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IGUAZÚ

VERSATILE TWIN-SCREW DEEPSEA WATER INJECTION DREDGER FOR HAM, DREDGING AND MARINE CONTRACTORS

Builders : Harlingen Shipyards, Harlingen, The Netherlands
Owners : HAM, dredging and marine contractors, Capelle a/d IJssel, The Netherlands

Harlingen Shipyards recently completed a versatile twin-screw deep sea water-injection dredger for account of HAM Dredging and Marine Contractors - the 'Iguazú'. The vessel is designed and equipped for an unrestricted sailing area and can be deployed worldwide. To be operated as a 'water injection dredger' by a 12-men crew, the vessel is able to dredge at a depth of 25 m.

The 'Iguazú' has been built in accordance to the rules and regulations of Bureau Veritas, notation I 3/3 E Dredger/Tugboat, Deep Sea, *MACH, CNC 1 and complies with the require-

ments of the Netherlands Shipping Inspectorate (NSI).

Main Characteristics

Built under yard number 210 the 'Iguazú' features the following main characteristics:

Principal particulars

Length o.a.	42.60 m
Length b.p.	35.15 m
Breadth mld.	10.00 m
Depth mld.	4.20 m
Design draught.	2.90 m
Gross tonnage.	476 t

Performance

Propulsion	2 x 746 kW
Bowthruster	272 kW
Speed	11.5 knots

Tank capacities

Marine diesel oil	165 m ³
Potable water	56 m ³
Lube oil	4 m ³
Hydraulic oil	2 m ³
Dirty oil	5 m ³
Sewage	8 m ³
Ballast water	95 m ³

General

The 'Iguazú' is a single deck type vessel with forecabin and accommodation deckhouse situated on forecabin deck. The hull is constructed of frames and deck beams of bulb profiles with webs built from plates with flat bars. The deckhouse construction consists of bulb profile deck

beams and girders of heavy bulb profile webs. Transverse frame spacing is 600 mm.

The forecastle accommodates two self-stowing chain lockers. Anchor chain cables are guided through two thick-wall steel pipe hawse pipes. The anchors are stored in two anchor pockets which ensure properly housing and easy chain lead to the anchor chain wheels.

The vessel is manned by a complement of four officers and eight crew members. The officers are accommodated in single-berth cabins and the crew in double berth cabins. Climate control of the accommodation section is with a single duct air conditioning system, make Friamco. The AC system is capable of maintaining an indoor temperature of 27°C (50% rh) at an outside temperature of 45°C (45% rh) in summer. In winter period at an outdoor temperature of minus 10°C an indoor temperature of 20°C (60% rh) can be maintained in accommodation section and wheelhouse.

From forward to aft the accommodation section has the following arrangement on main deck: a boatswain's store, four double-berth crew cabins, the lounge/messroom, a change room, a laundry, the galley, a paint store, workshop and dry store. The forecastle deck accommodates the captain's cabin and three officer's cabins. All accommodation spaces comply with the requirements regarding maximum noise levels.

Water Injection

Water injection dredging is a natural way of dredging patented by HAM and is facilitated by two powerful jetpumps located in the engine room and by a single jet/injection pipe system. The U-form jet pipe - fitted with nozzles - is carried in the vessel's side with the water injection pipe at the aft end. Jet pipe and injection pipe have been designed for the following water injection conditions:

- minimum injection depth of 3.00 m;
- maximum injection depth of 25.00 m.

The injection pipe features an inside diameter of 700 mm and has a wall thickness of 20 mm. Water jetting is with seawater.

The injection pipe is fitted with stainless steel nozzles at the lower side of the injection pipe. Accurate positioning is possible within the com-



The 'Iguazu' is fitted with a complete Alphatron Marine navcom package

plete dredging depth range. In all positions the nozzles in the injection pipe are jetting at an angle of 90 degrees in relation to the horizontal jet direction. Positioning of the injection pipe is controlled from the dredging desk in the wheelhouse. The two jet pump sets are driven by the PTO of the main diesel engines via a reduction gearbox with internal clutch and cardan shaft. Each jet pump set features a Nijhuis pump. The pumps are fitted with roller bearings and mechanical seals and connected to a flexible rubber bellow on suction and discharge side.

Jet pipe hoisting equipment includes a Hytop hoisting winch fitted on main deck. The hoisting winch - driven by a slow speed Hågglunds hydraulic motor and remotely controlled from the dredging desk in the wheelhouse - is remotely controlled from the control desk in the wheelhouse.

In order to compensate the impact of ground forces on the injection pipe a swell compensator is fitted. The swell compensator consists of a vertically mounted hydraulic cylinder with one wire sheave mounted on top of the plunger rod.

Engine Room

Propulsion is with a twin-engine main propulsion plant featuring two controllable pitch propellers. The Lips propellers are fitted in propeller nozzles with stainless steel inner rings. The nozzles are integrated in the shell of the aft ship. The propellers are driven through a reduction gearbox. At the foreside, each main engine drives - via a pto and reduction gearbox with clutch coupling and cardan shaft - a jet water pump. The main engines consist of KTA 38 M Cummins marine diesel engines.

Directional control is with a Promac steering gear controlling two spade-type double plate rudders interconnected to each other by an adjustable coupling rod. The rudders have a maximum rudder angle of 45 degrees to either side.

Manoeuvrability is enhanced by a diesel driven jet pump type bow thruster unit, make Schottel, fitted in a bowthruster tunnel. The unit is directly driven by a Cummins NTA-855-M marine diesel engine. Compressed air is generated by Atlas Copco air compressors. Engine room auxiliaries further include a bilge oily water separator, a general service/bilge/fire-fighting pump, a bilge/ballast pump, a ballast system with two ballast pumps, a hydrophore installation for supply of hot and cold water, a sewage system, and a Promac reverse osmosis plant with a capacity of 5 m³/day.

Hydraulic power is supplied by a central hydraulic power pack supplied by Boxel based Hydraudyne Hydrauliek. The power pack includes a hydraulic oil tank with piston type pump sets and separate cooling circuits. Following consumers can be operated simultaneously under full load or speed:

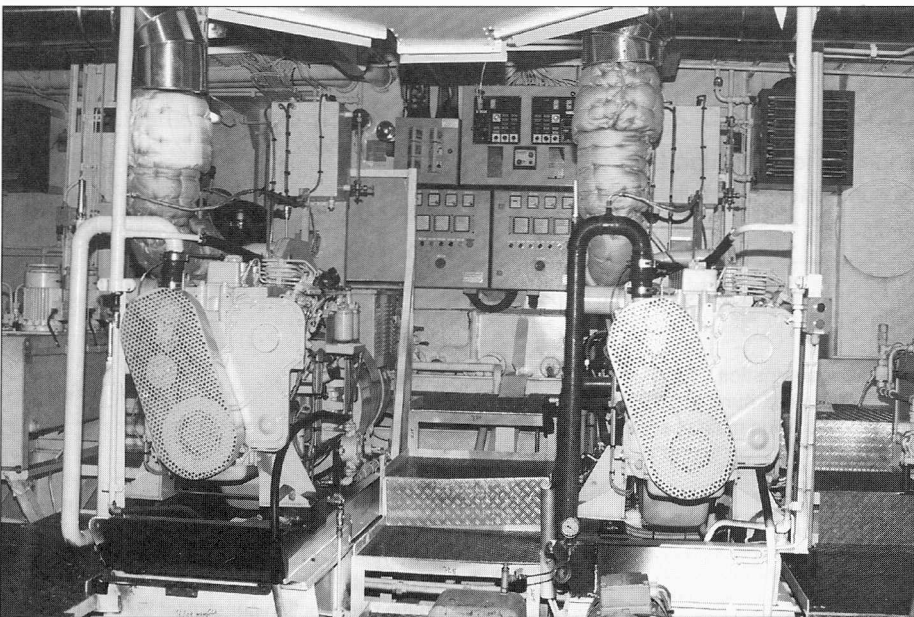
- jet water pipe winch;
- jet pipe hydraulic cylinders;
- deck crane with winch;
- hydraulic valves of the pipe lines;
- hydraulic windlass.

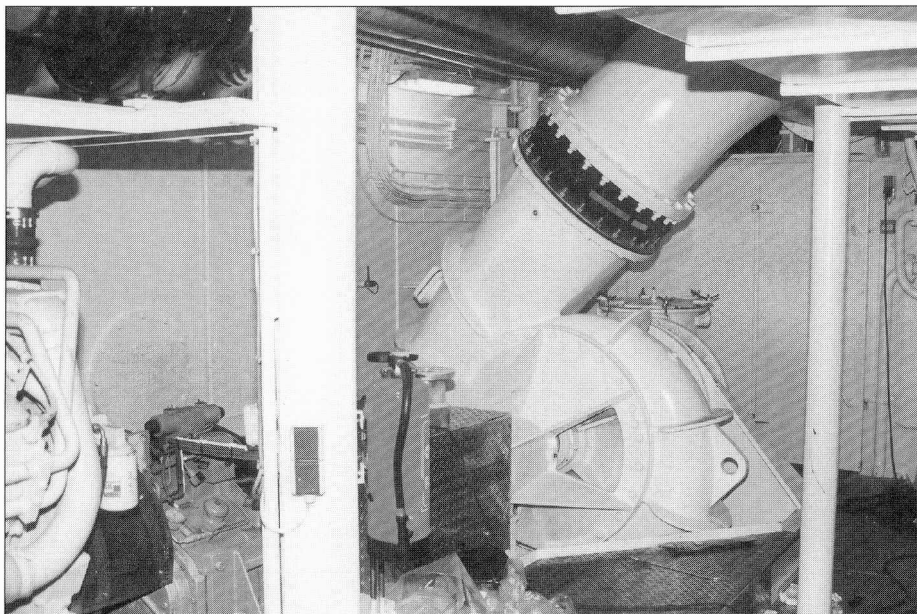
The maximum working pressure of the hydraulic oil system is 280 bar.

Electric Power

Electric power is derived from two diesel driven generator sets. Each genset consists of a Cummins 6 LTA83-6 diesel engine. The genera-

Electric power is derived from two Cummins generator sets





The two powerful jetpumps are located in the engine room

tors are suitable for continuous parallel operation. The electrical system consists of an AC system with supply from one or two auxiliary generator sets, and a DC emergency system with supply from the accumulator battery.

The electrical installation features the following main circuits:

- 400 Volt, 3-phase, 50 Hz (generators, shore connection, power consumers);
- 400 Volt to 230 Volt transformers, 3-phase, 50 Hz (lighting, battery backed up emergency lights, domestic consumers);
- 24 Volt (nautical equipment).

Deck Equipment

Machineries and equipment fitted on deck includes a knuckle boom hydraulic crane, make Effer, mounted on the aft side of the forecastle deck. The crane is fitted with a hydraulic winch equipped with 15 m steel wire. The deck crane is utilised for both maintenance work and handling of the survey boat.

The forecastle carries a Wortelboer hydraulic windlass with two cable lifters and two warping heads. The windlass handles two high holding power Pool TW type bow anchors fitted with grade U2 stud link anchor chain cable.

In order to be able to carry out towing operations the vessel is fitted with a towing bitt as well as with a towing disc-hook type. The towing hook features a remotely controlled quick release system operated from the bridge.

Life-saving Appliances

In accordance to the requirements of SOLAS the 'Iguazú' is equipped with two 12-person automatic inflatable liferafts. The liferafts are situated in port and starboard side and are stowed in fiberglass containers, complete with cradle and hydrostatic release. Complementing life-saving appliances include lifebuoys with self-igniting light and lifebuoys with self-igniting light and lifeline or grab line.

Audible and visible alarms are provided in the wheelhouse and engine room. A fire/smoke detection installation is installed in the wheelhouse and consists of a central alarm panel with an audible alarm. Smoke detectors are fitted in all machinery spaces. Combined smoke/heat detectors are fitted in accommoda-

tion spaces. The general alarm system is fitted in the navigation desk in the wheelhouse and is operated by a switch.

Wheelhouse

Fitted on top of the accommodation section the wheelhouse is such designed that an unobstructed view is provided to the surroundings and the working deck aft.

The navigation consoles of the 'Iguazú' are equipped with a complete navigation and communications package supplied by Rotterdam based Alphantron Marine. Main components of the navcom package include:

- a JRC sea radar system;
- a JRC river radar system;
- a Yokogawa gyro compass;
- a Robertson autopilot;
- a Lilley & Gillie magnetic compass;
- a Skipper echosounder;
- an Alphaturn rate-of-turn indicator;
- An Alphacall intercom system;
- a JRC DGPS;
- two Skanti VHF sets;

- a JRC Satcom C terminal;
- a JRC Navtex;
- a McMurdo GMDSS;
- a JRC colour echosounder;
- two McMurdo SARTS;
- one McMurdo EPIRB;
- one Skanti Mini M Inmarsat;
- one Walker speed log.

Subcontractors and suppliers of equipment fitted on board the 'Iguazú' (partial list)

A&L Hoekman, Urk: engine room installation

Ajax Brandbeveiliging,

Amsterdam: fire-fighting systems

Alphantron Marine, Rotterdam: nav aids & communications systems

Fischcon Trading & Engineering, Vianen: engines & generators

Friamco, Winsum: AC; ventilation system; sanitary system

FSW Timmerafdeling,

Harlingen: carpentry & upholstery

Hempel Coatings,

Vlaardingen: conservation systems

Hydraudyne Hydrauliek,

Boxtel: hydraulic installation & piping

Hytop Hydrauliek, Sliedrecht: winch

Kelvin Hughes, Hoogvliet: nautical equipment

Ketting, IJmuiden: air compressors

Lips, Drunen: propellers; gearboxes; shafts; nozzles

Marin Assist, Zoeterwoude: safety equipment

Nadrecon Naval Architects,

Roelofarendsveen: engineering

Nijhuis Pompen, Winterswijk: jet pumps

Piet Brouwer Elektrotechniek,

Urk: electrical installation

Promac, Zaltbommel: deck crane; RO unit; mob boat; rudders; steering engine

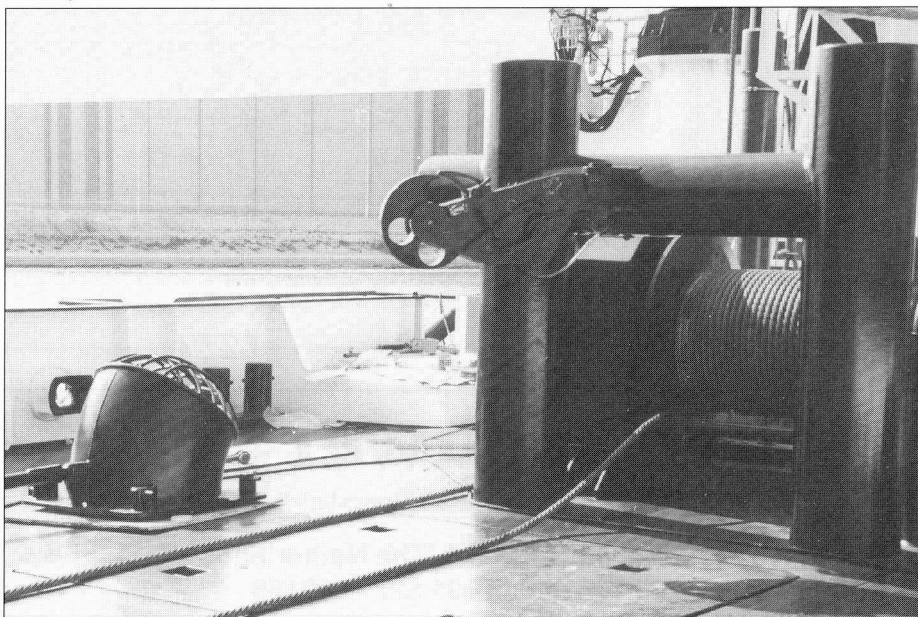
Schottel Werft Nederland,

Zoetermeer: bowthruster

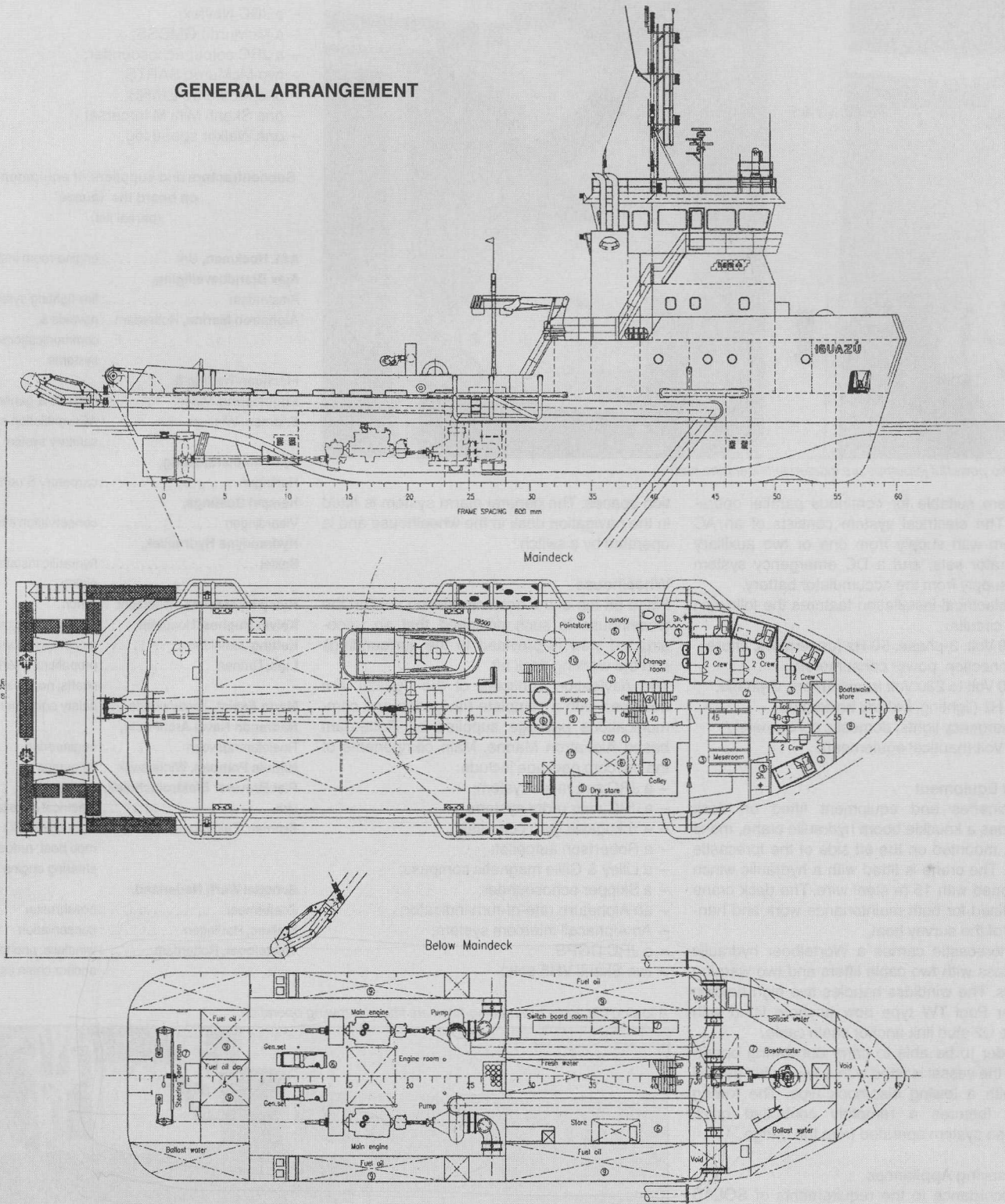
Welsec, Harlingen: conservation

Wortelboer, Rotterdam: windlass; anchors & anchor chain cables

A towing bitt and a towing disc-hook are fitted for towing operation



GENERAL ARRANGEMENT



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elektrotechniek

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We wish the "Iguazú" bon voyage!