Ulsan Class

Outlook

- The Bangladeshi frigate has been commissioned and is named the BNS *Khalid bin Al Waleed*
- No further construction likely
- Some Korean or Indian ships may be sold on the second-hand market
- Ruumored Myanmar order fails to materialize
- Sri Lanka is most obvious candidate to purchase surplus Ulsan class hulls that become available

Orientation

Description. Coastal frigate intended for inshore and continental shelf operations in relatively low-threat environments.

Status. In production and service.

Total Produced. A total of 21 ships of this class have been built.

Sponsor

Republic of Korea Navy
Chief of Naval Operations
Seoul, South Korea

Pennant List

Number & Name	Builder	Operator	Keel Laid	Commissioned
F25 *Khalid bin Al Waleed*	Daewoo Shipyard	Bangladesh Navy	9/1997	12/2007
F951 *Ulsan*	Hyundai Shipyard	South Korean Navy	4/1980	1/1981
F952 *Seoul*	Korea Shipbuilding	South Korean Navy	4/1984	6/1985
F953 *Chungnam*	Korea Shipbuilding	South Korean Navy	10/1984	6/1986
F955 *Masan*	Korea Tacoma	South Korean Navy	10/1984	7/1985
F956 *Keongbuk*	Daewoo Shipyard, Okpo	South Korean Navy	1/1986	5/1986
F957 *Jeonnam*	Korea Shipbuilding	South Korean Navy	4/1988	6/1989
F958 *Cheju*	Hyundai Shipyard	South Korean Navy	5/1988	1/1990
F959 *Pusan*	Hyundai Shipyard	South Korean Navy	2/1992	1/1993
F961 *Cheongju*	Daewoo Shipyard	South Korean Navy	3/1992	4/1993
P50 *Sukanya*	Korea Tacoma	Indian Navy	1988	8/1989
P51 *Subhadra*	Korea Tacoma	Indian Navy	1989	1/1991
P52 *Suvarna*	Korea Tacoma	Indian Navy	8/1990	4/1991
P53 *Savitri*	Hindustan SY	Indian Navy	5/1989	11/1990
P620 *Sayura*	Hindustan SY	Sri Lankan Navy	10/1989	10/1991
P55 *Sharda*	Hindustan SY	Indian Navy	8/1990	10/1991
P56 *Sujata*	Hindustan SY	Indian Navy	10/1991	11/1993

Number & Name	Builder	Operator	Keel Laid	Commissioned
42 *Samar*	Mazagon Dockyard	Indian Coast Guard	8/1992	2/1996
43 *Sangram*	Mazagon Dockyard	Indian Coast Guard	3/1995	3/1997
44 *Sarang*	Mazagon Dockyard	Indian Coast Guard	3/1997	5/1998
45 *Sagar*	Mazagon Dockyard	Indian Coast Guard	3/1999	11/2003

Mission. Coastal protection and interdiction. India uses the Sukanyas for harbor defense, to protect offshore installations, and to patrol the Exclusive Economic Zone (EEZ).

Price Range. These ships cost approximately $80 million in frigate configuration, according to the Korean Navy in 1991, but only about $20 million in OPV configuration. The most recent unit, delivered to Bangladesh, costs $100 million.

Contractors

Prime

Daewoo Shipbuilding & Marine Engineering Co Ltd, Okpo Shipyard	http://www.dsme.co.kr, 1, Aju-dong, Geoje City, South Kyoungsang, Korea, South, Tel: + 82 55 680 2114, Prime
Hindustan Shipyards	http://hsl.nic.in/, Ghandigram (PO), Vishakapatnam, 530 005 India, Tel: + 91 92 467 42032, Fax: + 91 91 891 2577502, Licensee
Hyundai Heavy Industries Co Ltd	http://www.hhi.co.kr, 1 Jeonha-dong, Dong-gu, Ulsan, Korea, South, Tel: + 82 52 230 2361, Fax: + 82 52 230 3432, Second Prime
Korea Shipbuilding & Engineering	http://www.krs.co.kr/, Pusan, Korea, South, Second Prime
Mazagon Dockyard	http://www.mdlindia.com, Dockyard Rd, Bombay, 400010 India, Tel: + 91 22 2373 8327, Fax: + 91 22 2373 8338, Licensee

Subcontractor

GE Transportation - Marine Engines	http://www.getransportation.com/na/en/marineengines.html, 1 Neumann Way S-156, Cincinnati, OH 45215 United States, Tel: + 1 (513) 552-5465, Fax: + 1 (513) 552-5005 (LM2500 Marine Gas Turbine)
John J McMullen Assoc	http://www.jjma.com/, 4300 King St, Alexandria, VA 22302 United States, Tel: + 1 (703) 418-0100, Fax: + 1 (703) 933-6774 (Design Assistance)
MTU Friedrichshafen GmbH	http://www.mtu-online.com, Maybachplatz 1, Postfach 2040, Friedrichshafen, 88040 Germany, Tel: + 49 7541 90 0, Fax: + 49 7541 90 2724, Email: info@mtu-on-line.com (Diesel Engine)
Oto Melara SpA	http://www.otomelara.it, Via Valdilocchi 15, La Spezia, 19136 Italy, Tel: + 39 0187 5811 11, Fax: + 39 0187 58266, Email: info@otomelara.it (76mm L62 Super Rapid)
Thales Nederland BV	http://www.thalesgroup.com, Haaksbergerstraat 49, Hengelo, 7554 PA Netherlands, Tel: + 31 74 2488111, Fax: + 31 74 2425936, Email: info@nl.thalesgroup.com (Fire Control Radar)

Comprehensive information on Contractors can be found in Forecast International's "International Contractors" series. For a detailed description, go to www.forecastinternational.com (see Products & Samples/Governments & Industries) or call + 1 (203) 426-0800.

Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com

Technical Data

	Metric	U.S.
Dimensions		
Length	102 m	334.6 ft
Beam	11.5 m	37.7 ft
Draft	3.4 m	11.8 ft
Displacement		
Standard	1,625 tonnes	1,600 tons
Full load	2,215 tonnes	2,180 tons
Performance		

Ulsan Class

	Metric	**U.S.**
Max speed	62 kmph	34 kt
Cruise speed	33 kmph	18 kt
Operating range	7,400 km at 33 kmph	4,000 nm at 18 kt
Crew	25 officers, 120 enlisted	
	Type	**Quantity**
Weaponry		
Guns	76mm L62 Oto Melara	2
	30mm Emerlec	4x 2
	40mm Oto Melara	4 (on 955-961)
Missiles	Harpoon SSM	8
Torpedo tubes	Mark 32 12.75 in	2x 3
Torpedoes	Mark 46	
ASW	Depth charge racks	2
Electronics		
Radars – Air/Surface search	Thales DA.05 E/F band	1
Radars – Surface search	Thales ZW 06 (on 951-956)	1
	Marconi S 1810 (on 957-961)	1
Radars – Fire control	Thales WM 28 (on 951-956)	1
	ST-1802 STIR (on 957-961)	1
Radars – Navigation	Raytheon SPS-10C (on 957-961)	1
Electronic Warfare – ESM	ULQ-12K	1
Electronic Warfare – RWR	Matilde	1
Electronic Warfare – ECM	ULQ-11K intercept	1
Decoys	Protean	4
	SLQ-26 NIXIE	1
Sonar	PHS 32 hull mounted	1
Air control	SRN 15 TACAN	1
Optical fire control	LIOD	2
Machinery		
Propulsion configuration	CODOG	
Gas turbines	GE LM 2500	2x 27,100 shp
Diesels	MTU 12V538	2x 3,400 shp
Power generation	Diesel generator	
Propellers	Controllable pitch	2

Design Features. The Ulsan class ships are multi-purpose frigates with varied capabilities for ASW, ASuW, and AAW. These are the first frigates designed (under the supervision of John J. McMullen) and built by four different shipbuilders in South Korea. Hyundai Heavy Industries Co, Daewoo Heavy Industries Co, Korea Tacoma Marine Industries Ltd, and Korea Shipbuilding & Engineering constructed the South Korean-designed Ulsan class frigates and Tonghae class corvettes for the Navy.

The ships have a steel hull with an aluminum alloy superstructure. The overall length is 102 meters; beam, 11.5 meters; draft, 3.51 meters; and the molded depth, 27.8 meters. The maximum displacement is 2,180 tons. The ships have excellent range, with the ability to navigate from Korea to the U.S. (distance of 4,447 miles) at a cruising speed of 15 knots. At maximum speed of 34 knots, the ships can run from Korea to the Philippines (distance of 911 miles) within 25 hours without refueling.

The ship is equipped with two LM 2500 gas turbines of 54,000 horsepower for a maximum speed of about 34 knots, as well as two diesel engines to give a cruising speed of 18 knots. The CODOG arrangement allows considerable efficiency. The machinery runs through two DTA 150 reduction gears, which adequately transfer the power generated from the propulsion machinery through the propulsion shaft to the two variable pitch screws. All of these systems can be remote controlled from anywhere on the bridge or the engine control room. One ship stabilizer can minimize the ship's rolling in bad weather conditions.

Operational Characteristics. The primary armament consists of eight Harpoon surface-to-surface missiles, with a range of 60 nautical miles. There are two 76mm L62 Oto Melara guns with a firing rate of 85

rounds/min and a range of 8 nautical miles. Anti-air defense is provided by four twin Emerlec 30mm gun mounts, which can be operated under local or remote control at a range of 4.5 nautical miles and at a firing rate of 600 rounds per barrel per minute.

For anti-submarine warfare, the Ulsan has two triple sets of Mk 32 torpedo tubes that fire the Mk 46 torpedo; the Mk 46 torpedo has a range of 5 nautical miles and a speed of 45 knots. Two depth-charge racks are also at the stern for conventional depth charges.

The sensor suite, with the exception of the SRN-15 (TACAN), was provided by Thales Nederland and includes the DA.05 target indication/air search radar. It transmits in the E/F band and has a 75-nautical-mile range. A ZW.06 surface search-and-navigation radar operates in the I-band and has a 15-nautical-mile range. The fire control radar is a WM.28, an I-band radar with a range of 20 nautical miles. There are also two Lightweight Optronic Director (LIOD) fire control systems. The LIODs use a TV camera, infrared camera, and laser rangefinder to provide a non-electronic means of gun fire control.

The sonar system is the PHS-32 hull-mounted medium- to low-frequency system. The PHS-32 has four active transmission modes and both passive and active reception. The electronic warfare system is an integrated Goldstar system designated ULQ-12K, which is similar to the ArgoSystems APECS equipment, and may be based on it. In addition, there are four Protean decoy launcher systems with a dedicated Matilde radar-warning receiver. The sequence of operations indicates that the ULQ-12K alerts the Matilde system, which then automatically fires the decoy launchers when required.

Aircraft can be guided by means of an SRN-15 TACAN (Tactical Air Navigation) beacon transponder. The Ulsan class is not equipped to carry a helicopter.

Ulsan Class Frigate Seoul

Source: ROK Navy

Variants/Upgrades

The basic ship design is the same for both groups of the class, but equipment fits differ. The last four ships of the class employ three twin Oto Melara 40mm AA guns in lieu of the four 30mm mounts. The *Keongbuk* and *Chungnam* have Samsung-built Marconi 1810 radars, Ferranti WSA-423 combat data/control systems, Marconi S-1802 tracker radars, and Radamac HK-409-029 electro-optical directors. At least two may have the Raytheon DE 1167 sonar and Dutch radar. Early ships in this class suffered from poor stability and were ballasted with cement blocks; this problem was rectified in later ships.

Sukanya Class. The seven Indian Navy ships are virtually disarmed, equipped only with a single 40mm Bofors and a Racal-Decca 1226 navigation radar.

However, they feature a helicopter pad and hangar on the stern and can be armed much more heavily if needed. It is believed that their role can be changed from harbor defense to protection of offshore installations and patrol of the EEZ with very little effort. Inmarsat can be fitted on the hangar roof.

Samar Class. The last three Indian Navy ships were reordered for the Indian Coast Guard. They are identical to the Navy's Sukanya ships but are more heavily armed and carry a helicopter that is capable of carrying a Marine contingent. The hangar is telescopic. For armament, these ships have an Oto Melara 76mm L62 gun and two 12.7mm machine guns in place of the Navy's 40mm gun.

Program Review

Background. The Ulsan frigate program had its genesis in several events that took place in the mid-1970s. At that time, South Korea's frigates and destroyers were all aging World War II-era ex-U.S. warships. When U.S. President Jimmy Carter entered office in 1977, he announced plans to withdraw troops from South Korea. North Korea was strengthening its naval forces, building nine Romeo class submarines after having received seven from China. However, the major perceived threat to South Korea stemmed from North Korean infiltration along South Korea's long coastline. This was highlighted in 1979 by the assassination of President Park Chung Hee of South Korea by special forces teams and by a growing level of terrorist operations in coastal areas.

The initial South Korean response was the construction of a large class of 1,000-ton corvettes tasked with inshore warfare. A total of 22 Pohang and four Donghae class corvettes were built. The size of the ships had to be kept to a minimum, both to shorten building time and to provide the requisite numbers. Although the Pohang class ships were effective, they were too small and over-armed to operate far from any coastlines. A larger design was required for deeper water operations. To meet that need, the South Korean Navy began design studies for a frigate in 1976. The frigate would be the largest warship ever built in South Korea, although Korean shipyards had built many tankers and freighters and had a reputation for efficiency.

The Frigate Program

A preliminary design was ready by 1978, and late that year four frigates were ordered from the Hyundai Shipyard. The first keel was laid in May 1979; the frigate, the *Ulsan*, was launched in April 1980 and commissioned on New Year's Day 1981. The deteriorating Korean financial situation forced the cancellation of the next three frigates, but this was partly offset by the receipt of two elderly destroyers from the U.S. Navy in 1981. In late 1981, Korea ordered four more ships from different shipyards. The second and third ships, *Seoul* and *Masan*, were commissioned in June and July 1985, respectively.

The South Korean Navy planned to commission the fourth ship in spring 1986, but this was delayed until late 1987 because of a shortage of funds. Orders reportedly were placed for two more ships – the sixth and seventh members of the class – in 1986. Little was heard about those orders, and some accounts said that the ships were postponed because of costs. These may be the two ships that appear out of sequence.

Indian Requirements

In 1986, South Korea began looking for export customers for the Ulsan class. The first (and only significant) export customer turned out to be India, which purchased three modified Ulsan class ships for its Navy in March 1987. These were intended as patrol ships and were virtually disarmed, being reduced to a single 20mm Oerlikon gun forward. Their electronics fit was also severely reduced to a single Decca 1226 navigation radar. However, the ships were equipped with a helicopter deck and hangar aft. The ships served as offshore patrol vessels (OPVs), tasked with harbor defense and protecting oil rigs and other offshore installations. They carried firefighting equipment aft. The ships proved extremely successful, and the Indian Navy produced four more ships of that design under license in Indian yards. One ship was subsequently transferred to Sri Lanka.

Three more ships were subsequently built in Indian yards for the Indian Coast Guard. The Coast Guard ships were fitted with an Oto Melara 76mm gun forward, as well as an AK-630 30mm twin mount. Twelve ships were to be constructed under the program, but economic considerations reduced that number to six, finally causing the termination of the Indian procurement after the original three hulls. In 1999, a fourth ship of this class was ordered to replace an Indian Navy ship transferred to Sri Lanka. The ship, called the INS *Sagar*, was completed in November 2003 and represents the last of the Ulsan family to be built.

The last two frigates in the original Ulsan program, *Jeonnam* and *Cheju*, were reported to have been commissioned in June 1989. Additional ships appeared in 1990 and continue to enter service; the current total is nine. A study of the order dates of these ships suggests that a second group of six hulls was discussed as an interim measure because of the long delays on the KDX program. However, at this point it appears unlikely that any further Ulsans will be built for the Korean Navy.

In 1993, the South Korean Navy announced plans to refurbish and modernize all in-service and building units of the Ulsan class – the phrase taken to suggest that more are on the way. The planned upgrade will involve the installation of a new command system, a new sonar, and new radars. At least some of the ships may be rebuilt with a helicopter hangar and a flight deck on the stern. Nothing appears to have come of these plans.

The Bangladesh Mystery

In 1995, Saudi Arabia offered to finance the purchase of a frigate by the Bangladesh Navy. This ship was intended to replace the BNS *Ali Haider*, an ancient ex-British Type 41 frigate that was a veritable museum of 1940s British electronic technology. In 1997, the Bangladesh Navy used this funding to order an Ulsan class frigate from the Daewoo yard. There has been speculation that this ship used components assembled for a Korean Navy construction that was canceled before completion. This ship, the BNS *Bangahandhu*, was delivered in June 2001. However, the ship was quickly decommissioned and returned to its builders amid complaints of engineering and mechanical problems.

In 2003, information appeared on the Internet regarding the ship's alleged problems, which included ill-fitting sonar domes and issues with electrical equipment. However, it appears that these problems were merely those normally detected when a ship runs acceptance trials, and the fuss made over them may be related to political developments in Bangladesh. This impression has been reinforced by a variety of legal and political moves within Bangladesh during 2004.

Unconfirmed reports in early 2007 suggested that the BNS *Bangahandhu* was either in service or approaching that status. Bangladeshi sources have suggested that the real reason for the ship's abrupt withdrawal from service was political. Although the ship was believed due for a prompt return to Bangladesh, it has been languishing in the Daewoo yard for at least five years. Recently, however, the ship was reportedly seen off Chittagong and is now equipped with Chinese FN-90N SAMs, which are essentially copies of the French Crotale NG SAM. Further reports from Bangladesh stated that the ship was scheduled to be recommissioned in June 2007.

In late 2007, it was revealed that this ship has indeed been commissioned, now bearing the pennant number F25 and named the BNS *Khalid bin Al Waleed*.

Related News

New Frigates for Bangladesh? – The Bangladeshi Navy is reported to be interested in purchasing four new missile corvettes or frigates to replace the aging ships currently in its inventory. Funding for the first of these ships has been allocated for next year's defense budget. It has been suggested that the Navy is considering procuring MEKO-A200 class frigates, similar to those in service with the South African Navy. Though such a purchase would make significant sense, a note of caution has to be sounded. Bangladesh is notorious for announcing defense procurement plans, even to the point of declaring that the funds will be included in "next year's" budgets. However, few such plans come to fruition, and those that do are usually but pale shadows of the original proposals. Thus, while the current reports are interesting, it is likely to be a long road before these ships become a reality. (*Bangladesh News*, 5/07)

Funding

This program is being funded by the South Korean government for the Navy.

Ulsan Class

Contracts/Orders & Options

No contractual information is currently available.

Timetable

Month	Year	Major Development
	1976	Korean Navy begins design studies for new frigate
May	1979	Korean Navy orders four frigates from Hyundai
May	1979	First keel laid at Hyundai
Apr	1980	First frigate launched
Jan	1981	Ulsan commissioned
	1982	Second ship's keel laid
	1987	Offshore patrol variant ordered by India
	1990	Second group enters service in India
Apr	1991	Three ordered for Indian Coast Guard
Jun	1993	Korea's last ship commissioned
May	1998	Indian Coast Guard's third ship commissioned
Jun	2001	Bangladeshi ship delivered
Dec	2007	Bangladeshi ship finally commissioned

Worldwide Distribution/Inventories

Bangladesh	One
India	Six, Navy; four, Coast Guard
South Korea	Nine
Sri Lanka	One

Forecast Rationale

With the Bangladeshi Navy recommissioning its Ulsan class frigate as the BNS *Khalid bin Al Waleed* (F25), the final chapter of the tale of the Ulsan class frigates has now been closed. Options for further sales of Ulsan class frigates seem limited. Bangladesh is exploring the possibility of building up to four MEKO-A200 class frigates, a decision that precludes further procurement of Ulsan class ships.

Furthermore, news that the Korean Navy is funding a successor to the Ulsan class is also a strong indication that no further construction of this class is likely. The South Koreans, chasing any available export orders, will probably wish to promote the new design, so new construction of the Ulsan class is now very unlikely indeed.

The Ulsan class was a creditable first step for the nascent Korean warship building industry. In many ways, it could be considered the 1980s equivalent of the "export frigates" produced by the U.K. and France in the 1960s and 1970s. These were light, inexpensive general-purpose ships that were undistinguished in terms of fighting capability but offered a flexible multirole capability for navies that did not face top-grade threats. Still, in following this tradition, it limited itself to a market niche that was already fading in the light of modern naval developments.

It is likely that these ships will be offered for sale on the international market as they have been phased out of Korean service. Although their capabilities are utterly inadequate for service as frigates, or indeed lesser surface combatants, they do have an attractive capability as coastguard cutters or offshore patrol vessels. Sri Lanka in particular is likely to find these ships ideally suited to its requirements.

Overall, we do not predict additional construction at the present time. Unless there is an unexpected development with reference to this class, this report will be archived next year.

Ten-Year Outlook

Due to the completion of all outstanding orders, a forecast of future production is not necessary.

* * *