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# SUDOSTROENIE 1 2021

## /SHIPBUILDING/

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#### AT SHIPBUILDING YARDS

##### CIVIL SHIPBUILDING

***E. K. Bakulin. Modernization of tankers, Pr. 414.***

This article describes alternative technical solutions to conventional technologies for imbedding of inner hulls and bottoms in tankers in order to meet requirement stipulated in clause 108 c of "Safety regulations for inland water transport". This procedure lies in coating of ship steel hull with protective layer of 200-300 mm thickness made from natural binding agents (cement, etc.) and having lesser specific density than water. This solution is cost-effective and feasible.

*Keywords:* tanker, ecology, double bottom, alternative, inner bottom, feature of novelty.

***S. O. Baryshnikov, T. O. Karklina, V. B. Chistov. Repair and reliability of river service ships.***

This article reviews reliability of ship hull after repair. It is stated, that health of ship hull under certain operational conditions can be defined any time with use of interdependencies described in the article.

*Keywords:* technical state, reliability, repair, ship hull, strength, safety.

##### NAVAL SHIPBUILDING

***Yu. F. Podoplekin, A. G. Yureskul, A. N. Popadyin, V. V. Kamanin. Modern trends in construction of competitive military equipment.***

The article justifies methods for construction of modelling aids for various military equipment at such stages as development, check-out, operational testing and series production. Concept of technology for check-out of advanced samples of military equipment at electronic "test facilities" has been revealed. The article proves that this system is perfect tool for design, trials and lifetime maintenance of performance of control systems of special equipment. Another key advantage is significant reduction and occasional full replacement of labour-intensive and expensive field trials.

*Keywords:* experimental check-out technology, semi-realistic simulation, on board control system, electronic "test facility".

***I. Ya. Baskakov. Harbor minesweeper, P. 1258 (code "Korund").***

The author narrates about design and construction of pilot harbour minesweeper "Korund", Pr. 1258 and its further trials and commissioning to Navy.

History: history of shipbuilding and fleet, mine countermeasures ship, harbour minesweeper.

***A. V. Platonov. Equipping light cruisers (Pr. 68-bis) with missile weapons.***

This article reviews available options for equipping Pr. 68-bis light cruisers ("Dzerzhinsky" light cruiser) with missile weapons and air defence systems in initial period of the Cold war.

*Keywords:* light cruiser, history of shipbuilding and fleet, shipboard missile systems, air defence system.

## **FOREIGN SHIPBUILDING**

### ***V. N. Polovinkin, A. B. Fomichev. Modern Naval Strategy of the USA.***

Analysis of the new US maritime strategy called Advantage at sea: Preventing with Integrated all-domain naval power, released on December 17, 2020.

*Keywords:* USA, strategy, Advantage at sea, naval power.

## **SHIPBUILDING ORGANIZATION AND TECHNOLOGIES**

### ***V. V. Lisitsky, N. I. Gerasimov, A. V. Krasilnikov, I. V. Grachev, A. O. Mikhailov, N. V. Rozov, A. S. Bul. General trends to increase efficiency of mechanical production facilities in modern shipbuilding industry.***

One of top-priority trends in development of shipbuilding and shiprepair industry is broad implementation of modular installation methods for equipment and large-scale equipment in particular. To implement such methods, one must develop principal technologies for construction, assembly and installation of large assembly units, augment existing shipyards with goliath cranes, utilize end-to-end digital technologies in control and measurement operations and technical expertise of TP feasibility and cost-efficiency.

*Keywords:* mechanical production facilities, digital technologies, expertise, feasibility, cost-efficiency.

### ***K. N. Kulikov, I. A. Parfentiev, A. N. Patrakeev. Measurement and calculations of gaps between mechanisms and foundations in modern shipbuilding.***

A method for determining gaps in places that are not accessible to measuring instruments used in shipbuilding is proposed. The device and the principle of operation of an electronic probe and an electronic gap meter are described, which allow measuring gaps with high accuracy even in hard-to-reach places. A program for calculating the dimensions of a rectangular wedge lining based on data obtained using electronic measuring devices is presented.

*Keywords:* mechanisms, foundations, foundations, gaps, measurement.

### ***D. P. Eliseev, S. N. Skoblikov, D. N. Anfimov. Development and research of math model of three-phase voltage converter for shipboard equipment.***

To ensure stable quality of power supply for shipboard equipment in all operation modes and conditions, JSC "Concern "Elektropribor" developed static DC-AC converter and its math model for subsequent performance enhancement.

Specified analysis of math model rendered in MATLAB Simulink software revealed, that static voltage converter may have output voltage instability in case of the following destabilizing factors: load application/shedding and discontinuous alteration of input parameters. Such instability may lead to shut down or failure of sensitive shipboard equipment. Experimental researches confirmed the conclusions obtained by math modelling.

Further analysis of the above model revealed, that output voltage instability is mainly caused by insufficient PWM alteration rate. This effect was removed by using proportional integral-differentiating regulator in feedback circuit of SVC, which can be implemented with use of existing hardware components and requires no alterations of SVC design.

*Keywords:* static voltage converter, math model, control system, MATLAB Simulink, verification.

### ***A. P. Voloschenko, P. P. Pivnev. Echo sounder for autonomous unmanned submersible vehicles.***

This article reviews issues related to construction of multi-purpose echo sounder for unmanned submersible vehicles. The authors hereby represent structural diagram of echo sounder and interconnection of its main units. Typical features of echo sounder being developed for autonomous submersible vehicles have been provided.

*Keywords:* echo sounder, unmanned submersible vehicles, PWM-signal, navigation, communication.

**S. G. Chorniy, P. A. Erofeev, V. A. Dorovskoy, V. Yu. Budnik. Development of identification algorithms for sea transport signals and objects.**

The authors hereby narrate about surveys related to development of information technologies to identify objects in acoustic range. To achieve this goal one had to develop information model describing information space, structural connections and properties of data processing operators comprising acoustic samples identification system.

*Keywords:* procedure, submersible vehicle, disturbance, acoustic, signal.

**S. I. Ilmenkov. Approximate calculation method for angular acoustic scattering by non-analytic objects with use of Green functions.**

This article reviews application of Green functions to achieve approximate solutions of boundary problems for objects with non-analytic shaped surfaces composed of analytical surfaces (infinity cylinder, sphere, prolate spheroid) variously mated between each other. The initial ratio is mathematical formulation of Helmholtz-Huygens principle (Kirchhoff integral) and representation of Green functions in form of eigenfunction decomposition of coordinate systems in relation to considered surface fragments. Errors of such approach have been analysed. Angular scattering values have been calculated and analyzed for objects of various shape, types of boundary conditions, wave dimensions and layout angles.

*Keywords:* Kirchhoff integral, Green functions, angular characteristics.

**V. V. Yarovoy. Delivery-acceptance trials of lead destroyer "Gnevny", Pr. 7.**

The author narrates about design, construction and conduction of delivery acceptance trials of lead destroyer "Gnevny", Pr. 7. The article indicates results of trials and conclusions made by State Committee upon commissioning to Navy.

*Keywords:* history of shipbuilding and fleet, delivery-acceptance trials, state trials, destroyer.

**V. V. Gorelov. Development of shipbuilding in USSR in 1920—1930 ss.**

This article generally estimates development of Soviet Shipbuilding Industry since mid-1920s till the beginning of the Great Patriotic War. The author rendered comparative analysis on application of new technologies and production procedures both in USSR and European states. Main stages of technical retooling have been analyzed. First steps in construction of ice-breakers have been reviewed.

*Keywords:* shipbuilding, shipbuilding technologies, welding facilities, ice-breakers.