

# ARCHIVED REPORT

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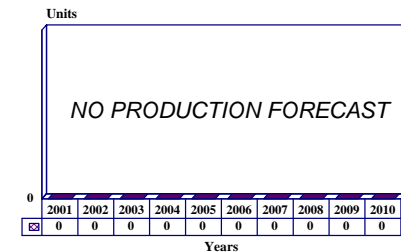
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## Luda Class - Archive 6/2002

### Outlook

- *Zhuhai* remains only Luda III class completed
- Luda III probably testbed and systems trial ship for later classes
- No additional construction of Luda class projected
- These ships were last traditional destroyers to be built

10 Year Unit Production Forecast  
2001-2010



### Orientation

**Description.** Surface combatants primarily tasked with anti-submarine and anti-ship operations.

#### Sponsor

China National Machinery Import and Export Corp  
(Machimpex)  
Erligou  
Xijiao  
Beijing, China

#### Contractors

Tunglang Shipyard  
Guangzhou, China

Luda Shipyard  
Lainning, China  
Chunghua Shipyard  
Shanghai, China

China State Shipbuilding Corporation (CSSC)  
Shanghai, China

**Licensee.** No production licenses have been granted.

**Status.** In service. Modernization and upgrades continue.

**Total Produced.** A total of 17 Luda class ships have been built; one was lost to internal explosion.

### Pennant List

<u>Name</u>	<u>Shipyard</u>	<u>Ordered</u>	<u>In Service</u>	<u>Fleet/Homeport</u>
105 <i>Jinan</i>	Luda	1965	1971	Yellow Sea/Yuchi
106 <i>Xian</i>	Luda	1968	1972	Yellow Sea/Yuchi
107 <i>Yinchuan</i>	Luda	1968	1972	Yellow Sea/Yuchi
108 <i>Xining</i>	Luda	1980	1985	Yellow Sea/Yuchi
109 <i>Kaifeng</i>	Luda	1980	1986	Yellow Sea/Yuchi
110 <i>Dalian</i>	Luda	1980	1988	Yellow Sea/Yuchi
131 <i>Nanjing</i>	Shanghai	1968	1973	East China Sea/Dalian
132 <i>Hefei</i>	Shanghai	1968	1974	East China Sea/Dalian
133 <i>Chongqing</i>	Shanghai	1968	1976	East China Sea/Dalian
134 <i>Zunyi</i>	Shanghai	1980	1987	East China Sea/Dalian
160	CSSC	1968	1973 (lost 1988)	
161 <i>Changsha</i>	Guangzhou	1968	1973	South China Sea/Zhanjiang
162 <i>Nanning</i>	Guangzhou	1968	1974	South China Sea/Zhanjiang
163 <i>Nanching</i>	Guangzhou	1980	1988	South China Sea/Zhanjiang

<u>Name</u>	<u>Shipyard</u>	<u>Ordered</u>	<u>In Service</u>	<u>Fleet/Homeport</u>
164 <i>Guilin</i>	Guangzhou	1985	1991	South China Sea/Zhanjiang
165 <i>Zhanjiang</i>	Guangzhou	1985	1992	South China Sea/Zhanjiang
166 <i>Zhuhai</i> (Luda III class)	Dalian	1985	1994	South China Sea/Zhanjiang

**Mission.** The Luda class ships are ASW-oriented surface combatants intended for blue-water power projection operations as part of the screen for surface strike groups.

**Price Range.** Estimated between US\$150 million and US\$200 million based on a comparison of similar ships.

## Technical Data

	<u>Metric</u>	<u>US</u>
<b>Dimensions</b>		
Length:	132 m	433.1 ft
Beam:	12.8 m	42 ft
Draft:	4.7 m	15.4 ft
<b>Displacement</b>		
Standard:	3,670 tonnes	
Full Load:	3,960 tonnes	
<b>Performance</b>		
Speed, Maximum:	60 km/h	32 kt
Cruising:	26 km/h	14 kt
Range:	5,500 km at 33 km/h	2,970 nm at 18 kt
Crew:	27 officers, 275 enlisted	

	<u>Type</u>	<u>Quantity</u>
<b>Armament</b>		
Guns		
Main Battery:	Chinese-made 130 mm L58	2x2
Anti-Aircraft:	37 mm Breda	4x2
Torpedoes:	Eurotorp A-244/S or Mk 46	24
Torpedo Tubes:	Whitehead B515	6
Depth Charge Rails:	BMB-1, FQF-2500 A/S	2
Depth Charges:	(N/A)	38
ASW Missiles:	CY-1	8
ASW Rocket Launchers:	EDS-25A	2x12

<b>Electronics</b>		
Radars		
Surface Search:	Sea Tiger	1
Air Search:	Rice Screen	1
Target Acquisition:	Orion RTN-20X	1
Gunnery Fire Control:	Type 343 Sun Visor B	1
ASuW Fire Control:	Wasp Head	1
AA Fire Control:	Vega II	2
Electronic Warfare:		
ESM:	Thomson DR-2000S	1
ECM:	Thomson Alligator	1
Decoy Launcher:	ERC-1	2x12
Sonars		
Hull Mounted:	DUBV-23C	1
VDS:	DUBV-43B	1

	<u>Type</u>	<u>Quantity</u>
Command System:	TAVITAC 2000	1
<b>Machinery</b>		
Steam Turbines:	Steam turbines	2x36,000 shp
Boilers:		4
Propellers:	2 shafts	2
Auxiliary Power:	Diesel generators for electricity	4

**Design Features.** The Project 051 Luda III is the latest variant of this design originally conceived in the early 1960s. Unlike earlier versions, it is not the result of a retrofit program but has been built to this standard as new construction. Previous available data had indicated that the hull dimensions and powerplant of the Luda III were retained unchanged from Luda I and II series. This is now known to be incorrect. The hull is slightly shorter and differently proportioned and the output of the powerplant is increased, boosting the speed by 1 knot. The internal layout has been substantially modernized and the bridge enlarged through the addition of an extra deck. The hull and superstructure are now fully sealed to provide NBC operating capability. Full air conditioning is provided for the crew.

The open command station on the bridge has been removed and a combat information center (CIC) installed on the extra superstructure deck. The CIC houses a TAVITAC 2000 command system now produced under license in China under the designation ECIC-1. A trial installation using a TAVITAC 2000 system imported from France was originally made using *Jinan*. The CIC also houses a centralized fire control system derived from French sources.

The CY-1 anti-submarine missiles are quite similar in overall dimensions to the C801 missile; the two weapons may therefore be interchangeable. There are also reports that the ships carry a mix of missiles with C801 in the forward set of four launchers and CY-1 missiles in the aft set. This would require a dedicated fire control radar on the ship that is not currently installed. It is possible that the Sun Visor gunnery control radar provides target designation for the anti-ship missiles.

The Luda III class frigates have a 3D phased array radar mounted on the rear mast and a Jupiter radar tasked with air and surface search forward. The electronic warfare equipment is based on the DR-2000S threat warning receiver and the Alligator jammer, coupled with Chinese-built chaff and flare launchers. A satellite communications antenna is provided on the bridge.

**Operational Characteristics.** Until recently, the latest version of this class, Luda III, was assumed to retain the ASuW orientation of earlier ships of this type. This

assessment has since been modified and the ships are dedicated ASW platforms, using their French sonars and Chinese torpedo-carrying missiles to achieve convergence zone ASW capability.

At present, they also provide flagship facilities for surface action groups. As China develops its naval aviation capability, these ships will play a key role.

The weapons systems installed on the Luda III are entirely new to the Chinese Navy. The only exception is that the main anti-surface weaponry consists of two Chinese-built twin 130 mm guns.

Air defense is provided by the Italian DARDO system controlling four Breda Twin 40 gun mounts. These mounts are equipped with guns chambered for Chinese 37 mm ammunition. Two Orion RTN-10X fire control radars are provided, including an optronic backup system. China is reported to have received a license to produce this system.

Three separate ASW weapons are included. Defensive and close-in capability are provided by two 12-barreled EDS-25A rocket launchers in the bow. They are supplemented by two triple 324 mm Whitehead B515 torpedo tubes housing A-244/S lightweight torpedoes. Additional magazine capacity is provided for three sets of reloads per ship. Offensive ASW capability is provided by four sets of twin tubes for the CY-1 ASROC torpedo-carrying missile. This missile is derived from the C801 anti-ship missile and can carry an A-244/S torpedo to ranges between 5 and 18 kilometers. The missile is 5.5 meters long and weighs 700 kilograms.

These weapons are controlled by a French-supplied DUBV-23 low-frequency bow sonar and a DUBV-43 variable depth sonar (VDS), which feed their input into a common set of processing equipment to form a combined sonar system. This is fundamentally the sensor fit of a French Navy Georges Leygues class frigate.

The use of a 3D phased array radar on a ship armed only with guns for anti-air warfare (AAW) work is indicative of the ship's role as a command unit for task groups. The function of the radar is to guide friendly

aircraft from shore-based land units to their targets and to control land-based air defense fighters.

Damage control in these ships is extremely deficient (a factor noted with many Chinese warships), and there is

little evidence of fire-fighting or flooding precautions. The ships are therefore likely to be vulnerable to hits from even small anti-ship missiles.

## Variants/Upgrades

EF-4. The Luda III (see below) has been made available for export under the designation Project EF-4.

Luda I. Original production version armed with four 130 mm guns in two twin turrets, six HY-1 Silkworm anti-ship missiles in rotating mounts amidships, and eight 37 mm guns in two twin mounts. ASW capability is restricted to depth charges rolled over the stern and two 12-barreled rocket launchers forward. Fire control and radar systems are all ex-Russian.

Luda IA. Second group of Luda class ships armed with 57 mm vice 37 mm AA guns, HY-2 Silkworm anti-ship missiles, and equipment for under way replenishment. Many earlier ships were brought up to this standard.

Luda II. Modification of first of class with hangar deck and helicopters replacing rear guns. Long-range FL-7 missiles fitted. Early reports suggested that all Project 051 ships would be eventually rebuilt to this standard but these plans appear to have been abandoned.

Luda III. The current model of the series, discussed in this report.

Project 051. The indigenous, domestic designation of the Luda class.

## Program Review

**Background.** In 1960, the Chinese Navy began designing a new class of long-range frigates equipped with anti-ship guided missiles. This design was originally thought to be based on the Russian Project 56 (Kotlin class) ships, with four single launchers for P-15 (SSN-2A Styx) missiles in place of the torpedo tubes. Russian sources have recently made it clear, however, that the design base was, in fact, the Project 41 (Tallinn class).

The major redesign, claimed by the Chinese as being intended to improve the seakeeping characteristics of the Kotlin class, simply reflected the differences between Tallinn and the smaller Kotlin. These included an enlarged hull with longitudinal framing, a flat transom stern and more superstructure volume. Following the Sino-Soviet split, this program was halted. R&D work was restarted in 1965, with nine ships of the new design ordered, three for each of the major fleets. Construction started in 1968. Sea trials were begun in 1971.

Work on the new ships was hurried due to the Cultural Revolution. Chinese accounts report inadequacies in the detail design of the ships, extremely poor workmanship, and large quantities of specified equipment that either was not available for installation, was incomplete when delivered, or simply did not work. Although the ships were theoretically delivered in the early and mid-1970s, much work was still required and few were fully operational prior to 1985.

Following the initial batch of nine, a second group of five ships was ordered in 1980. Apparently, the design teams were so disrupted by the Cultural Revolution that a planned, more advanced successor was unavailable and these ships represented an intermediate stage aimed at reinforcing the fleet and maintaining shipyard expertise. The new ships retained the design of the older group, but replaced the 37 mm guns with a similar number of 57 mm weapons and included provision for the new FL-2 anti-ship missile. A new, 3D phased array radar was installed on the rear mast.

The most significant factor in the new group was full provision for under way replenishment (UNREP) using both alongside and over-the-stern techniques. Chinese crews quickly developed a very high degree of proficiency in using this equipment, impressing US Navy observers with their ability to conduct UNREP operations in heavy seas and while at high speed.

In 1982, the Chinese Navy attempted to launch a program to significantly upgrade the combat direction capabilities of its warships, with the intention of adding modern Western systems on the Luda class. An agreement was signed with British Aerospace for the complete reconstruction of eight of the nine initial ships (excluding the *Jinan*, which has always served as a trials ship) with new Plessey ASW.5 surveillance radar, Marconi ST802 tracker, and facilities to fire the British Aerospace Sea Dart surface-to-air missile. A Chinese design study suggested, however, that the proposed

modifications would not be as cost-effective as hoped. The rebuilt ships would have air-defense capabilities not significantly better than those of the British HMS *Sheffield*, which was sunk in the Falklands war. Citing budgetary constraints, China abandoned the project in 1984.

Later, in 1986, new plans were drawn to install US-made Mk 15 Phalanx close-in weapon system, gas turbine engines, ASW weapons including Mk 46 torpedoes, and a computer and sonar, on the Luda class. The United States then scrapped those plans in reaction to the Tiananmen Square massacre.

In 1989, the *Jinan* reappeared after extensive modernization. The stern's 130 mm and 57 mm guns had been removed and replaced by a helicopter deck and hangar for two Zhi-9 helicopters. These are Chinese-built derivatives of the French Dauphin, used for over-the-horizon targeting of long-range anti-ship missiles. The extended-range FL-7 missile has been fitted. Reported plans are to extend this conversion to the rest of the existing Luda fleet, but with the addition of a Crotale anti-aircraft missile system. The latter addition has been trialed on the frigate *Kaifeng*.

A third batch of Luda class ships was ordered in 1985. These comprise the radically improved Luda III class which is the subject of this report. They effectively represent a packaging of license-built Western weapons and sensors in a Chinese-built hull. Reports suggested

at that time that a total of 16 ships were planned, with the older Luda class to be brought up to Luda II standards as the new ships became available.

In 1991 and 1992, the two Luda III class ships that were in service by that time were upgraded to Western standards with French assistance. The project included the fitting of Crotale Modulaire SAM system VIII, Thomson-CSF Sea Tiger air search radar and the TAVITAC (Traitement Automatique et Visualization Tactique) weapons control/combat direction system. This upgrade represented a major step forward for the Chinese in terms of establishing integrated weapon and sensor capability.

By early 1995, one Luda III was in service. Reports from China indicated that a second unit (pennant number 168) was running trials, while a third (167) was in dockyard hands for final fitting out. Three more hulls was reportedly under construction at that time. By 1996, data obtained from Taiwanese sources indicated that Chinese naval construction across the board had slowed substantially.

The situation became more complex when the ships of the new Luhai class appeared. The first pair of these, the *Yantai* and the *Shenzhen*, carried the hull numbers 167 and 168 previously associated with the Luda III class. It thus appears that the earlier reports of mass production of the Luda III were inaccurate and resulted from confusion with the newer design.

## Funding

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This program is funded by the People's Liberation Army and Navy (PLAN) of China.

## Recent Contracts

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No contractual information has been released.

## Timetable

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<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1960	Initial announcement of plans for new frigate
	1965	First keel laid
	1968	Bulk of orders placed
	1971	First hulls commissioned
	1980	Second batch ordered
Dec	1985	Third batch ordered
	1988	One ship lost to internal explosion
	1989	Luda II appears
	1991	First Luda III commissioned
	1995	Second (No. 168) Luda III sighted at sea
Oct	1998	New Luhai class ship sighted prior to beginning sea trials

## Worldwide Distribution

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**China.** 1 Luda III, 1 Luda II, 5 Luda IA, 10 Luda I

### Forecast Rationale

The Project 051 Luda III class is a holdover from the early 1990s when it appeared that a combination of Western electronics systems and weapons installed in low-cost Chinese-built hulls would prove a potent combination on the international market. While these ships would not have been as capable as their modern Western equivalents, their cost-effectiveness ratio would have made them very attractive to less well-resourced navies. By the middle to late 1990s the flaw in this argument was becoming apparent. The construction standards of the Chinese-built hulls were unacceptably low while the problems of integrating Western systems into non-traditional hulls proved more complex than anticipated. The first of the Luda III class, the *Zhuhai*, was also to be the last. The *Zhuhai* has also the distinction of being the last descendent of the classical destroyers of the First and Second World Wars to be completed.

The swiftness with which the Luda III was succeeded by newer designs poses the question of why the ship was built at all. It is now obvious that there was no intention of building a class of such ships and attempts to export the class were half-hearted at best. It is difficult to avoid the conclusion that she was used as a testbed for the integration of new electronics systems in order to avoid using the new-design ships for this role. There may also have been an element of insurance in that the installation of new equipment in an old hull provided a fall-back if the new classes experienced serious difficulties. This may have been wise; the Project 053 Luhai class was badly designed and had so many problems that a complete redesign, producing the Luhai class, was necessary. This was not enough to warrant building additional Luda III class ships though, and production of the venerable Luda has ceased. This report will be archived next year.

### Ten-Year Outlook

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The production of Luda (and Luha) has stopped, but modernization and upgrading of the systems onboard the existing ships will continue for the time being. Therefore, no production chart for the platform is included.

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