manthan, Dung Quat, Vietnam
- 8 Antareja, Mumbai, India
- 9 Jetsed, Veerhaven Kruiningen, the Netherlands
- 10 HAM 922, Jamuna River, Bangladesh
- 11 Baldur, London, United Kingdom

Research

Large quantities of sediment can be removed by Water Injection Dredging in a relatively short time. Therefore it is important to have knowledge of the behaviour of the sediments, during and after applying WID. Van Oord has carried out extensive research, in co-operation with Delft Hydraulics in the Netherlands. With this knowledge transportation distance of the dredged material can be estimated in advance of dredging works.

The interaction between the density current and the surrounding physical environment has also been monitored during the research. It confirmed that the density current, that actually transports the particles, stays relatively close to the bottom and creates virtually no turbidity higher in the water column. It can be stated therefore, that dispersion of sediment into the surrounding water is negligible.

