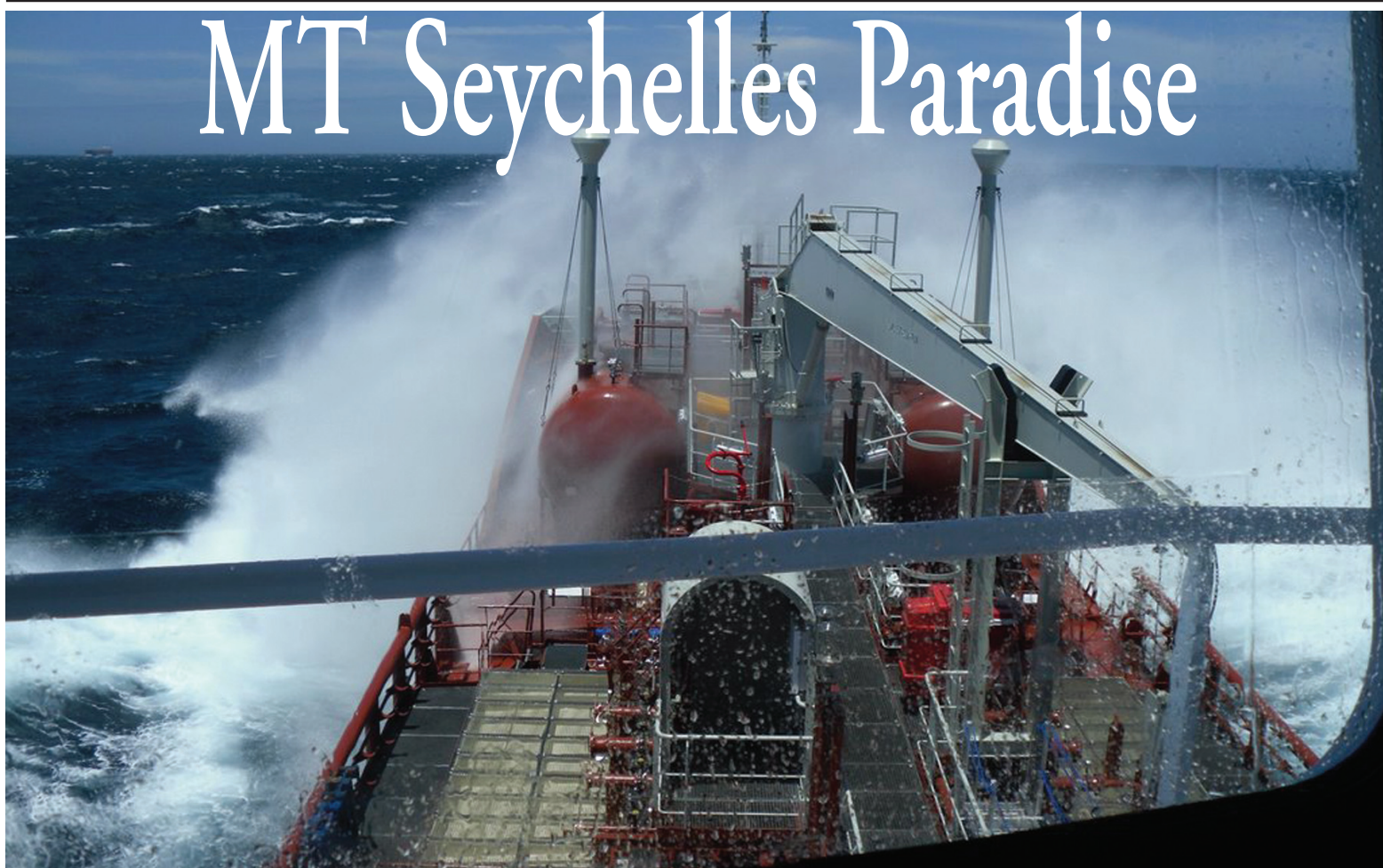


MT Seychelles Paradise



(Photo courtesy of Lindenau Shipyard)

“The Green Coastal Tanker”

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The Government of the Republic of Seychelles passed a directive concept to improve its maritime infrastructure and to protect the sensitive islands against oil pollution and gas accidents. MT Seychelles Paradise is part of this concept and was delivered from Lindenau shipyard to Seychelles Petroleum Ltd. in October 2009. Seypec Ltd. is the national oil and gas company of the Seychelles and owns the most modern tanker fleet in the Indian Ocean, consisting of six double hull tankers; designed to ensure a safe and ecological domestic supply and participate in the global seaborne market for oil and chemicals.

The global market of oil-carrying coastal tankers <5000 tdw consists of 3578 ships

with 8.3 million total deadweight; a segment characterized by a high age profile (39% are older than 30 years) and a high number of single hulls (78% of the fleet). The international regulations for the phase-out of single hulls are only mandatory for ships >5000 tdw, and generally do not affect this size segment. However if tankers in the size range 600-5000 tdw intend to transport heavy grade oil (crude- or fuel oil with density > 900 kg/m³ or viscosity at 50°C > 180 mm²/s) or bitumen-tar emulsions, a double hull is required. MT Seychelles Paradise was developed to:

- supply the islands of Seychelles with oil and liquefied gases (LPG),
- supply foreign vessels with bunker fuel at the anchorage of Victoria, and
- serve as crew training ship for the education of officers and sea men for the national fleet.

The ship is suitable for the transport of oil

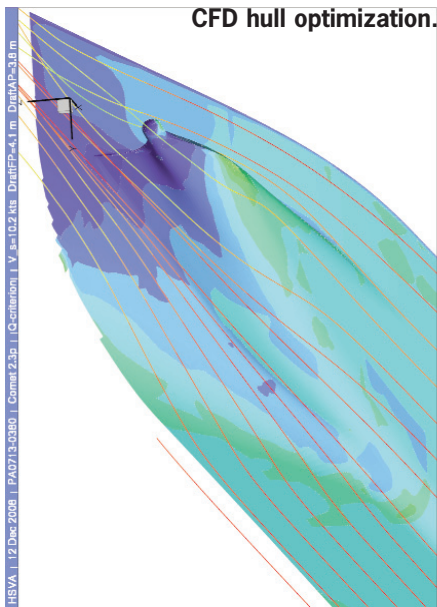
Lindenau Safety Tanker Class

Newbuilding S 284 Green Coastal Tanker

..... DH Tanker with LPG plant

Flag Republic of Seychelles

- Suitable for transport of IF 380, MDO or luboil with flashpoint < 60°C, < 1,025 t/cu. m., max. filling temp. 60°C
- Six (6) epoxy-coated cargo tanks with double hull (hDB=1,10 m, b= 0,90 m), 3 segregations, vertically corrugated bulkheads, transverse framing system, cargo deck stiffeners facing outside cargo tanks, recessed and covered bridge wings.
- Twin-screw propulsion with two ME, two gear boxes, two CPPs and two rudders for highest maneuverability and redundancy, one bow thruster
- 1 LPG plant (2x59 cu. m. tanks on deck, not insulated, 90% filling, 0,56 t/cu. m., 10 bar) with 2 booster pumps 20 cu. m./hr. at 120 mlc each.



Cargo Deck including the LPG tanks



and products with flashpoint $< 60^{\circ}\text{C}$, maximum density 1,025 t/cu. m. and maximum filling temperature 60°C . Six epoxy-coated cargo tanks with smooth surfaces are provided to ensure short discharge times and minimum slop residues. A double hull protects all oil cargo tanks and fuel service tanks. Four frequency-controlled screw pumps allow a discharge rate up to 600 cu. m./hr.

Especially for the bunker service, three calibrated cargo flow meters, two oil spill recov-



S284 twin-skeg arrangement with inclined shafts.



(Photo courtesy of Lindenau Shipyard)

ery units, special fenders, a manifold crane 5 ton/16 m and recessed bridge wings are installed. In addition, a 118 cu. m. LPG-plant is supplied, consisting of two tanks with 7 bar working pressure, 2 pumps at 20 cu. m./hr. and a one-grade piping system with crossover. The ship has a redundant propulsion plant consisting of two main engines, two CP propellers and two spade rudders. Furthermore one bowthruster is installed. This concept is designed to ensure maneuverability, soft power control and maximum safety against casualties.

The ship is built with a strong hydrostatic stability, to: allow a flexible bunker service with changing drafts and slack cargo tanks; avoid roll resonance in the Seychelles sea (area 69); and, compensate the top weights of the spacious deckhouse and the LPG tanks. The

main dimensions are an optimal compromise to ensure a superior speed-power-ratio despite of the high hydrostatic stability demand.

Minimal Consumption and Emission

Utmost efforts were invested by all interested parties to minimize fuel consumption and any kind of emission. The ship proved a speed of 10.2 knots at 57% MCR under trial conditions. This result is the best of the HSVA data base for ships with equal or higher breadth (scaled to the same displacement). During the optimization process in the design phase, the power demand for propulsion and ship's service was reduced by abt. 20% resulting in a serious reduction of fuel costs during the lifetime of the ship. The slender hull form, CFD-optimization of ship lines and shaft inclination, high propeller diameters and a power management system contributed to this result. For the

main engines a NOx-emission of 5.6 g/kWh was measured, which is only 56% of the actual IMO Tier-I limit. Even the emission targets of IMO Tier-II, which will become mandatory for newbuildings constructed on or after 2011, are fulfilled with a reserve of 28%. For the genset engines, a NOx-emission of 8.9 g/kWh was measured, which is 85% of the actual IMO tier-I limit.

For Seychelles Paradise the periods of roll (< 7,6 s), pitch (5,6 s) and heave (5,1 s) were calculated from typical loading cases and found to have at least 15% gap to the most probable wave periods according to global statistics.

The longitudinal strength is significantly improved to allow a bunker service with flexible cargo tank fillings. The issued permissible bending moment is 62% above the minimum classification requirement (hogging, sea condition) and the permissible shear force exceeds the GL-minimum requirement by 87%. These values are a comfortable margin to allow a flexible service with various stop-overs for discharge of small parcels during a round trip.

Technical Details

The machinery installation includes two main engines, Volvo D16 MH (2x473 kW/1500 rpm) with box coolers, two gear boxes with 1 : 5,93 reduction ratio, two (2m

diameter) CP-propellers, three gensets (MAN D2876 LXE 301 - 400kVA/1500 rpm, and one Cummins 6BT 5.9-D(M) harbor/emergency genset, two ballast pumps at 100 cu. m./hr., main- and emergency fire pumps, one MGO separator, one freshwater generator and one sewage treatment plant. The cargo system includes four frequency-controlled screw pumps at 150 cu. m./hr./8.5 bar, three manifolds (2xDN 150,1xDN 200), stainless steel pipes, remote operated valves for discharge- and drop lines, a radar ullage system, filling alarms, high-velocity pv-valves and portable tank washing machines.

For fire fighting a foam plant with three monitors, a waterspray system and a powder extinguishing plant for the LPG-area are installed.

The electric load balance was tailored for the simultaneous operation of four cargo pumps at full load with only two genset aggregates running, and a surplus of about 15%. In addition, a stand-by aggregate of equal size and an air-cooled harbor/emergency genset (75 kVA) were installed.

Increasing attention is being paid to minimizing noise and vibration levels onboard ships, both for the longevity of systems and comfort and retention of crew. Resiliently mounted main- and auxiliary engines, pro-

pellers with low pressure pulses and an optimized design contributed to achieve targets. In 75% of the accommodation rooms the measured sound pressure levels were at least 5 dB(A) less than the limits acc. to IMO resolution A 468 (XII).

Main particulars

Length, o.a.	67.8 m
Breadth	13.2 m
Depth	5.2 m
Draft	4.2 m
Deadweight	1,785 tons
Trial speed, 100%MCR	11.6 kn
Oil cargo volume	1700 cu. m.
LPG volume (100%)	118 cu. m.
Tonnage (London)	1545 gt
Main engines, PME	2x473 kW - 1500 rpm
Gensets, PAux	(3x400 + 1x75) kVA - 1500 rpm
Bow thruster	150 kW
Cargo pump capacity	4x150 cu. m./hr. at 8.5 bar
Endurance	2,900 nm
Accommodation	15 in 8 cabins
Satcom	INMARSAT Fleet 250
Main engines	2 x (6R) Volvo D16 MH
	each with 473 kW at 1,500 rpm,
	resilient mounted, MGO driven with box coolers
Gearboxes	2 x 1:5,93
Propeller	2 x CP
Classification	Germanischer Lloyd
	100 A5 RSA (50) Product Tanker, equipped for the carriage of oil products in bulk, equipped for the carriage of liquefied petrol gas in bulk MC AUT

Maneuverability: According to the sea trial report (pictured right) the tactical diameter of the turning circle was about 126m, which is only 40% of the IMO limit. The advance distance was measured with 185 m, which is 64% of the IMO-limit. These values are considered as an outstanding performance result for a bunker ship qualified for ship-ship-berthing.



S284 shaft tunnel with resiliently mounted main engine.

