

TECHNOTES

Modification or Conversion of Dredgers

There is no one reason for modifying or converting dredgers and dredging-related equipment. In some cases it is a shortage of dredging plant. In other cases, as a result of large dredging operations in the Middle East and elsewhere, the demand for specialised equipment is greater than the supply. In addition, not all existing equipment has sufficient capacity or quality to fit the needs of modern dredging mega-projects. Adding to the demand is that many shipyards are completely booked – even overbooked – for building new ships in the near future. Add these reasons together and modification and/or conversion of existing vessels is often the most convenient alternative.

Not that modifying equipment is without problems. Questions need to be asked before a modification is undertaken. For instance, how is the technical condition of the vessels? Are original drawings available? Have new standards come into effect? What about efficiency and economic status?

INTRODUCTION

When considering modifications or conversions, several technical choices are possible. Take for example a trailing suction hopper dredger (TSHD): The hopper capacity could be increased or the dredging depth extended. As well, the loading and unloading process of dredged sediment can be improved. For cutter suction dredgers (CSD), the cutter power and all relevant items can be upgraded; the cutter depth can be increased or minimised. Also, the swing length and dredging process can be improved by installing a spud carrier system, or other such improvements. Other possibilities to consider are converting one type of equipment into another system, like turning a split barge into a split hopper dredger, or a bucket dredger into slope trimmer, or a cutter dredger into deep suction dredger, or a tug into a bed leveller and so on. Merchant vessels can also be converted into dredging vessels like a naval supply vessel into an aggregate dredger, a module carrier into deep stone dumper/deep dredger, and a work vessel into a water injection dredger, to name a few.

In the last ten years, a number of these modifications and conversions have been successfully executed. The conclusion is clear from these examples: Existing dredging equipment, even when of an older age, can very often have new possibilities and an extended lifespan.

LIFETIME EXTENSION OF A BLOCK-LAYING VESSEL INTO A SIDE STONE DUMPER

The block-laying vessels *Norma* and *Libra* were originally built in 1968 for constructing the piers at the harbour entrance of Rotterdam (Figure 1). They were both equipped with Voith Schneider propellers for good manoeuvrability. Later on, the *Norma* was converted into a floating sheerlegs (Figure 2) and the *Libra* was renamed *HAM 602*.

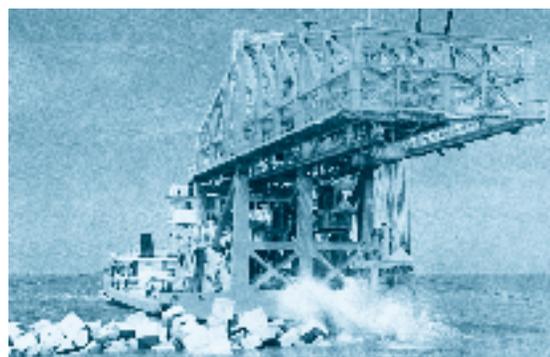


Figure 1. *Libra* as a stone dumping vessel.



Figure 2. *Norma* as a floating sheerlegs.



Figure 3. *HAM 602* (formerly *Libra*) during trials after modification as a MPV.

In 1985 the *HAM 602* was converted into a multi-purpose vessel (MPV) with a very large working deck with enough space for cranes, cable laying equipment, and so on (Figure 3). Also extra accommodations were added. However, with all the extensive projects in the Middle East and a lack of dredging vessels available, it was recently decided to modify the MPV into a side-stone dumper. Considering the previous improvements, including a renewed engine room, improved accommodations and good manoeuvrability, the *HAM 602* was eminently suitable for this conversion. A shipyard in Dubai executed all the necessary work once again adding a new chapter to the life of *HAM 602* (Figures 4 and 5).



Figure 4. *HAM 602* as she was being converted into a side stone dumper.



Figure 5. *Ham 602* in action as a stone-dumping vessel.

CONVERSION OF A TUGBOAT INTO A BED LEVELLER

In principle, the conversion of a tugboat into a bed leveller is not a very complicated job. However, when jet water supply also has to be provided and the only available tug is of a significant age (built in 1954) with a very slender body, a few problems arise which have to be solved. For instance, How to get sufficient information about drawings and stability? How to cope with a riveted steel construction? What about class? Fortunately, *the Geer* had a sister ship in Holland; in addition some pictures were sent from Africa, where the tug was sailing. Also several drawings were even found back filed away. So the conversion was begun. To create extra displacement at the stern side where it was most needed, two pipeline floaters were connected to the aft ship structure (Figure 6). The jet water pump set, as well as the hoisting gantry and the winch, were placed on the aft deck (Figure 7). The vessel performed very well, and today is acting once again as a normal tug.

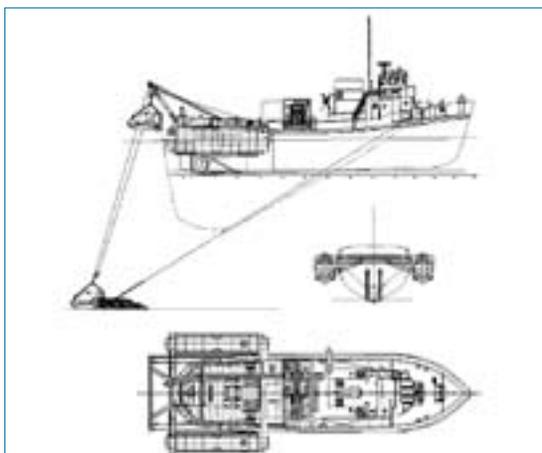


Figure 6. G.A. Plan 'Geer' with bed leveller.



Figure 7. The Tug *Geer* working as a bed leveller.

CONVERSION OF A MULTIPURPOSE VESSEL (MPV) INTO A WATER INJECTION DREDGER (WID)

Taking a multi purpose vessel (MPV), which is today working as bed leveller, the conversion into a water injection dredger (WID) is not too complicated. For one thing, gantries and winches are already available on the MPV. Thus all that is needed is to place two pump sets on the fore deck with suction inlet to the bottom, place one elbow gantry at each shell side and a U-shaped frame for delivery of jet water to the nozzles. The position of the nozzles can be adjusted to the existing water depth (Figure 8).



Figure 8. An artist's impression of a project converting a MPV into a WID, soon to be realised.

A BUCKET DREDGER BECOMES A SPREADER PONTOON

A bucket dredger is a nice piece of equipment for a conversion. Well-constructed, with a great number winches and a large gantry, a bucket dredger can be used for a great number of executions. This bucket dredger, the *Adriatico*, was modified into a spreader pontoon by replacing the lower part of the ladder with a T-shaped pipe over almost the total width of the pontoon (Figure 9). A mixture supply pipe was mounted on the original bucket ladder. The pontoon was then connected via a floating pipeline to a dredger. Thus its temporary life as a spreader pontoon began, producing the layers on the sea bottom for dyke construction, with assistance of course from the other necessary tools and instruments. The pontoon can also be used for water injection dredging.



Figure 9. On the bucket dredger *Adriatico*, a T-shaped pipe was placed on the lower part of the ladder covering almost the total width of the pontoon.

CONVERSION OF A SPLIT BARGE INTO A SPLIT HOPPER DREDGER

The split hopper dredger *Dravo Costa Blanca* is owned by Dravosa, a joint venture of Van Oord and Dragados based in Spain. The vessel, having started her life as the split hopper barge *Louisiana*, was converted in 1994 at the yard Astilleros de Huelva in Spain into a split trailing suction hopper dredger. During the conversion existing equipment was overhauled or renewed. The dredging equipment installed on *Dravo Costa Blanca* consists of a submersible dredge pump, driven by an electro-motor. For pumping ashore, a self-discharge system with a separate diesel-driven pump has been installed at PS aft. The delivery connection is located on the bow, where a floating shore-linked pipe can be hooked on. New propulsion engines and gearboxes were installed with as consequence more powerful generator sets. Also the trailing pipe has been lengthened with the new position of the aft gantry. Her overall length is now 73 m, with a hopper capacity of 1450 m³, a dredging depth from 23 to 35 m, and total installed power 3100 kW.

CONVERSION OF SPLIT HOPPER DREDGER INTO SPLIT BARGE

Conversion can also be done the other way around. For example, take the split hopper dredger *Pantagruelle* which was built in 1979 for an Italian contractor. Later on she joined the DEME fleet. Unfortunately in recent

times, the vessel was more often laid up than in working condition. Then DEME took delivery of their new sea-going cutter suction dredger *d'Artagnan*, equipped with barge loading facilities and the need for large capacity sea-going split barges became clear. Given her 2000 m³ hopper, the *Pantagruelle* could easily fulfil this function if she could be converted. As part of the conversion, the complete dredging installation and accommodations were removed from the *Pantagruelle*, new accommodations for a reduced crew were fitted at the aft of the ship, and new funnels were added and overflows were repositioned. Together with the split barge *Krankeloon*, which was also converted from split dredger into split barge, the *Pantagruelle* is living a new life. These conversions created a synergy between a brand-new CSD and some older but well-built vessels.

WIDENING THE CUTTER SUCTION DREDGER AL MAHAAR

The *Al Mahaar* is the most powerful cutter suction dredger in the fleet of the Qatar Dredging Company. QDC is a joint venture of the Belgian DEME, the Qatari UDC and the Government of Qatar.



Figure 10. The single pontoon (above) was then separated into two parts (below).

To deploy the dredger *Al Mahaar* on several projects in the Gulf area, the CSD had to be able to perform in very shallow waters at a minimum draught and dredging depth. Her draught had to be reduced to 3.5 metres to be able to work in a water depth of 5 metres. After studying several possible solutions, it was decided to widen the dredger with side pontoons welded to the original dredger, instead of using a dismountable arrangement.

To allow dredging also at the original depth, ballast provisions and cofferdams were provided between the dredger and the new side pontoons. These side pontoons were built as a single pontoon in India, towed to the yard in the Gulf where they were then separated into two pieces and welded to the original dredger (Figure 12). The total breadth has been upgraded from 19 metres up to 29.44 metres. Together with other modifications this conversion took place in March/April 2006.

CONCLUSION

The projects presented here cover a wide range of different types of equipment. Some dredgers have been converted in such a way that they can hardly be recognized. Especially for the older vessels finding all the relevant information is a challenge. Sometimes the drawings are not even at as-built level, and there are complex problems after a technical life of 15-20 years. Still, it is clear that there are many possibilities to give new life to old dredgers.

In addition, sometimes even converting young equipment is quite useful, making the dredger suitable for a specific job or giving her new opportunities for the rest of her lifetime. One cannot say: "Old dredgers never die", but small modifications, big conversions and even complete makeovers are possible and can extend the lifespan of a vessel and thus the original investment. Although conversions and modifications may not always be less expensive, the process is certainly faster than building new equipment. Given the time frame for new shipbuilding orders, a conversion of existing equipment should definitely be considered.

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