DEVELOPMENT OF VERSATILE TRANSPORT SHIPS AND OCEAN ENGINEERING FACILITIES

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The paper presents a cycle of integrated works performed by scientists and specialists from a number of organisations and aimed at designing of competitive ships and providing of Ukrainian shipyards with the advanced technologies for their construction.

Keywords: *welded structures, shipbuilding, transport ships, ocean engineering facilities, projects, advanced welding technologies*

Shipbuilding of Ukraine is functioning under conditions of a shortage of innovation financial support. Profitability of enterprises in a competitive environment can be achieved due to a high level of practicability and productivity of the applied technical facilities, providing the required quality of products. Therefore, investment attractiveness of the domestic shipbuilding can be ensured through comprehensive development of the designing methods and technologies, as well as dramatic reduction of the terms of construction of ships.

The present work nominated by the Admiral S.O. Makarov National Shipbuilding University for the 2011 State Prize in Science and Technology was dedicated to addressing this complex national scientific-and-technical problem.

Participating in the work were specialists of the Admiral S.O. Makarov National Shipbuilding University (Nikolaev), companies «Marine Engineering Bureau» (Odessa) and «Aker Yards Design Ukraine» (Nikolaev), E.O. Paton Electric Welding Institute (Kiev), Classification Society «The Shipping Register of Ukraine» (Kiev) and OJSC «Vadan Yards Ocean» (Nikolaev).

The efforts of the team were focused on two areas — development of projects of the efficient and reliable competitive ships, and development of the advanced technologies and arrangement of construction of the ships at the Ukrainian shipyards. Research in the field of development, design, technological preparation and production technology, management of construction of ships and marine engineering facilities resulted in finding of a solution to the complex scientific-and-technical problem of building of the high-efficiency versatile transport ships and ocean engineering facilities for the transportation industry, exploration and extraction of sea resources of Ukraine.

The main results of the work* are as follows:

- development of scientific principles of modern marine engineering and their implementation on a base of integrated approach to development, design and construction of ships, as well as building of the project platforms providing direct communication with databases of different shipyards and on-line solving of issues related to development, design, construction and fitting-out of ships with these shipyards;
- working out and implementation of a new development and design methodology based on the theories elaborated by the authors for ensuring technical sta-

Ship «Ukrainets» of project 005RSD03

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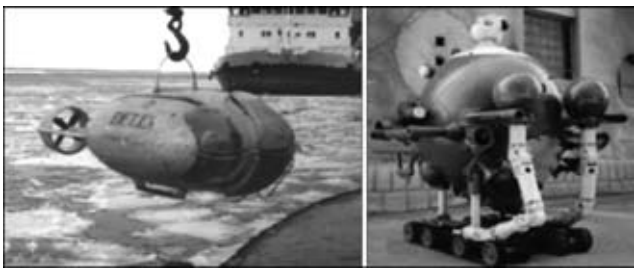
Train-ferry of project 002CA01



Appearances of underwater vehicles Delta and MTK-200

bility, reliability and efficiency of the ships, evaluation of their price and maritime safety characteristics, including further application of the programs aimed at supporting stages of lifetimes of the ships by using CALS technologies and PLM solutions;

• elaboration of theoretical fundamentals of designing, manufacturing and application of high-efficiency ocean engineering facilities for exploration and development of the sea shelf, monitoring of the technical state of off-shore and port engineering structures, and estimation of the level of safety of waterways;

• development and mastering of advanced metalworking and assembly-welding technologies and equipment for construction of ships, which will provide their competitiveness in the world market, and, in particular, application of the methods of air-plasma cutting with an addition of water to the plasma and underwater plasma cutting of metal, assembly and welding of large-size sections without the use of beds, mechanised and automatic flux-cored and solid wire welding in a mixture of gases using ceramic backings for the back weld formation, hybrid laser-arc and laser-plasma welding and materials treatment technologies, theoretical principles and technologies for upgrading of equipment, and thermal cutting machines in particular, manufacture of laser-arc and laser-plasma equipment, quasi-resonant-mode power supplies, and specialised equipment for metal treatment in hard-facing of marine shafts;

• elaboration of theoretical bases and development of mechanisms and devices for ensuring a high level of environmental safety in construction and operation of ships, and human life protection on and off shore;

• formation of a base of national standards on classification and building of practically all types of ships (from small coastal and river service to sea-going ships);

• development of computerised integrated plants and their application in the Ukrainian shipbuilding industry, and, in particular, development of methods and new software for optimisation management of domestic shipyards, i.e. management of operations on timely deliveries of materials and equipment from domestic and foreign manufacturers, sequences of operations on assembly and welding of sections, units and ship as a whole, this providing elimination of long-lasting building activities as a main obstacle in a way to entering the world market.

This integrated solution of the critical national problem has allowed 130 ships to be designed and constructed at the Ukrainian and foreign shipyards since 2002. 10 ships are now fitted out, and 24 ships are at building berths.

Since 2002 and up to now the «Ocean» (Kherson), Kiliysky and «Yuzhny Sevastopol» shipyards have built a series of ships by orders of Damen Shipyards Hoogezand and other Dutch companies, Briese Schiffahr (Germany), STX Norway Offshore AS and other Norwegian companies, STX Pan Ocean (Korea), some Ukrainian companies, such as Joint Stock Shipping Company «Ukrrechflot», «Black Sea Shipping Management Co. Ltd.», «NIBULON Ltd.», State Enterprise «Ukrvodshlyakh» etc., as well as 10 Russian companies.

The world level of the works performed is confirmed by their acknowledgement by foreign companies. Versatile transport ships of projects 006RSD05, RSD17 and RSD19 have been included by RINA, the Royal Institution of Naval Architects, on the list of «Significant Ships». As recognized by UNESCO, owing to the ocean engineering facilities built, Ukraine has ranked on a par with the countries — world leaders in the field of high underwater technologies.