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# SUDOSTROENIE 6 2019

## /SHIPBUILDING/

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### AT SHIPBUILDING YARDS

#### CIVIL SHIPBUILDING

**G. V. Egorov, A. S. Solovyov, N. V. Avtutov. «Alexander Sannikov» and «Andrei Vilkitsky» – two multi-purpose diesel-electric ice-breakers, P. IBSV01.**

The article justifies the necessity for construction of multi-purpose ice-breaking vessels to ensure continuous operation in the area of «Vorota Arktiki» terminal. The author indicates main design and construction stages of commissioned heavy-duty diesel-electric ice-breakers – 22 mW capacity, ice-class 8 and gives special priority to lines and propulsion system. The article shows outcome of trials fully complying with the Customer's requirements both to performance and functionality, as well as high manoeuvring and ice-breaking capabilities of the vessel.

*Keywords:* Northern sea route, ice-breakers, design, lines, trials, safety, innovation.

### SHIP POWER PLANTS

**Yu. N. Myasnikov. Analysis and advancement of calculation methods for projected reliability of shipboard electrical and mechanical systems.**

So far, calculation of technical objects reliability is based on theory of probability. The author hereby shows weaknesses of statistical method application towards reliability surveys of technical systems and devices and offers his own method for estimation of technical state of equipment and its failure patterns based on routine calculations of designed reliability of ship power plants.

*Keywords:* reliability, technical state, statistical method, engineering estimation, equipment failure, diagnostics.

### SHIPBUILDING ORGANIZATION AND TECHNOLOGY

**V. S. Mikhailov, A. V. Savinov, D. L. Desnev, V. E. Medvedeva. Implementation of digital technologies in metrological support of production facilities at JSC PA «Sevmash».**

Precision of parts fabrication and assembly is directly related to metrological support of production facilities. Usage of digital 3D-measuring systems capable to issue 3D-data on object geometry rapidly and precisely allows to significantly advance production, assembly and installation procedures of ship hull structures. The author exemplifies usage of modern 3D-measuring equipment at JSC PA «Sevmash».

*Keywords:* precision, tachometer, measurements, node circle, bed, foundation.

**N. V. Petrov. Digital technologies for installation of shipboard equipment and pipelines: application prospects.**

The author hereby reviews prospects for application of industrial technologies for assembly and installation of shipboard equipment and pipelines using interchangeability method and based of VR, AR and digital twins technologies.

*Keywords:* shipboard equipment, pipelines, interchangeability, digital technologies.

**E. D. Averina, A. I. Vlasov, A. A. Moiseyev. JSC PA «Sevmash» – application experience of device based on measuring unit Ф0303.5 for checking of ship hull protection rate against electric corrosion.**

The article reviews occurrence reasons and behaviour features of electric corrosion of ships during outfitting and repair afloat. The author analyses recommended means for check hull protection rate against corrosion and exemplifies application experience of modern microprocessor-based checking device. It has been proposed to use the device based on measuring unit Ф0303.5.

*Keywords:* electric corrosion, ship hull, measuring units.

## **ECONOMY AND FINANCE**

**G. R. Neiman, V. V. Potriakhaev. Planning labor costs of repair of ships – theory and practice.**

This article is devoted to issues related to definition of labor intensity for repair of ships and vessels as part of advanced production planning at dockyard as well as estimation and finalization of repair cost with the customer. The author highlights common practice of «Nerpa» dockyard in solving of above-mentioned issues.

*Keywords:* labor intensity, ship repair, production planning, cost.

**O. A. Chepelenko, V. V. Potriakhaev, A. N. Grechaniuk. About need of carrying out technical and economic examination of calculation of labor cost and cost of building of the ship.**

In accordance with requirements of normative and technical documents, the design company must render calculations of labor intensity and cost of construction at ship design stage. These calculations will constitute the basis of contract price for lead ship construction. Incorrect estimation of the price may impact or even wreck the execution of State Defence Orders. The article offers to discuss the necessity to involve specialized companies to check estimations of labor intensity and construction costs performed at ship design stage.

*Keywords:* labor intensity, cost, shipbuilding, technical-economic expertise, contract price.

**V. M. Charupa. Technical and economic review of pricing for subcontractors' supplies as one of constraining factors of price increase.**

Share of costs for purchase of size and expensive subcontractors' equipment in the cost price of ship construction may amount to 50–60%. In this regard, monitoring of validity of prices for such equipment becomes a matter of special interest. As one of the effective monitoring means, it is proposed to review the fixed prices for the most expensive equipment by agencies of competence approved by the Ministry of Trade and Industry of Russia. At this, a legal status of these reviews should be governed by a legal act issued by federal executive authorities.

*Keywords:* shipbuilding, expertise, contractor deliveries, price calculation, results objectivity.

## **FLEET EXPLOITATION ISSUES**

**V. P. Shegolikhin. Towards reduction of ship hull vibration rate.**

This article reviews options to reduce ship hull vibration rate using math model which describes ship's vibroacoustic state depending on motion parameters and operation of ship power plant.

It has been noted, that practical solution of the assigned task requires a ship to be equipped with onboard measurement and information system (MIS) composed of set of vibration converters installed in checkpoints of ship hull as well as measuring, analysing, processing and registering devices. Also, to receive current parameter values, MIS must be interfaced with shipboard equipment control system.

Usage of such math model as part of MIS software shall allow to decrease ship hull vibration rate significantly.

*Keywords:* hull vibration, math model, motion and ship power plant parameters, onboard measurement and information system, checkpoint, spectral component.

**V. I. Lyubimov, D. S. Mizgirev. On building the environmentally safe vessels.**

This article has been devoted to life journey and creative activities of professor A.S. Kurnikov, famous scientist, honoured worker of science and Doctor of technical science of the Russian Federation. The author also reviews topical issues on processing and disposal of various shipboard wastes and construction of environmentally safe vessels.

*Keywords:* environmentally safe vessel, complex waste processing vessels, activated oxidizing technologies, drinking water preparation systems, ballast water treatment systems, fuel preparation, fuel and exhaust gas treatment systems.

## **SHIPBUILDING MATERIALS**

**I. V. Grachev, A. A. Iva, S. A. Stavrov, O. E. Fedorova. «EPM» material has undergone trials and recommended for use on ships and vessels**

This article reviews works rendered by JSC SSTC to achieve approval of RMRS for new two-component polymeric material «EPM» of Russia origin developed in frames of import replacement program and implementation of technology for installation of shipboard machinery, equipment, shaft lines and devices which significantly decreases labor duration intensity and cost, but increases production quality.

*Keywords:* technology, installation, polymeric materials, shipboard machinery, equipment, shaft lines.

**A. G. Zinyagin. Plate for shipbuilding production at JSC «VMZ» facilities.**

The possibilities of JSM OMK for the production of plate for shipbuilding industry at the facilities of the metallurgical complex mill-5000 (MKS-5000) located at the production site of Vyksa Metallurgical Plant JSC were considered. An example of obtaining high mechanical properties at a rolled product of 50 mm thick is given.

*Keywords:* Mill-5000, plates, controlled rolling, microstructure, impact strength.

## **INFORMATION SECTION**

**A. N. Khaustov. Development strategy for shipbuilding industry till 2035 (65). V. S. Nikitin, A. S. Bobretsov. Director from the golden age of Russian shipbuilding industry (67). V. N. Polovinkin. Krylov Shipbuilding Research Institute – one hundred twenty five Anniversary (69). Foreign information (70). List of scientific specializations of «Sudostroenie» magazine has been extended (51). International historical and education conference «Fate of the Russian fleet: ships and people» (58)**

## **HISTORY OF SHIPBUILDING AND FLEET**

**R. V. Kondratenko. Casemated boats «Nikopol» and «Sistovo».**

The author hereby traces service life of casemated boats «Nikopol» and «Sistovo» captured from Turkey in course of Russian-Turkish war of 1877–1878. The article indicates boat specifications and general layout diagrams.

*Keywords:* history of fleet, Russian-Turkish war of 1877–1878, casemated boat, armor-plated boat, monitor.

**S. I. Ovsyannikov. Conversion of P.30-bis destroyers.**

In 1962, design agencies of Shipbuilding Industry, were developing projects on retooling of P.30-bis destroyers into civil vessels, especially for the fishing industry of USSR, which, however, had never been performed. The article contains compiled information on such exotic developments from the museum of JSC «Severnoe PDB».

*Keywords:* history of shipbuilding, Severnoye project-design bureau, ship design, destroyer, project 30-bis.