



# Big, bigger, biggest: Mega dredging vessels make mega dredging projects possible

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What is a megaproject? Think ports, airports in the sea and land reclamation at Hong Kong, Singapore, Rotterdam's Maasvlakte 2, Dubai's Palm Islands as well as the new Panama Canal. Mega dredging projects cover hundreds of hectares and move massive volumes of sand. They include projects for deep-sea oil and gas extraction as well as for renewable offshore wind energy. Such projects cost billions and have huge consequences for the sustainable economic and social progress of nations and their citizens.

## Megaprojects

Maritime megaprojects reflect the demands of a growing world population, demands intensified by worldwide migration towards coastal urban centres. According to the United Nations, the World Bank and OECD, more than 50% of the world's population now live in close proximity to the sea and three-quarters of all large cities are located on near water. These metropolises attract people because they promise a higher quality of life.

But the flip side is that these cities are at risk for overcrowding; they are vulnerable to sea-level rise and storms caused by climate change; they are subject to erosion and flooding – with a consequent disastrous loss of life and property. They are also the source of increasing air and water pollution, the destruction of coral reefs and other marine ecosystems. This threatens the sustainability of these very cities that are such magnets for economic expansion.



*CSD J.F.J. De Nul is the world's largest cutter; with a total installed power of 27,240 kW, she can dredge to 36 m depth*



*The self-propelled heavy-duty CSD D'Artagnan has over 28,000 kW total installed power and can dredge from 6 to 35 metres depth*

To meet these challenges the international dredging industry has created new land, enhanced coastal protection and helped exploit energy sources – monumental engineering achievements in which dredging plays a fundamental role. But to make this possible, dredging contractors require bigger, better, more cost-efficient Mega-vessels.

## Mega-equipment

This need led the major dredging companies to make long-term investments in developing larger equipment which facilitates larger projects; the larger projects in their turn create the need for larger equipment. A self-perpetuating cycle that has taken on new proportions in the last 20 years.

In 1994 a trailing suction hopper dredger (TSHD) with a hopper capacity of 17,000 m<sup>3</sup> was launched – this marked a 40% increase in capacity with the next largest trailer, which could handle 12,200 m<sup>3</sup>. A breakthrough. But by 2000, Jumbo TSHDs with hopper capacities of 24,000 m<sup>3</sup> were being built. In that six-year period at least nine new Jumbo dredgers were introduced into the fleets of the major international dredging contractors. These self-propelled TSHDs were instrumental in creating new markets.

But that was just the beginning. In 2000, with the commissioning of a 33,000 m<sup>3</sup> trailer, a new era had arrived. Mega-trailers, joined by Mega-cutters and other huge equipment, have since burst on the dredging scene, making Mega marine infrastructure projects economically feasible. After the land reclamations in Southeast Asia, the trend cross-pollinated to the Middle East for the next decade, with numerous projects in Dubai and surroundings requiring



The two sister THSDs *Cristóbal Colón* and *Leiv Eiriksson* both have a hopper capacity of 46,000 m<sup>3</sup> and a maximum dredging depth of 155 m

hundreds of millions of cubic metres of sand. Next was Latin America with such developments as Brazil's Superporto do Açú.

Nowadays Mega-ships include trailers, cutters and backhoes, as well as purpose-built auxiliary equipment. To imagine the enormity of a Mega-trailer compare it with smaller TSHDs. A trailer's size is expressed in the hopper volume capacity, the length and the pump power. A small TSHD may have a capacity of 3,400 m<sup>3</sup>, a deadweight of 4,800 tonnes, a length of 93.3 m and a loaded draught of 5.0 m. Her maximum dredging depth is 26.5 m with a suction pipe diameter of 800 mm, a trailing pump power of 1,250 kW, a power when pumping ashore of 2,000 kW and a propulsion power of 2 x 1,000 kW. Her total installed power is 4,100 kW and she has a speed of 11.5 knots.

Now consider a recently constructed Mega-TSHD with a 46,000 m<sup>3</sup> hopper capacity, 78,500 tonnes deadweight, 223 m in length, with a loaded draught of 15.15 m, a maximum dredging depth of 155 m, suction pipes with 1,300 mm diameter. Her trailing pump power is 2 x 6,500 kW, with a discharging pump power of 16,000 kW and a propulsion power 2 x 19,200 kW, a total installed power of 41,650 kW and sailing at 18.0 knots.

The same proportional differences are true of cutter suction dredgers (CSDs). The smallest CSDs have a total installed power of less than 300 kW compared to Mega-cutters ranging from 23,500 kW to more than 28,000 kW, which are all self-propelled. Smaller CSDs often dredge in very shallow waters of less than two metres depth whilst the biggest CSDs can reach to more than 35 metres underwater.

Backhoe dredgers (BHDs), usually classified by their length, draught, potential dredging depth, bucket size and total installed power, have seen a similar jump in size. The smallest BHDs are around 25 to 35 metres long; Mega-BHDs are some 60 to over 70 metres in length. Dredging depth varies from 10 to 20 metres for smaller equipment to 20 to 35 metres for the Megs. Bucket sizes range from 1.5 to 2.5 cubic metres on smaller BHDs to up to 40 cubic metres on some of the newest Megs. Power also varies: A small BHD has on average 200 to 500 kW; a Mega-BHD goes from 2000 to over 4000 kW.

What do these newest Mega-vessels add to the industry's capabilities? How do they benefit the clients? Whereas the large projects of the past took decades to complete, recent Megaprojects are realised in a few years' time. This accelerated execution is cost effective and has revolutionised the way the dredging industry can fulfil the needs of the global community.

### What's next?

Innovation, research and development and robust competition continue to drive the international dredgers. New, innovative Mega-vessels are on the drawing boards, incorporating technologies that meet the most stringent demands with respect to sustainability and safety, accuracy and efficiency. The addition of these Mega-vessels to the world-wide dredging fleets has improved and will continue to improve the potential of the major dredging contractors to deliver quality work that contributes to propelling the world's economy forward.

**About the author:** As Secretary General of the International Association of Dredging Companies (IADC), the umbrella organisation for the world-wide private dredging industry, René Kolman takes a leading role in promoting the industry's long-standing commitment to research, quality standards and sustainability. Mr Kolman studied at the Nautical School in Rotterdam and holds a degree in Economics from the University of Groningen, The Netherlands.

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