Date September 2005
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Opv Sarah Baartman – New multi-purpose Offshore patrol vessel for South Africa

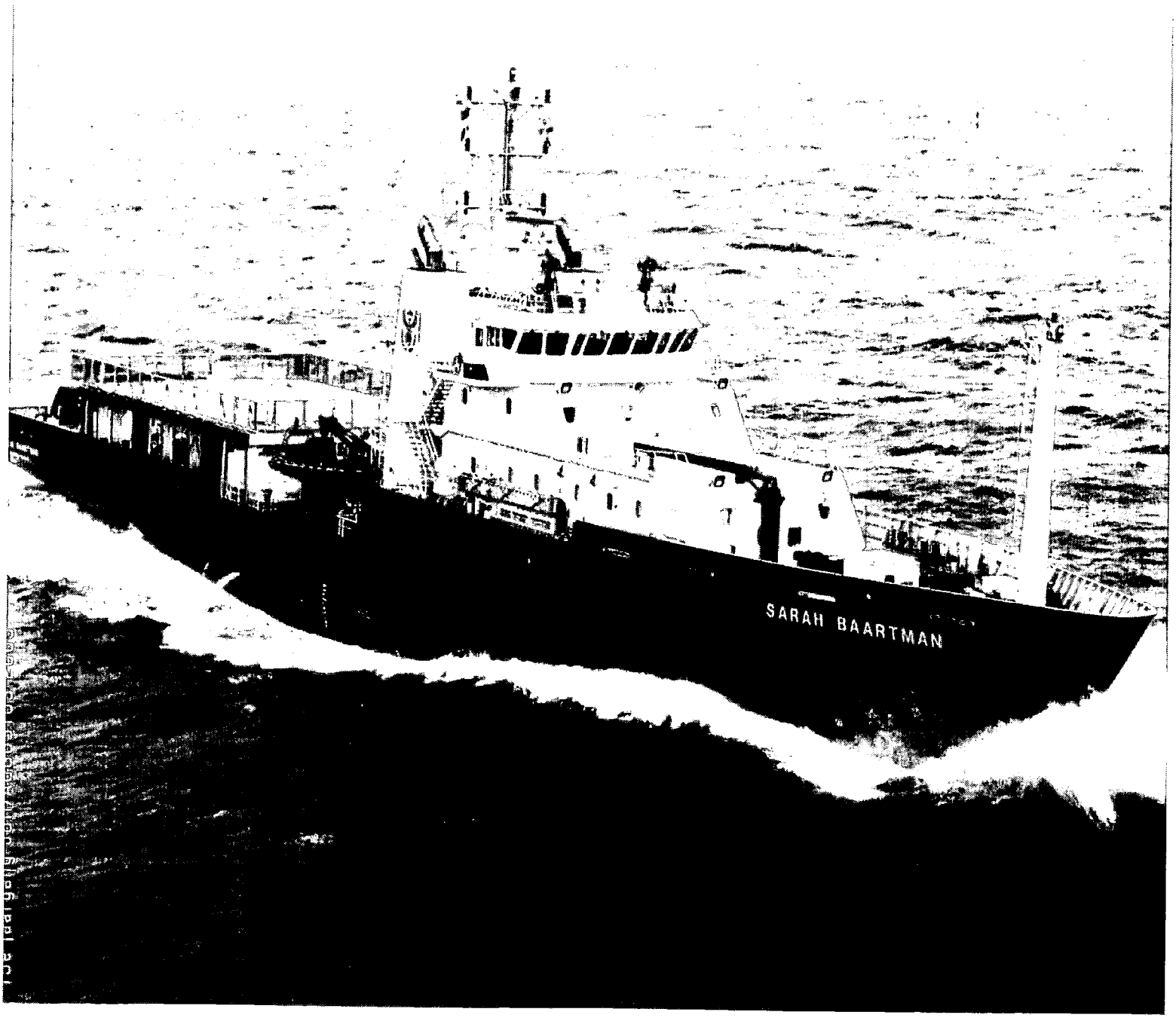
by

Jakob Pinkster

Report No. 1447-P 2005

Published in Schip & Werf de Zee, Juli/Augustus 2005

SCHIP & WERF de ZEE
Marine Technology
7-8/05



Deze maand:

opv Sarah Baartman

Nieuw Schepenbesluit

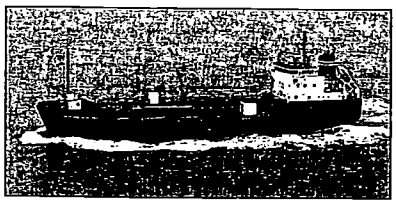
ISPS Code

mv Border Heather, Thistle & Tartan

Inhoudsopgave

18 mv Border Heather, Thistle & Tartan

In een tijdsbestek van slechts drie maanden heeft Damen Shipyard Bergum de mv Border Heather, mv Border Thistle én mv Border Tartan opgeleverd aan Darwin Shipping Ltd in Jersey. De schepen zullen worden gebruikt door oliemaatschappijen die hun producten op een veilige manier willen transporteren in het Verenigd Koninkrijk.

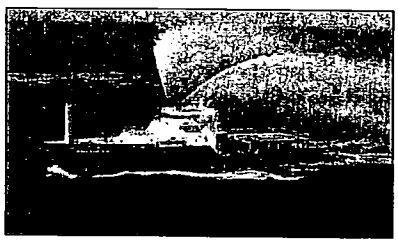


26 ISPS Code

Een internationale standaard voor een betere beveiliging van zeeschepen en havenfaciliteiten. Dat is waarvoor de ISPS Code in het leven is geroepen. De nieuwe regelgeving is op 1 juli 2004 van kracht geworden en is een onderdeel van de SOLAS-convention van de IMO. Het heeft betrekking op uitrusting, opleiding en een kwaliteitszorgsysteem voor beveiliging. Opmerkelijk is dat voor het eerst in de SOLAS-voorschriften ook havens aan de ISPS Code moeten voldoen.

30 opv Sarah Baartman

Damen Shipyards Gorinchem heeft begin dit jaar het patrouillevaartuig Sarah Baartman opgeleverd aan het ministerie van Ruimtelijke Ordening en Toerisme in Zuid-Afrika. Het schip zal worden ingezet bij de inspectie van visgebieden in Zuidelijk Afrika. Ook is de Sarah Baartman uitgerust voor taken zoals het opruimen van olie, zoek- en reddingswerk en brandbestrijding.



38 Nieuw Schepenbesluit

De inwerkingtreding van een nieuw Schepenbesluit en de totstandkoming van de nieuwe regelingvormen is de één na laatste stap van een omvangrijk project tot modernisering van de Nederlandse veiligheidswetgeving voor zeeschepen Het nieuwe besluit komt in de plaats van het vier decennia oude Schepenbesluit 1965, dat in veel opzichten was verouderd.

Omslag: opv Sarah Baartman (foto: Flying Focus)

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Groep uitgeverijen voor vak en wetenschap — Uitgeversverbond — HQ 2005 TIJDSCHRIFTEN

ISSN 0926 - 4213

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Basisontwerp:
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Oplevering door Jakob Pinkster M.Sc. FRINA

opv Sarah Baartman

New multi-purpose offshore patrol vessel for South Africa

Damen Shipyards Gorinchem delivered mv Sarah Baartman on 10th January 2005 to her owner, the Department of Environmental Affairs and Tourism (DEA&T), in Cape Town, South Africa. Sarah Baartman is the first purpose built offshore fisheries and environmental protection vessel to be delivered to South Africa.

Mv Sarah Baartman, yard number 555053, was designed by Damen Shipyards (Offshore & Transport Department) Gorinchem. The Damen Offshore Patrol 8313 has multipurpose functions - patrol vessel, search and rescue, oil pollution prevention and fire fighting - but the essence is that she will act as a deterrent to illegal, unreported and unregulated fishing and that she will also apprehend wrong doers, whether local or foreign. Some of South African most valuable fish stocks are found on the edge of the continental shelf, which in turn coincides partly with the Exclusive Economic Zone. The vessel will be deployed in part to monitor fishing activities within territorial waters, not least around the Prince Edward Island Group, where Patagonian Tooth fish is targeted by illegal high seas vessels. Damen was contracted to build the vessel in December 2002 and work on the first hull section of the vessel started in July 2003 at the Galati yard in Romania. In July 2004, the nearly completed ship was towed to Vlissingen in the Netherlands where final fitting out and commissioning was carried out at the Royal Schelde Yard. Sea trials were carried out off the Dutch coast in November 2004. The ship was formally named on the third December and departed for Cape Town the following day. The trip to Cape Town went well and took seventeen days.

Smit Marine South Africa, who also manages the rest of the DEA&T fleet of polar supply and research ships, takes care of the management of the Damen Offshore Patrol Vessel 8313.

Design challenge

The main function of the Sarah Baartman is to:

- Monitor fishing activities in territorial waters of South Africa
- Act as a deterrent to illegal, unreported and unregulated fishing
- Apprehend wrong doers and be able to tow vessels to port
- Assist in operations such as SAR, anti-pollution and FiFi
- Function in an environmentally friendly manner (green ship)
- Possess an extremely high degree of manoeuvrability

In order to do this a seaworthy and highly manoeuvrable twin-screw 'green' vessel of 83 metres length has been built, fitted out with a controllable pitch bow thruster. The vessel has deployable units in the form of two fast interceptor type RIB boats and a slow work boat. To facilitate flexibility of operations there is also a helideck suit-

Jakob Pinkster is marine consultant and also works as a teacher for TU Delft.

able for day operations with refuelling system. Full service is able throughout the year as the vessel meets all the necessary standards to do so.

Mission Profile

The vessel is expected to be at sea up to a maximum of 300 days per year and has three different operations modes:
1) Loitering at speeds of two to five knots for about twenty percent of the time
2) Patrolling at fifteen knots for about sixty percent of the time
3) Chasing at twenty knots for about twenty percent of the time

The vessel

The vessel from bow to stern consists of:

- A long forecastle deck covering about half the ship's length
- A large symmetrically accommodation and bridge superstructure placed on the forecastle deck starting a short distance from the bow and continuing on to midships
- Engine room below the main deck just aft of midships housing a twin screw twin engine installation
- Above the engine room, on the main deck on both sides a 7.5 m RIB SAR boat
- A small hold in the fore ship with hatch suitable to carry some aircraft type of containers with her
- A small box hold with flush hatches on the main deck
- Above the aft hold a helicopter landing platform is situated
- Large working deck aft with an 8 m work boat on deck port side
- Below the main deck, a steering gear room along with storage space

Hull Construction

The vessel has been constructed using normal shipbuilding steel. The hull scantlings are according the latest Lloyd Register of Shipping rules. The ship has been constructed with a combination of transverse and longitudinal frame system. The double bottom is constructed with longitudinal frames. The fore ship is built with transverse frames with stringers in the forepeak and the bow thruster tunnel is integrated into the centerline girder and the shell. The helideck is integrated within the ship's structure by way of supporting frames along the side, front and back. The hull is protected for corrosion by an impressed current system, in combination with a Sigma epoxy paint system for hull and ballast tanks.

Cargo space below main deck

On board this Offshore Patrol Vessel all types of equipment can be placed in the completely box shaped cargo hold aft of the engine room just below the main deck underneath the helicopter deck. The hatchway is closed with ponton type weather tight hatch covers. The hatch cover is flush deck type and operated by means of the hydraulic stern deck crane

Auxiliary boats

In order to assist with pollution control operations and SAR-work, the vessel has been fitted with three auxiliary boats:

- 1 x 8.1 m aluminium twin engine/ twin propulsion work boat (speed 6 knots and 2 t bollard pull)
- 2 x 7.5 m self-righting inspection/ rescue RIB SAR boats each with 231 kW inboard engine driving a water jet (speed 30 knots and maximum capacity 8 persons)

Helicopter deck

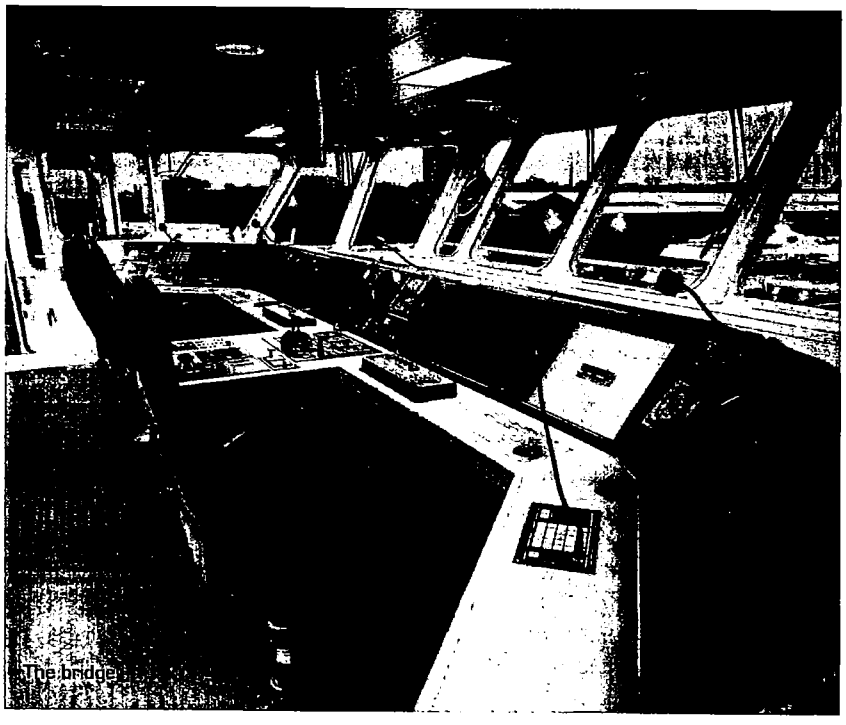
To facilitate flexibility of operations there is also a helideck capable of operations with a maximum size Super Puma for day operations with refuelling system. Helicopter fuel is stored in special tanks placed in a container under the helicopter deck. Under normal circumstances, the vessel will not carry a helicopter and is therefore not fitted with a Hangar.
The helicopter deck is positioned aft as shown on the general arrangement plan and consists of a rectangular shaped deck with a length of 19,5 m and a beam of 13,0 m and is capable of withstanding the necessary dynamic loads. Tie down points, chocks and tie down strops are used to secure the helicopter to the deck. Furthermore safety nets, handrails, access routes, markings, drainage etc. are fitted to satisfy CAA standards regarding safety requirements.
A removable deck part of approximately 6.6 m x 2.6 m at the aft side facilitates the removal of the standard TEU containers with the crane. The following containers may be housed under the helideck:
Under the helideck a manual gantry crane has been installed to move the containers horizontally. These containers can be secured using flush deck containers fittings.
The deck immediately below the helicopter deck can also be used to deploy oil spill countermeasure equipment and adequate provisions have been made to load, position and secure such equipment.

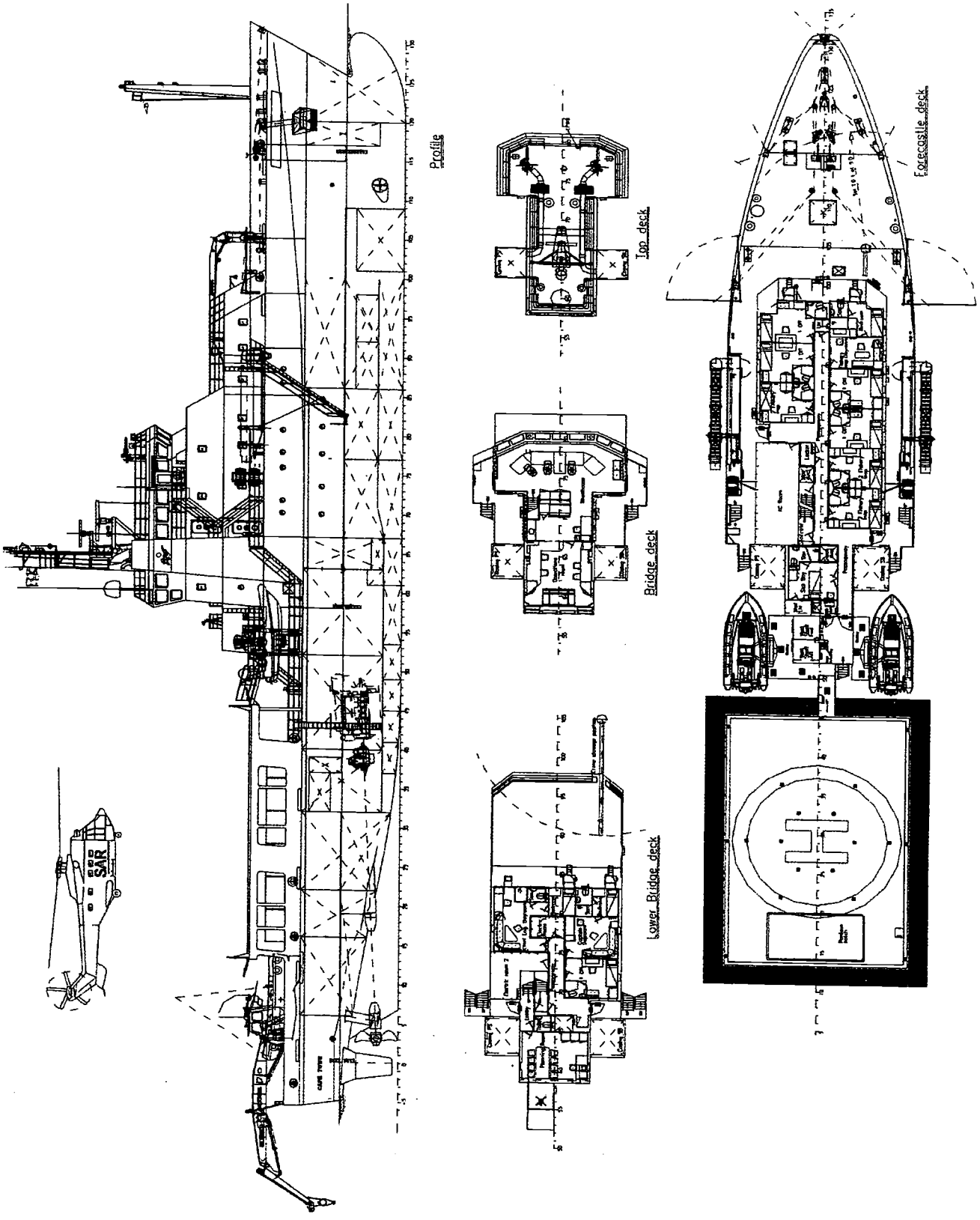
Oil recovery equipment

In order to assist with anti-pollution operations, the vessel has been fitted with

Permanently on board		
Oil spill equipment:	7.000	kg
Helicopter refuelling:	8.000	kg

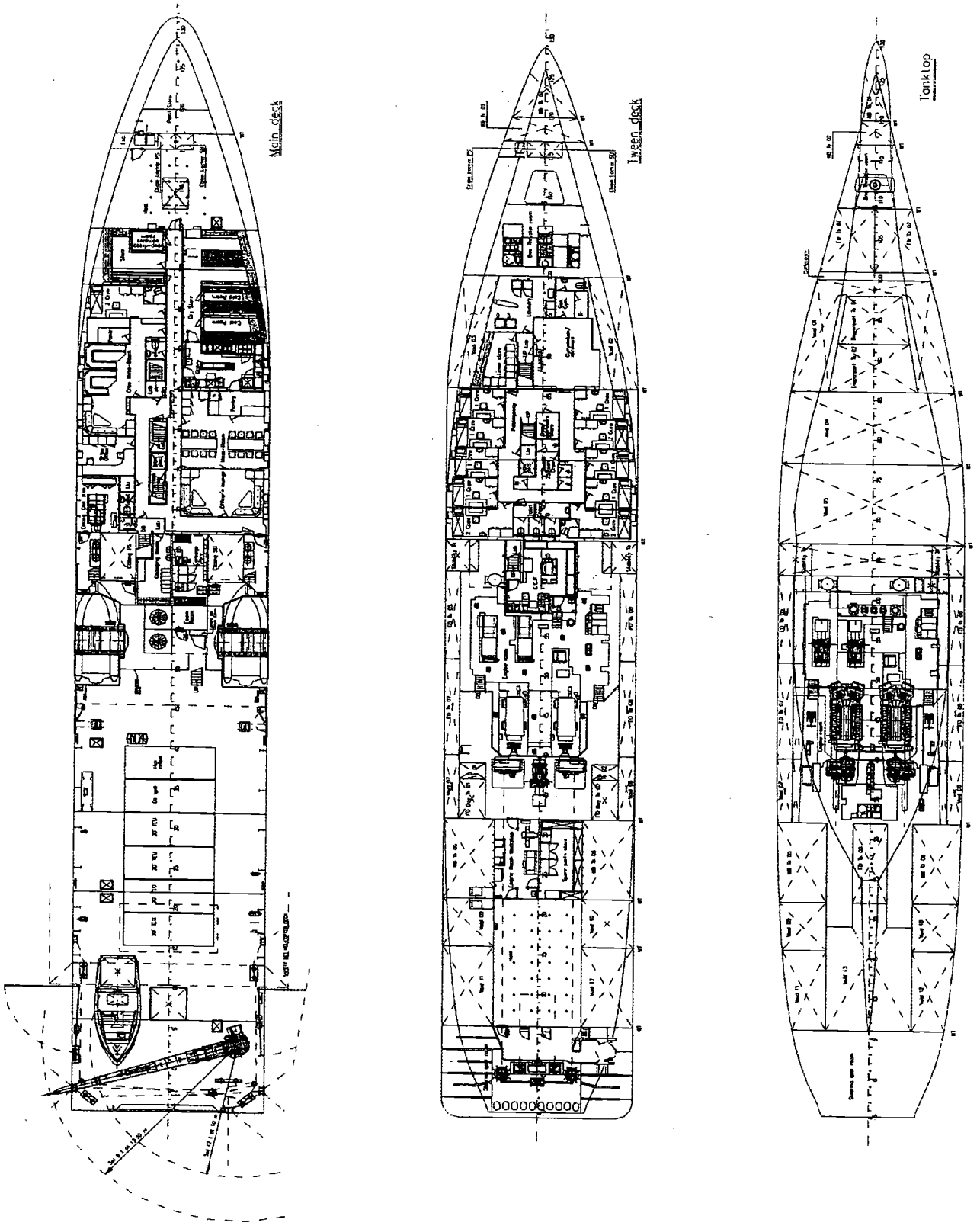
and if required		
Emergency Genset:	10.000	kg
Field hospital:	5.000	kg
FW generator:	5.000	kg
Spare:	10.000	kg


The bridge



Main Particulars mv Sarah Baartman

Port of registry	:	Cape Town
Flag	:	South Africa
Classification	:	LRoS ✠ 100A1, ✠LMC, UMS (Patrol Vessel)
Owners	:	Department of Environ mental Affairs and Tourism (DEA&T), Branch Marine and Coastal Management, Republic of South Africa
Length o.a.	:	82.90 m
Length b.p.	:	75.60 m
Breadth mld.	:	13.00 m
Depth	:	6.80 m
Draft (design)	:	4.00 m
Deadweight	:	460 ton
Displacement	:	2050 ton
Main engines	:	2x Wärtsilä 12V26A (each MCR: 4,080 kW @1000 rpm)
Speed (100% MCR)	:	20 knots (max. displacement)
Max. speed	:	22 knots (reduced draft)
Bow thrusters (electric)	:	1 x John Crane Lips C.P.P. (350 kW)
Auxiliary generators	:	3 x 405 ekW/50 Hz
Helicopter deck	:	According to CAP 437
Cruising range	:	approx. 12,000 nm or 45 days (at 15 kn).



General Arrangement Plan mv Sarah Baartman

Some tank capacities of the vessel (100%) are as follows:

MDO (DMA)			
(including day & settling tanks)	approx.	400	$m.^3$
Lubricating oil	approx.	9.7	m^3
Sludge/dirty oil	approx.	14.6	m^3
Fresh water	approx.	50	m^3
Dispersant	approx.	50	m^3
Sewage	approx.	13.1	m^3
Ballast water	approx.	277.0	m^3

Sarah Baartman is now patrolling the South African waters and has already caught its first perpetrators at sea

the following oil recovery equipment:
- Booms: 2 x 26 m Ro-boom 1500
- Skimmer: 1 x Ro-skim with desmi DOP
- JIB: 15 m jib in three sections
- Spray Booms: 2 x 5 m with six nozzles each

Propulsion system

As usual for this class of vessel, Sarah Baartman has been fitted out with a twin main engine installation. Two non-reversible, air-started, four-stroke Wärtsilä 12V26A medium-speed main engines, each with an output MCR: 4,080 kW @ 1000 rpm, burning MDO drives a Lips four bladed moderate skew Ni-Al bronze controllable-pitch propeller (diameter 3.0 m) via a Reintjes gearbox (type LAF4555, ratio 1:3.05). The attained speed is twenty knots at maximum draft. The maximum attainable speed is 22 knots at a reduced vessel draft. The main engines are fresh water cooled and equipped with a high temperature (HT) and low temperature (LT) cooling water system.

Manoeuvring/Steering Gear

As stated previously Sarah Baartman is highly manoeuvrable in all conditions. This high manoeuvrability is guaranteed using a special combination of two C.P.P. propellers and two spade rudders. Each rudder is controlled by a rotary vane steering gear and can produce a maximum rudder angle of 45° to each side. To enhance manoeuvring at slow speeds an electrically driven (350 ekW, nominal speed 1500 r.p.m.) transverse tunnel bow thruster (make John Crane Lips, type CT04H, diameter 1,200 mm, CPP, four bladed, no skew, NiAL bronze) is installed. Approximate thrust is 55 kN.

Bilge/Ballast/Fire Fighting

The bilge/ballast/internal fire fighting system consists of two bilge/ballast pumps, a general service pump and an emergency fifi/deckwash pump. They are all placed in the engine room, serving the bilge, ballast, fire fighting and deck washing system.

Passive anti-heeling tank system

A gyro controlled passive anti-heeling tank system (make Intering) is situated midships. The system is designed to ensure maximum safety and comfort at the most frequently used vessel speeds and is also effective at speeds as low as five knots, i.e. speed for RIB-operations.

The galley

Electrical installation

The Sarah Baartman has three auxiliary generator sets and one emergency generator; all sets run on MDO (DMA). The generator sets are suitable for continuous parallel operation if necessary and are placed in the engine room. An emergency set is situated on the portside on the main deck. The following voltage systems are installed:
- 400 VAC/3-phase at 50 Hz, for power supply
- 230 VAC/3-phase at 50 Hz, for lighting, small systems and emergency systems
- 24 VDC circuit for instruments

All three auxiliary diesel engines are Caterpillar (3412C-TA), with a generator output of 506 KVA, 405 ekW @ cos phi = 0.8, 230/400 Volt, 50 Hz., 1500 r.p.m. The emergency generating set consists of a Caterpillar (3304B-T) engine of 85 ekW with a generator output of 106 KVA, 85 ekW @ cos phi = 0.8, 230/400 Volt, 50 Hz., r.p.m. 1500 r.p.m. The emergency generator is fitted with a built on radiator cooling system.

Further auxiliary installations consist of:
- Two reverse osmosis fresh water generators, capacity three tons each per day
- A sewage treatment plant suitable for IMO approved discharge at sea and ashore
- One bilge/oily water separator in accordance to MARPOL regulations, discharge via dirty oil tank in engine room and dedicated pump to a deck manifold fitted with an international shore connection

Deck Equipment

On the forecastle one locally controlled, electro hydraulic driven anchor winch has been fitted for anchor/mooring purposes. A total of two 1305 kg high-holding power Pool bow anchors with U3 type 32 mm diameter anchor stud link chains with a total length of 440 m are available to keep the vessel in position when necessary. The winch is fitted with two cable lifters and two warping heads.
On starboard side of the main deck aft an electrically driven capstan with a capacity of six ton is fitted. Control of all deck equipment is local.
A knuckle boom type deck crane is placed on the foredeck (1 t SWL at 9 m) for the loading and discharging of cargo to and from the forward cargo hold.
Crane data:

Make	:	Petrel
Type	:	FC-10-9.0-1.0
Max. reach	:	9.0 m.
Min. reach	:	1.0 m.
Max. capacity	:	1.0 ton at 9.0 m. reach
Winch SWL	:	1.3 ton at 2nd layer
Winch speed	:	0-35 m/min.

A pedestal type knuckle boom crane on the aft is used for the loading and discharging of containers and general car-

go. It is also be used for the deployment and recovery of oil spill countermeasure equipment as well as the deployment and recovery of the 8 m workboat. The unit is also capable of lifting a twenty feet container (TEU) with a maximum mass of 12.000 kg from the aft deck to the quayside.

Crane data:

Make	:	Petrel
Type	:	KC-120-13.3-8.0
Max. reach	:	13.3 m.
Min. reach	:	2.6 m.
Capacity (single reave)	:	8.0 ton at 13.3 m. reach
Capacity (double reave)	:	12.0 ton at 10.0 m. reach
Winch SWL	:	8.0 ton
Winch speed	:	0-26 m/min.

External fire fighting

For fire fighting duties, the vessel is equipped with an external fire fighting installation comprising one main engine PTO driven fire fighting pump with a capacity of 2400m^3/hr at thirteen bar and two 1200 m^3/hr remote controlled water/foam monitors.

Hydrodynamic design considerations

The Sarah Baartman has a maximum speed of 22 knots. This speed requirement along with the obvious high demands on vessel stability, motions in a seaway, launching/retrieving boats etc., in conjunction with her displacement, proposed a formidable design challenge for the new building team. In close cooperation with MARIN the vessel was fitted out with a bulbous bow. MARIN came upon this design solution based again on advanced CFD-calculations and model tests. Also the vessel is fitted out with a single symmetrically streamlined skeg which minimizes propeller interaction, improves and gives good course keeping stability. The skeg also helps provide optimal flow of water to the two propellers and thereby produce high propulsion efficiency and also result in low propeller vibration levels. To facilitate helicopter operations ship motions at the helideck had to be within certain limits based on CAP 437. Ship motion tests were carried out by MARIN in order to substantiate the expected levels.

Accommodation

Accommodation on board is for crew and officers (29) and is situated mostly just affront of midships. The ships complement comprises of:

Master	1
Navigating Officers	3
Chief Engineer Officer	1
Engineer Officer	2
Fishery inspection officers	7
Cadet Officers	4
Cook	1
Steward	2
Bosun	1
Deck hands	5
Engine Room Attendant	2

The comfortable accommodations are arranged in a three storey deckhouse placed on the extended forecastle deck and also on the main deck and tween deck (see GAP).

Life-Saving Appliances

Beside the two SAR rescue boats already mentioned on each side of the boat deck, two inflatable twenty person life rafts are placed with a hydrostatic release device on each side of the accommodations midships on the main deck. Further installed on board are the usual personal life-saving appliances for this type of patrol vessel.

Navigation Equipment

The vessel is provided with an extensive Imtech integrated bridge system and communication system according tp GMDSS area A3, including Satcom C and B, X- and S-band radars, ECDIS, Gyro, DGPS, speedlog, autopilot, echosounder and navtex.