

# Is KNM *Skjold* the Future of the Littoral Combat

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Her name is Norwegian for “shield.” She always drew attention with her unusual paint scheme and unique design. For a year, the Norwegian navy’s fast patrol boat, KNM *Skjold*, was a familiar sight while operating out of the Naval Amphibious Base, Little Creek, in Virginia Beach, Va. The ship since has returned to her native waters, ending a visit during which scores of senior American naval officers, government officials, and maritime VIPs toured her spaces. Some even were able to get underway with her. The craft is one of many being “test-driven” by the Navy for possible future acquisition.

More evolutionary than revolutionary, the 3-year-old ship is the prototype for six such fast patrol boats (FPBs) to be built in Norway. All incorporate multinational technology. The ship is not an experimental craft because she was designed and built to meet specific requirements. Using a catamaran (twin-hull) design, *Skjold* is a rigid-sidewall surface effect ship (SES) that can sustain 50-plus knots and can operate in waters as

shallow as 3 feet. With its light weight and two lift fans for SES operation, *Skjold* can lift about 70 percent of her weight out of the water, yet keep some “keel” in the water via her two hulls. The ship’s high-speed capability could not be achieved with a traditional hull or catamaran design and without the lift fans. Having a minimum portion of the hull in the water reduces “skin drag,” friction created by the portion of a hull beneath the water’s surface as a ship moves forward (or backward). Reduced skin drag thus allows for higher speeds.

The ship’s main propulsion comes from two Rolls Royce-Allison gas turbines, each producing 8,160 shaft horsepower. Two diesels power the lift fans, and *Skjold* also has two auxiliary diesels and two waterjets.

The ship is designed for littoral and anti-surface warfare. Said the ship’s captain, LCdr. Rune Andersen, “Sea power today is not used for one fleet to fight another. You use it to project power from sea to shore. And in some conflicts, we’ve seen the coastline has been a challenge.” *Skjold*’s

All photos courtesy KNM *Skjold*



# Future Ship?

Chief of Naval Operations, Adm. Vern Clark (center), navigates *Skjold* into the Naval Amphibious Base, Little Creek, harbor with the ship's joystick "helm." Looking on are (left) *Skjold's* navigator, Ltjg. Richard Salomonsen and (right) then-commanding officer, LCdr. Rune Andersen.



ability to operate near those shorelines is a significant contribution from Norway to the NATO Alliance, according to LCdr. Andersen.

While unarmed during its American naval lease, *Skjold* is designed to carry two quad anti-ship-missile launchers; a 76 mm, rapid-fire gun; and a two-round, point-defense, surface-to-air missile launcher.

U.S. Navy interest lies in the ship incorporating several existing technologies into a single,

light, sea-borne platform possessing stealth, speed and a lethal arms suite. While twin-hulled ships and surface-effect technology themselves are not new to the Navy, combining all into one hull holds promise for the littoral combat ship (LCS) concept the Navy is studying. LCSs would supplement deep-draft combatants such as the DD(X) Zumwalt-class destroyer and the CG(X), scheduled to replace Ticonderoga-class Aegis cruisers.

Littoral combat ships are considered critical to the Navy's 21st-century transformation; they also



will be a departure from the steel, single-hulled platforms of today's legacy fleet.

Survivability—because of the strength of the composite material used to build the ship—is another *Skjold* attribute the Navy is studying. According to LCdr. Andersen, “Composite materials used in the ship's construction are the key to the *Skjold* prototype project and to the very concept of this class of littoral combat ship. It is by far the strongest and lightest material around.”

He added, “If you travel fast—like we do—and also in bad weather, you place a certain amount of stress on the vessel. You need a vessel that is very light and able to be lifted up effectively, and still be able to withstand the beating it gets. And composites are a ‘dead’ material: They will not have the cracking, fatigue, or corrosion you find on all kinds of metals.”

Even structural repairs to *Skjold* are relatively simple, the captain pointed out when describing repair work done in the Caribbean. “We've done

repairs—I had the last one done in Puerto Rico, where I had a small dent in the bow. You cut out the piece that is damaged and create a new piece of core material. Then you glue that in and put on the laminate. There's foam in the center, surrounded by ‘cells.’

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“These small cells in the composite material are all enclosed, and this vessel is much lighter than water. So, if you have a ‘fatal’ accident, such

*Skjold* plies through Norwegian waters during early operational testing, during which she had mounted forward an OTO Melara 76 mm, rapid-fire gun. The gun was removed before the ship arrived in the United States for her one-year lease to the U.S. Navy



While the ship incorporates state-of-the-art technology and design, *Skjold's* crew must constantly drill to remain proficient in traditional skills like damage control and firefighting. The ship has a combined crew of 15, made of eight officers and seven enlisted.



as a grounding, where you open up both hulls in all watertight compartments—USS *Cole* times ten—she [*Skjold*] still will float high in the water because she is so much lighter than water. There are different kinds of foam in different places on the ship because we want it to be as light as possible but still strong enough. And there's different laminate outside, with varying thicknesses. All reinforcing components and all the hull plates—everything—are made of composite material,” he explained.

The captain described the composite used as mainly glass-fiber material, with some carbon fiber. It's the way the fibers are laid down and the way they are pressed together that give the material its strength. And, while there are some radar-absorbing areas, most of the ship is radar-reflecting. According to *Skjold's* skipper, it's difficult to absorb a radar signal; it's much easier to reflect it. Only in special situations does a ship

want to absorb it. The ship does have infrared (IR) and radio-energy shielding molded into its composite structure to reduce its radar and IR signature.

How susceptible to fire is the composite? Explained the captain, “The composites we are using are fire-retardant, meaning they will not catch fire, and they also are ‘isolating.’ Normally, when you have a shipboard fire, you attack it from all directions. You try to seal it off, and cool it down so it doesn't spread because—with steel plates—heat will go right through [the plates], and the next compartment will catch fire. That will not happen here. It will not help to start cooling this side if there's a fire on the other side because the heat will not spread [through the composite material]. If you add fuel under pressure and oxygen, for a prolonged period of time, you eventually will generate enough heat to melt it down—then you also could have toxic fumes,” he said.

“For us as operators, there’s a slightly different [damage control] logic—but I feel a little better with these composites than with steel or aluminum. If we have a severe fire, we have at least 15 minutes to do something: either to seal it off and close off the oxygen, or to go in actively with foam or with firefighters. We have AFFF in all four engine rooms. We have additional CO<sub>2</sub> in the gas turbine enclosures and in the galley. Sprinklers are in the spaces where there would be ammunition and pyrotechnics. In the rest of the compartments like this one, firefighters would have to go in.”

State-of-the-art weapons and technology aboard *Skjold* will be supplemented with up-to-date training based on the developing concepts of littoral warfighting, something with which the Norwegian navy is quite familiar. Based upon that experience, plans call for installing a specific weapons package on *Skjold*. LCdr. Andersen emphasized the ship’s main offensive weapons will be surface-to-surface missiles, designed specifically for littoral warfare and, as such, having very high-resolution imaging and passive infrared seekers so they can discriminate targets in an archipelago area, along with a highly accurate navigation system. He adds that this particular missile system is a separate Norwegian navy project and also will be installed on Norway’s new Aegis frigates.

When commenting about the U.S. Navy possibly acquiring *Skjold*-class ships, LCdr. Andersen explained he and his 14-man crew were not

in the United States to “sell” the concept to the Navy. “We—I and the crew—are here in uniform as [Norwegian] navy representatives: We’re part of a navy-to-navy relationship. We don’t ‘sell’ boats.” Nonetheless, he pointed out there has definitely been a lot of enthusiasm and interest in the *Skjold*.

“It is my hope that our presence here has been helpful to the process the U.S. Navy has started toward transformation and that we have offered some new ideas for ship design. We have had a lot of visitors on board, and, hopefully, we have contributed in some positive way to showing a new way of thinking, in design and with the philosophy of manning,” the skipper said.

“If that has contributed in some way to helping the transformation process, that is good. From the Norwegian side, this is our prototype which we commissioned in nineteen ninety-nine. We tested her very thoroughly for one-and-a-half years, with all the scientists running aboard all the time, measuring basically everything. We have done much more thorough testing with this vessel in Norway than what has been done in the U.S.,” he explained.

Is there a *Skjold* in the Navy’s future? Time will tell, but the Norwegian ship’s one-year visit certainly has given U.S. naval leadership some food for thought. ☺

*On Dec. 2, 2002, during a scheduled change-of-command, LCdr. Trigg Noekleby relieved LCdr. Rune Andersen as commanding officer of KNM Skjold. — Ed.*

KNM *Skjold* is shown near New York’s Ellis Island in September 2001. The ship was standing by to assist after the terrorist attacks against the city’s World Trade Center and had just arrived after transiting the Atlantic from Norway.

