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Absalon Class

Outlook

- Planned construction completed
- Dropped from Australian frigate requirement
- Odense Marine Technology continues to promote design
- Further construction is unlikely
- This report will be archived next year

Orientation

Description. The Absalon class ships have been variously described as combat support ships and transport frigates. In Danish service, the Absalon class is termed Kommandostøtteskib, or command and support ships.

Sponsor

Danish Fleet Headquarters

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Status. In service.

Total Produced. A total of five ships have been built.

Pennant List

<u>Number & Name</u>	<u>Builder</u>	<u>Launch Date</u>	<u>Commission Date</u>
L16 <i>Absalon</i>	Odense Staalskibsværft, Lindø	2/2004	10/2004
L17 <i>Esbern Snare</i>	Odense Staalskibsværft, Lindø	6/2004	4/2005
F361 <i>Iver Huitfeldt</i>	Odense Staalskibsværft, Lindø	3/2010	1/2011
F362 <i>Peter Willemoes</i>	Odense Staalskibsværft, Lindø	12/2010	10/2012
F363 <i>Niels Juel</i>	Odense Staalskibsværft, Lindø	8/2011	12/2013

Mission. The Absalon class ships are extremely flexible multirole auxiliaries, combat support ships, and/or frigates, depending on configuration and module selection.

Price Range. The Absalon class ships have an estimated unit value of \$230 million. The follow-on Iver Huitfeldt class has a unit cost of \$353 million.

Absalon Class**Contractors****Prime**

Odense Marine Technology A/S	http://www.odensemaritime.com , Sverigesgade 4, Odense C, 5000, Denmark, Tel: + 45 4580 2037, Fax: + 45 4580 8137, Prime
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Subcontractor

Atlas Elektronik GmbH	http://www.atlas-elektronik.com , Sebaldsbrücker Heerstrasse 235, Bremen, Germany, Tel: + 49 421 457 02, Fax: + 49 421 457 3699, Email: info@atlas-elektronik.com (ASO-94 Sonar)
BAE Systems Inc, Platforms & Services	http://www.baesystems.com , 4800 E River Rd, Minneapolis, MN 55421-1498 United States, Tel: + 1 (763) 571-9201, Fax: + 1 (763) 572-9826, Email: land.armaments@baesystems.com (Mk 45 5-Inch/54 Lightweight Gun)
Boeing Defense, Space & Security	http://www.boeing.com/defense/ , PO Box 516, St Louis, MO 63166 United States, Tel: + 1 (314) 232-0232, Fax: + 1 (314) 777-1096 (SWG-1(5) Harpoon Launch Control Set)
MTU Friedrichshafen GmbH	http://www.mtu-online.com , Maybachplatz 1, Postfach 2040, Friedrichshafen, Germany, Tel: + 49 7541 90 0, Fax: + 49 7541 90 5000, Email: info@mtu-online.com (Diesel Engine)
Rheinmetall Defence	http://www.rheinmetall-defence.com , Rheinmetall Platz 1, Düsseldorf, Germany, Tel: + 49 211 473 01, Fax: + 49 211 473 4746, Email: info@rheinmetall-defence.com (35mm GDM08)
Saab Surveillance	http://www.saabgroup.com , Nettovägen 6, Järfälla, Sweden, Tel: + 46 8 580 840 00, Fax: + 46 8 580 322 44, Email: info@saabtech.se (Command & Control System)
Terma A/S	http://www.terma.com , Hovmarken 4, Lystrup, Denmark, Tel: + 45 8743 6000, Fax: + 45 8743 6001 (C-Flex Command System)

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

	<u>Metric</u>	<u>U.S.</u>
Dimensions		
Length	137.0 m	449.6 ft
Beam	19.5 m	64.0 ft
Draft	6.3 m	20.7 ft
Displacement, Full Load	6,300 tonnes	6,187 tons
Performance		
Speed, Maximum	42.6 kmph	23 kt
Speed, Cruising	27.75 kmph	15 kt
Range (est.)	16,670 km @ 27.75 kmph	9,000 nm @ 15 kt
Crew		99 + 70

Absalon Class

	<u>Type</u>	<u>Quantity</u>
Armament		
Medium Guns	5-in Mk 45 L62	1
Light Guns	Rheinmetall 35mm GDM08 12.7mm MG	2 4
Missiles – SSM	RGM-84 Harpoon Block II	16
Missiles – SAM	RIM-162B ESSM Sea Stinger	36 2x 2
Torpedo Tubes	Mk 32 for MU-90 Impact	2x 3
Helicopter	EH101	2
Electronics		
Command System	Terma C-Flex	1
Radar		
Search	Thales Smart-S	1
Fire Control	SaabTech CEROS 200 Mk 3	2
Navigation	Terma Scanter 2001 FR-2135	1 2
Sonar		
Hull	Atlas ASO-94	1
Towed Array	For But Not With	1
EW Suite		
ESM	EDO ES3701	1
Decoy Launchers	Terma DL12T Terma DL6T	2 2
Propulsion		
Configuration	Diesel CODAD	
Diesels	MTU 20VM70	2x 11,150
Propellers	Cycloidal Pitch	2

Design Features. The armament for the Absalon class follows the Danish Standard Flex approach, but the guns are permanently mounted. The main gun is a 5-inch L62 Mk 45 Mod 4. This gun was selected to provide shore bombardment capability, as the 5-inch gun offers a much greater shell weight and range than the 76mm L62 gun used on most Danish ships. The Danish Navy planned to buy the Extended Range Guided Munition for these ships, and the cancellation of this system has caused the service serious concern. Two 35mm Millennium close-in weapon system (CIWS) turrets are mounted, one behind and above the main gun and the other on top of the rear hangar.

Other equipment includes four launchers for the Seagnat/SBROC chaff decoys and two Mk 32 triple torpedo tubes for the MU-90 Impact anti-submarine torpedoes. Forward of the torpedo launchers, in a sunken midsection, are five StanFlex container slots for 16 Harpoon anti-ship cruise missiles in two groups of paired quad canisters and three rows of 12 ESSM surface-to-air missiles.

The Absalon class is powered by two MTU diesels delivering a total of 22,300 shp to two cycloidal pitch propellers. The ships were designed for 23 knots in service but comfortably exceeded this speed during trials and are rated at 26 knots.

Operational Characteristics. The Absalon class Flexible Support Ships are hard to classify precisely because they represent an unusual blend of frigate and auxiliary. They are similar in size and armament to a modern frigate, but they lack the sensors required for frigate operations. Instead, the Absalon class has roll-on, roll-off (RO/RO) ramps and interior space for vehicles, cargo and support equipment.

The stern ramps fitted to the ships allow access to a 900-square-meter multirole "flex-deck" that is normally used to carry military vehicles. The deck is stressed to carry vehicles as heavy as the 62-ton Leopard 2A5 DK main battle tank. Alternatively, the flex-deck can be used to carry around 450 tonnes of cargo. Other uses for this deck can include a containerized hospital and extra living quarter modules for troops.

The RO/RO ramp to the flex-deck is accessed from a hatch on the starboard side of the transom stern. On the port side is a bay containing two fast landing craft and their retractable launch/recovery system. The landing craft are based on the Swedish Combat Boat 90H but are primarily used as crew boats. When not needed, both landing craft are stored in the bay beside the vehicle loading ramp.

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Above the flex-deck is an 850-square-meter helicopter landing deck. This deck has been sized to accommodate medium helicopters of the EH101 class and is serviced by two hangars, also capable of accommodating the EH101. The landing deck serves as further vehicle parking space and container storage when the helicopters are not in use. The Absalon class was designed to accommodate a company-size landing force with a command staff of total strength equivalent to around 200 Marines.

The original ship's crew was set at 100, but early experience proved this number was inadequate to run the ship properly. An additional 17 berths were provided to carry out the under-staffed operations. In addition, the ships have provision for up to 70 more crew members should operational requirements make a larger crew necessary.



HDMS Absalon and Esbern Snare

Source: Royal Danish Navy

Variants/Upgrades

Flexible Support Ship. The basic variant of the Absalon class as described in the main body of this report.

AAW Frigate. If the basic Flexible Support Ship variant of the Absalon class can best be viewed as a fleet auxiliary with the offensive and defensive firepower of a frigate, the anti-air warfare version can be seen as a frigate that has the cargo-carrying and support capability of an auxiliary.

The basic hull and layout of the AAW frigate remain identical to those of the Flexible Support Ship. The

machinery is doubled, with the AAW ship having four MTU diesels rather than two, giving her a design speed of 28 knots. Since the Absalon class ships handsomely exceeded their design speed during trials, it is likely that the AAW ships will do so also.

In sensor terms, the primary difference is the installation of an active phased array radar (APAR) on a new, enlarged foremast and the replacement of the SMART-S radar with a SMART-L system. These give the ship the ability to fire Standard SM-2 missiles in addition to the ESSM and Stinger weapons carried by the Flexible

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Support Ship. A 32-cell vertical launch system (VLS) is provided for the Standard missiles. The single 127mm gun is replaced by two single 76mm L62 Oto Melara

guns. With these exceptions, the AAW and Flexible Support Ship versions of the Absalon class are identical.

Program Review

Background. The design history of the Absalon class Flexible Support Ships can be traced back to the Flyvefisken-class multirole patrol craft built by the Danish Navy between 1985 and 1996. Faced with the need to replace three classes of ship (the Daphne class submarine chasers, Soloven fast attack craft, and Sund class minehunters), the Danish Navy conceived the idea of building a homogenous class of 14 ships that could be switched from one role to another by exchanging palletized and containerized weapons and sensor outfits.

These ships, the Flyvefisken class, were ordered in 1985, and the lead ship entered service four years later. They proved to be a qualified success, being the germ of a good idea but limited by some of the design decisions made at an early stage. The idea that the ships would be able to be switched rapidly from one role to another by exchanging their combat modules proved to be groundless; there is much more to a ship's efficiency in a given role than just the equipment carried. Switching roles turned out to be impractical, and the Flyvefisken class ships were eventually divided into three subgroups with their roles (and the appropriate modules) permanently assigned to them.

More significantly, the Flyvefisken class turned out to have been badly timed. The ships were designed at the end of the fast attack craft frenzy of the 1970s and early 1980s. As a result, the Flyvefisken class was significantly undersized and proved too small for the range of tasks it was supposed to perform. Of the 14 Flyvefisken class built, 10 remain in Danish Navy service, three have been sold to Lithuania, and one was scrapped.

The lessons learned with the Flyvefisken class were then applied to the Thetis class of frigates. These were much larger ships (3,500 tons full load, as opposed to 450 tons for the Flyvefisken class) that used the concept of containerized weapons systems to ease construction and provide for upgrades rather than to achieve a theoretical level of flexibility that could not be realized in practice. The Thetis class proved to be very successful ships, and they directed the Danish Navy's attention to a bigger and better derivative that would provide at-sea command and support capabilities, as well as the firepower of a fully sized frigate.

This new class of ship, quickly designated Flexible Support Ship, was the product of a design effort carried out by the Danish Navy – specifically, the Søværnets Materielkommando – and Odense Staalskibsværft

(a part of AP Møller Group). Following the finalization of a satisfactory design, the construction contract for two ships was signed with Odense Lindø in November 2001.

Construction of the first Absalon hull began in May 2003. The first ship was delivered in June 2004 and named *Absalon* (founder of Copenhagen) by HM Queen Margrethe II. At that time, the ship was ready to sail but was not yet fitted with all of her military hardware, her operational equipment being restricted to a 5-inch main gun. The HDMS *Absalon* then went to a naval base for her first fit of government-supplied naval hardware. After initial fitting out, the new ship was sent out into the Atlantic for two months of sea trials, including climatic tests.

Upon the ship's return to Denmark, KDM personnel installed and tested the remaining hardware, cables, and electronic units. With this equipment fully tested, the *Absalon* was declared fully operational. She then joined Combined Task Force 150, the multinational maritime security operation in the Indian Ocean, in August 2008. By this time, the second ship in the class, the HDMS *Esbern Snare* (named after the brother of Absalon, Esbern the Resolute) had already undergone sea trials and participated in NATO exercises. She was declared operational during the fall of 2008.

Enter the AAW Frigate

In 2003, with the first pair of Flexible Support Ships well advanced, the Danish Navy started to look at the second phase of the program. Originally, this was to consist of approximately four lightly armed patrol ships that would have used a slightly downsized version of the Absalon hull. However, changing international circumstances combined with the highly favorable qualities demonstrated by the Absalon hull design caused a change in policy, and it was decided to build three air warfare frigates in place of the four patrol ships. These three frigates featured much-improved sensor outfits and additional engine power at the expense of some of their cargo-carrying capacity. First metal on the lead ship of these AAW frigates was cut in August 2008.

The lead ship of the AAW frigate variant, the *Iver Huitfeldt*, was launched on March 11, 2010, and began to run sea trials in January 2011. However, she entered service without the APAR, a fire control system, and other combat equipment. She returned to dockyard

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hands in order to have this equipment fitted in 2012. Her two sister ships were delivered fully outfitted. The second-of-class, the *Peter Willemoes*, started to run trials in October 2012, while the third, the *Niels Juel*, was delivered in December 2013.

The original Odense Shipyard responsible for the construction of these ships closed with the delivery of the *Niels Juel*. However, the team that designed these ships, a combination of Maersk Shipping, Odense Shipyards and the Danish Navy, has re-established itself as Odense Maritime Technology (OMT) in order to promote the technology developed for the Absalon class to additional clients.

The new OMT group made a strong play to supply a modified version of its 6,650-ton Iver Huitfeldt frigate to fulfill Australia's SEA-5000 requirement for nine large new frigates. OMT modified the basic design to give it the anti-submarine warfare focus specified by Australia. The changes included expanding the frigate's helicopter hangar to hold two ASW helicopters and

installing a towed array sonar to hunt subs. Australia has been weak on ASW capabilities for many years, at a time when the submarines deployed in Pacific waters are rising in both numbers and operational capability.

The bid did not meet with success, however, despite the Iver Huitfeldt class's unit cost of \$340 million, less than half the projected costs of the other SEA-5000 competitors. Moreover, it would have been built from interchangeable modules that could be combined in various configurations to produce flexible, multirole ships.

A shortlist of three teams that would proceed to the final decision was announced in April 2016: BAE Systems, offering a version of the Type 26 Global Combat Ship; Fincantieri with a derivative of the Carlo Bergamini class variant of the FREMM multimission frigate; and Navantia, with a modified F-100 design. Eliminated from further consideration besides OMT were DCNS and ThyssenKrupp Marine Systems.

Funding

The Flexible Support Ships and AAW frigates were developed by the Royal Danish Navy.

Contracts/Orders & Options

<u>Contractor</u>	<u>Award (\$ millions)</u>	<u>Date/Description</u>
Terma	N/A	Aug 2008 – Provision of multilink capability to the Royal Danish Navy's Flexible Support Ships and frigates. The multilink solution was to be integrated into the Terma C-Flex command and control system on board the five ships.

N/A = Not Available

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
Aug	1997	Flexible Support Ship program started
Oct	2001	Order for Flexible Support Ships signed
Aug	2003	Work on AAW frigates started
	2004	Flexible Support Ships launched
	2005	Flexible Support Ships commissioned
	2007	Flexible Support Ships fully operational
	2008	First metal cut on AAW frigates
Mar	2010	First AAW frigate launched
Jan	2011	<i>Iver Huitfeldt</i> commissioned
Oct	2012	<i>Peter Willemoes</i> commissioned

Worldwide Distribution/Inventories

Denmark Two Flexible Support Ships and three AAW frigates in service.

Absalon Class**Forecast Rationale**

Every so often, the *Warships Forecast* comes across programs that are well conceived, well executed and applicable to a variety of operational requirements yet fail to break into the market outside their initial requirement. Elimination of the OMT bid from the Australian frigate requirement puts the Absalon class in this category.

Overall, the Absalon class must be rated as a highly successful design that should be of great interest to navies that have a wide range of operational commitments but limited funds. Yet, for all their merits

and almost unique spread of capabilities, both the Absalon class and the Iver Huitfeldt subclass of the basic design look likely to be restricted to the five ships now ordered.

Although the formation of Odense Maritime Technology (OMT) does raise the possibility that export efforts will continue, the closure of the parent shipyard means that such export sales remain hypothetical. At this point, the design would probably be licensed to another yard in the now-unlikely event of an order being placed.

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