Maritime Holland

special

Fast Forward & Rewind 2015/2016

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Experienced strategist

Maritime prizes galore!
On Saturday 9 May 2015, Ilembe was launched and named at the IHC facility in the township of Kinderdijk, at the confluence of the Lek and Noord rivers. Lunga Ngcobo, general manager corporate affairs at TNPA, performed the naming ceremony.

The vessel’s name, Ilembe, is a South African title for a hero. Having played a vital role in uniting the Zulu tribes and fighting against the Europeans, King Shaka Zulu was hailed as ‘Ilembe’. He was, and still is, described as ‘a hero who excels due to his wisdom and excellence’ - ‘veqa amanye avuLEMBE ngokukhalipha’. North of Durban is a municipality also called iLembe, which is one of the eleven district municipalities of the KwaZulu-Natal province in South Africa. The municipality of iLembe, formerly named King Shaka District Municipality, has a rich historical connection to the Zulu tribe, confirmed by its district town KwaDukuza accommodating the tomb of King Shaka.

Trailing Suction Hopper Dredger (TSDH), Ilembe, with its 5,500 cubic metres hopper, is Royal IHC’s latest addition to the Transnet National Ports Authority (TNPA) fleet. This TSHD will help TNPA maintain the standards of South Africa’s eight main commercial seaports and expand the capacity of the bay of Durban Port. This latest offering will join TNPA’s existing fleet of IHC-built vessels, which includes the 4,200 cubic metres TSHD Isandlwana, delivered in 2010, and the grab hopper dredger, Italeni, of 2014. TSHD Ilembe will replace TSHD Ingwenya, which was also built by IHC and delivered to TNPA in the early 1980s.

Survival of the fittest

IHC were awarded the project after submitting a successful, and attractive, design proposal during an open tender procedure for what was to become the largest dredging vessel of its kind operating in South Africa. The contract for the design, construction and delivery of the vessel between TNPA and IHC was signed in March 2014. With the keel laid on 8 January 2015, the vessel will be delivered in Durban, its homeport, in early 2016, which is a very short turnaround.

As IHC’s executive director shipbuilding, Fer Tummers, stated in his address during the launch ceremony: “IHC value the long history of collaboration with TNPA. The South African port authority expressed great confidence in the quality and reliability of IHC’s products.” Being one of the five operating divisions of Transnet SOC Ltd, TNPA are responsible for the safe, effective and efficient economic functioning of the South African national port system. As such, they require highly reliable dredgers, resulting in low-maintenance requirements, excellent dredging performance, high workability and a high level of safety. It is for these reasons that TNPA do not wish to experiment with the latest unique or customised techniques, nor be a test case for prototyping equipment, but rather opt for reliability and proven tooling. Furthermore, all equipment and materials on board are selected on the basis of local availability in Africa, and easy repairability; indeed, some of the equipment used on board Ilembe during newbuilding is already manufactured in South Africa. However, all the main dredging components and systems are designed and produced within IHC, with parts manufactured in association with regional Dutch entrepreneurs.

As part of the contract with TNPA, IHC will set up a Supplier Development (SD) plan in order to further develop and improve the local industry in South Africa. The primary activity within the SD plan is to establish a school for dredging operators - including the delivery of a dredging simulator - where IHC, together with TNPA’s own Maritime School of Excellence, will initiate a long-standing cooperation for the training of local people.

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Sense and sensibility

The superstructure with the accommodation is set at the far forward end of the TSHD, while the main machinery room with the pump room is aft, and the hopper in the middle between the two. Under the accommodation are technical spaces, the bow thruster room and the forepeak. The dredge pipe is to port side and feeds the directly driven main dredge pump in the aft ship. The dredge suction pipe itself is 900 millimetres in diameter. The dredging system control is provided by IHC Systems, a division of the parent company.

EXTENSIVE LIFECYCLE SUPPORT
The wheelhouse forward area contains the main navigation consoles on centreline, with all the usual navigation and ship control facilities; this is the ‘captain’s area’ and designated for sailing in the conventional sense. The radio console is to starboard fore, while portside fore accommodates the chart table. The portside aft part of the bridge is the operational area for dredging activities, and is home to the ‘dredge master’. Starboard side aft contains an L-shaped settee, whilst the two bridge parts are separated in the middle by a kitchenette and the stairs to lower decks.

Below the wheelhouse, on the restricted height A-deck, is a convertor room housing most of the electrical junction boxes, control units and the HVAC system to support the bridge and accommodation. The crew accommodation is to be found on the lower superstructure decks, between the wheelhouse and the technical spaces in the hull. The vessel has a crew of 26 people, each with their own individual single-birth cabin. Furthermore, three of these decks comprise offices on B-deck and a crew mess, an officer’s mess, a hospital and changing room at forecastle deck level. A gymnasium, galley and laundry are located on main deck, while food storage space, along with cool and freeze storage rooms, can be found straight below the galley in a separated area of the technical space.

The area below the superstructure, on the same level as tank top and tween deck, contains the technical spaces, comprising the domestic machinery and equipment, providing facilities for the accommodation, including a ballast water treatment unit.

Sand and silt dredging
Ilembe is designed to dredge to a maximum depth of 30 metres by means of a suction tube of 900 millimetre diameter with a dredge head on portside. The owners opted for a singular rather than duplex suction tube to simplify the installation. With local repair facilities nearby, the redundancy offered by a dual dredge pipe installation was not deemed crucial. Consequently, the grab hopper dredger, Ilembe, will tackle inaccessible harbour corners. As the South African harbours are often polluted with debris, the dredge head is fitted with an inlet grating.

A swell-compensating system has been installed to maintain the dredge mouth position and pressure on the seabed at all times, when the vessel is dredging on the move. To facilitate the stationary dredging capability, or when dredging silt and mud, a dedicated suction mouth with high-pressure jets can be fitted, which loosen the seabed by injecting water into it. During normal trailing dredging, the drag head teeth, which are no longer useful when the vessel is stationary, cut into the seabed to allow the drag head to move. To work at their highest efficiency, the vessel is capable of discharging the dredged spoil by three different means. It can be pumped through a (floating) pipeline or, finally, by what is known as ‘rainbowing’. This means discharging from the bow by means of a high-pressure spray, to create an area of reclaimed land. However, TSAD Ilembe will primarily use the bow coupling for discharging, via a shore connection, to a cleaning and filtration plant along the quayside in Durban. The resulting purified sand will be used for beach replenishment. When the vessel is being discharged, water injection pumps are employed, which liquefy the spoil via injection nozzles on both sides at the hopper bottom. The coupling for a (floating) pipe and the rainbow nozzle are situated at the bow.

The hopper includes an overflow system, designed to optimise the efficiency of the dredging process by ensuring the maximum retention of solids in the hopper in parallel with fast discharge of water overboard. The vessel is also fitted with a degrading plant as the dredger can operate in areas where natural gases are trapped or dissolved in the dredged material. As the soil comes to the surface and is exposed to a reduced pressure, the gases within it expand and are released to atmosphere. In doing so, they reduce the density of the mixture. This all happens prior to passing through the dredge pump. Clearly this would radically reduce dredging efficiency or completely stop the dredging process altogether. Moreover, these gases are typically organic by nature and can be toxic or potentially explosive.

The vessel is also fitted with a degassing plant, via a shore connection, to a cleaning and filtration plant along the quayside in Durban. The resulting purified sand will be used for reclaimed land. However, TSAD Ilembe is designed to dredge to a maximum depth of 40 metres by means of a suction tube with a dredge head on portside.

Plain sailing
The main propulsion package consists of two marine diesel engines, each with a gearbox at both ends. The aft gearboxes drive controllable pitch propellers (CPPs) in a nozzle, regulated by the propulsion control and monitoring system. These gearboxes are horizontal-offset single-input, dual-output units, with a shaft generator coupled to the rear of the starboard box. As manoeuvrability is essential, sizable spade rudders have been fitted behind the nozzleled CPPs. To further enhance the manoeuvrability, the vessel has a tunnel thruster in the bow, having its engine flexibly mounted to reduce transmission of noise.

The starboard side main engine also drives the jet pumps via a coupling to the forward end. The portable main engine runs parallel with an auxiliary diesel engine; both can power the dredge pump at the same time through a dual-input, single-output gearbox. The jet pumps and the single-walled dredge pumps are located in a watertight compartment forward of the engine room.

The emergency or harbour generator set is accommodated to portside aft on main deck level, in a dedicated compartment behind the casing containing the ventilation components and the exhaust lines to the engine room. All of the engine room on tween deck are the various storage spaces for engine parts and spare dredging equipment. On main-deck, all of the casing to starboard side, a workshop annex welding space is located.

All mod cons outdoors
On the aft deck, two capstans and four bollards (two on each side) are situated for mooring purposes. A rope basket and a horizontal wire drum to starboard side, the stern anchor equipment on centreline, and the guide rollers or fairleads in the guardrails complete the aft anchoring and mooring equipment. On the foredeck, a further four bollards (two on each side) are situated,
complemented with a rope basket, a number of fairleads and guide rollers in the bulwark, plus two combined bow anchor/mooring winches with horizontal rope drums.

For general tasks, two stiff boom cranes are fitted: one to starboard side of centreline on the aft coaming deck, and one on the starboard side gangway just behind the superstructure. The aft crane is primarily for lifting dredging equipment and maintenance purposes, such as changing the dredging mouth. The second smaller crane is fitted above a service hatch, facilitating provision- and transporting equipment into the forward technical spaces. On port side, two dedicated gantry cranes with heave compensation are installed for the handling of the suction pipe assembly.

On the raised aft coaming deck to starboard side next to the funnel, a twelve metre steel workboat is placed. This workboat is manufactured in South Africa as part of the Supplier Development (SD) plan to improve the local industry. The required lifeboats, one on each side, are installed in the matching davit installations just aft of the superstructure.

Alternatively, dredged spoil can be pumped ashore through a pipeline or by what is known as ‘rainbowing’.

Tipping the scales
Although the quality of the vessels and equipment, alongside IHC’s reputation and their long-term relationship with this client, were an important selection criterion, being able to provide more than just a hopper dredger gave IHC the competitive edge. The willingness to invest in the further development of the South African industry, as well as enabling training and extensive lifecycle support after delivery, tipped the scale for granting the order.

Tom Oomkens
Builder
Royal IHC, Kinderdijk, the Netherlands

Owner
Transnet National Ports Authority, Durban, South Africa

Length o.a. 101.50 m
Length p.p. 96.85 m
Breadth mld. 22.40 m
Depth mld. 7.50 m
Draught 6.00 m
Speed 11.9 kn
Complement 26 persons

Dredging parameters
Hopper capacity 5,500 m³
Suction pipe, diameter 900 mm
Dredging depth, max. 30 m
Installed power, total 7,660 kW

Tank capacities
Marine diesel oil 393 m³
Freshwater, drinking 42 m³
Freshwater, technical 42 m³

Principal particulars

Photo by J. Klatsman, Sleep- & Duwvaart

Photo by Flying Focus

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