> Bora-class guided missile hovercraft Samum

SIDEWALL HOVERCRAFT DEVELOPMENT

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The future of sidewall hovercraft (skeg-type air-cushion vessels) – fast and seaworthy – looks very promising. The key design feature of this hydrodynamic configuration is an air cushion that separates the hull from the water surface combined with maintaining contact with the water surface by means of sidewalls. The latter provide very low resistance to motion of the ship, but significantly reduce air loss from the air cushion area, partially unload the cushion, increase course-keeping stability and ship steering performance.

In the USSR, several design organizations worked on sidewall hovercraft, built several large-scale self-propelled models and passenger ships. The Almaz Central Marine Design Bureau developed a combatant sidewall hovercraft – Bora-class small missile ship (SMS).

Full-scale development began in 1976 with extensive research efforts. Designers had to address a number of challenging technical problems, carry out a series of testing of towed and self-propelled models on tight schedule. Testing the 50-t Ikar-2 self-propelled model substantiated the surprisingly high sea-keeping capacities of sidewall hovercraft.

After a comprehensive analysis of the pros and cons of the different propulsion unit options, a CODOG-CODAG diesel/gas-turbine plant was selected: diesels were used for cruising and gas turbines jointly with diesel engines – for full-speed running. For high-speed running, down-take steerable pods were used with propellers driven by gas turbines.

The set of out-of-the-box technical solutions adopted in the detailed design phase resulted in a unique SMS unrivalled in global shipbuilding industry. The overall layout and dimensions of sidewalls allow the craft to move safely with clearance at sea state up to 5. With blowers on, the air cushion enables achieving a speed of more than 50 knots. In addition, intermediate speed modes with reduced air supply to the air cushion zone are available. This is called «multimode motion capability» – a property no other ship in the world can boast.

Today the level of shipbuilding technologies and accessory equipment in our country makes it possible to exploit the success in the development of combat sidewall hovercraft for the Russian Navy. Retaining the basic technical solutions fine-tuned on Bora-class SMS (hull lines, the principle of air delivery to and distribution in the air-cushion area, flexible skirt retraction scheme, diesel-gas turbine power plant), it is feasible to develop an upgraded version of the project offering enhanced operational performance and extended range of use.

Relying on the operating experience with Bora-class ships, Almaz has considered alternative propulsion systems and the use of water-jet propulsors in more detail, which drastically simplifies the propulsion system and motion control in all modes. Abandoning the down-take steerable pods frees the afterbody to accommodate a helipad and a sliding hangar, while the use of unmanned aerial vehicles for strike missions increases the mission effectiveness and safety for the ship.

Owing to its high speed combined with outstanding steering performance, the ship can effectively take part in operations related to the preparation and fire support for amphibious landings using its multiple rocket launchers.

A design feature of a sidewall hovercraft hull is two horizontal keels along the whole hull length, which it can rest on in a coastal strip or shallow water as on fixed supports. Moving on an air cushion, the ship can negotiate offshore shoals and approach unequipped shores up to a depth of 1 m, where, going aground on its keels, it can carry out cargo handling, rescue or special operations.

Thus, using a fast and seaworthy universal platform, it is possible to develop strike missile ships, amphibious fire support ships, rapid response rescue ships, amphibious ships, special and small ships of different purposes.

The R&D groundwork laid by Almaz gives reason for a more comprehensive approach to the development of sidewall hovercraft. Design studies of high-speed sidewall hovercraft based on the testing results for the Strepet self-propelled model have demonstrated the feasibility to develop ships with a displacement of about 1,000 t and speeds of over 100 knots. The speed performance and combat capabilities of such ships become commensurate with the characteristics of wing-in-ground (WIG) effect vehicles, the attacks of which cannot be detected by satellites and have a very high mission accomplishment probability. In this context, it should be noted that sidewall hovercraft are easier, cheaper and more reliable in operation than WIG vehicles.

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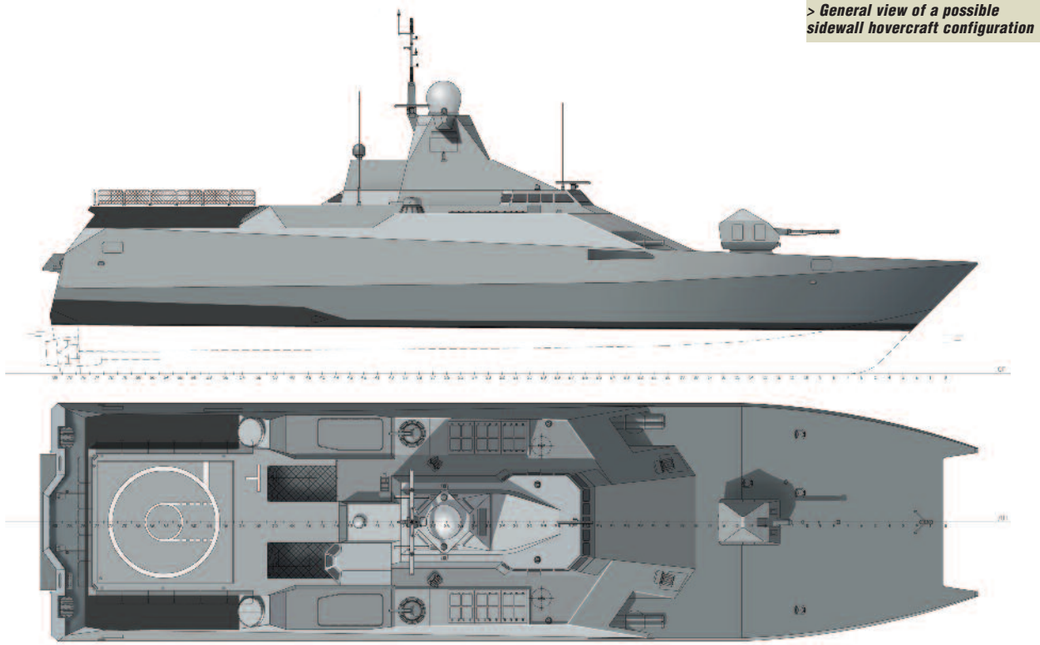

> General view of a possible sidewall hovercraft configuration

> Strepet self-propelled model

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