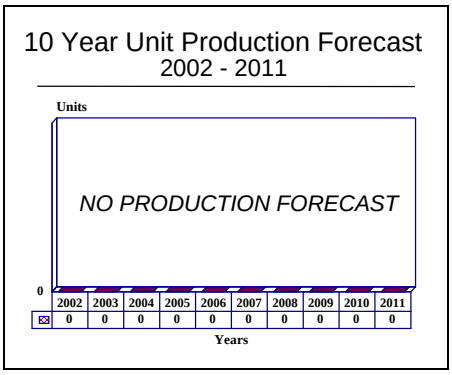
Endurance Class - Archived 2/2003

Outlook

- Program completed with last two ships commissioned
- No additional Singapore construction planned
- No apparent export possibilities
- Slow speed limits tactical usefulness



Orientation

Description. Landing ship tank/landing amphibious transport dock (LST/LPD).

Sponsor. Republic of Singapore Navy (RSN).

Contractors

Singapore Technologies, Shipbuilding & Engineering Ltd
ST Marine
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Singapore 629882
Tel: +65 861 2244
Fax: +65 861 3028 or 862 1601
E-mail: business@singnet.com.sg
(prime contractor)

Alenia Difesa Otobreda Division
Via Valdilocchi 15
19136 La Spezia
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Tel: +39 0187 581111
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E-mail: otobsales@col.it
(guns)

Indal Technologies Inc (ITI)
3570 Hawkestone Road
Mississauga, Ontario
Canada L5C 2V8
Tel: +1 905 275 5300
Fax: +1 905 273 7004
(assist helicopter recovery systems on deck)

Kamewa AB
Box 1010
68129 Kristinehamn
Sweden
Tel: +46 550 84000
Fax: +46 550 18190
Web site: http://www.kamewagroup.com
(propellers)

Licensees. No production licenses have been granted.

Status. In production and service.

Total Produced. All four ships in this program have been completed.

Pennant List

Name	Builder	Launch	Commissioning
L-207 *Endurance*	ST Marine, Banoi SY	3/14/1998	3/18/2000
L-208 *Resolution*	ST Marine, Banoi SY	8/1/1998	3/18/2000

Name	Builder	Launch	Commissioning
L-209 *Persistence*	ST Marine, Banoi SY	3/13/1999	4/7/2001
L-210 *Endeavour*	ST Marine, Banoi SY	2/12/2000	4/7/2001

Mission. Troop and equipment carrier for amphibious operations. The ships also allow RSN to participate in large-scale disaster relief and humanitarian missions.

Price Range. No price information has been released. Based on price information concerning similar ships elsewhere, these ships cost approximately US$200 million each.

Technical Data

Specifications

	Metric	US
Dimensions		
Length	140.0 m	459.3 ft
Beam	21.0 m	68.9 ft
Height	13.6 m	44.6 ft
Draft	5.0 m	16.4 ft
Displacement		
Standard	6,000 tonnes	5,905 tons
Full Load	8,500 tonnes	8,360 tons
	Type	**Number**
Weaponry		
Missiles – SAM	Barak Mistral VLS	2x8
Guns	Otobreda 76 mm L62 Super Rapid	1
	CIS 0.5 inch machine gun	5
Military Lift Capability		
Tanks		18
Vehicles		20
Landing Craft	RPL-60 type LCVP	4
Troops	Marines, navy	350
Helicopters	Medium lift (Super Puma)	2 on aft deck + 2-4 in hangar
Electronics		
Radar – Air/Surface Search	Ericsson (E/F band)	1
Navigation	Kelvin Hughes Type 1007 (I-band)	2 sets
ESM/ECM	Rafael RAN 1101; intercept, jammer	1
Countermeasures – Decoys	GEC Marine Shield III 102 mm launcher	2x6
Optronic director	CS Defense NAJIR 2000	1
Performance		
Maximum Speed	28 kmph	15 kt
Cruising Speed	22 kmph	12 kt
Range	9,250 km at 28 kmph	5,000 nm at 15 kt
	19,250 km at 22 kmph	10,400 nm at 12 kt
Crew	65 (8 officers, 57 NCOs + crew)	
Machinery		
Diesels	Ruston 16V RK270 medium-speed	2x6,000 shp
Propellers	Kamewa controllable pitch	2

	Type	Number
Power Generation	Diesel generators	4x700 kW (875 kVA)
Maneuvering Propulsor	Bow thruster	1

Design Features. The Endurance-class landing ship tanks (LST) were designed to replace the Singapore's five older US-built LSTs. These dated from 1944 and became uneconomical to service and maintain. The new ships are 40 percent larger than the British-built Sir Lancelot class landing ship logistic (LSL), but will require fewer crew members thanks to modern automated onboard systems. The new ships have larger cargo capacity and are faster. The basic design resembles a scaled-down landing ship dock (LSD) rather than a traditional LST since it includes a floodable stern welldeck.

The hull has been extensively tank tested for its form, and features a stern-gated dockwell, which allows drive-through loading and unloading of the vehicles, tanks, and troops. Landing craft air cushions (LCACs) may be carried as well, but this has not been confirmed. In the bow, the ship has a bulbous forefoot under a bow door/ramp that meets the latest IMO requirements and from which it is possible to access the tank/vehicle deck.

The main superstructure is dominated by the block extending forward from midships. The remaining aft 40 percent of the vessel consists of a landing deck for two medium-lift helicopters located over the welldeck. This is connected to the hangar with integrated securing and traversing systems for the helos. Above the helideck is the helicopter control room, which has direct communications with the control and safety station on the deck itself. The ship has two 25-tonne cranes amidships to handle equipment and materials. Four RPL-60 class landing craft are carried on davits, two on either beam.

The ships have a sophisticated, integrated self-defense system that incorporates the French CS Défense's NAJIR 2000 new-generation electro-optical tracking and fire control system. The company disclosed a sale of four such systems to an unidentified customer in Southeast Asia in 1997. Two multifunction color consoles are located below decks in the combat information center (CIC) of the ship. The combat systems include an integrated navigation and communications system, an integrated bridge system, a computerized gun-fire control system, and an electro-optical weapons director, as well as an infrared target tracker.

For its size, the vessel has ample weaponry for self-defense purposes. The weapons include a 76 mm Otobreda Super Rapid gun forward and surface-to-air Mistral missiles fired from Matra-BAe Dynamics' Simbad launcher. There were plans to include two nests of eight Barak VLS silos, but these have not been fitted and appear unlikely to be so. Additional weaponry includes five 0.50-caliber machine guns for close-in defense against small craft.

Operational Characteristics. Besides the military amphibious operations and peacetime disaster relief and humanitarian missions, the LSTs will be used for sea transportation for the Singapore Armed Forces personnel and equipment detached for overseas training. Their large storage capability makes these ships particularly suitable for large-scale rescue efforts. The LSTs are also used for cruises as part of midshipman training, and for operational support ships.

The ship's military-lift capacity is estimated to include about 350 troops, plus 18 tanks and 20 vehicles.

The design of the ship allows for a great deal of flexibility in maneuvering the materiel on- and off-board the vessel. A number of internal ramps and lifts make it possible to load stores, equipment, and personnel from the flight deck, through the bow door and ramp, or from the welldock. The cranes amidships are also used in the process. The design of the helideck permits two medium-sized helicopters to operate by day or night in up to Sea State 5.

The ships' integrated self-defense system includes standard functions such as sector search, acquisition, autotrack, and gun control against sea and air targets. However, other features have been added to the system to make the self-defense capability more comprehensive, including infrared tracking of radar targets, the generation of EO tracks for air and surface threats and weapon assignment, and shore bombardment facilities.

The CIC Embedded Trainer facility allows LST shipboard operators to train for and maintain operational readiness even when the ships are deployed away from base. The ship's diesel engines yield a maximum speed of 15 knots, and the estimated operating range is approximately 5,000 nautical miles.

Variants/Upgrades

125 meter LST. In February 2000, at the Asian Aerospace 2000 show in Singapore, the company displayed a model of a new 125 meter LST featuring the characteristics of a landing ship combined with those of a fleet auxiliary. As this is already the second design produced by ST Marine since production of the Endurance class, it is uncertain which road the Singapore Navy will eventually take in its selection of a successor class to these ships.

Program Review

Background. The Royal Singapore Navy (RSN) had a fleet of five US-built LST 511-1152 class landing ship tankers. Built in the 1940s, they had reached the point where their continued maintenance and service was becoming uneconomical. These ships were supplemented by a Sir Lancelot class LSL purchased from the UK in the 1960s.

The design specification for the replacement amphibious warfare ship was conceived in a collaboration among Singapore Technologies, Shipbuilding & Engineering Ltd, the Singapore Navy (RSN), and the Ministry of Defense (MINDEF) Materials Organization within a period of only nine months.

After completion of detail design, an order for a group of four was approved in September 1994, to be bought from ST Marine, a subsidiary of Singapore Technologies. The order was confirmed with the builder in mid-1996, and the keel for the first ship was laid down on March 26, 1997. The lead ship, RSS *Endurance*, was launched a year later, on March 14, 1998, followed by sea trials in November, once the outfitting has been completed. A sale of four surface vessel self-defense systems was made by the French company CS Défense in early 1998. It is assumed that this was for the Singaporean landing ship program, which is understood to use the company's NAJIR 2000 electro-optical tracking and fire control system.

Although the first ship was expected to be handed over to the RSN in the first quarter of 1999, it did not enter full operational service until later in the year 2000. Both the first of class and the second ship, RSS *Resolution*, were commissioned officially to the Singapore Navy on March 18, 2000, in a joint ceremony. Prior to that, on February 12, the fourth ship of the class was launched, while the third ship (RSS *Persistence*) was undergoing sea trials in preparation for its hand over. The Republic of Singapore Navy commissioned the third and fourth ships of the Endurance class on April 7, 2001. After completing some minor aspects of the program, the Endurance-class project was officially ended in October 2001.

Funding

This program is funded by the Singaporean Ministry of Defense (MINDEF), through the Royal Singapore Navy (RSN).

Recent Contracts

Contractor	Award ($ millions)	Date/Description
ST Marine	N/A	September 1994 – A fleet of four vessels ordered (confirmed in mid-1996).
CS Défense	N/A	June 1997 – Four surface vessel self-defense systems.

Timetable

Month	Year	Major Development
Sep	1994	Order placed with Singapore shipbuilders
Mid	1996	Order confirmed by authorities
Early	1997	Construction begun

Month	Year	Major Development
Mar	1997	Keel laid for first of class
Oct	1997	Second ship's keel laid
Mar	1998	Launch of *Endurance*. Keel laid for third ship
Aug	1998	Second ship launched
Oct	1998	Fourth ship's keel laid
Nov	1998	Sea trials originally scheduled to begin for first-of-class
Mar	1999	*Endurance* begins sea trials; third of class (RSS *Persistence*) launched
Feb	2000	Fourth ship (RSS *Endeavour*) launched. New LST design exhibited at Asian Aerospace 2000
Mar	2000	Commissioning of the *Endurance* and *Resolution*
April	2001	Commissioning of RSS *Persistence and Endeavour*

Worldwide Distribution

Singapore. Four. No exports of this ship are foreseen at this point.

Forecast Rationale

The construction of the Endurance class has now been completed with the commissioning of the final two ships in the class of four. This has terminated the program from the point of view of the Singaporean Navy, and no further activity appears probable. The Endurance class has provided the Singapore Navy with a modern and capable amphibious warfare fleet that allows it to extend its reach into neighboring waters. These ships also allow the Singapore Navy to support training activities conducted by other elements of the Singapore armed forces. The small size of the country has long been a serious problem to the Singaporean defense forces, which pressures them to seek facilities from allied countries. The Endurance class will enable Singaporean units to be transferred to those training areas with greater efficiency. Finally, they will play an important role in supporting humanitarian operations in the event of natural or man-made disasters.

Exports for this class seem to be most unlikely, as they are optimized very closely to Singapore Navy requirements and design philosophy. The Endurance class reflects the manpower shortage and wealth of the Singaporean forces. Given these constraints, the replacement of scarce and expensive manpower by automated systems makes sense. For many other navies, where manpower is far less expensive and in greater supply, the capital cost of this approach is undesirable. Also, the Endurance class is unusually slow by modern amphibious warfare standards. Most modern amphibious deployments envisage a cruise speed of 18 to 20 knots with a spurt maximum a little greater. The cruising speed of the Endurance class is 12 knots.

Although the Endurance class is technically interesting, there seems to be little scope for future construction in this program. We are, therefore, recording a null forecast for this class.

Ten-Year Outlook

No production is forecast.

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