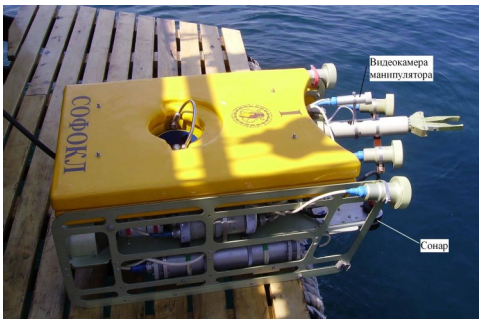
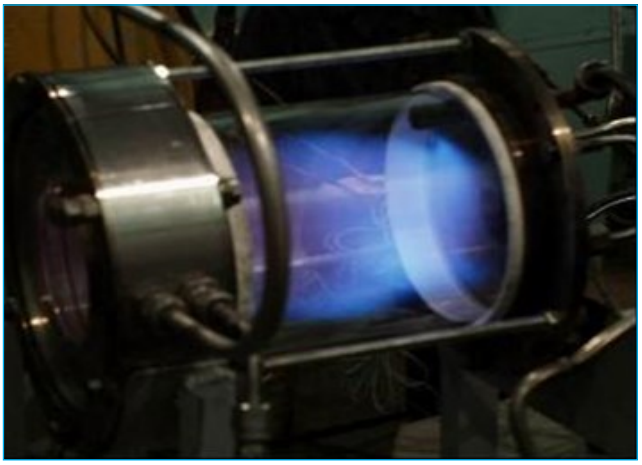
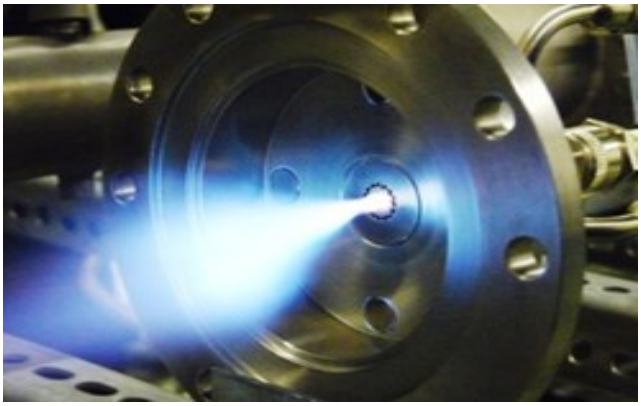
MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
ADMIRAL MAKAROV NATIONAL UNIVERSITY OF SHIPBUILDING

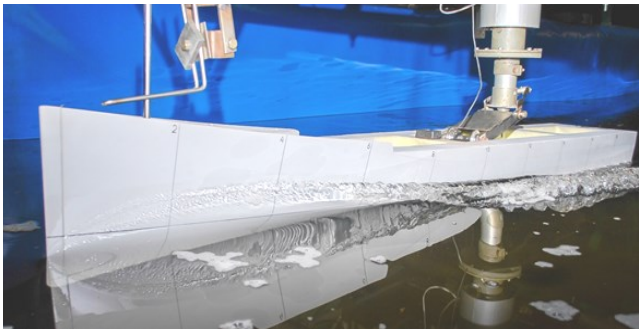


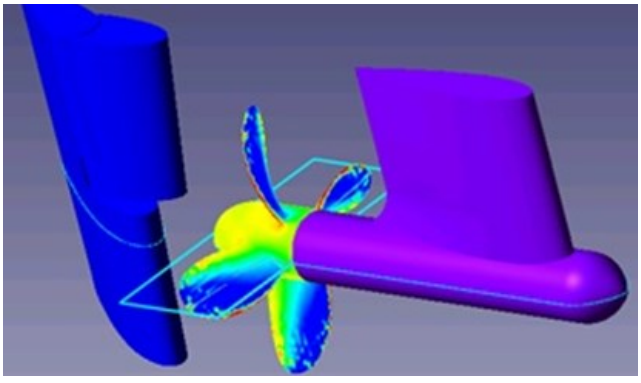


CATALOG OF THE SCIENTIFIC PRODUCT

Advertising - information issue





MYKOLAIV-2023

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
Admiral Makarov National University of Shipbuilding

Advertising –information issue

CATALOG OF THE SCIENTIFIC PRODUCT

ADMIRAL MAKAROV NATIONAL UNIVERSITY OF SHIPBUILDING

Mykolaiv ● NUS ● 2023

CONTENT

Dear readers!

The advertising-information issue of Admiral Makarov National University of Shipbuilding scientific achievements is proposed to your attention. There are the results of the applied scientific developments, which have been completed by our scientists during last years.

The aim of the issue is to inform producers and businessmen of Ukraine concerning the valued at the market and the science intensive developments of our University, which have been implemented into the economical activity of the state and have the great perspective for the further development after the necessary financial support granting.

The plan of the University is to make this issue as periodic issue, where the latest innovation developments of the University will be introduced for the operative familiarization of producers and businessmen.

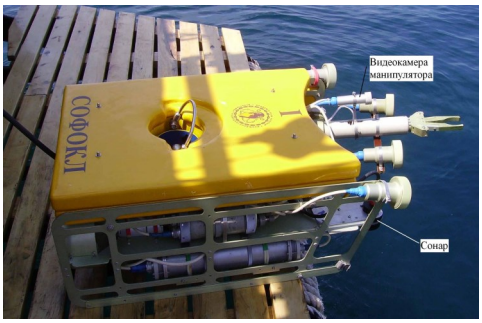
We will accept with thanks your comments concerning the content of the introduced developments and the advices and the propositions concerning the themes of the further researches, which are actual for the state industry. I hope that the information of this issue will contribute the implementation of the new ideas, technologies, devices and materials at your enterprises.

Yours faithfully,
Rector of Admiral Makarov
National University of Shipbuilding

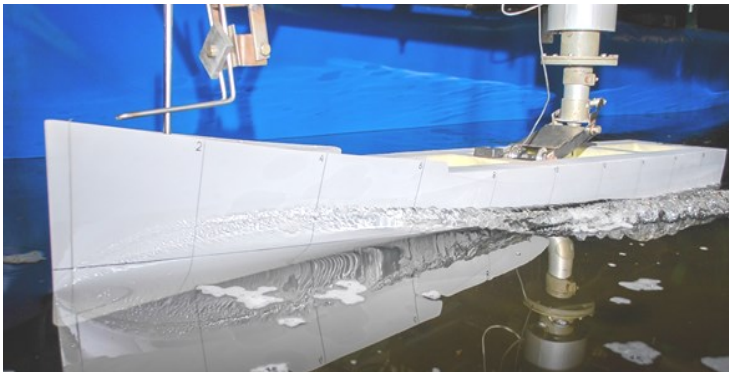
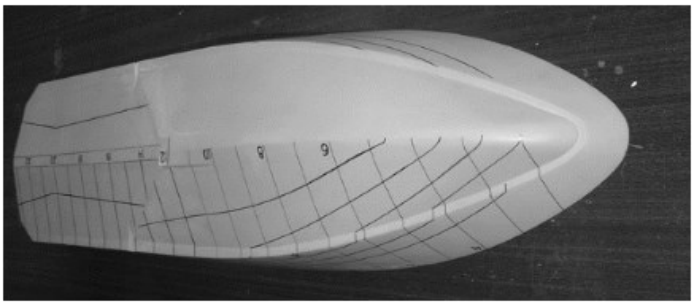
E. Trushliakov

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
ADMIRAL MAKAROV NATIONAL UNIVERSITY OF SHIPBUILDING





TECHNOLOGIES AND DEVELOPMENTS IN SHIPBUILDING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PARAMETRIC MODEL OF THE SHIP HULL WITH SMALL SQUARE OF THE WATERLINE

Purpose and sphere of the development

The generation of SWATH ship hull surface with the necessary characteristics and the receiving of the theoretical drawing. It is used at the calculations of the initial stability and the large angle stability, the propulsive quality of ship by use of CFD programms, the strength at the analysis by use of the final elements method, the researched of the different parameters of the hull form effect on the resistance with the aim of the hydro dynamic optimization execution

Essence and main characteristics of the development

The base of the proposed model are the shape elements lines (the cross section, the diametral line i.e.) are described by the system of equalizations. The hull is the result of the use of one of the methods for the creating of the surface: rotation, extruding, lofting. Each shape elements line is described by the mathematical relations, which connect the main ship dimensions with the coordinates of shape elements lines points. The parametric model is realized in one of CAD system for parametric modelling. The way from the parametric model to the real sizes of SWATH ship hull is executed by use of the geometric parameters introduction: sizes of the lower hulls, struts, sponsons, cross structure box, the parameter of the hull cross section shape, parameters of the lower hull and strut nose shape, lower hull and strut tail shape

Main advantages of the development

Main advantages of the development The hulls of the new ship designs and the recovering of the hulls of the designed ships-prototypes can be generated with the minimal set of the characteristics and during minimal time period

State of the development ready

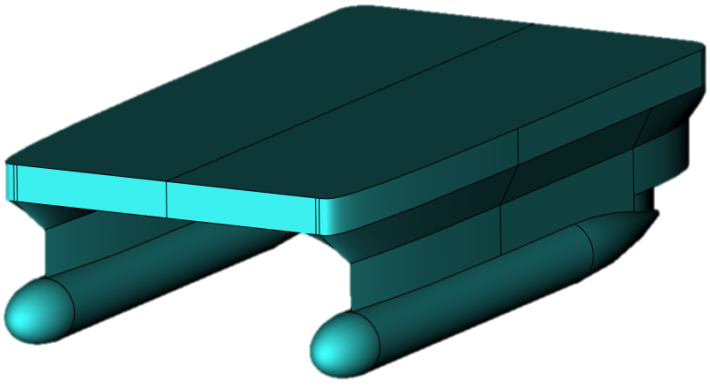
It has been used at the creation of the conceptual designs of the research, patrol, pilot SWATH ships

Demand at the market

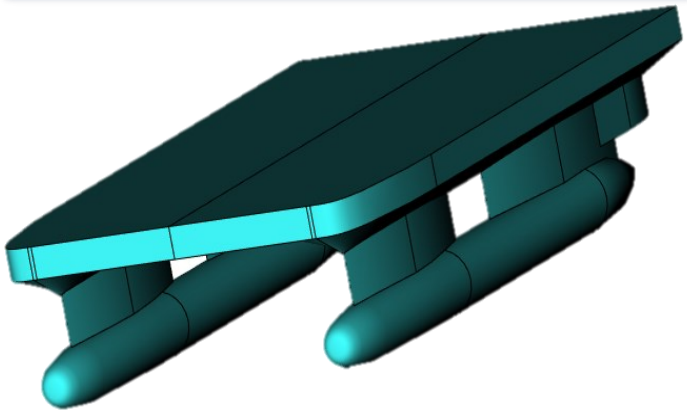
There is the necessity of the different type of SWATH ship developments at the modern market of the sea trade

State of the intellectual property protection, number of the scientific publications

The development is in more than 10 scientific publications



Parametric model of SWATH ship hull with one strut



Parametric model of SWATH ship hull with two struts

COMPUTERIZED UNIT FOR THE RESEARCH OF THE BUOYANCY, STABILITY, FLOODABILITY AND ROLLING OF THE SHIP IN STILL WATER

Purpose and sphere of the development use

It is used for the study of the properties of the buoyancy, stability and floodability and rolling of the ship in the nautical schools, marine colleges, marine academies and marine and shipbuilding universities

Essence and main characteristics of the development

There are three small research pools, in which the ship models are situated with the equipment for modelling of the properties of buoyancy, initial stability, stability at big angles of list, floodability and ships navigability and the computerized definition of their characteristics

Main advantages of the development

The analogs of this unit are not . It allows to execute 15 laboratory works on all points of the ship statics, which support the quick and stable familiarization of knowledge which is necessary for the efficient practical activity of the shipbuilding engineers and the command positions at river and sea ships

State of the intellectual property protection, number of the scientific publications

Our University has the patent of Ukraine № 132596 for the unit, the instruction manual for the use of the unit in Ukrainian , English and Russian languages

State of the development ready

Our University has the drawing and the equipment for the production of the computerized unit

Demand at the market

6 samples of the unit as the small research pools with the ships models and the necessary equipment have been bought by the educational enterprises of Russia, Iran and PRC. The educational enterprises of Ukraine, Georgia and one educational enterprise of PRC has the intention to buy the unit

Content of the laboratory works

LW № 1. Definition of the ship draft parameters
LW № 2. Definition of the characteristics of the deep volume
LW № 3. Research of the balance conditions
LW № 4. Change of the draft and the coordinates of the buoyancy centre at the loading or the discharging of small and large load
LW № 5. Experimental test of the ship stability
LW № 6. Research of the increased load effect
LW № 7. Research of the liquid load effect
LW № 8. Research of the load move
LW № 9. Definition of the gravity force and the coordinates of the ship gravity force centre
LW № 10. Research of the effect of the loading on the ship draft and stability
LW №11. Experimental definition of the static stability diagram
LW № 12. Definition of the buoyancy and stability of the damaged ship

CONCEPTUAL PROJECT OF THE SHIP FOR THE SECURITY OF THE TERRITORIAL SEA

Purpose and sphere of the development use

It is used for the further development at the stages of the advanced and the work design and the building of the boats of the security of the territorial sea (the coastal line with width of 12 miles)

Essence and main characteristics of the development

The project (70 t, 45 knots) has been designed by use of the program of the optimization conceptual design of the boat for the security of the territorial sea in accordance with the complex criterion of efficiency and reliability of this sea security in its weather conditions and in terms of the cooperation with the possible disturbers by use of the modern radar equipment and sometimes some type of weapon

Main advantages of the development

The optimization project solution has been received for the redan boat with free ventilated behind redan area. It was established that the appearance of the ventilation area behind redan reduces the resistance of the water to the boat movement in still water and improves very much the boat navigability characteristics on heavy sea. At the optimal speeds of the boat movement she becomes the alternative to the well-known Russian boat of the coast guard «Mirazh» with some controlled interceptors on the bottom

State of the intellectual property protection, number of the scientific publications

The conceptual project is the result of the execution of the state budget scientific and research work №0115U000305

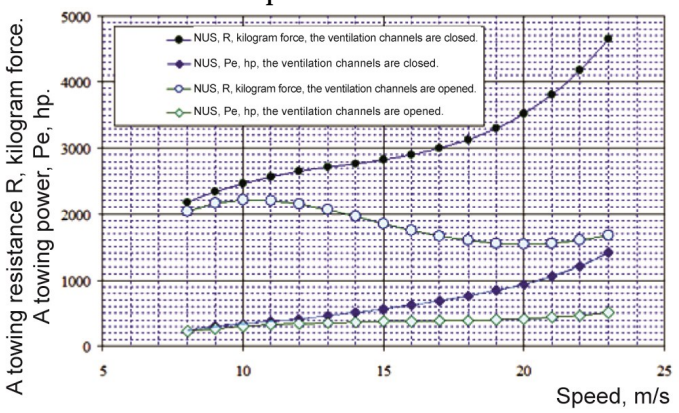
Demand at the market

The project which is an analog to the received project has been realized during the building of the boat for the security of the president of Ukraine, the project M-1100. It was built by Feodosiya shipbuilding enterprise SPO «MORE»

State of the development ready

The conceptual project has been received by use of the computer program. The first version of its has been protected as the result of the thesis research

Experiment results

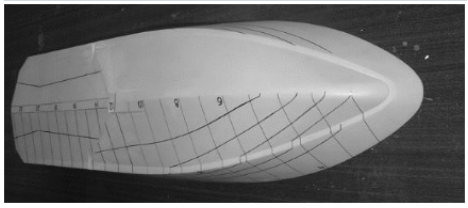


Graphs of the resistance at the closed and opened channels of the ventilation of the specified area

The result is the increase of the resistance in 2,6

Experiments at the research pool of NUS

The unicity of the experiment is the change of the hull form at the test



Wind cavern on the bottom

Real tests of the boat at SPO «MORE»

The boat movements : the semi-submerged screws of Arneson drive

The boat during the test

Speed at the test is 45 knots.

The prediction of the speed is 44,5 knots

CONCEPTUAL PROJECT OF THE COAST GUARD SHIP FOR THE SECURITY OF THE SEA ECONOMICAL ZONE

Purpose and sphere of the development use

The conceptual project is used for further development at the stages of the advanced and work projecting and the ships building of the sea economical zones security

Essence and main characteristics of the development

The project (578 t, 34 knots) has been designed by use of the program of the optimization conceptual design of the coast guard ship of the sea economical zone in accordance with the complex criterion of the efficiency and the reliability of the protection of this zone in its weather conditions and in the terms of the cooperation with the possible disturbers by use of the modern radar equipment and sometimes some type of weapon

Main theoretical result of the conceptual projecting of the coast guard ships for the needs of Ukraine

The reliable coast guard can be provided by the compact, fast and nautical carriages of the efficient devices of the neutralization of the disturbers of the sea border territory

Main advantages of the development

The optimization project solution has been received for the ship of the type Exe-Bow, which is used for the protection of the sea economical zone of Ukraine, by use of the computer modelling of the cooperation of the ship and the possible disturbers. The test of this solution has been executed at the research pool of our university. It has been showed that the ship of the type Exe-Bow has better characteristics of the propulsive quality of ship and seaworthy than the ship DeepV

State of the development ready

The conceptual project has been received by use the computer program. The first version of it has been protected as the result of the thesis research

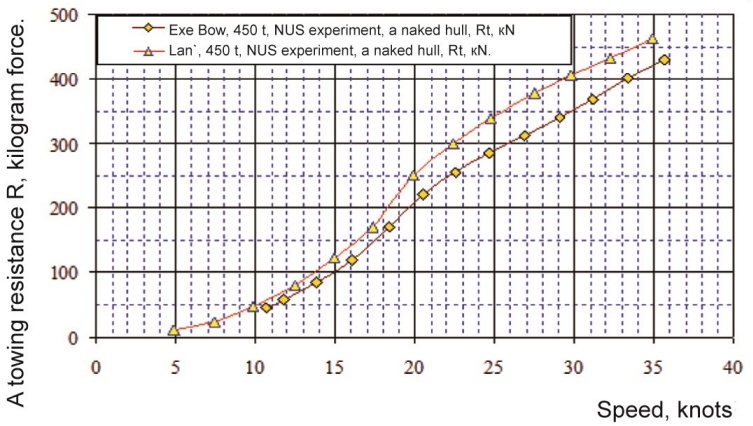
Demand at the market

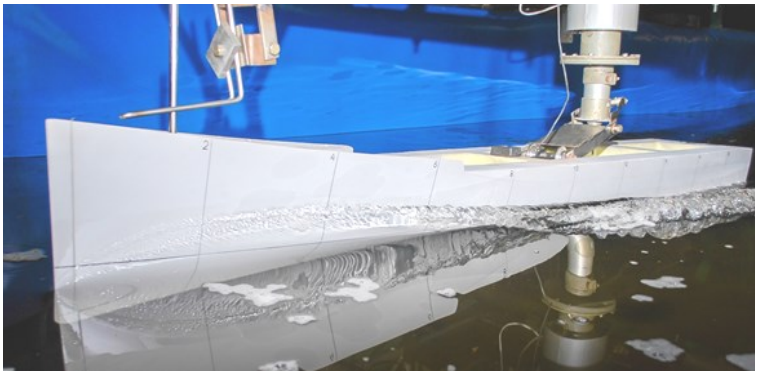
Today, the project 58504, the analogical to the received conceptual project solution, is used at the shipbuilding enterprise "Plant "Kuznya na Rubalskomy"Plc.

Our university has executed the necessary experimental research of the propulsive quality of ship of this project

State of the intellectual property protection, number of the scientific publications

The conceptual project is the result of the execution of the state budget scientific and research work №0115U000305





METHOD OF THE EFFOTS DEFINITION, WHICH EFFECT ON THE TUG AT THE REGIMES OF THE STATIONARY ESCORT OPERATIONS

Purpose and sphere of the development use

The method is the computer program complex for the determination of the values which effect into ASD tug the forces in the process of the execution of the escort operations. It has received the approval of the classification community

Essence and main characteristics of the development

The determination of the effected into tug forces and moments in accordance with the requirements of the classification communities. The base of the determination of the forces into the hull of the tug is the relation of the theory of the steering of the ship at big angles of drift. The structure of the forces and the moments relation from the parameters of the hull form , the angle of drift and the flow speed , which is appeared , has been accepted the same like it at the data processing of the serial model tests of the duplicated bodies of the ship forms at the aerodynamic tubes, the coefficients of the structure have been corrected in accordance with the data of the model tests of the escort tugs in the research pool

Main advantages of the development

The determination of the effected into ASD tug forces in accordance with the method at the process of the projecting is the base for the assignment for this tug the escort class without the verification nature escort tests, which is required by Rules

State of the intellectual property protection, number of the scientific publications

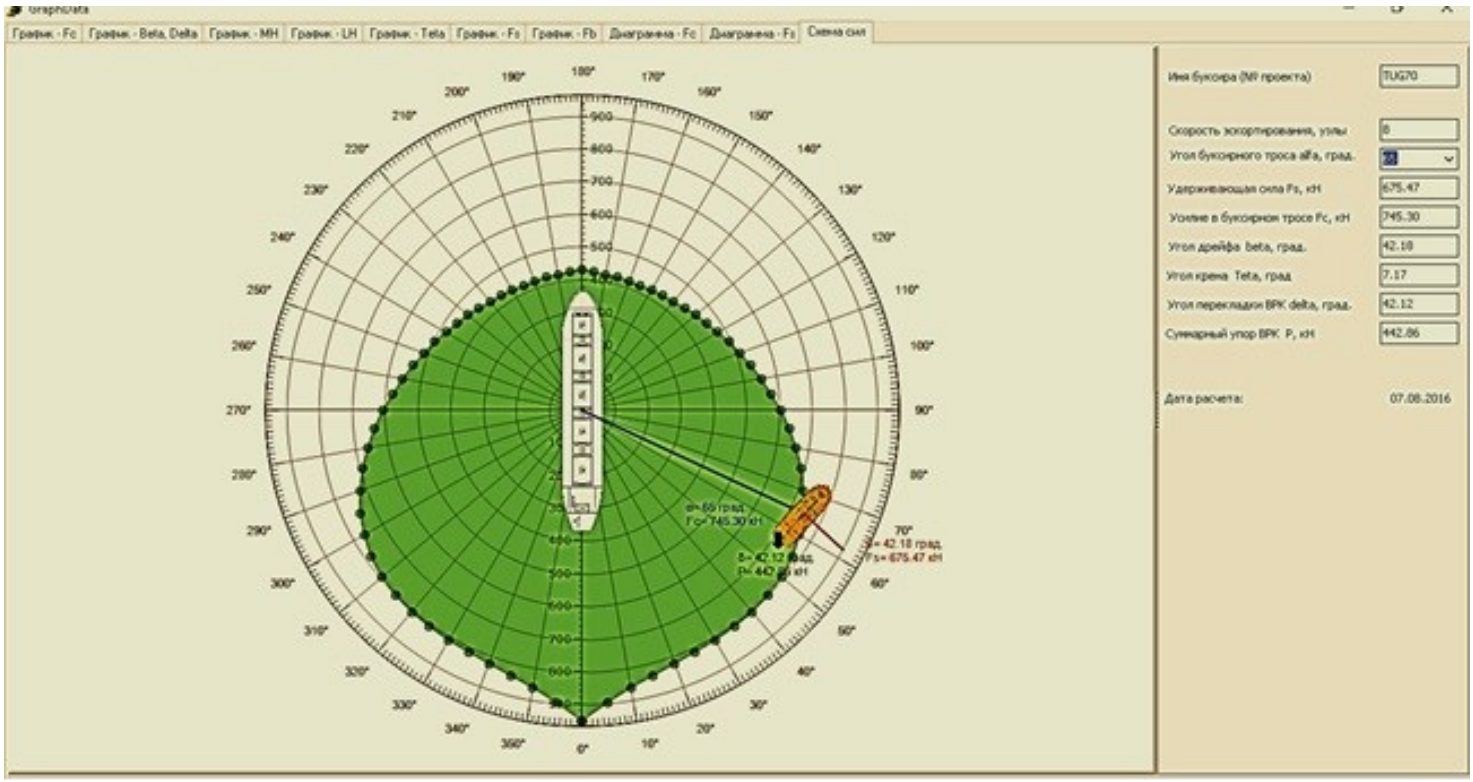
The development has been implemented

State of the development ready

The development is used in the project agency of TransShip corporation

Demand at the market

The method is proposed for the use at the project organizations of the shipbuilding industry for the determination of the escort class projected tug without the execution of the verification nature tests, which are required by the Rules



COMPLEX METHOD OF THE AUTOMATED DETERMINATION OF THE COST AND TERMS OF THE PERSPECTIVE SHIPS AND VESSELS CREATION

Purpose and sphere of the development use

It is used for the determination of the cost and terms of the ships and vessels building of all types and classes during their conceptual and advanced projecting, which is executed by the scientific and research institutes, the design offices and the shipbuilding plants

Essence and main characteristics of the development

It has been designed on the base of the use of the parametrical method of the determination of the production cost and the terms of the product creation. It uses the wide system of the ship division into parts (ESWBS) and the empirical relations of the cost value of these parts (ECER), which are the experience of the shipbuilding in all countries of the world

Main advantages of the development

The method gives the full picture of the ship or the vessel creation. The method shows the state of economy, the structure and the level of the mechanization and the productivity of the shipbuilding industry, the volume and the cost of all stages of the projecting and the building, the duration of the projecting and the building, the assessment of the risk of the ships and vessels creation for each type and class of the ships and the vessels

Demand at the market

The complex method can be used by the scientific and research institutes, the design offices and the shipbuilding plants at the determination of the research directions, the design of the new projects and the conclusion of the contracts concerning the shipbuilding of the ships and the vessels of the new projects

State of the development ready

The development has been introduced by the completed program product like the sum of Microsoft Excel tables. It is used at the Senior management of shipbuilding of MMF MF of Ukraine

State of the intellectual property protection, number of the scientific publications

The development has been realized. It is the first method of the projecting and the building of the ships and the vessels in Ukraine transfer into NATO standards

FAST FERRY FOR BLACK SEA

(Version of ECERs: April, 2017)

Current year	2017	
%Program Costs	-	%
% Contingencies	15,00	%

Characteristics of Ship:

Mass	Speed	Coef. TF
770	20,5	0,45
tons	knots	
Full		

Shipyard: **Ukrain Shipyard**

Version of Costs: A

Date: **25.04.2017**

Pricing:

Shipbuilder Economic Mark-Up-Down:	0,00%	%		
Technical Wage, $/Mhr:	3,41		7,67	with overhead
Production Wage $/Mhr:	2,51		5,65	with overhea
% Overhead:	125%	%		
% G&A Labor:	-	%		
% G&A Material:	6%	%		
% Profit	10%	%		

Non-Recurring Engeneering and Production Planing:

	Standard Work Week:	40,00	hours/week
	Labor Rates:		
120%	Senior Professional/Manager:	7,67	$/hour
120%	Engeneer:	7,67	$/hour
120%	Designer/Draftsperson/Planner:	7,67	$/hour
120%	Clerical:	7,67	$/hour
120%	Contingency(weighted avarage):	7,67	$/hour

Personal of Shipyard:

Average Number of Workers in Planing and Prepear Production of Shipyard:	23
Average Number of Workers in Production of Shipyard:	32

Production of Shipyard:

		Modules
Shipyard Tech Support Labor Factor:	1,0000	0,0000
Steel Productivity Factor:	1,0000	1,0000
Outfit Productivity Factor:	1,0000	1,0000
Common Productivity Factor:	1,0000	1,0000

Addition matwerial Escalation:	1,00
Shipyard Material Cost Factor:	1,00
Combined Material Cost Factor:	1,00

Costs for Design and Production Planning (D&PP):

Conceptual Design	$	-
Preliminary Design	$	2 437
Contract Project	$	27 614
Working Design & Mechanisms	$	159 185
Production Planning	$	32 487
Purchase of Parts, Support	$	9 746
Spare Parts, Loads	$	24 365
Engineering Contracts	$	31 675
Unforeseen Work	$	35 735
Compensation for Copyright Infringement	$	-
Miscellaneous Services	$	1 480
Miscellaneous Materials and Tools	$	1 624
TOTAL EXPENDITURE on D&PP:	$	326 346
G&A and Profit:	$	32 723
TOTAL:	$	359 070

Расчетные графики постройки:

				Estimation of Terms of Design and Construction
Estimated of D&PP Time:	11,0	Months		
Estimated Construction Time:	13,7	Months	=	22,2
Overlapping times:	2,5	Months		Months

ESWBS Name	Groops	Weight tons	M-Hrs Per Mton	Modules M-Hrs	Production M-Hrs	$ Labor	$ Overhead	$ АУП Labor	2017 $ Material	$ G&A Material	Profit Work+Material	$ Total		$/kg Direct and Indirect Costs
Structures	100	231,2	114,20	-	26 407	66 283	82 853	-	287 287	17 237	45 366	499 026	$	2,2
Propulsion	200	52,8	44,68	-	2 358	5 918	7 398	-	669 400	40 164	72 288	795 168	$	15,1
Electrical	300	30,8	88,83	-	2 740	6 877	8 596	-	108 776	6 527	13 078	143 853	$	4,7
Electronics&Navigation	400	26,5	660,39	-	17 511	43 952	54 941	-	33 709	2 023	13 462	148 087	$	5,6
Auxilary Systems	500	76,1	105,53	-	8 027	20 148	25 184	-	670 830	40 250	75 641	832 053	$	10,9
Outfit & Furnishings	600	42,1	142,09	-	5 980	15 009	18 761	-	280 039	16 802	33 061	363 673	$	8,6
Armament	700	0,0	0,00	-	0	0	0	-	0	-	0	0	$	#ДЕЛ/0!
Technical Support	800	8,1%	0,00		0	0	0	-	30 687	1 841	3 253	35 781	$	0,1
Shipyard Services	900	20,2%	23,77		10 922	27 413	34 267	-	1 064 958	63 897	119 054	1 309 589	$	2,8
Margin, Bonds & Insurance	1000	-	-	-	-	-	-	-	1 624 468	97 468	172 194	1 894 129	$	4,1
Lead Ship (LS) Totals		460	160,92		73 944	185 600	232 000	-	4 770 153	286 209	547 396	6 021 359	$	6 021 359
D&PP Costs:	*% Total LS G100-700 Mhrs:*			57%	*42 342*	*324 867*	-	-	*1 480*	*89*	*32 635*	*359 070*	$	***6 380 429***

Technical Support	**1,29%**	*Production & Costs*
Shipyard Services	**47,08%**	*Production & Costs*
Margin, Bonds & Insurance	**68,09%**	*Production & Costs*
G&PP Costs:	**12,91%**	*Production & Costs*
Production Costs (100 -700): **2 781 860**	**46,20%**	*Production & Costs*

Estimation for the General Contractor:	***6 380 429***	**$**	**PRICE without weapons**
Deductions:	***0,00%***	**$**	**$ per kg D_{light}**
Estimate of the Cost Agreed with the Contractor:	***6 380 429***	**$**	**14**
Estimation of weapons cost:	***0***	**$**	**PRICE with weapons**
Valuation of the Ship with Weapons:	***6 380 429***	**$**	**14**
A Rough Estimate of the Cost of Ship Using Formula (1):	***9 619 443***	**$**	**$ per kg D_{light}**

Risk assessments:

7,80%	*Estimating the Risk of ECERs Rregressions*	**426 969**	$	*Without profit*
0,10%	*Risk Assessment of Engineering Rework*	**4 091**	$	*Without profit*
57,80%	*Risk Assessment of Shipyard Operation*	**2 757 148**	$	*Without profit*
57,80%	*Technical Support Risk Assessment*	**1 291 520**	$	*Without profit*
0,90%	*Risk Assessment of the Production Schedule*	**54 192**	$	*Without profit*
59,00%	*100% of theCost of the 1st Ship*	**10 144 882**	$	*Without profit*
	Total Construction Cost with 20% Risk	***6 960 478***	$	*Without profit*

Notes:	Designations of Quantities Entered	15,00	%, Current Rates, Taxes, Tariffs, Pricing
	for Estimation	114,20	Man-hour, Ratio of Labor
	Cost and	*1000*	Group SWBS Fees, Insurance Premiums, etc.
	Terms of Construction	231,2	Tons, Mass in Fractions of Light Displacement
	of Ship	287 287	$, ECERs of Cost of Materials
		2 437	$, ECERs of Design Work and Production Preparation

OPTIMIZATION OF THE SHIP STEERING COMPLEX

Purpose and sphere of the development use

It is the increase of the steering complex (SC) efficiency in the ship propulsive complex. It is used during the projecting and the implementation of the ship SC

Essence of the development

The scheme of the screw propeller form improvement has been designed and the ways of its realization has been developed for the provision of the SC efficient operation in the conditions of the use

Main advantages of the development

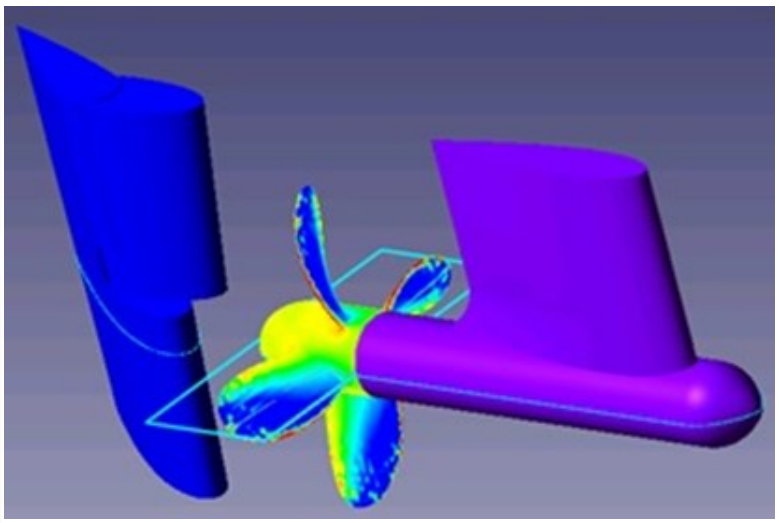
Today only one method of the choice of the optimal form of the screw propeller is the multiversion projecting by the use of the designed innovation scheme of the projecting, which does not require the use of the excessive costs for the buying of the commercial Software at the expense of the author programs use,such as GSP3D, Anvint, Approximator

Demand at the market

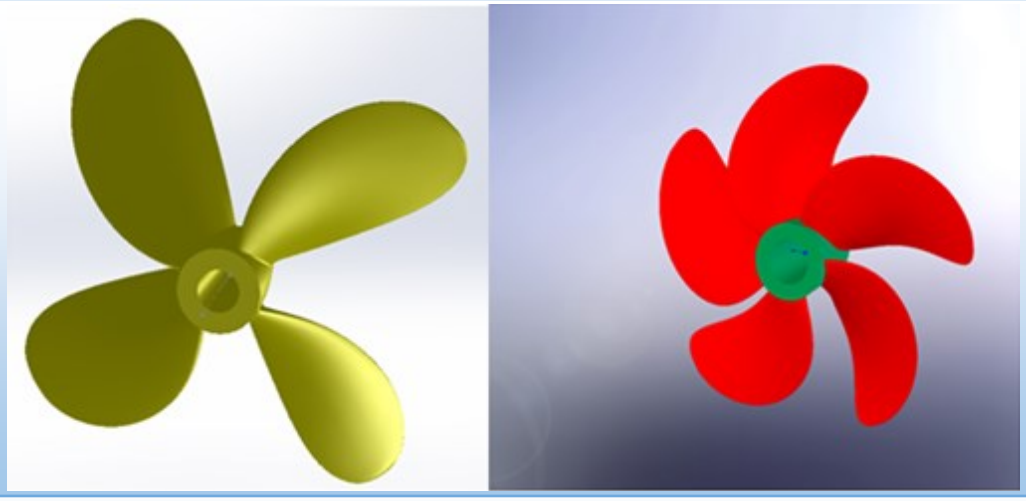
It is actual at the shipbuilding enterprises, especially at the designing organizations of Ukraine

State of the development

The verification of the results practicability concerning the implementation of the scheme into the production have been executed. The scientific articles with the results of the researches have been published



Ship steering complex



Research of the blade screw propeller roll– forming

SLIPWAY FOR THE BUILDING OF FERROCONCRETE SHIPS

Purpose and sphere of the development use

It is used to reduce the labor-intensive at the setting of the bottom decking of the ferroconcrete ships and the stripping

Essence and main characteristics of the development

The construction has the supporting keel-blocks, which are on the supporting surface. The metal hard frame boards connected with the keel-blocks by use of the rotary joints and the bars.There is the pillow on the top part of each keel-block. The down boards move upper to the horizontal position by turn and fix by the bars. Then the pillows are adjusted and implemented. The cracks should not appeared between them because the cement "milk" appearance is not good during the concrete casting of the bottom plate

Main advantages of the development

The slipway for the building of the ferroconcrete ships allows to improve the conditions of the work, to reduce the transport operations to carry the boards of the big sizes with the simultaneous saving of the materials, by use of the inventory frame metal boards for the decking which are not required the repair after the striking. It provides the anticorrosion protection of the ballast compartments without the withdrawal of the ships

Demand at the market

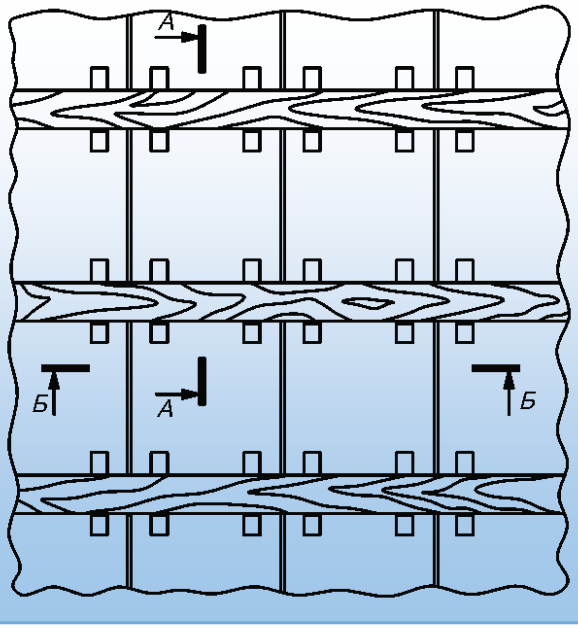
The slipway construction for the building of the ferro-concrete ships will have the high demand in the fields of the shipbuilding and building of docks

State of the intellectual property protection

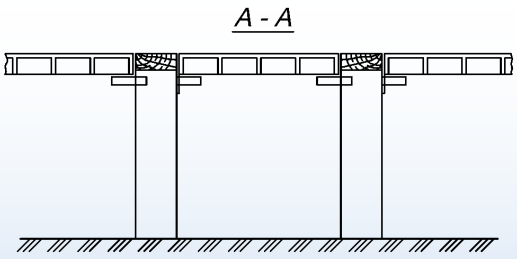
The patent of Ukraine №113891 has been received

State of the development ready

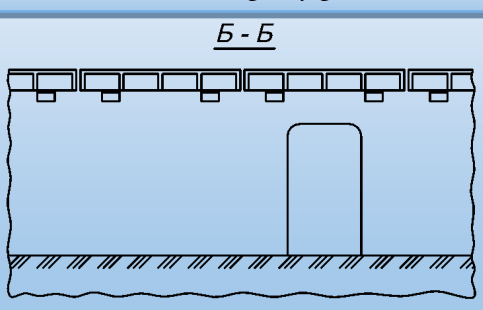
It is ready for the implementation



Construction of the slipway part, the view from above



Construction of the slipway part, the cut A-A



Construction of the slipway part, the cut B-B

TANK OF THE TANKER ISOLATED BALLAST

Purpose and sphere of the development use

It is used to reduce the costs and the labor-intensive of the repair of the ship ballast compartments by use of the floating inhibitors

Essence and main characteristics of the development

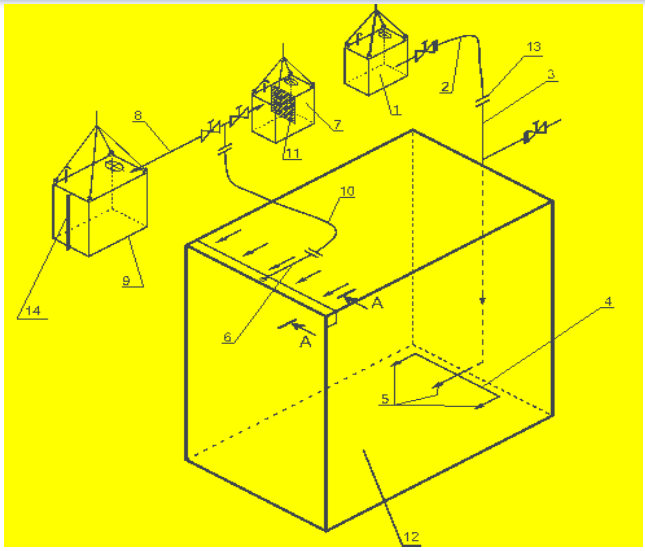
The construction has the portable tank for the preparation and transfer of the lubricant floating inhibitors, which is connected with the pipeline by the portable hose. During the setting on the walls of the ballast compartments, the inhibitor penetrates through the products of the corrosion to the metal, extrudes water from its surface and makes the protective water repelling film

Main advantages of the development

The improved construction and the designed technology of the anticorrosion protection of the ballast compartments allow to provide the anticorrosive protection of the ballast compartments without the withdrawal of the ships

State of the development ready

It is ready for the implementation



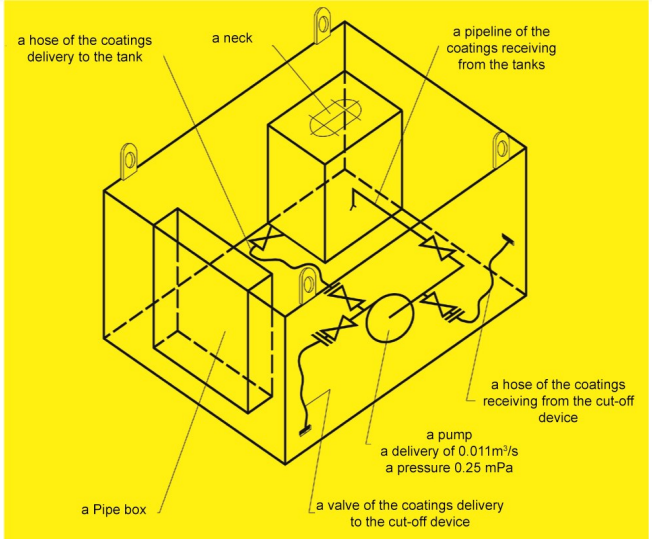
Systems for the use of the floating inhibitors

Demand at the market

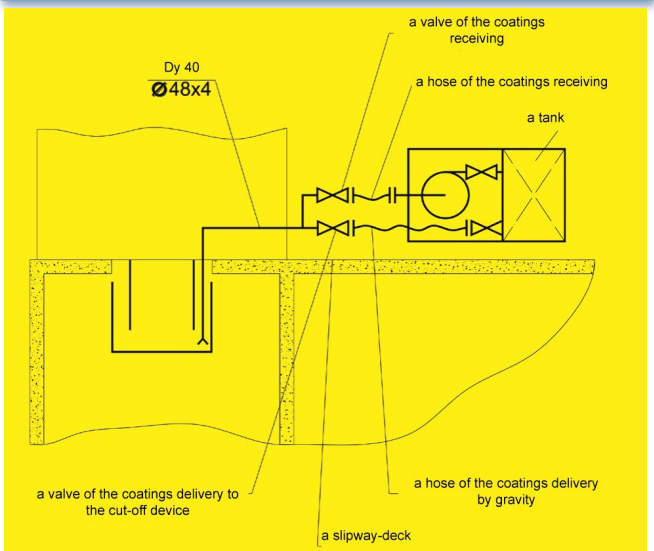
The constructively technological schemes of the ship ballast compartments will have the high demand in the fields of the shipbuilding, the dock building and the ship repair

State of the intellectual property protection

The patent of Ukraine №117657 has been received



Portable stand



Scheme of the portable stand unit

IMPROVEMENT OF THE TECHNOLOGY OF THE POSITIONING AND THE TRANSFER OF THE CABINS IN THE SHIP HULL AND IN THE SUPERSTRUCTURE OF THE FLOATING NON-SELF-PROPELLED CONSTRUCTIONS

Purpose and sphere of the development use

It is used to reduce the costs and labor-intensive of the ship superstructure and the deckhouse formation by module method

Essence and main characteristics of the development

The received technologies of the solution allow to identify the real position of the basic points of the product (the block –cabin), which is transferring at the system of coordinates of the assembly place, and also to definite the intervals of the platform suspension change with the placement of the product on it

Main advantages of the development

The absolute error of the transfer is less than 1,2 m at the vertical transfer and 0,24 m at the horizontal transfer and at the existed errors which are equal to 2,5 for the unit of the square

Demand at the market

The technology of the formation of the apartments has the high demand in the fields of the shipbuilding, the modernization and the ship re-equipment

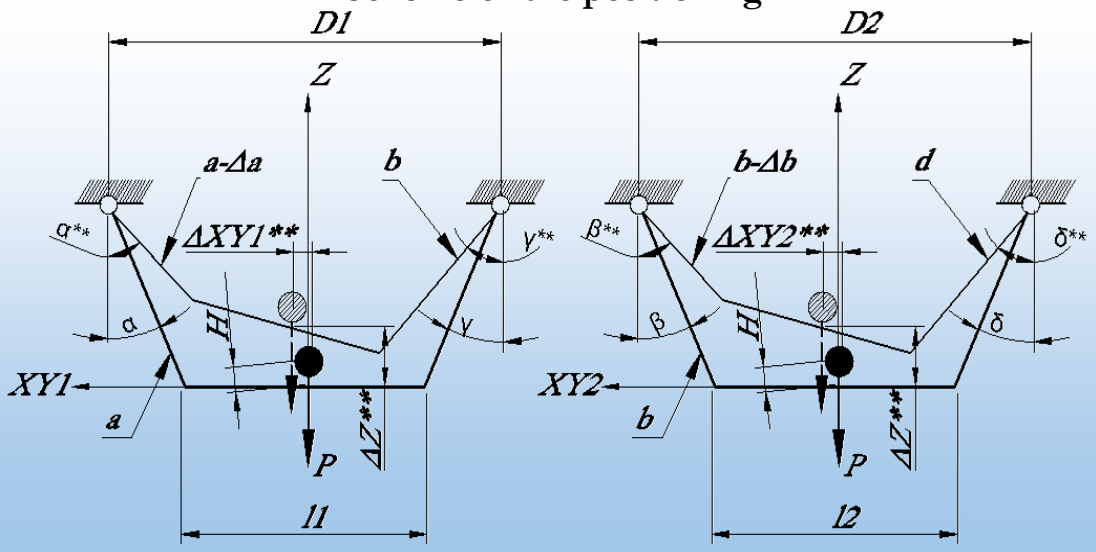
State of the intellectual property protection, number of the scientific publications

2 professional articles and 8 works of the test character have been published

State of the development ready

The technology has been implemented at KSP "Palada"

Scheme of the positioning



ELASTIC FILLERS OF SHIPBUILDING PURPOSE

Purpose and sphere of the development use

It is used for the change of the wood in the supporting equipment of the shipbuilding purpose

Essence and main characteristics of the development

The elastic fillers of the shipbuilding purpose simulate the flexible properties of the wood elements, which are used in the shipbuilding supporting equipment. It allows to change the traditional wood elements of the shipbuilding supporting equipment into the elastic fillers

Main advantages of the development

The elastic fillers are simple for the sea conditions of the use , they can make the large changes of the form and the deformations. They can be used a lot of times

Demand at the market

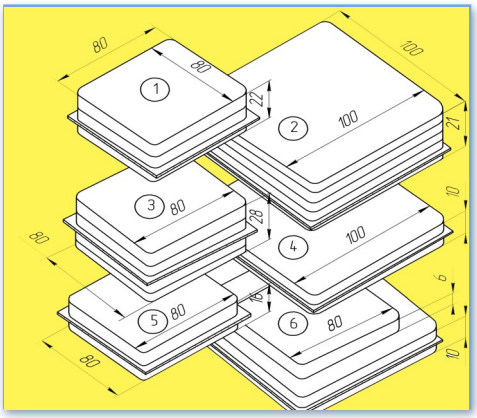
The usual constructions, which were made of wood, are comparatively nondurable. The additional factors are in the conditions of the shipbuilding and ship repair, which contribute the fast wear of the wood constructions. The elastic fillers have not such disadvantages,that's why they are in demand in the shipbuilding industry

State of the development ready

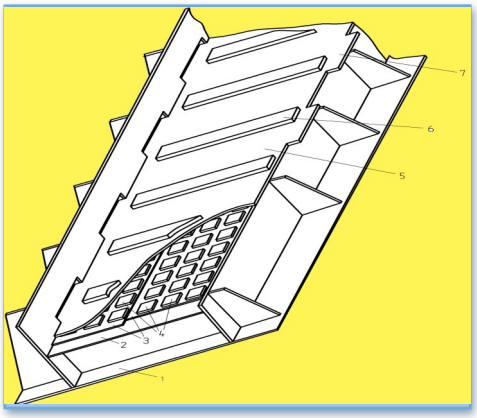
It is ready for the implementation

State of the intellectual property protection, number of the scientific publications

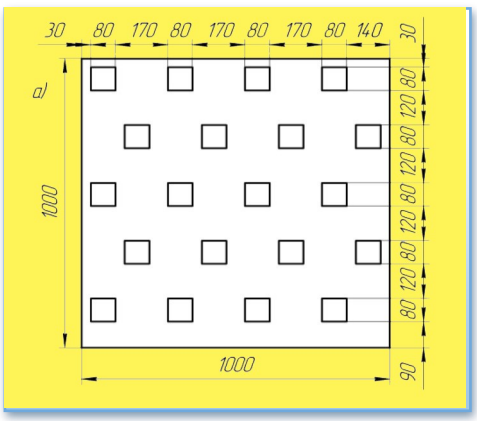
The patent of Ukraine № 36820 has been received



Elastic fillers



Slipways with elastic fillers



Placement of the elastic fillers on the elastic measured line

DIFFUSE FLAME-RESISTANT COATING

Purpose and sphere of the development use

The coating is used for the protection of the electrical nets and the equipment on fire of the closed apartments such as : the power station, the living accommodations and etc

Essence and main characteristics of the development

During fire the diffuse coating increases the flame-resistant up to 60 minutes at temperature of the flame which is equal to 1000° C or more at the thickness of the ball which is equal to 1-3 mm. The oriented cost of the flame-resistant coating is 17÷18 $/kg, it is cheaper than the foreign analogs (21÷22 $/kg)

Main advantages of the development

- Strength to high temperatures: T = 1000 or more
- Ball thickness 2-3 mm
- Foam order 30-40.
- Hydrophobic ;
- Strength to radiation;
- Strength to concentrated acids;
- Strength to rupture;
- strength to brittle rupture;
- nontoxic;
- high adhesive strength

Demand at the market

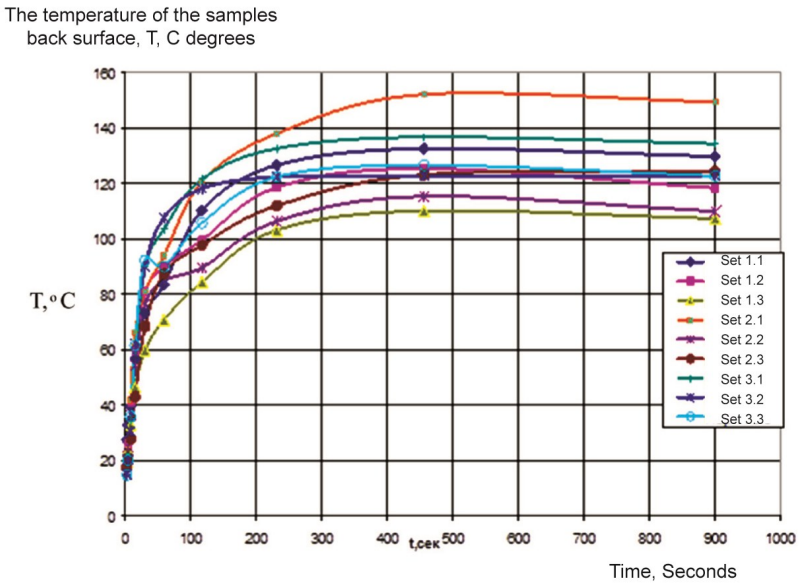
The development is perspective for the making decision of the problem of the protection of the man life and the ecological safety in the conditions of the fire at APS and other potentially dangerous engineering objects. It is for the execution of the sea doctrine of Ukraine concerning the safety of navigation in the conditions of fire in the closed ship apartments during operations and repair

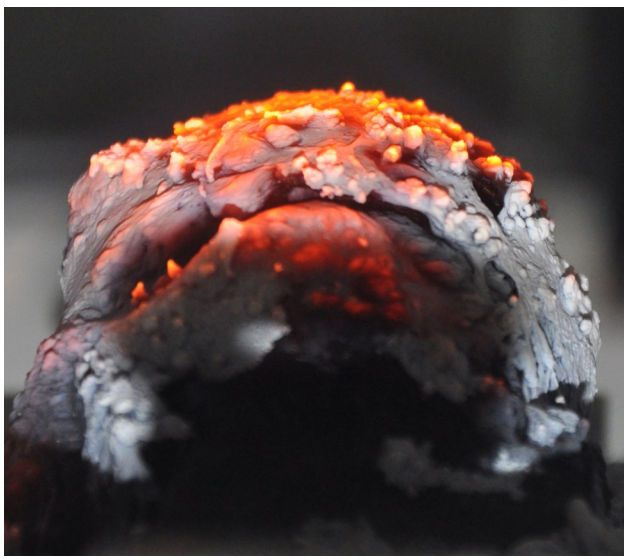
State of the intellectual property protection, number of the scientific publications

7 articles have been published, 1 patent has been received

State of the development ready

It has been implemented in PRC in 2013 at HaiLong Nuclear Material Technology (Jiangsu) Co., Ltd and Sino-Ukraine (Jiangsu) Transnational Technology Transfer Center and Marine Engineering





UNIT OF THE COMPLEX PREPARATION OF WATER, FUEL AND WATER-FUEL EMULSION

Purpose and sphere of the development use

In the unit ,the block of the electrochemical preparation of water , the advanced preparation of the sea water executes by use of the cavitation electrodialysis treatment of the diluat (the soft product of the electrodialysis) and the cavitation preparation of the water – fuel emulsion with the use of the diluat, and also the continuous cavitation treatment catholyte with the caustic properties for the irrigation of the scrubbers of the system of the gases purifying. The technology of the use of the cavitation and electrodialysis treatment of water belongs to the field of heat-and-power engineering, shipbuilding, sea and river transport

Essence and main characteristics of the development

During cavitation and electrodialysis treatment of water , the additional activation of the burning is provided, because the activated water of WFE content gives the additional specified quantity of ions of H^+, OH^- to the same ions (H^+, OH^-), which have been appeared at the micro-explosions of WFE during the process of the burning. The indices of water are necessary properties of the water-fuel emulsion from view of point of the burning intensification and by the need of the receiving the gases in the content of the equimolar relation NO_2:NO, which gives possibility for neutralization of the toxic combination in the fuel , then to continue the intensification of the absorption of NO_X, CO_2, CO and sulfur compounds. The neutralization is better , then the higher alkalinity of the activated catolit (one of the product of the electrodialysis of the water treatment, and the neutralization of the sulfur compounds will be better in the gases during their absorption in the scrubbers

Main advantages of the development

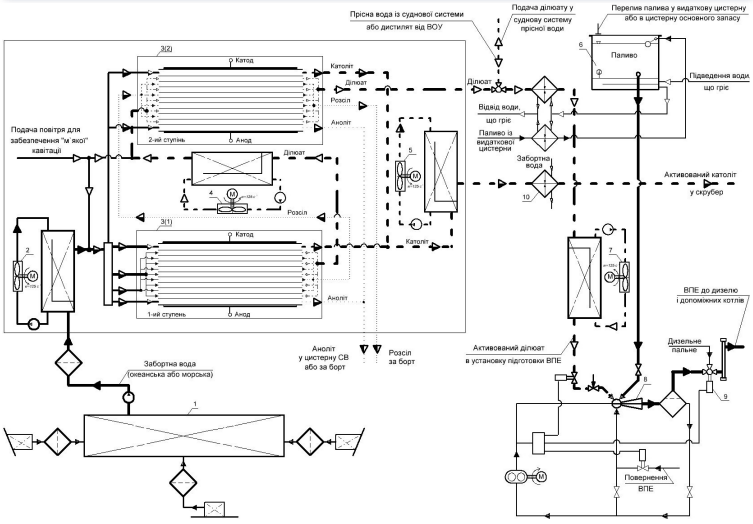
The use of the block of the electrochemical preparation of the cavitation activated water allows to provide the decrease of the temperature at the outlet of the active burning zone , then at the outlet of the furnace , for 70…100 °C, because the most part of the heat is transferring into radiation on the screen surfaces, which are clean due to their clearance at the micro- explosions of WFE which is burning. The decrease at the outlet of the furnace NO_X in 3,6 times, SO_2 in 2,9 times because of the specified processes

Demand at the market

The unit can be used for the provision of the energy and resources saving , the increase of the economical indices and the operation reliability, the decrease of the emission of the toxic substances into environment during the use of the stationary and ship power plants ,in which the sulfur organic fuel is burning

State of the intellectual property protection, number of the scientific publications

The results of the development have been introduced at the reports of 21scientific and technical conferences. The patent of Ukraine has been received (UA 115037 C2 dated 11.09.2017). 4 articles have been published in the scientific and professional issues



Structure of the unit for the complex preparation of water, fuel and water-fuel emulsion

State of the development ready

It has been developed by method of the unit separate elements design , the execution of the experimental researches and testing of the module of the electrodialysis of the water preparation, the cavitation for the preparation of the water-fuel emulsion, the definite effect into the output gases on the surface of the heating of the power plants

UNIVERSAL MODULE FOR THE SEA WATER DISTILLATION BY METHOD OF ELECTRODIALYSIS

Purpose and sphere of the development use

The need of the fresh water is quickly increasing because there are the restricted resources of the fresh water sources. It leads to the need of the design and the use of the membrane technologies of the sea water treatment. Today the wide use of the electrodialysis preparation of the water is increasing. It allows to clean the drinking water to the best level. During treatment of the waste waters, it can be possible to receive the water, which can be used for the second time in industry. This method is based on the concentration of the electrolytes, the removal of the electrolytes from the organic liquids, the separation of different substances, the receiving of the acids and etc

Essence and main characteristics of the development

The designed universal module electrodialysis unit for the sea water distillation with the salinity up to 35 g/l is the system of chambers , designed by the cation and anion exchanged membranes, which works in accordance with the flow scheme. The process of the reverse electrodialysis, which is used in the unit, provides the efficient demineralization of the strongly mineralized waters at minimal pre-cleaning and low costs for use.

The productivity of the module in accordance with the desalted water – 2 t/day

The regime of the work is automated, continuous, during many days.

The quality of the sea water demineralization requires to the standard «Drinking water »

Electric power consumption - 0,7-1,0 kW·hr for the removal of 1 kg of the extracted salts

Main advantages of the development

Comparing with the traditional technologies, the electrodialysis has:

- a low power consumption: the absence of the phase transfer of the liquid;
- the resource saving: the return into the production the components of water which is purifying;
- the ecological compatibility: it does not require the additional reagents for its execution or other substances, which are used.
- the workability: the building of the module provides the simplicity of its service and the reliability during use

Demand at the market

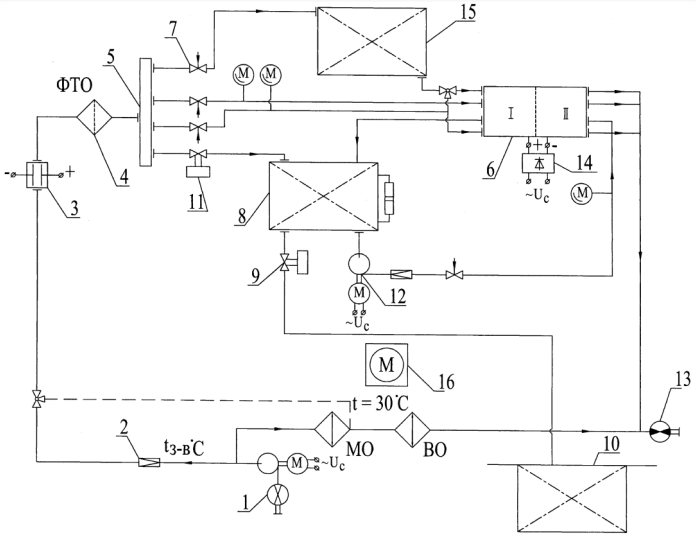
The development can be used in the industry, instrument engineering, heat-and-power engineering, the sea and river transport, the agroindustrial complex , the housing and communal services

State of the intellectual property protection, number of the scientific publications

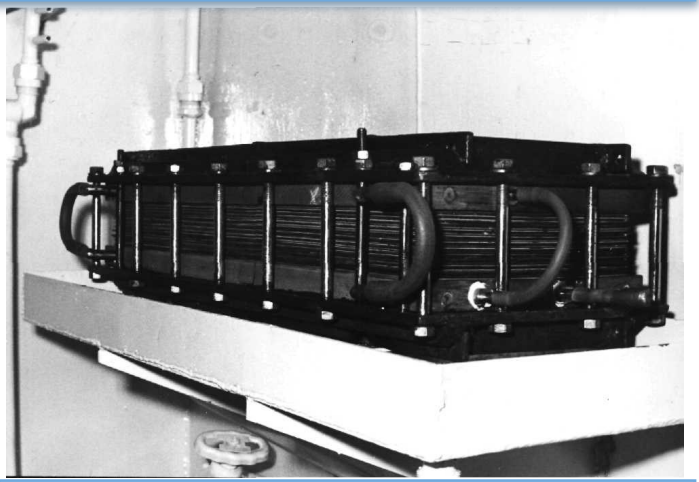
2 patents of Ukraine have been received, 4 articles have been published in the scientific and professional issues (UA 64384 A dated 16.02.2004; UA 64438 A dated16.02.2004)

State of the development ready

The research and production module has been executed , the technological scheme has been designed and the tests on board the ship have been executed



Technological scheme of the electrodialysis distiller module attachment on board the ship



Research and production module of the electrodialysis distiller

CUTTING OF THE SHIP HULL STEELS WITH ADDITION OF THE WATER INTO PLASMA

Purpose and sphere of the development use

The production of the details by plasma cutting from the rolled sheet in shipbuilding and mechanical engineering

Essence and main characteristics of the development

In the process of the wind – plasma cutting, the misalignment of the edges of the cut can be 2,5 mm for one side, which strongly effects into the volume of the weld metal, the productivity and the quality of welding. In the process of the cutting ,the edges are filled by nitrogen and under flux metal with thickness which is equal to 5…12 mm, there are pores in the welded joints

Main advantages of the development

The use of the wind –plasma cutting with addition of water in plasma is the efficient method of the absence of the pores at the automated welding of the machine details with thickness which is equal up to 12 mm due to the execution of the plasma chemical processes of the connection of nitrogen, and also the effect of water into the decrease of the dissolved nitrogen in steel. The power of arc at the plasma cutting with addition of water has been increased due to the increase of the arc voltage. The increase of the arc voltage (170…180 V) S reduces the cut width , the misalignment of the cut edges is 1,0…1.2 mm. It is in accordance with the 2 d class of the misalignment of the standard. The presence of water prevents the heat spreading out of the limits of the shower curtain, cools the cut edges at the plasmotron move. The associative cooling of the edges of the cutting by water provides the minimal deformations, that's why the shaping of the details is not required

State of the development ready

The method of the wind-plasma cutting with addition of water has been implemented at the stationary machines of «Kristal» type at KSP (Smart Maritime Group Ltd.)

State of the intellectual property protection, number of the scientific publications

2 monographs and 17 scientific articles have been published

Machine of type «Kristal»

Plasmatron ПМР-74М for the plasma cutting

INSTRUMENTS OF THE INNOVATION OUTSOURCING IN SHIPBUILDING ENGINEERING

Purpose and sphere of the development use

The establishment of the well -organized and technically modern centres of the profit, which are able for expansion of the internal and external markets of the engineering, the creation of the separate demand for the innovation services, which can be used in outsourcing

Scientific and commercial results:

The conception of the transformation of the innovation outsourcing into business process of the technologies transfer, the economic-organizing model of the innovation outsourcing realization, the specification of the criterion of the partner choice for outsourcing, the way of the management of the engineering labour coefficient, the structure of the system of the quality management for the partners in the engineering outsourcing

Key advantage of the development :

It has been confirmed by the practice of many engineering companies activity, including those, which belong to the foreign investors

Research results:

а)the theoretical and methodical basic of the development of the system of the quality management of the shipbuilding engineering services has been created.It has been used at MDEM Ltd, which has been confirmed by the certificates issued by Germanischer Lloyd and Bureau Veritas concerning the accordance to the requirements of ISO 9001:2008 «Quality management systems–Requirements» and the results of the 5 international observers;

б) the print is in 25 publications, 2 from them are the collective monographs

Demand at the market:

The increase of the effectiveness of the management of the engineering enterprises is actual due to the increase of globalization, the covering of more quantity of the national economy all over the world by the fourth industrial revolution, which is based on knowledge and its transfer , the new information technologies

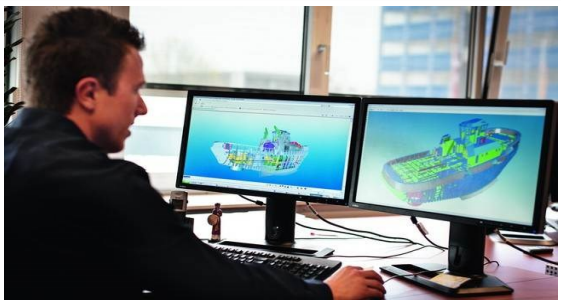
Services which are proposed:

The consultations on the model of the innovation outsourcing and its elements of the training program concerning the creation of the engineering business in shipbuilding, the seminars on the applied aspects of the realization of the innovation outsourcing

AYDU ship design & engineering

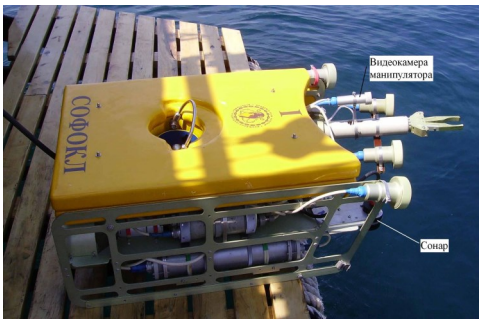
NIKOLAYEV C-JOB DEDICATED NAVAL ARCHITECTS

mds Marine Design Service

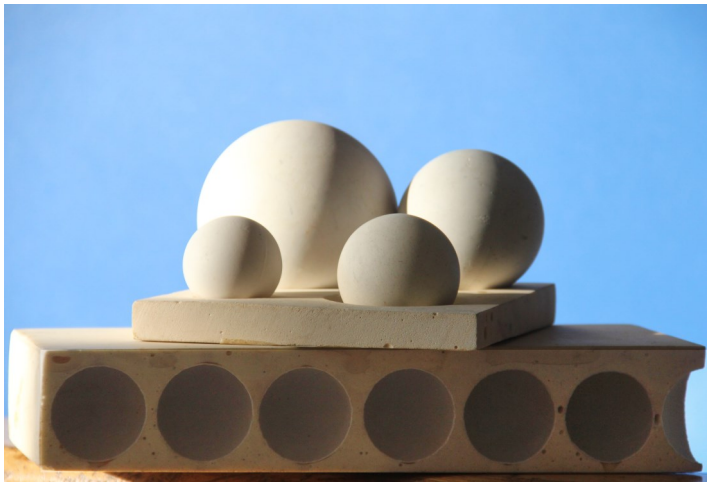


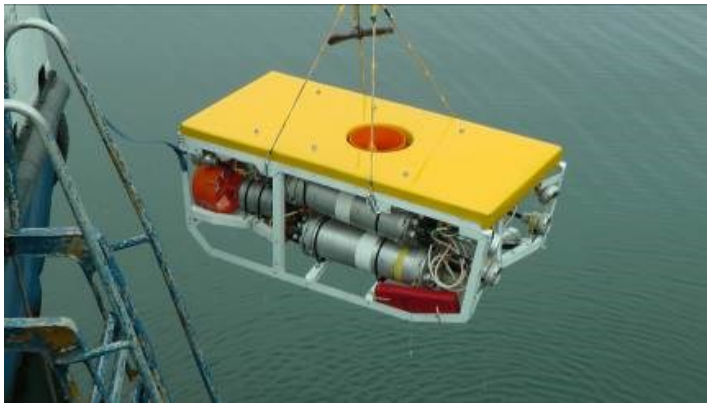
MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
ADMIRAL MAKAROV NATIONAL UNIVERSITY OF SHIPBUILDING



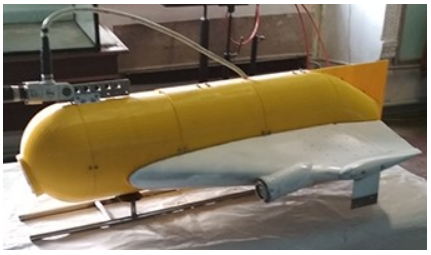


OCEAN ENGINEERING AND UNDERWATER TECHNOLOGIES





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SUBMERGED VIDEO CAMERA FOR INSPECTION OF THE HOLE

Purpose and sphere of the use

The examination and the inspection of the holes of depth which is up to 250 meters, with high quality colour video documentation process and the results of the operation

Essence and main characteristics of the development

The compactness and the mobility of the unit is supported by use of the off-line sources of supply which gives the possibility to adapt it for the execution of the different tasks. Maximum work depth is 200 m, overall sizes are 62x275 mm, number of video camera is 1, mass is 1,14 kg, power supply is 12 V, time of the continuous operation is 2hrs, quantity of the maintenance staff is 1 person

Main advantages of the development

The most important advantage of the development is the possibility to reduce the time consumption on the inspection of the oil-and – gas fields, of the drinking water fields, caves, catacombs for 25-30%

State of the development ready

The development has been used at the industrial enterprises of Ukraine

Demand at the market

The development can be used for the maintenance of the oil-and-gas fields, of the drinking water fields, caves, catacombs and in the subdivisions of SSDS of Ukraine, MMF MF of Ukraine

State of the intellectual property protection, the quantity of the scientific publications

The development has been realized at the market

Unit with the automated cable winch

Submerged video camera

Frame of the hole video inspection

Unit with the hand cable winch

TUG UNDERWATER UNITS OF «GLIDER» PROJECT

Purpose and sphere of the use

The tug underwater units of «Glider» project are aimed for search and inspection of the sunk objects by use of video and magnetic methods. They provide the transfer of video picture in the real time scale and two-sided information change between the underwater unit and the tug

Essence and main characteristics of the development

Taking into account the executed tasks the unit can have the following devices : the hydro locator of the side view, the profilograph , the hydro locator of the round view , the metal detector . The small overall mass characteristics give possibility to use the unit from board of the small sized ships. The availability of the unit active control devices doesn't require the tug movement speed regulation

Main advantages of the development

The most important advantage of the development is the possibility to reduce the time consumption for the inspection of the port water areas and the shelf zones for 45-50%

State of development ready

The development has been used at the industrial enterprises of Ukraine

State of the intellectual property protection, number of the scientific publications

The development has been realized at the market

Specification

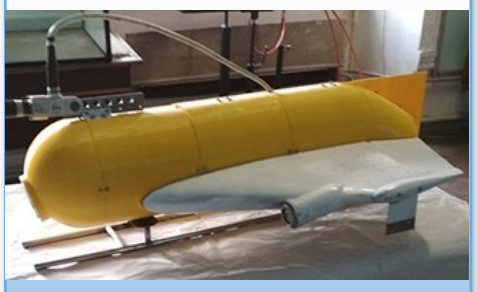
Maximum work depth, m ……. …20
Overall sizes, mm ….. ……..……870x600x200
Sustainer speed , knots ……..……...… 1
Length of cable –rope, m ……..... up to 50
Unit mass, kg ……..…….……..….. 10
Power supply ……...…...……... 24 v

Demand at the market

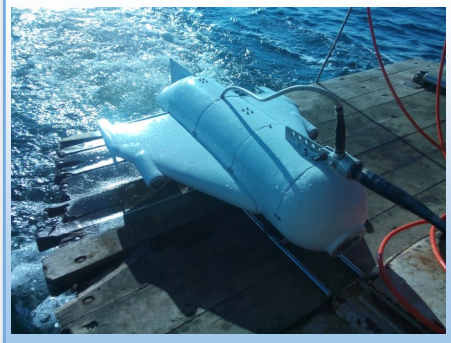
The design can be applied for maintenance and inspection of the port water areas, shelf and in the State Emergency Service units of Ukraine, Ministry of Internal Affairs of the Armed Forces of Ukraine

Control console

Underwater unit



On board of tug



SMALL-SIZED TETHERED UNDERWATER VEHICLE "INSPECTOR"

Purpose and application scope

The underwater vehicles are designed for search and inspection of sunken objects using video, sonar and magnetometric devices, performing simple underwater technical operations using underwater manipulators, high-quality process documentation and underwater technical operation results

The essence and main characteristics of development

Due to the hydroacoustic equipment, it has the ability to control the water area around the ship's anchorage with prompt response to the appearance of space violators, and in case of their appearance, promptly perform identification. Due to the presence of the magnetometer, it is possible to search for metal objects located in the covered (hidden) medium (under the soil layer)

The main development advantages

The major development advantages are the ability to reduce the time spent on the inspection of the port waters, hydraulic structures and shelf zones by 45-50%

Development preparedness state

The development is implemented at industrial enterprises of Ukraine

Market demand

The development can be applied for maintenance and inspection of port water areas, shelf, hydraulic structures and in the SES units of Ukraine, the Ministry of Internal Affairs of the Armed Forces of Ukraine

State of the intellectual property protection, number of the scientific publications

The development has been realized at the market

Underwater units

Specification

Work depth, m ……..... 100
Overall sizes, mm..…. 966x600x450
Sustainer speed, knots ……..…4
Length of cable-rope, m ..up to 500
Unit mass, kg ……..35
Power supply .. 3x220 V, 50 (60) Hz, 2,5 kW
Quantity of staff, persons. ……2

Equipment set

SMALL SIZED REMOTE-CONTROLLED UNDERWATER UNITS OF «HYDROGRAPH» PROJECT

Purpose and sphere of the use

The underwater units are aimed for search, identification, the research of the ounderwater objects by use of the video-, hydroacoustic and magnetometer devices; the device inspection of the underwater objects by the external measurers; the execution of the underwater technical operations by use of the manipulator and the cutter of the ropes; the high quality documentation process and the results of the underwater operations with GPS coordinates binding

Essence and main characteristics of the development

The availability of the log drive provides the high maneuvering for the close research of the underwater part of the ships at the anchorage or at the berth

Main advantages of the development

The most important advantage of the development is the possibility to reduce the time consumption for the inspection of the port water areas, the hydrotechnical constructions, the underwater parts of the ships and the shelf zones 45-50%

State of the development ready

The development has been used at the industrial enterprises of Ukraine

State of the intellectual property protection, number of the scientific publications

The development has been realized at the market

Demand at the market

The development can be applied for maintenance and inspection of port water areas, shelf, hydraulic structures and in the SES units of Ukraine, the Ministry of Internal Affairs of the Armed Forces of Ukraine

Underwater unit

Specification

Work depth, m ……..…... 250
Overall sizes, mm …1220x600x540
Sustainer speed, knots ……..…2
Length of cable-rope, m ….. Up to 400
Unit mass, kg …… 97
Power supply ….. 3x220 V, 50 (60) Hz, 3,0 kW
Quantity of staff,persons. …… …2

Diving in ice conditions

SMALL-SIZED TETHERED UNDERWATER VEHICLES "DELTA"

Purpose and application scope

The underwater vehicles are designed for search, exploration and inspection of sunken objects by video devices, process high-quality documentation and the results of underwater technical operations

The essence and main characteristics of development

Due to high-quality video equipment, the vehicles have the ability to monitor the state of hydraulic technical operations (structures), underwater parts of vessels and sunken objects.

Operating depth - 100 m, overall dimensions - 950x600x370 mm, speed - 1 knot, tether-cable length - up to 150 m, weight of the device - up to 60 kg, power consumption - 1.5 kW, number of personnel - 2 people

The main development advantages

The most important development advantages are the ability to reduce the time spent on inspection of port water areas, hydraulic structures and shelf zones by 45-50%.

Intellectual property protection status, number of scientific publications

Vehicle "Delta-P" was implemented in 1990
Vehicle "Diaph" was implemented in 1991
Vehicle "ADELINE" was implemented in 1992

Market demand

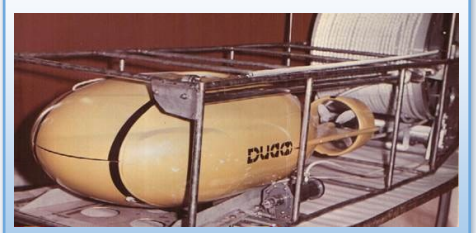
Development can be applied for maintenance and inspection of ports' water areas, shelf, hydraulic structures and in the SES units of Ukraine, the Ministry of Internal Affairs of the Ukrainian Armed Forces

Development preparedness state

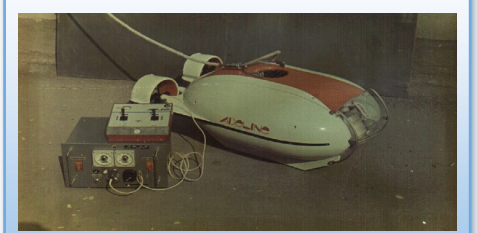
The development is implemented at industrial enterprises in Ukraine and Germany

Underwater vehicle “Delta-P”

Underwater vehicle “Diaph”



Underwater vehicle “ADELINE”



UNDERWATER-TECHNICAL COMPLEXES "ATLESH"

Purpose and application scope

The underwater technical complexes are designed for search, exploration and inspection of offshore oil and gas facilities, hydraulic structures, underwater communications and vessels' underwater parts using video and magnetometric instruments, performing simple underwater engineering operations using underwater measuring instruments for non-destructive inspection, high-quality documentation of the process and the results of underwater technical operations

The essence and main characteristics of development

Due to the increased maneuverability, it is possible to perform underwater technical works in confined spaces

The main development advantages

The most important development advantage is the presence of four degrees of freedom, which makes it possible to perform the survey of underwater parts of complex hydraulic structures

Development preparedness state

Development implemented in industrial enterprises of Ukraine and were in operation from 1994 to 2014.

Market demand

The development can be applied for maintenance and inspection of hydraulic structures, port water areas, shelf, vessels' underwater parts

Intellectual property protection status, number of scientific publications

Vehicle "Atlesh" was implemented in 1994

Vehicle "OPTIO" was implemented in 1995

Underwater vehicle

Technical Specifications

Operating depth, m …….. ..… ... 300/600

Overall dimensions, mm…. 1260x540x660

Marching speed, knots ……..…… .. 3

Tether-cable length, m ..….. ..…. up to 800

Vehicle mass, kg ……...……. 77

Power supply .. 3x380 V, 50 (60) Hz, 6 kW

Number of personnel, people ……. 2

Underwater vehicle launch

TETHERED UNDERWATER VEHICLES "THE NORTH STAR"

Purpose and application scope

The underwater vehicles are designed for search, exploration and inspection of underwater objects in complex hydrometeorological conditions using video and magnetometric instruments, performing simple underwater technical operations using non-destructive testing devices, high-quality documentation of the process and the results of underwater technical operations.

The essence and main characteristics of development

Due to the extremely high specific energy and information characteristics, they are able to be successfully used in conditions of strong current and wind-wave effects. Due to the presence of the magnetometer, they have the ability to execute the search for metal objects located in a covered medium (under the soil layer)

The main development advantages

The most important development advantage is the ability to use small tonnage carrier vessels using the simplest launch and recovery devices

Development preparedness state

The development was implemented at industrial enterprises of Russia and was in operation from 1995 to 2006

Market demand

The development can be used year-round for maintenance and inspection of port water areas, shelf, hydraulic structures and in the SES units of Ukraine, Ministry of Internal Affairs of the Ukrainian Armed Forces

Intellectual property protection status, number of scientific publications

Vehicle "NIF" implemented in 1995 p.
Vehicle "NOOF" implemented in 1996.
Vehicle "NUF" implemented in 1996.

Underwater vehicle

Technical Specifications

Operating depth, m ……..... 150
Overall dimensions, mm…. 1130x620x470
Marching speed, knots ……..…… .. 3,9
Tether-cable length, m ...… ..…. up to 150
Vehicle mass, kg ……..……. 65
Power supply .. 3x220 V, 50 (60) Hz, 4 kW
Number of personnel, people……. 2

Equipment package

TETHERED UNDERWATER VEHICLE "POISK"

Purpose and application scope

The underwater vehicle is designed for search and inspection of sunken objects using video and magnetometric instruments, inspections by their instrument parameters control, performing simple underwater technical operations using underwater tools, process high-quality documentation and the results of underwater technical operations

The essence and main characteristics of development

The design of the underwater vehicle allows its use from surface and underwater carriers. Due to the availability of a magnetometer, has the ability to search for metallic objects located in the covered environment (under the soil layer)

The main development advantages

The most important development advantage is the possibility of using it as an attachable equipment for an underwater vehicle or a heavy-duty remotely operated vehicle (ROV)

Development preparedness state

The development is implemented in the Navy of the Armed Forces of Ukraine.

Market demand

The development can be applied for maintenance and inspection of port, shelf, hydraulic structures and in the SES units of Ukraine, the Ministry of Internal Affairs of the Armed Forces of Ukraine

Intellectual property protection status, number of scientific publications

Vehicle basic model was implemented in 2001

Vehicle deep water model was implemented in 2004

Underwater vehicle basic model

Technical Specifications

Operating depth, m ……..…….. 550

Overall dimensions, mm….. 966x526x605

Marching speed, knots ……..…...……4

Tether-cable length, m ..…...…. up to 200

Vehicle mass, kg ……..……. 65

Power supply …...3x220 V, 50 (60) Hz, 2,0 kW

Number of personnel, people……. 2

Underwater vehicle deep water model

TETHERED UNDERWATER VEHICLE "MTK-200"

Purpose and application scope

The underwater is designed for search and inspection of sunken objects using video and magnetometric devices, performing complex underwater technical operations using underwater manipulators, high-quality documentation of the process and results of underwater technical operations

The essence and main characteristics of development

Due to the presence of two manipulators with 7 degrees of freedom, has the ability to perform complex underwater technical operations. The availability of 5 high resolution camcorders provides full coverage of the performance and underwater environment. Due to the availability of the magnetometer, has the ability to search for metallic objects located in the covered medium (under the soil layer)

The main development advantages

The most important development advantages is the presence of a small-sized underwater inspection vehicle "Poisk" in the complex

Development preparedness state

The development is implemented on industrial Ukrainian enterprises

Market demand

The development can be applied for maintenance and inspection of port water areas, shelf, hydraulic structures and in the SES units of Ukraine, the Ministry of Internal Affairs of the Armed Forces of Ukraine

Intellectual property protection status, number of scientific publications

Vehicle "MTK-200" was implemented in 2007

Underwater vehicle

Technical Specifications

Operating depth, m ……....550
Overall dimensions, m…….....3,9x2,0x4,2
Marching speed, knots ……...……4
Tether-cable length, m ...…..…. up to 500
Vehicle mass, kg …….…….. 2500
Power supply .. 3x220 V, 50 (60) Hz, 40 kW
Number of personnel, people….…….. 4

Control panel

COMMUNICATION TOWED UNDERWATER VEHICLES "ARGO-BUOY"

Purpose and application scope

The towed underwater vehicles are designed for transmission of control commands and telemetry, real-time video image transmission and for two-way radio communication between the underwater vehicle and the coastal (maritime) control station

The essence and main characteristics of development

Due to the GPS/GLONASS receiver, it has the ability to accurately determine the underwater vehicle position and due to the presence of communication and control devices, has operational communication with the coastal control station

The main development advantages

The most important development advantage is the possibility of the unmanned underwater vehicle covert communication between the coastal control station

Development preparedness state

Development work is implemented in the Navy of the People's Liberation Army of the People's Republic of China

Market demand

The development can be applied in the Ministry of Internal Affairs of the Armed Forces of Ukraine.

Intellectual property protection status, number of scientific publications

Implemented in 2005

Underwater vehicle series 1

Technical Specifications

Maximum immersion depth, m ...……..600
Operating depth, m ……..…...…. 100
Antenna height, m ……..…..……... 3
Overall dimensions, mm ... 1500x1000x800
Towing speed, knots… ……..…. 8
Tether-cable length, m ..……. up to 300
Vehicle mass, kg ……....……. 130

Underwater vehicle series 2

TECHNOLOGICAL COMPLEX FOR CRUSHING SOLID BOTTOM SOIL

Purpose and application scope

The complex is designed for crushing solid bottom sediments at depths up to 20 meters using ecologically friendly electrohydroimpulse method

The essence and main characteristics of development

The complex contains an industrial electrohydroimpulse installation "Basalt-2M", outboard technological equipment for borehole making and grinding (crushing) of solid bottom soils, as well as a control board. It can be used from the surface carrier vessel board as an autonomous electrotechnological equipment, receives energy from the carrier vessel energy sources and uses the ship lifting device

The main development advantages

The complex contains an industrial electrohydroimpulse installation "Базальт" and a descending underwater vehicle with combined drilling rig and electrohydroimpulse technological elements.

Development preparedness state

The development is implemented at industrial enterprises of Ukraine

Market demand

The development can be applied to the service of port waters and shipping canals of Ukraine

Intellectual property protection status, number of scientific publications

Launched in 2003. Awarded with gold medals of the All-Russian contests and performances, "The Best Domestic Product of the Year" in 2004 and 2005

Underwater vehicle

Technical Specifications

Operating depth, m ……...…… ... 20
Bottom soil category ……..……...… ... 6-7
Discharge energy, kJ ……..…… .. 100
Soil thickness, m …….. 0.3 -0.5
Complex mass, kg ……...……. 3500
Power supply .. 3x380V, 50(60) Hz, 17 kW

Complex model

WAVE POWER PLANT

Purpose and application scope

The wave power station is designed to produce and transmit ashore electric energy from an ecologically clean renewable energy source - sea waves. It is an offshore energy complex installed on anchors designed for operation in the Black Sea-Azov basin

The essence and main characteristics of development

Each energy module is structurally an anchored floating frame-type structure (platform), on which a flexible energy-absorbing element, a transmission and power generators, as well as an emergency power source and navigation safety system are located

The main development advantages

Automatically fixes the length of the flexible energy-absorbing element and the angle relative to the wave direction, immerses when exceeding the characteristics of the sea waves

Development preparedness state

The project is at the "Working design documentation of the prototype product" stage in accordance with GOST 3974-2000

Market demand

The development can be applied to ensure uninterrupted power supply of the ports, hydraulic structures and in the SES units of Ukraine, the Ministry of Internal Affairs of the Armed Forces of Ukraine

Intellectual property protection status, number of scientific publications

An application for the Utility Model Patent of Ukraine is issued

Power-plant layout

Technical Specifications

Maximum power, kW…..…….... 250
Voltage ……..3x380 V, 50 (60) Hz
Overall dimensions, m ……42x25x10
Vehicle mass, t ……..…….. ……. 80
Operating mode ……..... long
Sea depth, m ……...…. 20
Distance from shore, m ……...……...5000

Power-plant layout

SHIP UNDERWATER-TECHNICAL COMPLEX WITH SELF-PROPELLED UNDERWATER VEHICLE "KNPA"

Purpose and application scope

The underwater vehicle is designed to perform diving-free search, inspection and instrumental underwater operations at depths up to 150 meters.

The essence and main characteristics of development

The complex solves the tasks of search for underwater objects using regular video and sonar equipment; survey the underwater part of the hulls and the bottom surface using a color video camera delivering payload weighing up to 10 kg in the sunken objects; cutting steel cable with a diameter to 20 mm; diving and technical operations support by means of the manipulator.

The main development advantages

The major development advantage is the possibility of reducing the time spent on the inspection of port waters, hydraulic structures and shelf zones by 45-50%.

Development preparedness state

The project is at the "Working design documentation (WDD) of prototype product" stage in accordance with GOST 3974-2000

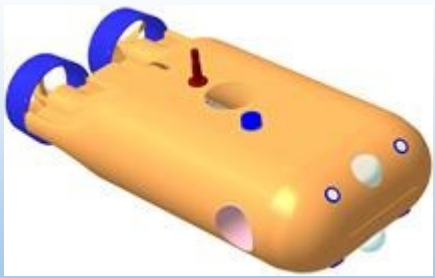
Intellectual property protection status, number of scientific publications

An application for the Utility Model Patent of Ukraine is issued

Market demand

The development can be applied to control the underwater conditions of the territorial waters shelf of Ukraine in the State Border Guard Service units and the Navy of the Armed Forces of Ukraine

Underwater vehicle



Technical Specifications

Operating depth, m …….... 150
Overall dimensions, m …….. 2,2x1,1x0,64
Marching speed, knots ……..… ..… 4
Tether-cable length, m ..……..... up to 550
Vehicle mass, kg ……..…..... 350
Power supply .. 3x380 V, 50 (60) Hz, 27.5 kW
Number of personnel, people……. 2

Control system

REMOTELY-OPERATED TETHERED UNDERWATER VEHICLES "ARCHIMEDES"

Purpose and application scope

The underwater vehicles are designed for search and inspection of sunken objects using video, hydroacoustic and magnetometric devices, performing simple underwater technical operations using underwater manipulators, delivering payload to a sunken object, and providing high-quality process documentation and underwater technical operation results

The essence and main characteristics of development

Due to the hydroacoustic equipment complex and a magnetometer, has the ability to search for sunken objects located in a covered environment (under a soil layer). Due to the availability of two manipulators, has the ability to perform simple underwater technical operations

The main development advantages

The major development advantage is the possibility of reducing the time spent on port waters inspection, hydraulic structures and shelf zones by 45-50%

Development preparedness state

The project is at the "Working design documentation (WDD) of prototype product" stage in accordance with GOST 3974-2000

Market demand

The development can be applied for maintenance and inspection of port water areas, shelf, hydraulic structures and in the SES units of Ukraine, the Ministry of Internal Affairs of the Armed Forces of Ukraine

Intellectual property protection status, number of scientific publications

An application for the Utility Model Patent of Ukraine is issued

Underwater vehicle

Technical Specifications

Operating depth, m ……...…….500
Overall dimensions, m …….2,2x1,1x0,64
Marching speed, knots ……..…..…...3
Tether-cable length, m ..…….up to 1000
Vehicle mass, kg ……..…….....400
Power supply .. 3x380 V, 50 (60) Hz, 20.0 kW
Number of personnel, people……2

Control system

SUBMERSIBLE CAMCORDER FOR WELL INSPECTION

Purpose and application scope

Review and inspection of wells up to 100 meters deep, which are accompanied by the high-quality color video documentation of the process and operation results

The essence and main characteristics of development

The presence of two high resolution camcorders allows to assess the condition of casing pipes, identify damage. Maximum operating depth - 100 m, overall dimensions - 90x535 mm, number of cameras - 2, mass - 5.0 kg, power supply - 24 V, number of personnel - 1 person

The main development advantages

The major development advantage is the possibility of reducing the time spent on inspection of oil and gas fields, portable water deposits, karst formations, catacombs by 25-30%

Development preparedness state

The development is implemented at industrial enterprises of Ukraine

Intellectual property protection status, number of scientific publications

Sample "PSV-1" was implemented in 2012

Market demand

The development can be applied for the maintenance of oil and gas fields, drinking water deposits, karst formations, catacombs and in the SES units of Ukraine, the Ministry of Internal Affairs of the Armed Forces of Ukraine

Equipment package

Submersible camcorder

Control panel

TOWED SEARCH UNDERWATER VEHICLES "PLANER"

Purpose and application scope

The underwater vehicles are designed for high-performance search and inspection of sunken objects by video and magnetometric equipment. Provide real-time video transmission and two-way information exchange between the underwater vehicle and the towing vessel

The essence and main characteristics of development

The presence of 4 high-resolution camcorders provides high-quality video recording of the bottom surface of the shelf zones

The main development advantages

The major development advantage is the possibility of reducing the time spent on port waters inspection, hydraulic structures and shelf zones by 45-50%

Development preparedness state

The development is implemented at industrial enterprises of Ukraine

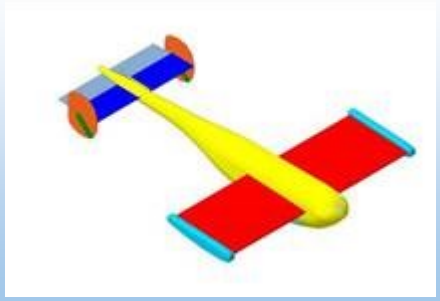
Market demand

The design can be applied for maintenance and inspection of the port water areas, shelf and in the State Emergency Service units of Ukraine, Ministry of Internal Affairs of the Armed Forces of Ukraine

Intellectual property protection status, number of scientific publications

Vehicle "Planer" was implemented in 2012

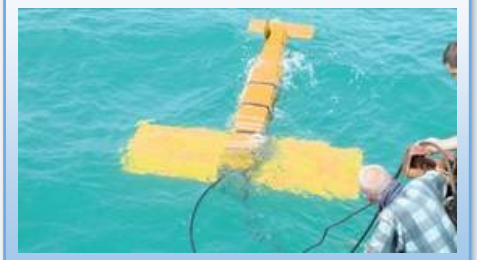
Underwater vehicle



Technical Specifications

Operating depth, m …….…… ... 500
Overall dimensions, mm ... 3000x1500x400
Towing speed, knots… ……..… 8
Tether-cable length, m ..…...…. up to 900
Vehicle mass, kg ……...…… ..…. 190
Power supply .. 220 V, 50 (60) Hz, 2,0 kW
Number of personnel, people……. 2

Testing the working model



SMALL-SIZED REMOTELY-OPERATED VEHICLE "BRIZ"

Purpose and application scope

The underwater vehicles are designed to perform the following operations at depths up to 50 meters: inspection, using the color camcorders, of the underwater part of the vessel and the seabed surface in basing areas and anchorage sites using video, hydroacoustic and magnetometric equipment; high-quality documentation of the process and underwater operation results with GPS- coordinate references

The essence and main characteristics of development

Small dimensions and placements in the transport and installation modules allow to operatively deploy the complex on board any boat. The autonomous power supply ensures the complex operating capacity on board a small motor or rowing boat

The main development advantages

The major development advantage is the ability to reduce the time spent on inspection of port water areas, hydraulic structures, underwater vessel parts and port waters by 45-50%

Development preparedness state

The project is at the "Technical proposal" stage according to GOST 3974-2000

Market demand

The development can be applied to monitor the shelf underwater conditions of the territorial waters of Ukraine in the State Holding Service units and the Naval Forces of Ukraine

Intellectual property protection status, number of scientific publications

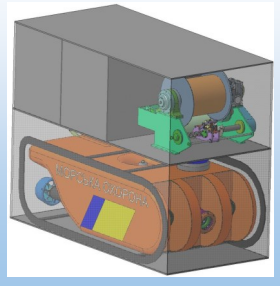
An application for the Utility Model Patent of Ukraine is issued

Underwater vehicle

Technical Specifications

Operating depth, m ……..…..50
Overall dimensions, mm….. 850x420x350
Marching speed, knots ……..…...….1
Tether-cable length, m ..…...…. up to 150
Vehicle mass, kg ……..……..35
Power supply ……..…..…....autonomous
Autonomy, h ……..…….……2
Number of personnel, people……...2

Underwater vehicle complex in transport module



REMOTELY-OPERATED UNDERWATER CARGO CARRIER "CSPUU"

Purpose and application scope

It is used to perform search and transport operations of the "vessel - bottom surface" type; it ensures delivery to the bottom surface of autonomous radio-hydroacoustic station equipment; its safe installation on the bottom surface; at the end of its operation term, using hydroacoustic and underwater video equipment, perform search, conduct its packing and lifting to the surface

The essence and main characteristics of development

The presence of the powerful propulsion-steering complex allows precise positioning of autonomous radiohydroacoustic station elements on the bottom surface. The presence of video, sonar and magnetometric equipment makes it possible for search of installed equipment hidden by bottom sediment layer

The main development advantages

The major development advantage is the ability to reduce the time required to install the autonomous radio-hydroacoustic station equipment

Development preparedness state

The project is at the "Technical proposal" stage according to GOST 3974-2000

Market demand

The development can be applied to monitor the shelf underwater conditions of the territorial waters of Ukraine in the State Holding Service units and the Naval Forces of Ukraine

Intellectual property protection status, number of scientific publications

An application for the Utility Model Patent of Ukraine is issued

Underwater vehicle

Technical Specifications

Operating depth, m..……..…..……....200
Overall dimensions, mm....3480x1850x700
Marching speed, knots ……..…….0.6
Tether-cable length, m ..…...….. up to 600
Tether-cable diameter, mm …...…...….6.6
Vehicle mass, kg ……..……..……..1750
Power Supply ……..…....autonomous
Operation time, hours ……..…...….2
Cargo mass, kg ……..…….. 81,5
Number of personnel, people …...……..2

Underwater vehicle

SMALL-SIZED AUTONOMOUS RADIO-CONTROLLED UNDERWATER VEHICLES "AUV-RB"

Purpose and application scope

The underwater vehicles are designed to perform the following operations in shallow water areas: search for underwater objects; inspection of the bottom surface of port water areas and underwater parts of vessels and hydraulic structures using video, hydroacoustic and magneto-metric instruments; high-quality documentation of the process and underwater operation results with GPS- coordinate references

The essence and main characteristics of development

The presence of a buoy provides the operational communication of the vehicle with the control post in real time from any point in the water area. Having a GPS-navigator allows mapping the water area bottom surface and to accurately anchor discovered potentially dangerous objects

The main development advantages

Due to wireless communication with the control panel, it is possible to use the vehicle throughout the port water area without the use of additional boats

Development preparedness state

The project is at the "Technical proposal" stage according to GOST 3974-2000

Market demand

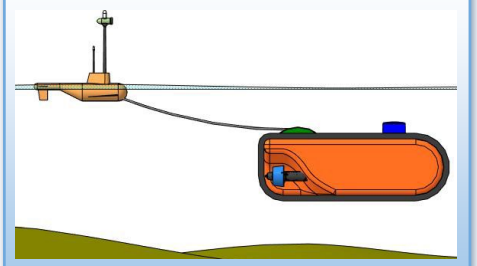
The development can be applied to monitor the shelf underwater conditions of the territorial waters of Ukraine in the State Border Guard Service units and the Naval Forces of Ukraine

Intellectual property protection status, number of scientific publications

An application for the Utility Model

Patent of Ukraine is issued

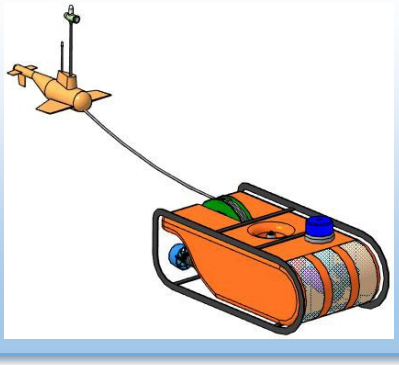
Underwater vehicle



Technical Specifications

Operating depth, m ……...25
Overall dimensions, mm…...850x420x350
Marching speed, knots……..……...…….1
Tether-cable length, m.....…….....to 15
Vehicle mass, kg ……..……...……35
Power supply…….....autonomous
Autonomy, h ……...…...……...2
Control and telemetry……radio channel
Number of personnel, people……...2

Application scheme



SMALL-SIZED AUTONOMOUS UNDERWATER VEHICLES "SHEL'F"

Purpose and application scope

The underwater vehicles are intended for search, identification, inspection of underwater objects by video, hydroacoustic and magnetometric means; monitoring of underwater conditions in the offshore area; high-quality documentation of the process and underwater operation results with GPS- coordinate references

The essence and main characteristics of development

The vehicle is equipped with a search equipment complex with all-round sonar survey, magnetometer, profilographs and a camcorder. The presence of hydroacoustic and radio channels provides a stable communication channel with the control post in the underwater and surface state of the AUV. The presence of a GPS receiver provides the vehicle geographic reference in the operation areas

The main development advantages

One of the major development advantages is the ability to reduce the time spent on the inspection of port waters, hydraulic structures and shelf zones by 45-50%

Development preparedness state

The project is at the "Technical proposal" stage according to GOST 3974-2000.

Market demand

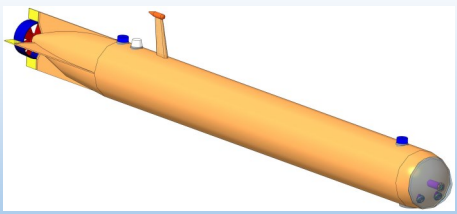
The development can be applied to monitor the shelf underwater conditions of the territorial waters of Ukraine in the State Border Guard Service units and the Naval Forces of Ukraine

Intellectual property protection status, number of scientific publications

An application for the Utility Model

Patent of Ukraine is issued

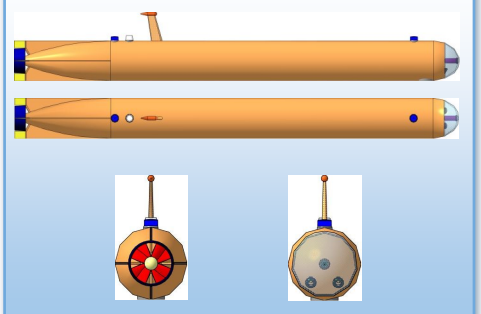
Underwater vehicle



Technical Specifications

Operating depth, m	200
Overall dimensions, mm	533x6000
Marching speed, knots	2
Vehicle mass, kg	1500
Power supply	autonomous
Duration of work, h	2
Number of personnel, people	2

Underwater vehicle



SMALL-SIZED AUTONOMOUS UNDERWATER VEHICLES "PROSTOR"

Purpose and application scope

The underwater vehicles are designed to deliver payload to a given point on the offshore shelf at depths up to 300 m. Identification of the final delivery point by video and hydroacoustic equipment; high-quality documentation of the process and underwater operation results with GPS- coordinate references

The essence and main characteristics of development

The vehicle is equipped with navigation equipment complex, which allows to execute effective load delivery to a point on the offshore shelf according to a given program. The ability to change the set of compartments allows you to configure the vehicle for any payload delivery tasks to any range and quantity and total payload units mass

The main development advantages

The major development advantages are the possibility of payload covert delivery to a given point of the offshore shelf and the ability to change configuration depending on the task.

Development preparedness state

The project is at the "Technical proposal" stage according to GOST 3974-2000

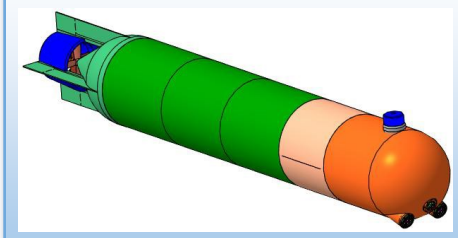
Market demand

The development can be applied to monitor the shelf underwater conditions of the territorial waters of Ukraine in the State Border Guard Service units and the Naval Forces of Ukraine

Intellectual property protection status, number of scientific publications

An application for the Utility Model Patent of Ukraine is issued

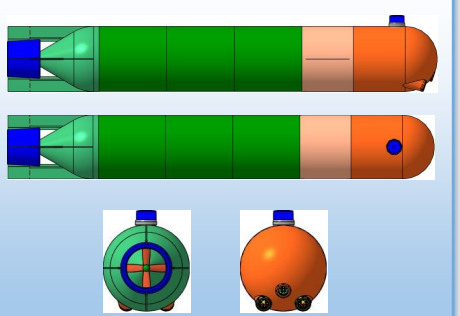
Underwater vehicle



Technical Specifications

Operating depth, m……300
Overall dimensions, mm:
•hull diameter…….....…...440
•Length...…….....….2026-2950
Marching speed, knots…..……...…..2
Vehicle mass, kg..……...580-860
Work duration, h...…….…...… 9,5-28,5
Running distance, km……..……100
Payload, kg…….……50
Number of personnel, people ….……2

Underwater vehicle



SMALL-SIZED AUTONOMOUS UNDERWATER VEHICLES "SKANER"

Purpose and application scope

The underwater vehicles are designed for search, identification, inspection of underwater objects by video and magnetometric equipment; underwater environment monitoring in the offshore shelf area; high-quality documentation of the process and underwater operation results with GPS- coordinate references

The essence and main characteristics of development

A powerful propulsion and steering device provides the vehicle with significant speed. A wide-angle, full-resolution color image camera delivers high-quality bottom-surface shooting. Due to its small weight and dimensional characteristics, it is possible to use the vehicle from the small size vessels

The main development advantages

One of the major development advantage is the ability to reduce the time spent on the inspection of port water areas and shelf zones by 55-60%

Development preparedness state

The project is at the "Technical proposal" stage according to GOST 3974-2000

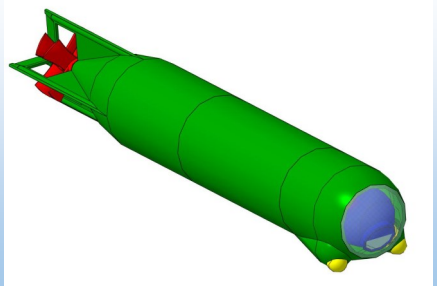
Market demand

The design can be applied for maintenance and inspection of the port water areas, shelf and in the SES units of Ukraine, State Border Guard Service, Ministry of Internal Affairs of the Armed Forces of Ukraine

Intellectual property protection status, number of scientific publications

An application for the Utility Model Patent of Ukraine is issued

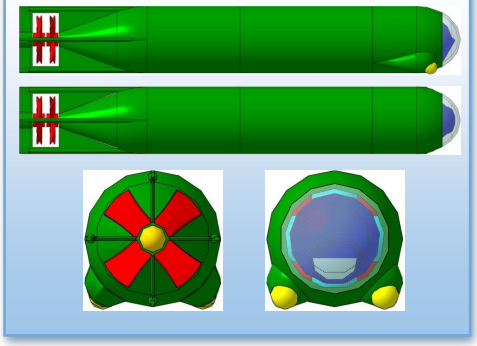
Underwater vehicle



Technical Specifications

Maximum operating depth, m……....50
Overall dimensions, mm..……....150x1000
Marching speed, knots...……..…..5-7
Vehicle mass, kg…….……..……..……80
Battery life, h.……..…….....1.5

Underwater vehicle



SMALL SIZED UNDERWATER UAV CARRIER "OKO"

Purpose and application scope

Designed to perform coastal water patrol at depths up to 50 m with search for potential dangers using hydroacoustic and video equipment; alternating at the point with specified coordinates; concealed lifting to the container surface with the UAV and its launch; reception on the UAV container platform, with subsequent movement to the duty point with new coordinates

The essence and main characteristics of development

The accumulator battery high capacity provides long-time mode covert patrol and duty at a point with specified coordinates. The presence of UAVs provides the visual assessment of the border violation danger, object identification, its video recording and the rapid transfer of information to the control center

The main development advantages

One of the most important development advantages is the ability of the frontier waters covert patrol, alternating at the point with specified coordinates.

Development preparedness state

The project is at the "Technical proposal" stage according to GOST 3974-2000

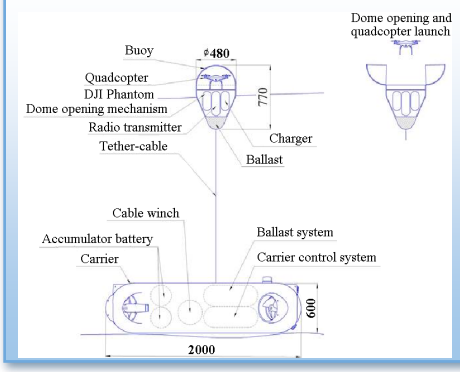
Market demand

The design can be applied for maintenance and inspection of the port water areas, shelf and in the SES units of Ukraine, State Border Guard Service, Ministry of Internal Affairs of the Armed Forces of Ukraine

Intellectual property protection status, number of scientific publications

An application for the Utility Model Patent of Ukraine is issued

Underwater vehicle



Technical Specifications

Maximum working depth, m…….....50
Overall dimensions, mm..2000x1000x800
Marching speed, knots ……..…12
Vehicle mass, kg…….....…….…….…400
UAV container mass, kg……...….30
Cruising range, km……..……...50
Standby mode time, year..……....1
Number of personnel, people.…….....2

UAV Technical Specifications

Flight weight, kg……...….....1
Hovering accuracy, m
- vertically ……...…...……0.8
- horizontally ……...……2.5
Vertical speed, m/s …….....6
Horizontal speed, m/s …….....15
Power Consumption, W. ……...……5.6
Flight duration to, min. ……...……25

TOWED UNDERWATER GARAGE-GLIDER "PLANER-M"

Purpose and application scope

The underwater vehicles are designed for high-performance search and inspection of sunken objects by video and magnetometric equipment. Provide real-time video transmission and two-way information exchange between the underwater vehicle and the towing vessel.

The essence and main characteristics of development

The presence of a small-sized high-speed tethered underwater vehicle as a part of the garage-glider equipment provides a detailed survey and inspection of the sunken object without stopping the towing process

The main development advantages

One of the major development advantages is the ability to reduce the time spent on the inspection of port waters, hydraulic structures and shelf zones by 45-50%

Development preparedness state

The project is at the "Technical proposal" stage according to GOST 3974-2000

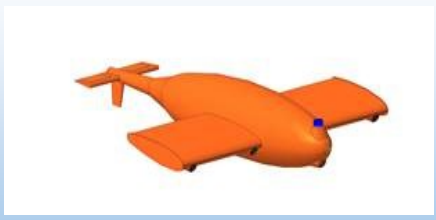
Market demand

The design can be applied for maintenance and inspection of the port water areas, shelf and in the SES units of Ukraine, State Border Guard Service, Ministry of Internal Affairs of the Armed Forces of Ukraine

Intellectual property protection status, number of scientific publications

An application for the Utility Model Patent of Ukraine is issued

Underwater vehicle



Technical Specifications

Maximum working depth, m……150
Overall dimensions, mm…4200x2700x700
Marching speed, knots..……..……4
Tether-cable, m…….....up to 350
Vehicle mass, kg…….……...……...800
Power Supply, V…….....…..…….....24

Equipment layout

WORKING UNDERWATER VEHICLES "TEKHNIK"

Purpose and application scope

The underwater vehicles are designed for search, inspection and inspection of sunken objects by video-, hydroacoustic and magnetometric equipment, performing complex underwater technical operations using underwater manipulators, high-quality documentation of the process and underwater technical operation results

The essence and main characteristics of development

Due to the presence of two manipulators with 5 degrees of freedom, it has the ability to perform complex underwater technical operations. The presence of 2 high resolution camcorders provides full coverage of the performance and the underwater environment. Due to the presence of the magnetometer, it is possible to search for metallic objects in the covered medium (under the soil layer).

The main development advantages

One of the development major advantages is the ability to reduce the time spent on inspection and repair of hydraulic structures by 45-50%

Development preparedness state

The project is at the "Technical proposal" stage according to GOST 3974-2000

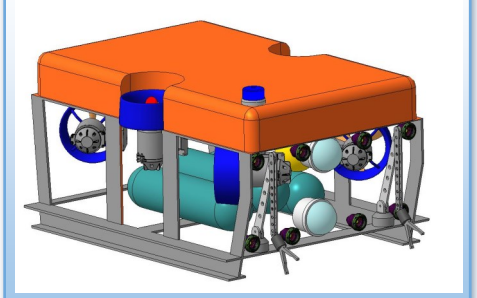
Market demand

The design can be applied for maintenance and inspection of the port water areas, shelf, hydraulic structures and in the SES units of Ukraine, State Border Guard Service, Ministry of Internal Affairs of the Armed Forces of Ukraine

Intellectual property protection status, number of scientific publications

An application for the Utility Model Patent of Ukraine is issued.

Underwater vehicle



Technical Specifications

Maximum working depth, m…….... 100
Overall dimensions, mm.....1600x1200x800
Marching speed, knots……...……..2
Tether-cable length, m..…….....up to 150
Vehicle mass, kg…..……...……450
Power supply..3x220 V, 50(60) Hz, 8.5 kW
Number of personnel, people……...3

Research Pool Tests

UNDERWATER METAL STRUCTURES THICKNESS METER

Purpose and application scope

Designed for use as attachments for remotely operated underwater vehicles in the survey of hydraulic structures, underwater pipelines and underwater parts of vessel hulls

The essence and main characteristics of development

It is intended for remote measurement of underwater metal structures wall thickness by the ultrasonic flaw detection method. It allows metal structures condition assessment and the susceptibility degree to their corrosion, as well as to locate areas that are in emergency and dangerous state. The advantage of the method is the ability to perform inspection of the metal structure condition without damage (without its integrity violation)

The main development advantages

One of the major development advantages is the possibility of reducing the cost of inspection of underwater pipelines and underwater parts of vessel hulls

Development preparedness state

The development is implemented at industrial enterprises of Ukraine

Market demand

The development can be applied to the maintenance and inspection of hydraulic structures, underwater pipelines and the underwater vessel hull parts

Intellectual property protection status, number of scientific publications

The model was implemented in 1995.

The Meter

Technical Specifications

Maximum working depth, m……..1000
Overall dimensions, mm.....550x120x100
Measuring range, mm ……...…...1-50
Measurement error, mm.…….....0.05
Operating frequency, MHz..……...10
Vehicle mass, kg……..…….……....1
Power supply, V……..……..…....12

Meter application

UNDERWATER ELECTROCHEMICAL POTENTIAL METER OF METAL STRUCTURES

Purpose and application scope

The device is designed to measure the electrochemical potential of underwater parts of ships, metal structures of marine hydraulic and oil and gas facilities, underwater pipelines, etc. The device allows to perform measurements of electrochemical potential of metal structures with multilayer waterproofing, of thickness up to 30-35 mm

The essence and main characteristics of development

The device uses a high quality silver chloride electrode, which allows the device to control the electrochemical potential with an accuracy of at least 10 mV.

The main development advantages

The major development advantage is the ability to reduce the cost of inspection of underwater pipelines and underwater parts of vessel hulls

Development preparedness state

The development is implemented at industrial enterprises of Ukraine

Market demand

The design can be applied for maintenance and inspection of hydraulic structures, underwater pipelines and underwater vessel hull parts

Intellectual property protection status, number of scientific publications

The model was implemented in 1994

The meter (measuring instrument)

Technical Specifications

Maximum operating depth, m………....1000
Overall dimensions, mm ……..….130x450
Measuring range, V…………….......….0-2
Measurement error, V………..…...…….0.01
Vehicle mass, kg….……….…….…..……....5.2
Power supply, V………...…....3x220, 400 Hz

Meter application

SURFACE VESSEL WITHOUT CREW

Purpose and sphere of the development use

The monitoring of the water areas and coastal zones (the protection of nature, the ecological monitoring, the protection of the engineering communications and the hydro-constructions, the protection of the underwater historical monuments, the lighting of the surface and underwater situation, SAR and etc.

Essence and main characteristics of the development

The development is used for the creation of the separate marine transport systems. Such systems consist of three main connected subsystem; the first is the main subsystem of energetics and the separate movement, which provides the power supply of the equipment on board the vessel and safe movement of the vessel without crew on the advanced specified course; the second is the subsystem of the mounted equipment , which provides the execution of the different missions; the third is the communicative subsystem for the processing, storage and change od data between on board systems of the surface vessel without crew and the operator's desk (if it is necessary). Depending on the specified task the specified mounting equipment is assembled on the surface vessel without crew, the programming of the route and the approaching the patrolling zone is executing (if it is necessary). During the mission the equipment of the surface vessel without crew can transfer the data to the operator's desk and respond for the operator actions in the real time regime

Main advantages of the development

The main advantage of such systems is the high operational characteristics, the mobility and the universality of the use. The disadvantage is the relatively high capital costs for the creation of the fleet of the surface vessels without crew, their additional equipping and the coastal infrastructure

Demand at the market

This technology can be used at the water transport for the decrease of the operational costs, the increase of the presence time (the increase of the effect of presence), the decrease of risk for the person life during activity at sea

State of the development ready

It has been developed by method of the design of the separate blocks of the main subsystems , the technologies. The simulative and the real tests of the separate joints and the blocks of the main subsystems have been executed. The experimental sample of the surface vessel without crew has been made

State of the intellectual property protection, number of the scientific publication

The results of the development have been introduced at the scientific and engineering conferences, in the competition students works. 2 scientific and research and one research and design theme have been registered

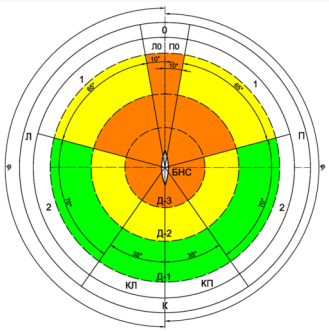


Fig. 1. Diagram of the danger level calculation at channel (drift, positioning)

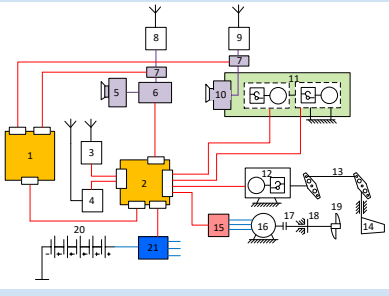


Fig. 2.Functional scheme of the microprocessor system for the current control

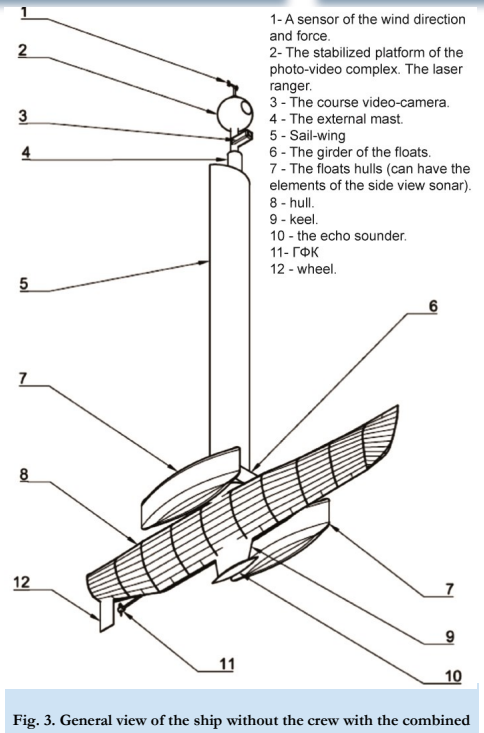


Fig. 3. General view of the ship without the crew with the combined

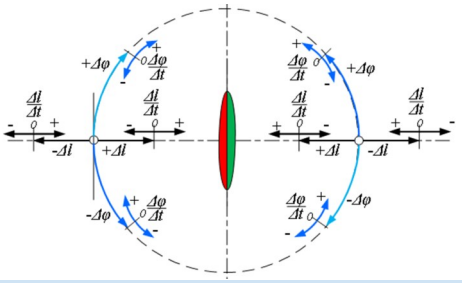


Fig. 4. Graphic interpretation of the obstruction movement direction calculation in accordance with the distance error and the direction angle to the obstruction error

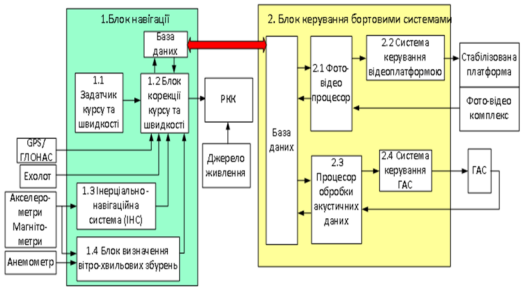


Fig. 5. General scheme of the interaction of the navigation equipment and the sensor board systems

DEEP WATER HARD HULL OF THE TELEBOX

Purpose and sphere of the development

The deep hard hull of the tele box is used for the visual researches at the depths up to 1000 m in the constructions of the uninhabited individual and fastened deep water units for the research of the flora, fauna or for the search of the objects

Essence and main characteristics of the development

The hemispherical optical porthole allows to execute the wide angle view for the objects. The hard hull of the tele box with the implemented optical and electrical hermotap has been made in the three-balls variant with the glass-plastic or carbo-filled plastic balls. The spheroplast with the additional porosity density 450-500 kg/m^3 is used like the light fill of the three – balls construction

Main advantages of the development

The diameter of the hemispherical port hole - 250 mm
The material - the quartz glass
The wall thickness - 15 mm
The angle of view - +180 °
The operation depth - 1000 m.
Mass of the hard hull — 2,5 kg (without glass)

State of the development ready

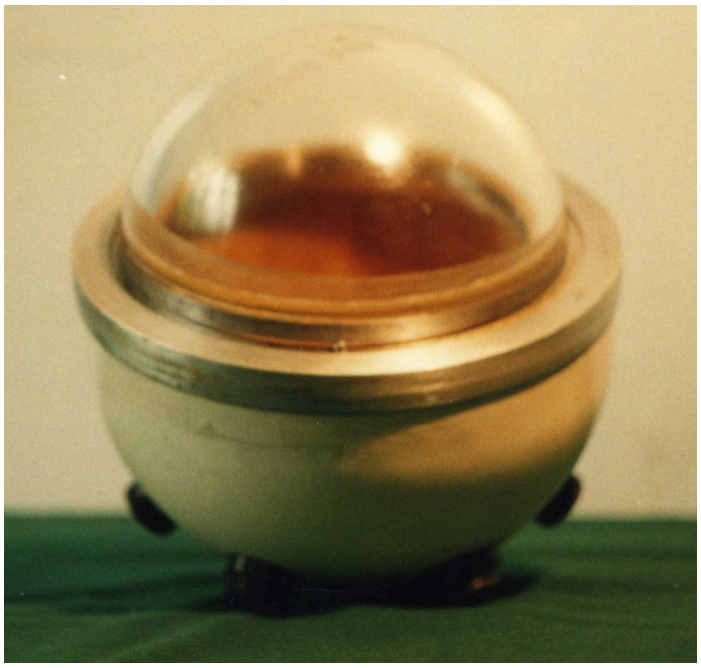
The development has been used in the experimental construction of the shard hull of the nonmagnetic deep water unit

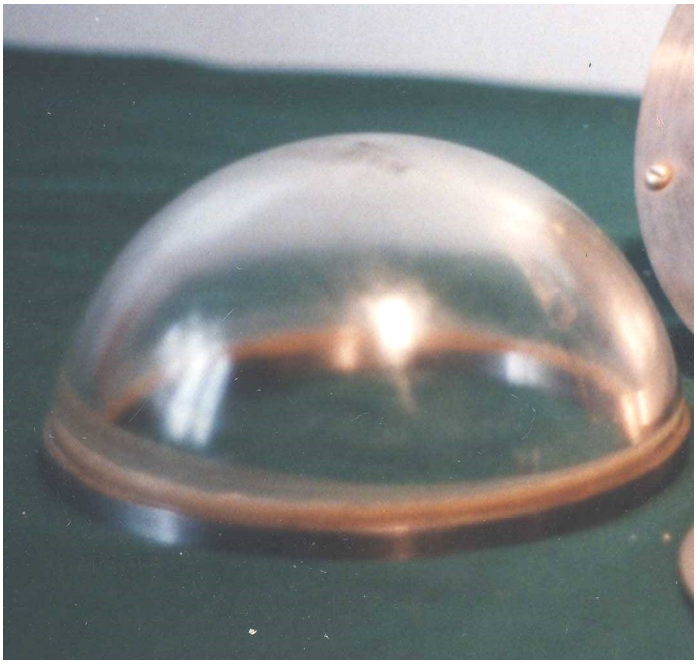
State of the intellectual property protection, number of the scientific publications

The published articles - 4

Demand at the market

The development is perspective for the use in the marine coastal shelf area, and also it is interested for the search of the sea bottom and the underwater pipe-lines and the divers





DEEP-WATER PORTHOLES

Purpose and sphere of the development use

The constructions of the universal deep water portholes are used in the following:
- the populated and uninhabited deep water units;
- the cameras of the high pressure, hyperbaric cameras;
- the constructions of the equipment for the chemical and other fields of the industry, in the autoclaves.

The overall characteristics in accordance with mass are differ very much from the analogical for the suitable level of the pressure

Essence and main characteristics of the development

The conical porthole which has been made of the acrylic resin or the mineral glass allows to execute the wide angle view of the objects at the pressure difference of the external (the internal) pressure up to 60 mPa

Main advantages of the development

The finite angle - 75-105°
The pupil diameter - 70-115 mm
The material - the acrylic resin, the mineral glass
The material of the coat - Ti
The operation depth - 500 - 6000 m

Demand at the market

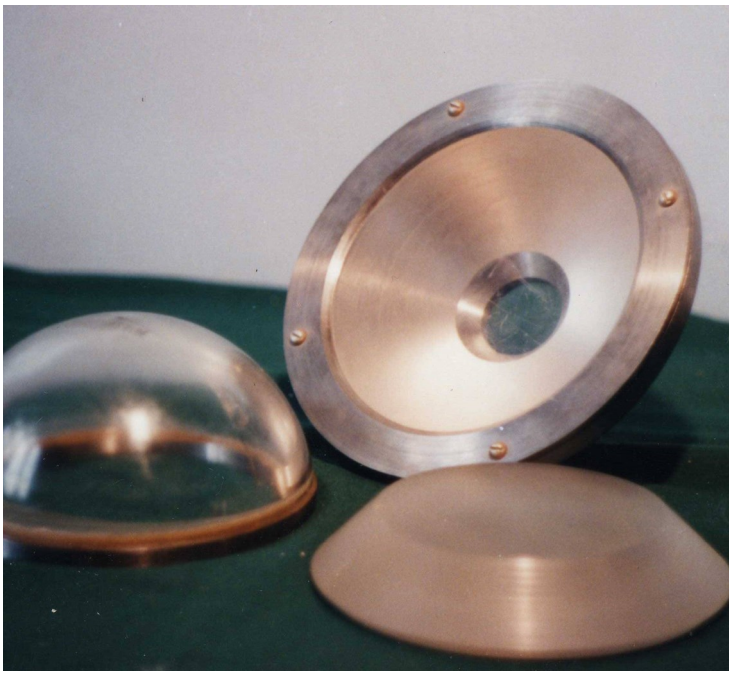
The development is perspective for the use in the marine deep water engineering of the different purpose, and also for the constructions of the high pressure in the different fields of the production

State of the intellectual property protection, number of the scientific publications

The published articles - 5;
PhD thesis has been prepaired for defence - 1

State of the development ready

The development has been used in the construction of the deep water unit of "URAN" with the operation depth up to 6000 m



UNDERWATER LOGISTIC CENTRES

Purpose and sphere of the development use

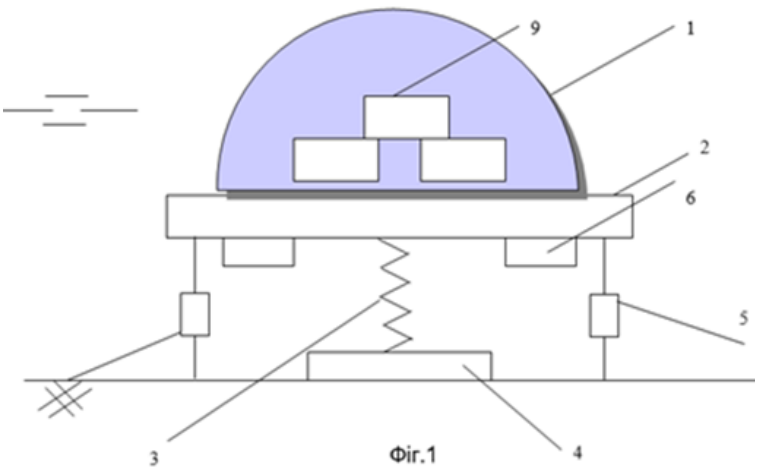
The hydroengineering constructions which can be used at the sea and river ports water areas. The developments are used for the temporary storage of the liquid and solid cargo under water

Essence and main characteristics of the development

The essence of the development is the storage of the cargo at the logistic centres under water.

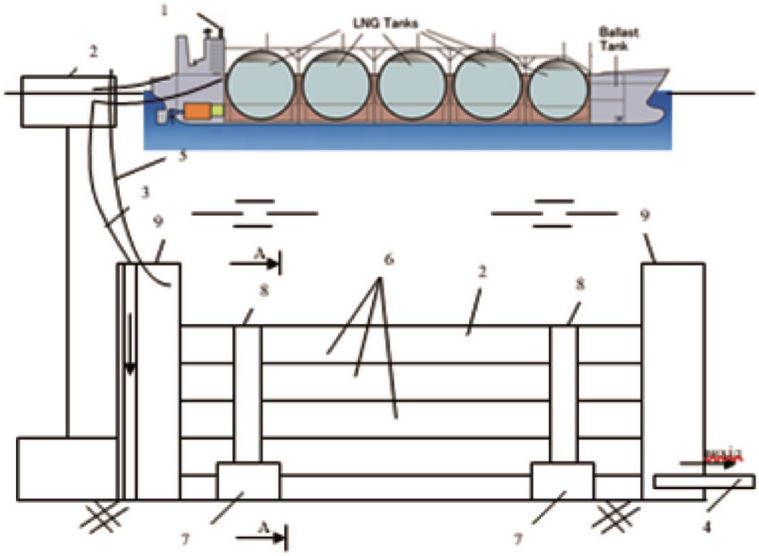
Main characteristics :

- the storage of the large volumes of the cargo under water ;
- the reliability of the storage;
- the support of the ships with big draft passage at the port water area



Фіг.1

The method of the oil products saving under water



Main advantages of the development

The advantage is the increase of the freight flow volume at the port due to the temporary storage of cargo under water. It is reduce the time of the loading and the unloading of the ships near berth in the conditions of the port freight flow constructions capability limit and the small area of the berth

State of the development ready

The construction has been designed like the principle scheme with the choice and the validation of the constructive elements and joints and the technology of the hydroengineering constructions

Demand at the market

Due to the restriction of the free areas in ports and the port approaches there is the need to place the cargo in the alternative zones

State of the intellectual property protection, Number of the scientific publications

2 patents of Ukraine have been received

HYDROACOUSTICAL SECURITY SYSTEM

Purpose and sphere of the development use

The security of the water areas from the unauthorized access to the engineering constructions and the communications, to the closed for the navigation water areas, the sank historical monuments or the lighting of the underwater/the surface situation. It can be used by the state services,organizations and enterprises like the systems of control of the access at the protected water area

Essence and main characteristics of the development

It is based on the use of the multielement dimensional hydroacoustical antenna with the combined passive principle of the determination on bearing into the source of the acoustical field and the determination of the parameters of its dimensional movement. The system consists of the sensor field, received by the hydrophones, signals from them are processing in accordance with the special algorithm by the microprocessor system. The result of the data processing can be storaged or transferred to the operator desk for the further use

Main advantages of the development

It will allow to make secretly the effect of the presence in the controlled water areas. The result of the system operation can be the following observations as (the hydroacoustical information), or the physical echo by use of the additional systems on the determined source of the acoustical field

State of the development ready

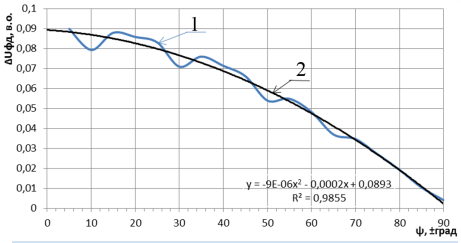
The theoretical research has been executed concerning the system functioning and its creating and the algorithm of its operation. The simulation modelling of the separate units and blocks of the system

Demand at the market

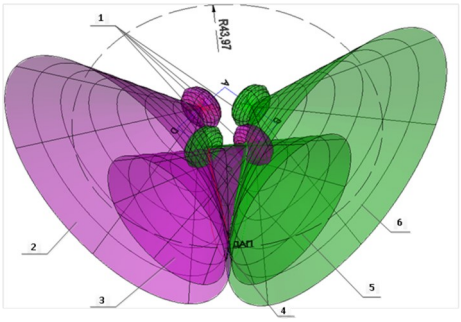
The systems of the control of the access at the protected water area are constantly expanded due to the increase of the expansion of the human activity into the world ocean

State of the intellectual property protection, number of the scientific publications

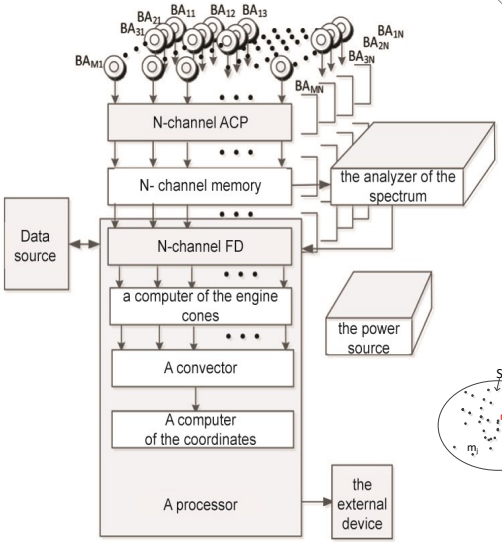
The result of the research is the Master's Thesis



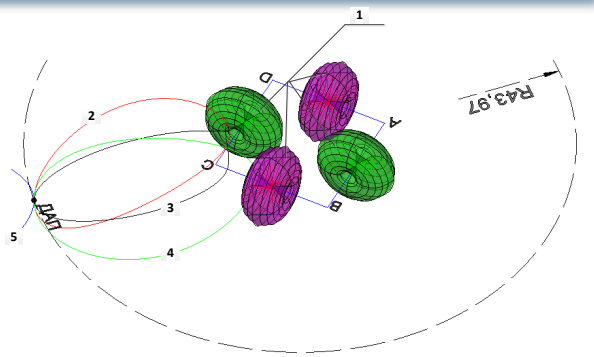
Picture1.Sensitivity of the phase detector like dependence $\Delta U_{\Phi A}=f(\psi)$. 1 – a calculating diagram; 2 – a polynomial approximation



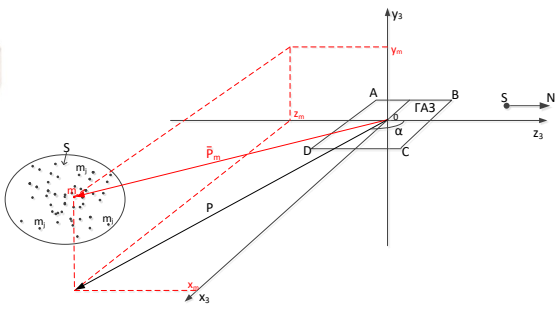
Picture2 Cones of the directions into point source of the acoustical field , determined by the dimensional hydroacoustical antenna



Picture3 Functional scheme of the hydroacoustical station for the passive monitoring



Picture 4 Plotting of the dimensional lines of the cones intersection of the direction into the source of the acoustical field in the plate of the hydroacoustical assembly



Picture5 Determination of the vector into the source of the acoustical field , i.e. the distance and the bearing

MATERIALS OF BUOYANCY OF THE UNDEWATER DEVICES

Purpose and sphere of the development use

The floating composite materials have the low density 500 ... 700 kg/m3 and the strength at the hydrostatic pressure 25 - 140 mPa. They can be used like elements of the additional buoyancy for the underwater devices

Essence and main characteristics of the development

The series of the composite materials of the buoyancy has been developed with the density from 420kg/m^3 up to 600kg/m^3 for the operations at the depth up to 7000 m and the density from 420kg/m^3 up to 450kg/m^3, which are used like deep-water (1500 m and more) and heat-insulating materials

Main advantages of the development

The materials of the buoyancy with the density 650kg/m^3 of Russia production have the maximum depth of the long-term operation up to 4500 m, of USA production with the density 620 - 650kg/m^3 - up to 7000 m., of France production with the density 500 – 520 kg/m^3 have the depth of the operation up to 2000 m. The materials which have been developed by the department team with the density 480-500kg/m^3 have the depth of the operation the same like the French analogs but are the heat-insulating materials for underwater operations

State of the development ready

The developments have been used in the constructions of the uninhabited fastened units and blocks of the buoyancy of the deep-water technical complexes „Agent", „Argo-Buoy" and others which have been produced at the university, and also in the constructions of many underwater devices of Russia and China

State of the intellectual property protection, number of the scientific publications

PhD thesis have been defended - 10;
Publications - 112. Author certifications - 5

Properties	Type of syntactics	
	SDP - 1	SP - 1
Density, kg/m^3	440 – 550	580 – 630
Hydrostatic strength , mPa - density, 440 kg/m^3 - density, 500 kg/m^3 - density, 550 kg/m^3	 25 41 81	 140
Modulus of elasticity , mPa	2600	2850
Strength, mPa - tension - compression		 29 82
Work depth, m - density, 440 kg/m^3 - density, 500 kg/m^3 - density, 550 kg/m^3	 1500 3000 4500	 7000

Demand at the market

First of all in shipbuilding– the underwater (like civil and military). Due to the increase of the oil mining depth in the Black Sea, the necessity of the buoyancy materials is increasing (they are heat –insulating at the depth). It creates the common increasing necessity of these materials. The following enterprises are interested in it :Kazenuy Centre of Shipbuilding, „BSP" Plc, Jiangsu ENTC., Ltd (China)

HEAT –INSULATING MATERIALS OF THE BUOYANCY

Purpose and sphere of the development use

The heat-insulating materials of the buoyancy are used in the underwater devices, especially the populated devices and the constructions of the oil pipelines for the purpose to save the heat at the depths from 500 up to 6000 m at low temperatures of water. The purpose is to save the energy resources of the populated units and to save the oil high temperatures, which has been got at the depths of the marine bottom up to 3000 m during the passage of the oil on the pipelines from the hole up to the terminal

Essence and main characteristics of the development

The deep water material of buoyancy on the base of the syntactic with the additional porosity or foamed glass can be used in accordance with main purpose, connecting the heat-insulating and the heat –resistant properties. The extended heat resistant of the foamed glass allows to use it for the hydrothermal sources of the World Ocean

Main advantages of the development

The spheroplastic with the additional porosity:

- The density - 450 ... 500 kg / m3
- The coefficient of the thermal conduction 0.085 W/m·K
- The work depth up to 2000 m

The foamed glass is the most cheap from all materials of the buoyancy:

- The density - 400 ... 700 kg / m3
- The coefficient of the thermal conduction 0.1 W / m · K
- The work depth 500 m
- Heat-resistance 305 °C

Demand at the market

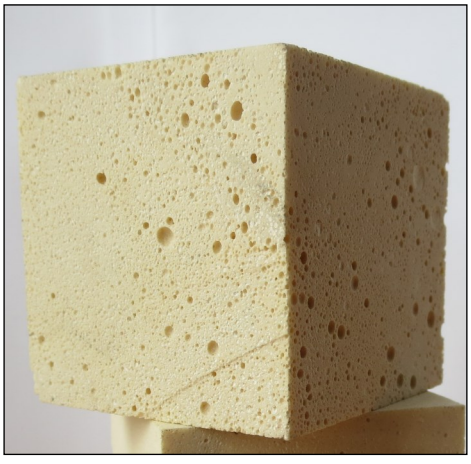
The developments are perspective at the market of the heat-insulating materials for the underwater oil pipelines and the underwater oil storages

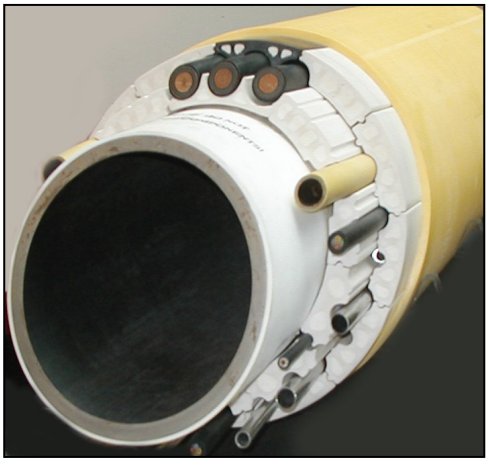
State of the development ready

The development has been used in the construction of the deep-water diving bell with the operation depth for the ship "ALAGEZ",and for the unit "LANGUST"

State of the intellectual property protection, number of the scientific publications

The published articles - 18; The protected PhD thesis - 2, The patents - 2





SPHERICAL ELEMENTS FOR BUOYANCY OF THE UNDERWATER ENGINEERING

Purpose and sphere of the development use

They are used like separate elements of the buoyancy for example as the underwater buoys of the buoyancy, so as in the combination with the thermoplastic or the thermoreactive resins (the syntactic foam) with density 600-650 kg/m^3. And the practical combinations of the syntactical foam with the additional porosity with density 440-550 kg/m^3). The large blocks of the buoyancy of the necessary form have been assembled from the module elements of the buoyancy

Main advantages of the development

- The production cheapness;
- The use of the widespread materials and equipment;
- The increase of the products operation life
- The low specific density

Demand at the market

The development of the mineral and biological resources of the World Ocean requires the reliable in the operation , cheap elements of buoyancy for the populated and uninhabited units of the underwater constructions and robots

State of the development ready

We have the experience of the production and the operation of the experimental sets of the parcelled coats with the following characteristics:

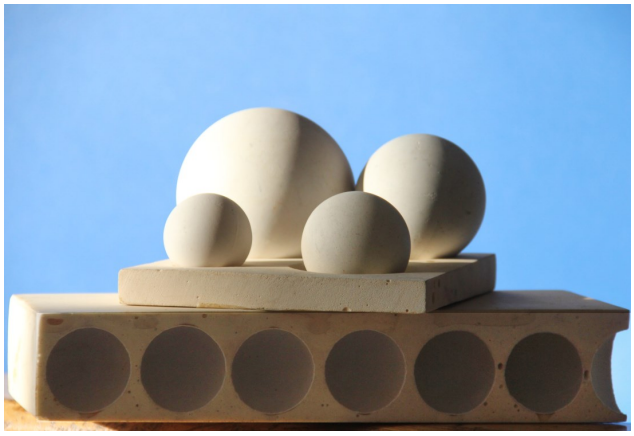
- the external diameter- 30 ... 250 mm
- the wall thickness- 0,8-8 mm
- the specific density- 120 - 650 kg / m3
- the work depth- 6500 m
- the disturbing hydrostatical pressure up to 160 mPa

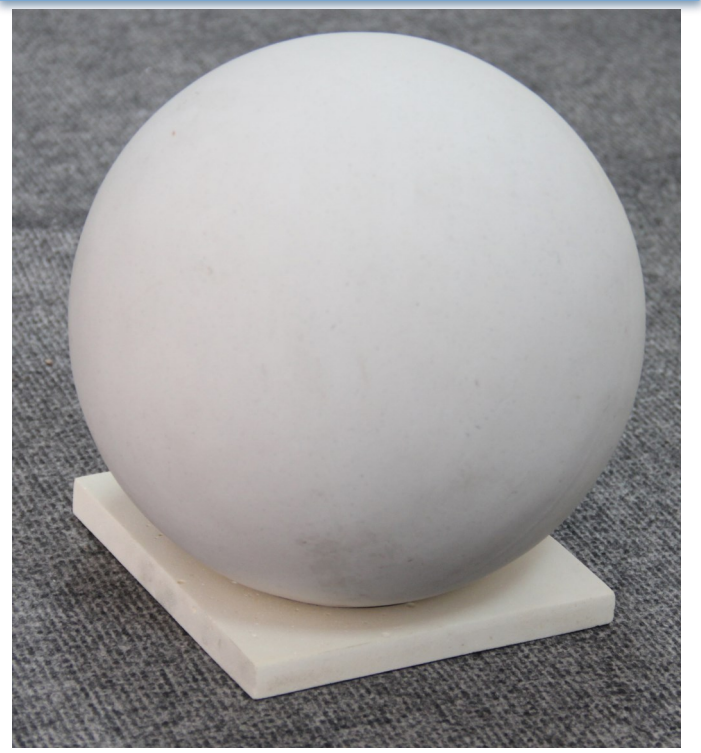
State of the intellectual property protection, number of the scientific publications

The development is protected by author right a.c. of the USSR №1766053

The protected PhD Thesis- 1

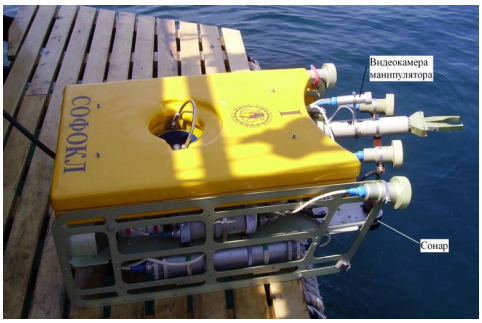
The published articles - 12



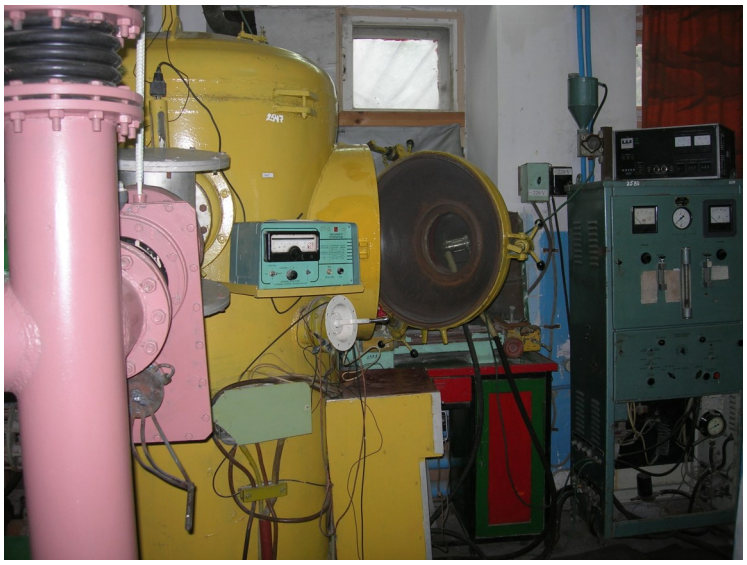


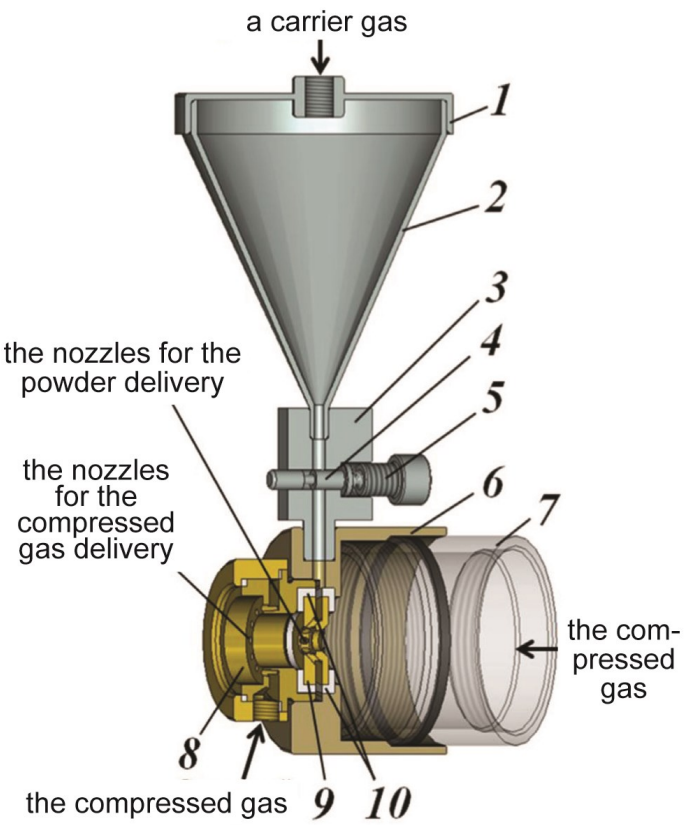
MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
ADMIRAL MAKAROV NATIONAL UNIVERSITY OF SHIPBUILDING

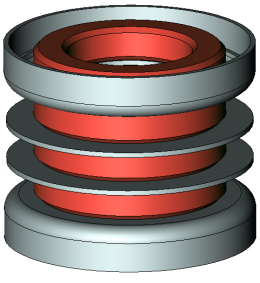




MATERIAL SCIIENCE AND METALS TECHNOLOGY







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Scientific and research department - Phone +0380512424280. e-mail: university@nuos.edu.ua

UNIT FOR THE PLASMA SPRAYING IN THE CONTROLLED ENVIRONMENT

Purpose and the sphere of the development use

The unit is used for the spreading of the corrosion, wear, friction resistant , the heat –resistant coating and other special coatings on the details surface by method of the plasms spreading of the powder materials in the machine engineering

Essence and main characteristics of the development

Plasmatron arc current 150…600 A
Plasmatron arc voltage 30…150 V
Working pressure in the chamber is not less than $1{,}33\times10^{-5}$ Pa
Consumption of the plasmaexecuted gas (mixture) $1{,}65\times10^{-4}$…$3{,}50\times10^{-4}$ m3/s
Pressure of water at the input of the plasmatron is not less than 0,5 MPa
Consumption of water at the outlet from the plasmatron is nor less than $1{,}34\times10^{-4}$ m3/s
Temperature of water at the outlet of the plasmatron is not more than 50 °C
Distance of the spraying 0,15…1,2 m
Form and sizes of the details which are spraying: the shaft with length up to 310 mm, the diameter up to 200 mm;the flat surfaces with length up to 310 mm, the width up to 100 mm

Main advantages of the development

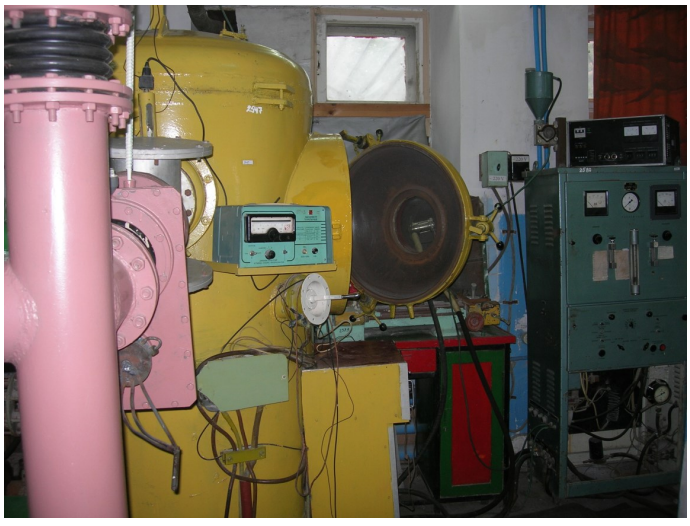
The unit allows to receive the qualitative coatings with high adhesion strength and the compactness with any material

State of the development ready

The unit has been designed and it is used successfully at NUS Kherson branch

State of the intellectual property protection, number of the scientific publications

Several decades of the articles and the thesis of the reports have been published



Unit for plasma spraying in the controlled environment

TECHNOLOGY OF THE CONTINUOUS SAMPLE EXECUTION

Purpose and sphere of the development use

The technology is concerning the black metallurgy - the ways of the execution of the continuous steel sample

Essence and main characteristics of the development

The liquid metal has been saturated into a water-cooled crystallizer from the dispenser dipper in the unit of the steel continuous dispenser. The inhomogeneous magnetic field has been created by use of the electromagnetic field with the specified gradient. The solid particles have been introduced into the liquid metal from the storage bunker at temperature that lower than the point of Curie, in the quantity which is in accordance with the coefficient of compactness β=0,52 – 0,60. The height of the liquid metal in the crystallizer has been supported continuously

Main advantages of the development

The technology allows to increase the speed of the crystallization process and the speed of the metal spillage, to reduce the weight and overall characteristics of the machine of the continuous samples casting, to improve the sample quality, to connect the process of the continuous casting with the process of the rolling

State of the development ready

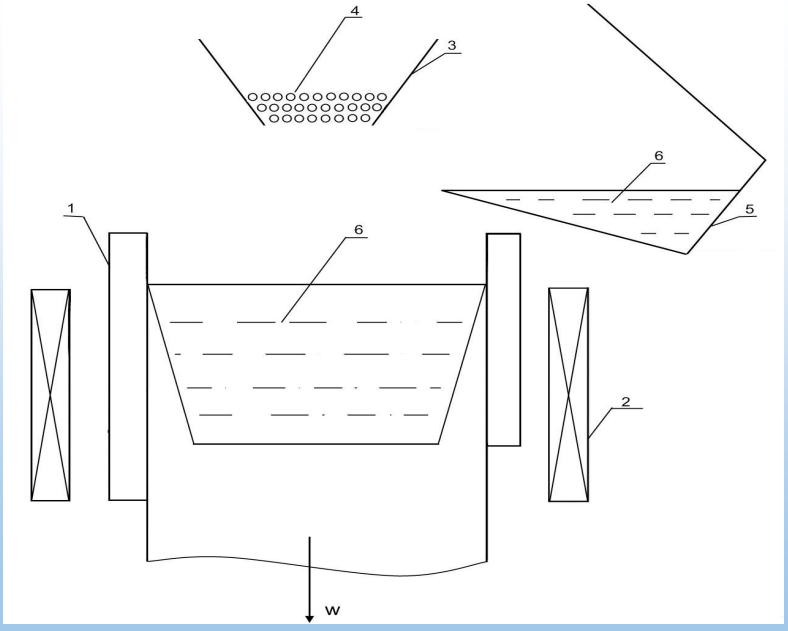
The research model has been executed

Demand at the market

The enterprises of the black metallurgy is interested into the development

State of the intellectual property protection, number of the scientific publications

The patent has been received



MODELLING OF THE STATE OF STRESS AT THE TESTING OF THE THERMAL SPRAY COATINGS FOR THE THERMAL STABILITY

Purpose and the sphere of the development use

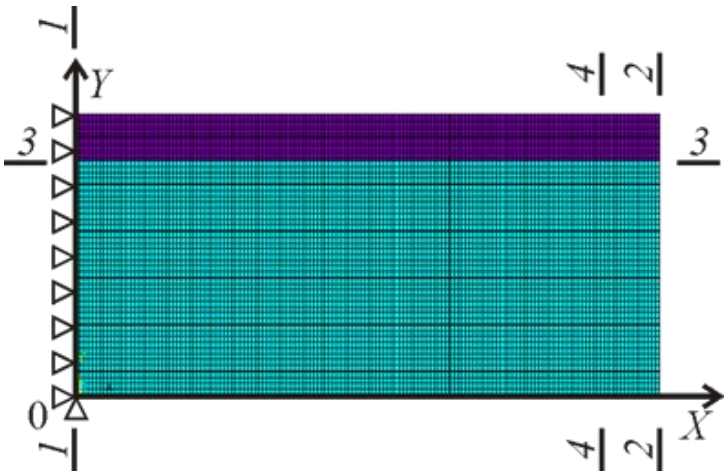
The assessment of the state of stress at the heating and cooling of the samples with the spraying coatings and the determination of some relations of the stress level from the thickness of the coating and the properties of the material

Essence and main characteristics of the development

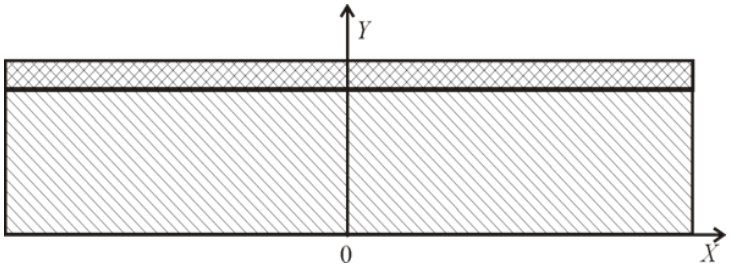
The quantitative relations of the stress at the test for the thermal stability from the hardness and the thickness of the sprayed ball have been executed . The samples like flat plates with the sprayed on the top surface coating which are used at the test on the thermal stability have been researched. The fields and the stress distribution diagram at the stress stage of the operation on the samples with the coating have been analyzed at the increase of the temperature for $T = 100°C$. The sample length is 10 mm. 2 versions of the models are studied : with coating of small hardness (E=0,5·10^5 MPa) and big (E=2·10^5 MPa) hardness. In both versions KLTR of coating material has been accepted less (5·10^{-6} 1/degree), than the base material (12·10^{-6} 1/degree). Poisson coefficient for all materials of the base and the coating is 0,3

Main advantages of the development

The designed model allows to value the state of stress in the thermal spray coatings of different thickness, sprayed by the powder materials at any base



Finite-element model of the samples with the spraying ball for the test on the thermal stability



Physical model of the samples with the spraying ball for the test on the thermal stability

State of the development ready

The quantitative relations of the stress at heating and cooling of the samples with the spraying coating have been executed by the method of the analytical calculation and the computer modelling

State of the intellectual property protection, number of the scientific publications

2 articles and 6 thesis of the reports have been published

MODELLING OF THE INNOVATION TECHNOLOGICAL PROCESS OF THE METAL TREATMENT WITH USE OF THE STRUCTURAL OPTIMIZATION AND THE DETERMINATION OF THE OPTIMIZATION CRITERION PRIORITY

Purpose and the sphere of the development use

It is used for the implementation of new progressive technologies of the metal treatment

Essence and main characteristics of the development

The structurally functional model of the process of the hydroabrasive cutting has been designed. It allows to value the costs for some functional parts of the process and their functions

Main advantages of the development

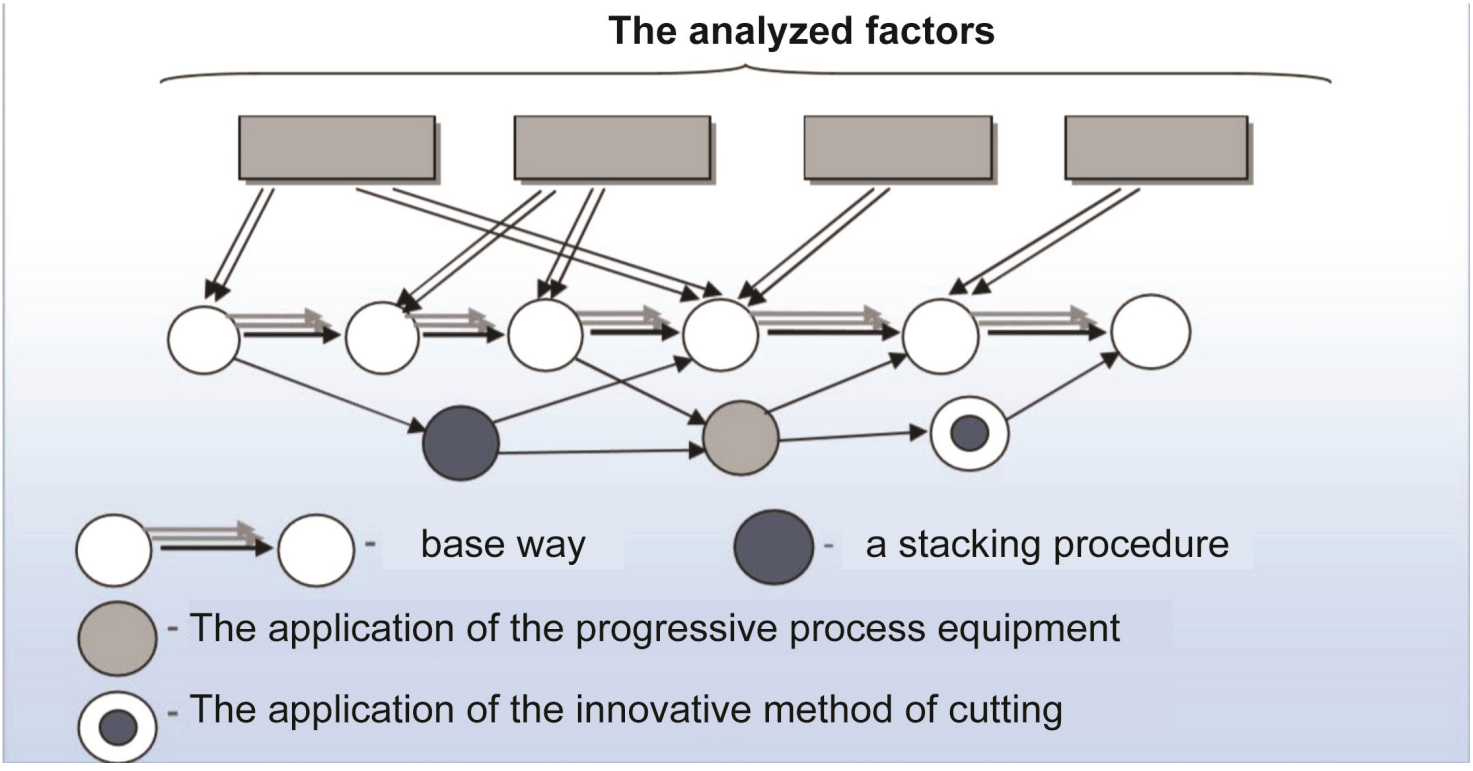
The modelling of the metal cutting process (laser, hydroabrasive) with use of the principles of the system projecting gives the possibility to make conclusions concerning the build of the optimal structure of shipbuilding industry ,which is reequipping technologically

Demand at the market

The research of the innovation technologies gives the possibility to implement more efficient methods of the metal treatment for the increase of the competitiveness of the ships which are building

State of the development ready

It is ready for implementation



DEVICE FOR THE SPRAYING OF THE COMPOSITE COATINGS BY THE ELECTROARC METHOD

Purpose and the sphere of the development use

It is used for the increase of the reliability, service life of new and renewed details of machines and mechanisms, constructions. It provides the saving of the high quality metal, fuel, energy and labour resources, and also the rational use of the natural resources and the protection of the environment

Essence and main characteristics of the development

It provides the possibility of the regulation of the concentration of the powder particles in the wide range of the high temperature of current , and in the composite electroarc coating. It improves the quality of the receiving coating due to the increase of the speed of the portion of the high temperature current and the decrease of the angle of its uncovering, which leads to the increase of the coefficient of the material use at the spraying. For the receiving of the composite coatings, the construction of the electroarc metallizator has not be changed. It is enough to change the regular cover of the sprayed head into the improved cover. The development allows to wide in 2 times the possibility of the electroarc spraying for the creation of the functional composite coatings (wear resistant, heat -proofing, anticorrosion, special and etc.). For example, it is established that, the hardness of the metal matrix, in the cerametallic and glass-to-metal coatings , is increasing due to the creation of the additional cold hardening by use of the appropriate filling on 7 - 21%. At the use in the electroarc coating from 65g 11±3%, A-glass, the strength of the adhesion with the base increases from 28 MPa up to 38 MPa, the wear resistance is increased comparing with the moulded bronze БрАЖ 9-4 in 2,8 times

Main advantages of the development

- The cheapness of the proposed technology;
- The use of the widespread materials and equipment;
- The increase of the products service life duration in 2...6 times

State of the development ready

The executed laboratory tests have confirmed the competitiveness of the composite electroarc coatings and the possibility of their receiving in industry conditions. It has confirmed by acts of the implementation

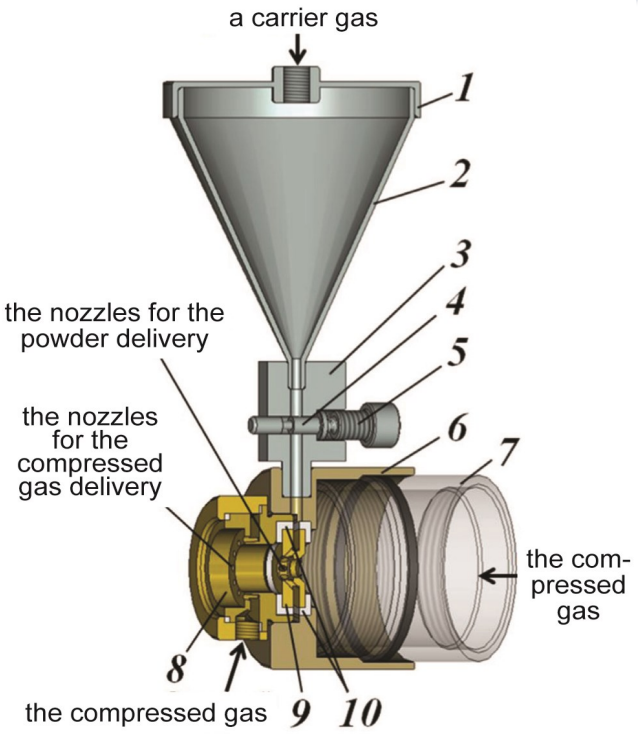
State of the intellectual property protection, number of the scientific publications

4 patents of Ukraine have been received, 20 scientific articles have been published

The scheme of the device is at picture. It is for the electroarc sprayings of the composite coatings , which are in the head 6, which by use of the adapter 7 is fastened to the front wall of the sprayed head. The coverage 6 has the device for the transfer of the powder, which consists of the cover of the bunker 1, the bunker 2 and the measuring device 3. The hull of the measuring device has the arm of control 4 and spring with the screw of control of the measuring device 5. The protection screen 8 presses the nozzle 9, which is in the isolator 10, to the hull of the coverage 6. By regulation of the transfer of the powder by use of the measuring device and the speed of the transfer of the dart, the composite (multicomponent) coatings with different filling of the powder filler in the spayed ball can be received.

Demand at the market

There is the need for the recovering and the protection of wide range of the machine components, constructions at the market. The equipment for the electroarc spraying is cheap, simple in the use. It has been produced in Ukraine. The sprayed coatings increase the duration of the details use in 2…6 times. It has a low prime cost



OPTIMIZATION OF THE ARC MECHANIZED CUTTING BY THE POWDER DART

Purpose and the sphere of the development use

The choice of the equipment and the determination of the optimal parameters of the arc cutting by the powder dart. The cutting of the instrumental steel, the cast iron, the nonferrous metal on the base of Cu, for example, during the cutting of the old ships, the military equipment, the electrotechnical equipment and etc

Essence and main characteristics of the development

On the base of the comparative assessment of the semiautomatic devices ПДО-517, ПДГ-508 і ПШІ-107В in accordance with the cut quality, the power inputs,the speed of cutting and the manoeuvring of the equipment, ПШІ-107В, has been selected , which provides on 5...10% more speed of cutting and better view of the edges. The maximum achieved thickness of the cut without use of the compressed air, is 60 mm. During the use of the air the of the trunk pressure, the thickness of the cut is more than 100 mm, at the thickness of 5...25 mm, the speed of cut can be increased in 2times. The most efficient process of cutting was at holds $l_э = (25…30)d_э$.

The cut width is $2…3d_э$

Main advantages of the development

The mean costs are 2,6 Kw per year/kg , in accordance with the mass of the powder cutting dart, which allows to consider the cutting by use of semiautomatic device ПШІ-107Р enough economical. The metal has not sags in the point of the cut, which are during cutting by imitation electrodes. The simple equipment and materials, the possibility of the cutting of the changeable overcutting in different conditions, the high productivity

State of the development ready

The research sample of the semiautomatic device for the mechanized cutting by use of the powder dart has been executed, which has the index ПШІ-107Р after the modernization

State of the intellectual property protection, number of the scientific publications

It is the common development with Paton Institute of Electric Welding has been implemented during the cutting of the old ship hull constructions, including on the shelf. 2 articles and thesis for reports have been published

FORMATION OF THE GAS-THERMAL COATINGS WITH NANODIMENSIONAL SUBSTRUCTURE BEFORE THE RECRYSTALLIZATION THERMAL TREATMENT

Purpose and sphere of the development use

The development is used for the increase of the reliability and the operating life of new and the recovering of the machine components. It supports the saving of the high quality metal, fuel, energy and labour resources, and also the rational use of the nature resources and the protection of the environment

Essence and main characteristics of the development

The thermal treatment of the sprayed coatings before crystallization allows to increase the limit of the strength, the strength of fatigue, the damping properties and to reduce the thermal conduction with the simultaneous small increase of the plasticity due to the nanostrucrured elements formation. So, for example, for the electric arc sprayed coating which made from дроту 65Г their mean quantity is 32%. The additional deformation by pressing or by the surface plastic deformation (SPD) is used for the making decision of the problem of the short aging.The bigger aging at the thermal treatment provides the active relieving of the residual stress of the coatings and increases the adhesive strength. The combination of the thermal treatment and SPD increases additionally the hardness of the surface balls.It creates the perspectives for the formation of the abrasion-resistant reduced coatings with the cheap materials with the increased corrosion strength and the strength of the coalescence with the base

Main advantages of the development

- The cheapness of the proposed technology;
- The use of the widespread materials and equipment
- The increase of the operation life of the products for 30...60%

Demand at the market

There is the necessity of the recovering and the protection of the machines, mechanisms and constructions parts at the market. The equipment for the gas-thermal deposition is cheap, simple in the use. It is produced in Ukraine. The sprayed coatings increase the operation life of the parts in 2…6 times and have a low cost

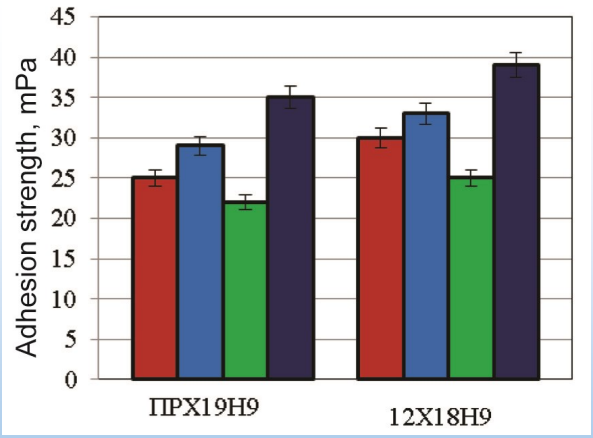
State of the development ready

The executed laboratory tests have proved the competitiveness of the nanostructured coatings and the possibility of their receiving at the industrial conditions

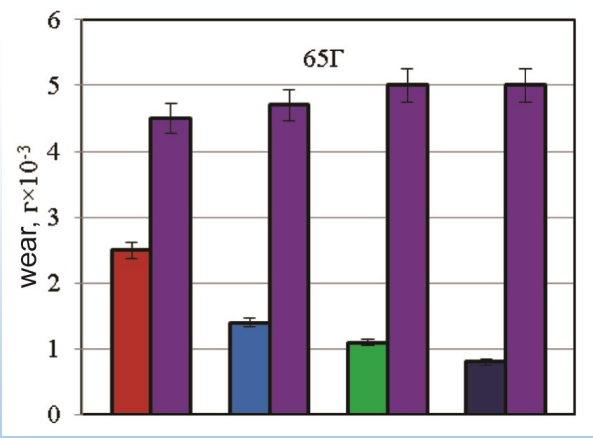
State of the intellectual property protection, Number of the scientific publications

The published scientific articles - 25;

The received patents of Ukraine - 7



The results of the strength definition of the coatings coalescence: ■ - after deposition; ■ - deposition +thermal treatment; ■ - deposition+SPD; ■ - deposition+SPD+thermal treatment



The results of the coatings abrasion : ■ - after deposition; ■ - deposition +thermal treatment; ■ - deposition+SPD; ■ - counterbody

NANOSTRUCTURING OF THE STRAINED STEELS

Purpose and sphere of the development use

The development is used for the increase of the reliability and the operating life of the machines and mechanisms parts by use of the increase of the physical –mechanical properties of steels. It provides the saving of the high quality metals , the increase of the operation resource and the reliability of the products which are made from them

Essence and main characteristics of the development

The increase of the physical-mechanical properties of the plastically deformed steels is possible by use of the formation of the grinded and nanodimensional substructure of steels. The thermal stabilization of the polygonization substructure regardless from the type of the material crystal lattice can be reached as result of the recrystallization thermal treatment of the combined deformed steels. As a result of the executed work, it has been showed that the recrystallization thermal treatment allows to form the substructure with nanodimensional elements in the combined deformed steels. Their quantity can be reached 75% from total number of the structural components with the maximum angle of the misorientation of the subgrain 2,16 °. The formation of such structure allows to increase the value of the steel strength which is not less than for 15%

Main advantages of the development

- The low cost of the proposed technology;
- The use of the traditional material and the equipment;
- The method can be used for the treatment of the different metals regardless of the type of the crystal lattice;
- The increase of the strength, separately from the hardness for more than 15 % , allows to increase the operation life of the products.

State of the development ready

The tests which have been executed in the work, are showed that the proposed technology is competitiveness. It has the possibility of its use in the industrial conditions for the increase of the steel physical-mechanical properties

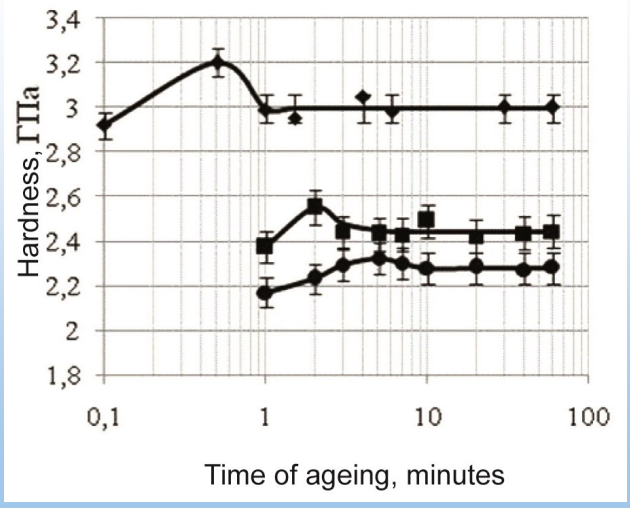
State of the intellectual property protection, Number of the scientific publications

1 patent of Ukraine has been received, 5 scientific articles have been published, from which 1 article is included into SCOPUS– the scientific and metrical base

Demand at the market

The acute need of the methods of the operation life increase of the machine, mechanisms parts is at the world market. The equipment for the thermal treatment and the deformation of metals is cheap, simple in the use.It is produced in Ukraine

The effect of the combined deformation (the cold dynamical deformation for 30 % + the static deformation for 30 %) and the following recrystallization thermal statement : 1 – steel 20; 2 – steel 45; 3 – csteel У8.



The relative quantity of the nanoscaled subgraines, %, in the iron and the steels , deformed technically clean before and after recrystallization thermal treatment

Обробка	Залізо	Сталь 20	Сталь 45	У8	40Х	12Х13
комбіноване деформування	54	17	15	28	37	18
комбіноване деформування та оптимальна термообробка	75	20	22	42	65	34
комбіноване деформування та оптимальна стабілізація	58	16	18	19	16	12

USE OF THE METHYL –ACETYL FRACTION (MAF) FOR WELDING AND GAS-FLAME SPRAYING

Purpose and the sphere of the development use

The use of the gas MAF instead of the expensive and unsafe acetyl in the sphere of the welding and the appropriate technology

Essence and main characteristics of the development

The equipment has been modernized. The operations of welding at different objects by the enterprise CSR «Lider» with use of gas MAF. The possibility of the gas-flame spraying by use of gas MAF has been researched. The comparative characteristics of the flammable gas influence (MAF, acetyl, propane-butane) into hardness of the coatings and the coefficient of the material use have been received

Main advantages of the development

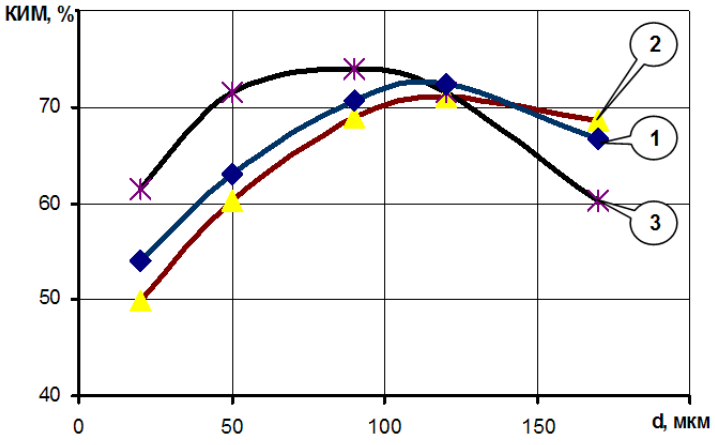
The gas MAF can be storage in the tanks in liquid state. The increased prime cost of welding and spraying comparative with acetyl. The high level of quality of the welded joints and the gas-flame coatings

State of the development ready

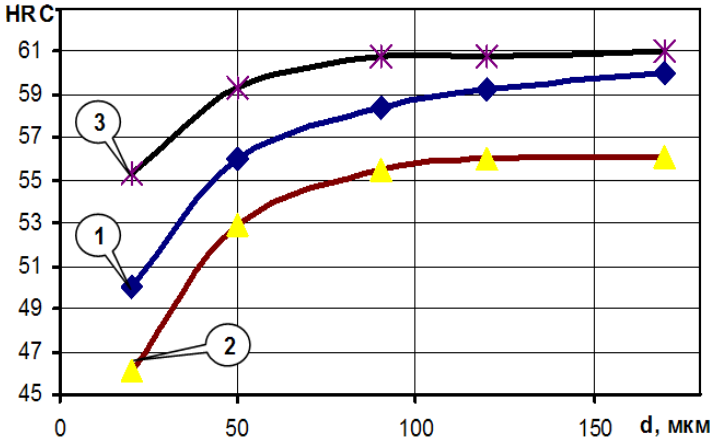
The technological instructions have been developed concerning the gas welding and the gas-flame spraying with use of the gas MAF. At this stage it can be used for welding and spraying

State of the intellectual property protection, number of the scientific publications

The work has been implemented at the enterprises «SPK-YUG» Ltd and CSR «Lider».
1 article and 4 thesis for the reports have been published



Picture 1 Dependence of the powder use coefficient (KPU) of brand ПГ-10Н- 01 from its granulation 1 – MAF, 2 – acetyl, 3 - propane-butane



Picture 2 Influence of the grade composition of the powder ПГ-10Н- 01 into hardness of the coatings
1 – MAF, 2 – acetyl, 3 - propane-butane

DIFFUSE WELDING , TLP-DIFFUSE WELDING AND SOLDERING BY THE CONTROLLED MODE OF DEFORMATION

Purpose and the sphere of the development use

The production of the details from the homogeneous and dissimilar materials by diffuse welding , TLP-diffuse welding and soldering

Essence and main characteristics of the development

The studying of the influence of the regimes,the constructive properties of the joints and the physical and mechanical characteristics of the connected materials into the formation of the mode of deformation which effects into the connection creation and its efficiency at the diffuse welding, TLP-diffuse welding and soldering

Main advantages of the development

The diffuse welding, TLP-diffuse welding and soldering allow to connect the materials with great physical and mechanical properties, when the welding by soldering is not possible. But, the great properties (the temperature coefficient of the linear expansion, the modulus of elasticity, the limits of fluidity, the parameters of the creep of the connected elements and etc.) can lead to the appearance of the residual stress and deformation in the joints. They effect into the creation of the connections and their efficiency positively and negatively during use.

The constructive properties of the details also effect into the mode of deformation and the operation characteristics of the details. The accounting of these properties during design and the production allows to increase the efficiency and quality of the joints and details

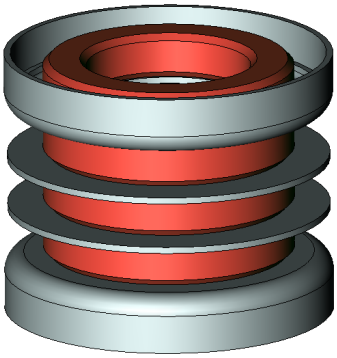
State of the development ready

The technology of the diffuse welding of the hull of the electromagnetic valve with controlled mode of deformation (SE «KACB») and the technologies of the cerametallic hermoinputs soldering for the electron beam gun and the isolators of the high voltage pulse condensers have been

State of the intellectual property protection, number of the scientific publications

2 monographs, 28 scientific articles and thesis of the reports have been published. There are 3 patents of Ukraine

General view of the electromagnetic valve hull samples EK212040.11.00



General view of the cerametallic hermoinput for the electron beam gun

DEVICE FOR THE DEFINITION OF THE COEFFICIENT OF FRICTION BETWEEN THE ATOMS OF THE MATERIAL CRYSTAL LATTIC

Purpose and sphere of the development use

The device is concerning the instrument engineering in the field of the physical material science and can be used for the definition of the coefficient of friction between the atoms of the material crystal lattic

Essence and main characteristics of the development

The device has the straight fixed two piezosensors on the foundation ,between them is the fixed thermostat , connected with the piezosensors to the linear input of the computer. Each piezosensor can be used for the formation of п – type pulse .It generates the wave of the elastic deformation. At the same time, they can be like receiver for the registration of the pulses of the compression signals which are becoming wider

Main advantages of the development

The device is used for the definition of the coefficient of friction between the atoms of the material crystal lattice allows to increase the accuracy of the measurements comparing with the well-known prototype to the order

State of the intellectual property protection, number of the scientific publications

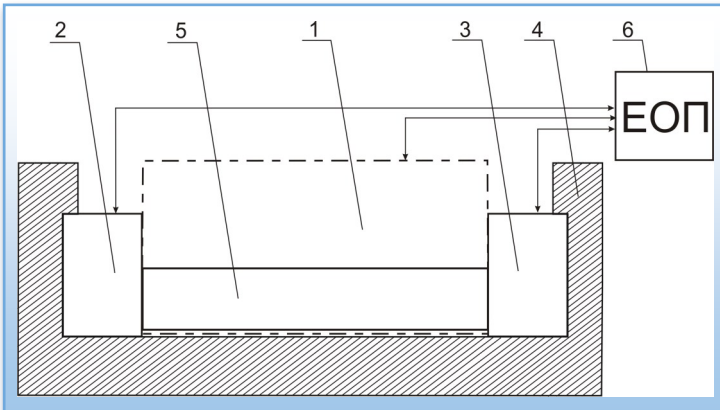
The patent of Ukraine has been received

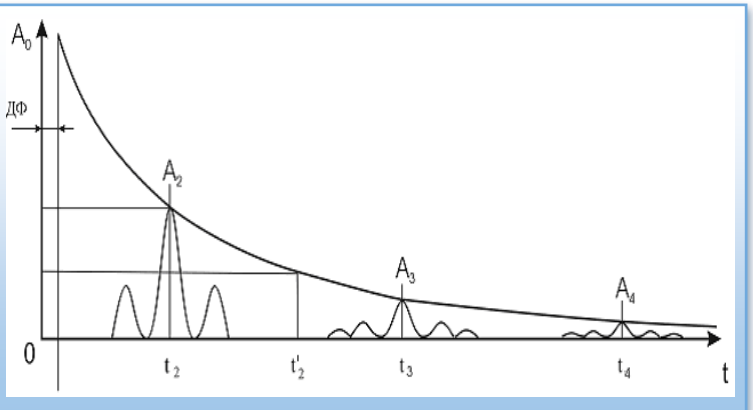
State of the development ready

The sample has been created

Demand at the market

The scientific –researches establishments are interested in the development





MATHEMATICAL MODELLING OF TWO-PHASE ZONES FORMATION AT THE PROCESS OF THE INTERNAL OXIDATION OF THE BINARY ALLOYS

Purpose and the sphere of the development

The results of the work can be used at the development of the new technologies of the thermal and the chemical – thermal treatment for the disperse strengthening of the materials, like the physical base for the search of the ways of the provision of the specified distribution of the parameters of the structure of two-phase area, which are necessary for the receiving by this alloy the necessary complex of the physical and mechanical properties at the process of the internal oxidation (especially, the high temperature strength, the heat-resistance, the wear-resistance and etc.)

Essence and main characteristics of the development

The question of the creation of the disperse particles of the second phase at the diffuse saturation of the binary alloys by thin component has been considered theoretically. The mathematical model of the process of the internal oxidation has been formulated and described by the system of equalizations, of the diffusion in the solid solution of the three-components systems which consists of the particles of the second phase, and the equalization of the continuance for the function of the particles division in accordance with the sizes. The numerical modelling of the process of the internal oxidation in the plate of the binary alloy parameters for the different values of the kinetic and thermodynamic parameters has been executed

Main advantages of the development

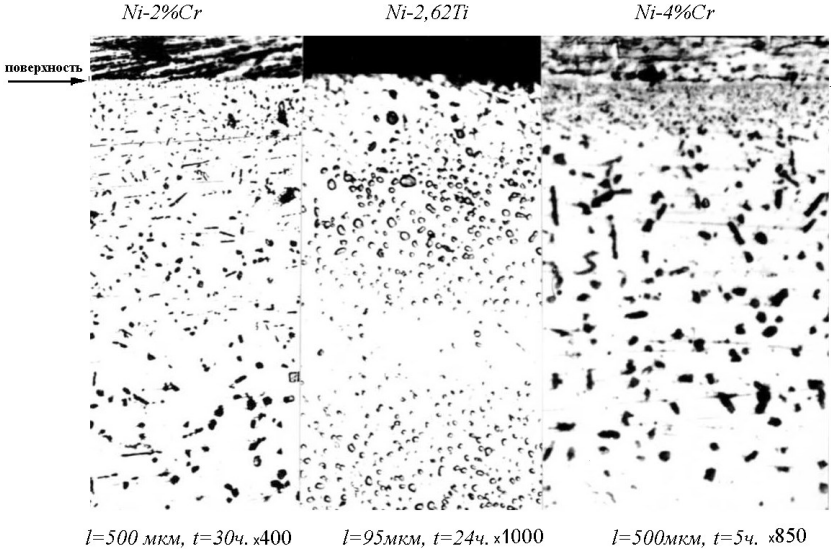
The results of the numerical modelling are in a good accordance with the experimental results concerning the internal oxidation of the plates of the alloy of the type *Ni-Cr* and *Ni-Ti*

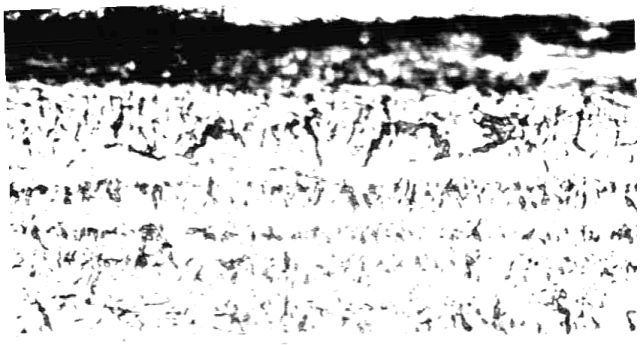
Demand at the market

It is in demand at the market of Ukraine and at the international market

State of the development ready

The theoretically anticipated and the experimentally received the "striped" cstructure of the zone of the internal oxidation, in which the stripes of two-phase area are interchanged by the stripes ,which are free from the particles of two-phase. The material with such structure can be considered composite , and the programmed internal oxidation can be regarded like the perspective method of the receiving of such materials

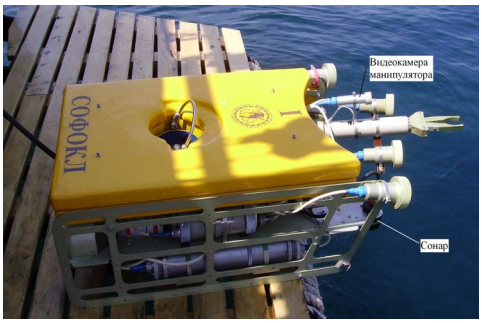




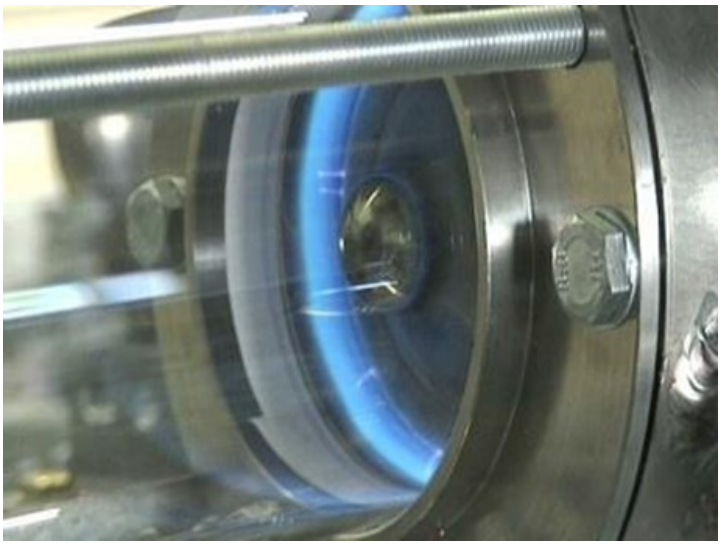
Structure of two-phase zone of alloy Ni-2,5%Al-1,5%Hf, of the internal oxidation thermo-cycling

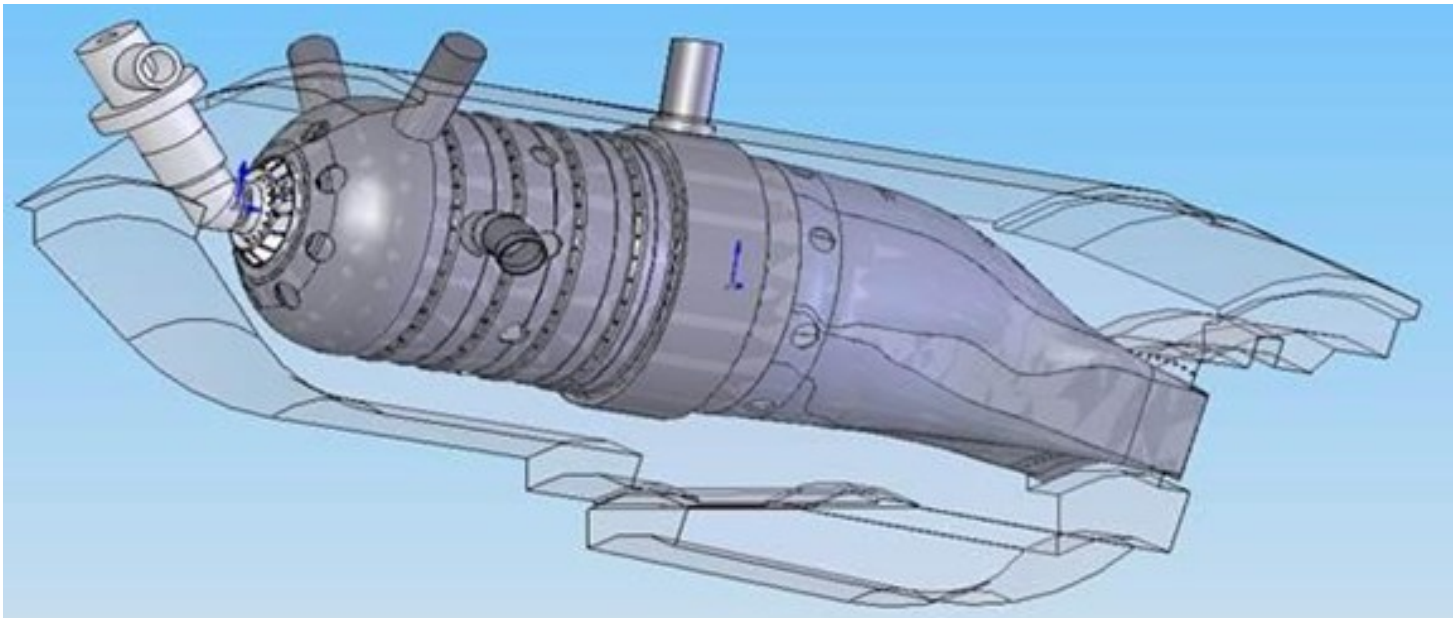
MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
ADMIRAL MAKAROV NATIONAL UNIVERSITY OF SHIPBUILDING





SHIP POWER MACHINE BUILDING AND ENERGY SAVING TECHNOLOGIES



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PLASMA-CHEMICAL TECHNOLOGIES OF THE ORGANIC FUELS USE AT THE POWER PLANTS

Purpose and sphere of the development use

The power machine building, the heat engines and the power plants of the different purpose

Essence and main characteristics of the development

The base of the technology is the idea of the use of the low-temperature (1000-5000 K) wind plasma for the increase of the physico-chemical process of the ignition and the burning of the carbohydrate fuels. The plasma streams give the thermal, chemical and hydrodynamic effect on the main fuel mixture, to increase the reliability of the ignition, the efficiency and the stability of the burning processes

Main advantages of the development

The plasma-chemical technologies increase the reliability of the power plants of the different types start due to the expansion of the fuels ignition range in accordance with the coefficient of the wind excess in 2-4 times, to reduce the emission of the toxic components on 20-40 %, to increase the strength of the burning of fuels on the transition regimes of the operation of the engines, to reduce the commissioning work content, to increase the safety of the engines maintenance

State of the development ready

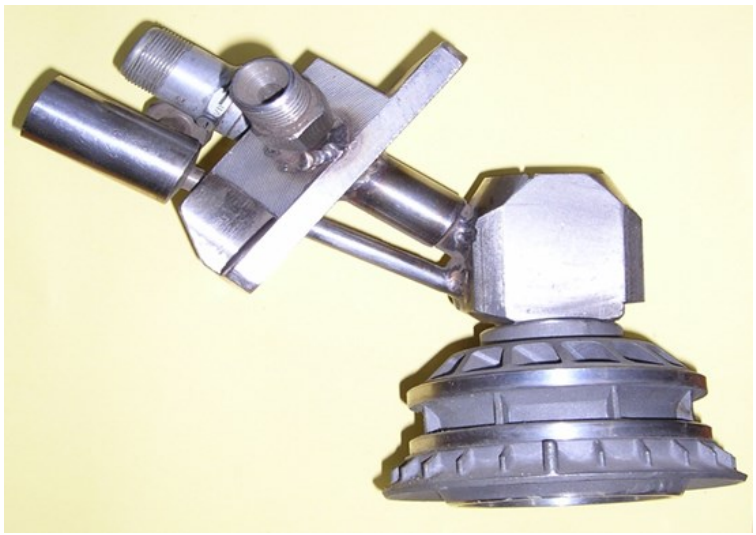
Admiral Makarov National University of Shipbuilding is the main organization in Ukraine, which specializes on the design and the implementation of the organic fuels burning intensification plasma-chemical systems. Today more than 800 gas pumping gas turbine units of such types as ГПА-10, ГПА-16,ГТ-750-6М, ГТН-25 and etc. are equipped by the plasma ignition systems

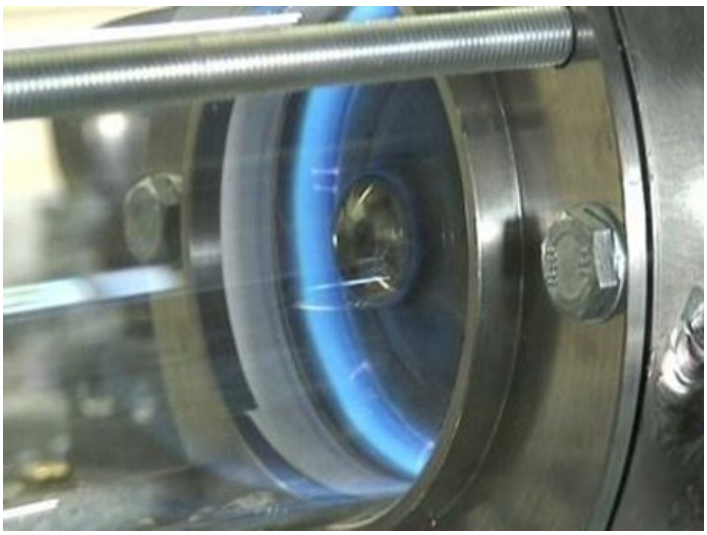
Demand at the market

The technologies can be used at the enterprises of the energy complex at the design and the use of the heat engines and the plants of the ship and stationary types

State of the intellectual property protection , number of the scientific publications

More than 15 author certificates and the patents have been received, more than 100 scientific publications have been published in the professional publications





PLASMA-CHEMICAL GENERATOR OF HYDROGEN-CONTAINING GAS

Purpose and sphere of the development use

Power engineering, heat engines and power plants

The main characteristics of the development

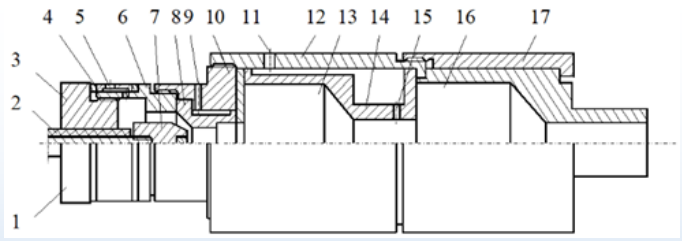
The development is based on the idea of using low-temperature air plasma to generate synthesis gas, which mainly contains molecular hydrogen and carbon monoxide. Plasma-chemical transformations of hydrocarbon raw materials contribute to the stability of the composition of products and provide a wide range of modes of operation of the device

Market demand

The devices can be used by enterprises of the energy complex in the design and operation of diesel and gas turbine plants for various purposes, as well as decarbonized modules of the new generation.

The main advantages:

1. Power consumption - from 0.5 to 5.0 kW.
2. Plasma gas flow rate - up to 5 g/s.
3. The weight of the power supply - up to 60 kg.
4. The weight of the generator - up to 15 kg..



Design of the hydrogen-containing gas generator:
1 – plasma-chemical reactor; 2, 5, 9, 11 – supply of electricity, air and fuel; 3 – holder; 4 – gasket; 6 – reactor body; 7 – cathode; 8 – nozzle; 10 – adapter; 12, 17 – generator body; 13 – chamber for the formation of hydrogen-containing gas; 14 – gas acceleration channel; 15 – fuel channel; 16 – gas and fuel mixture formation chamber

State of intellectual property, scientific publications

Received 3 patents, published more than 10 scientific articles in International journals

Ready state

Experimental samples of plasma-chemical generators were tested on a number of diesel engines.

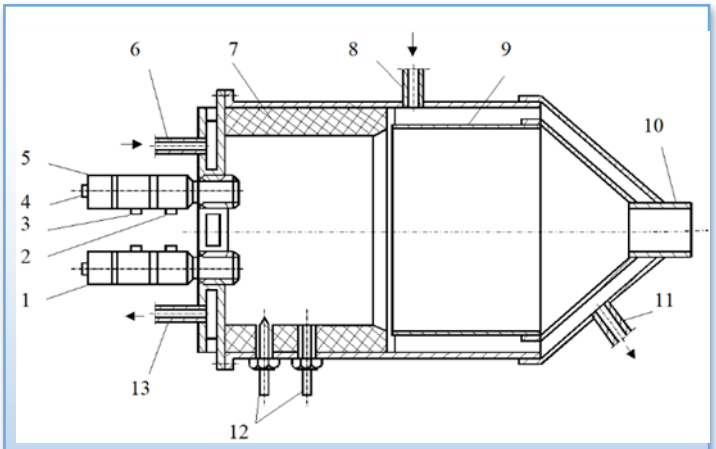


Diagram of the hydrogen-containing gas reactor:
1, 5 – plasma-chemical reactors; 2-4 – supply of fuel, air and power; 6, 8 – water supply pipes; 7, 9 – high-temperature and cooled areas; 10 – gas outlet pipe; 11, 13 – water outlet pipes; 12 – sampling and temperature sensor

HYBRID SYSTEM OF SOLID OXIDE FUEL CELLS AND GAS TURBINE WITH OVER-EXPANSION

Purpose and scope of development

Power engineering, heat engines and power plants

The main characteristics of the development

To improve the efficiency of energy conversion processes in the marine energy system, it is proposed to use the idea of deep utilization of the heat of solid oxide fuel cells in a regenerative gas turbine installation with the over-expansion turbine and plasma-chemical afterburning of waste gases of fuel cells

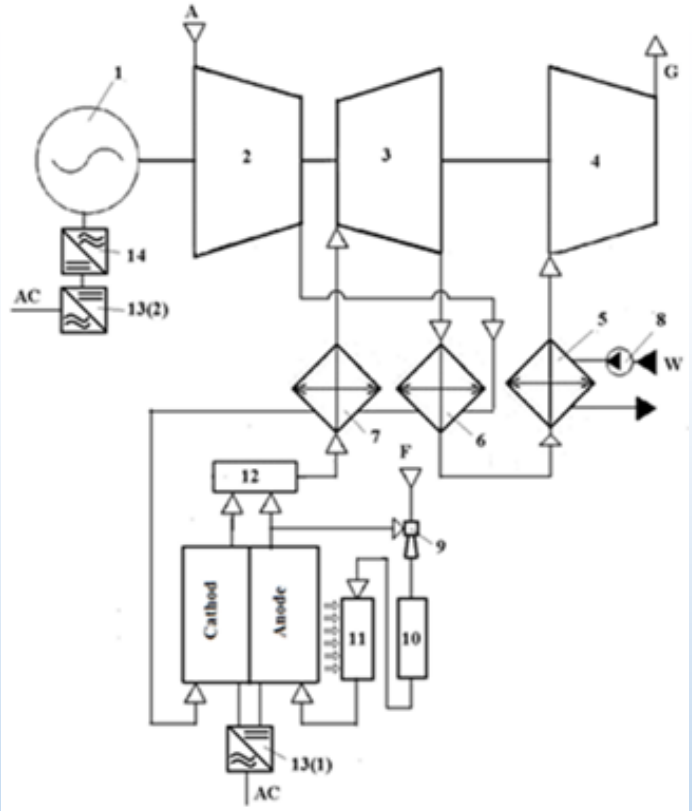


Diagram of an electric power plant using SOFC stacks in combination with a regenerative gas turbine operating with over-expansion:

1 - electric generator; 2 - compressor; 3 - turbine; 4 - exhauster; 5 - gas cooler; 6 - regenerator; 7 - air superheater; 8 - circulation pump; 9 - ejector of gas supply; 10 - preliminary reformer; 11 - built-in reformer; 12 - combustor; 13 (1), 13 (2) - DC-AC inverters; 14 - AC-DC inverter; A - atmospheric air; G - exhaust gases; F - fuel supply

Market demand

Highly efficient and competitive energy systems of the new generation will correspond to the priority transition to ecologically clean energy

The main advantages:

Systems of solid oxide fuel cells with over-expansion turbines, designed for comprehensive and rapid supply of electricity to various facilities, will have an efficiency of 60-70%

State of intellectual property, scientific publications

Received 2 patents, published a number of scientific articles in specialized journals

Ready state

The technology is implemented in the form of scientifically based schematic solutions of power plants, methods of determining rational equipment parameters. The use of gas turbines of various thermal schemes and capacities is proposed

TECHNOLOGIES OF THE LOW-EMISSION FUEL CONSUMPTION OF THE FUELS IN THE HEAT GAS TURBINE ENGINES

Purpose and sphere of the development use

The power machine building, the heat engines and the power plants of the different purpose

Essence and main characteristics of the development

The base of the technology is the idea of the intensification and the increase of the stability of the burning of the advanced mixed depleted fuel and air mixtures in the combustion cameras of the gas turbine engines and the possibility to reduce the discharges of the toxic components of the due to the injection of the water fumes in the zone of the initial mixture

Main advantages of the development

The proposed technologies give the possibility to design and to produce the power systems at the base of the gas turbine engines with the discharges of the nitric oxide and carbon, which is not exceed 25 ppm at the main operation regimes. It is in accordance with the tasks of the European Parliament and Council of Europe Directives

Demand at the market

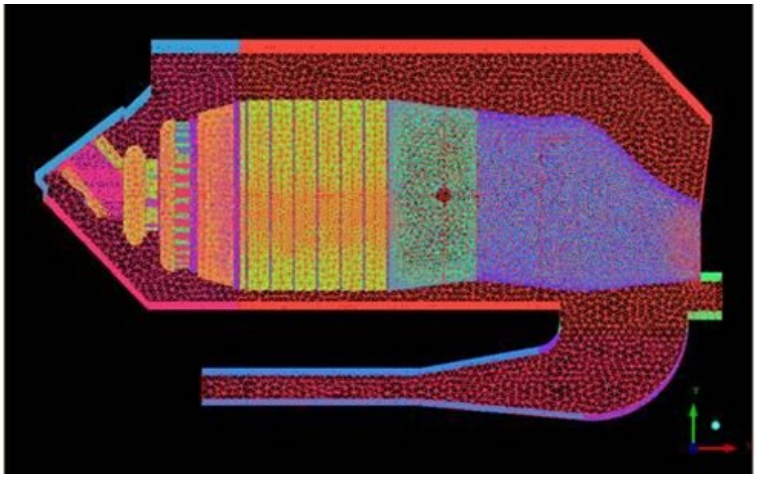
The technologies can be used by the enterprises of the energy complex and for the use of the gas turbine engines and the plants of the ship and stationary types

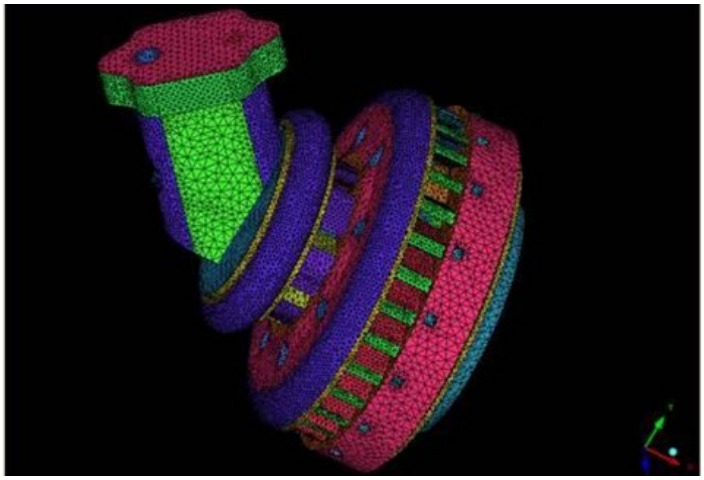
State of the development ready

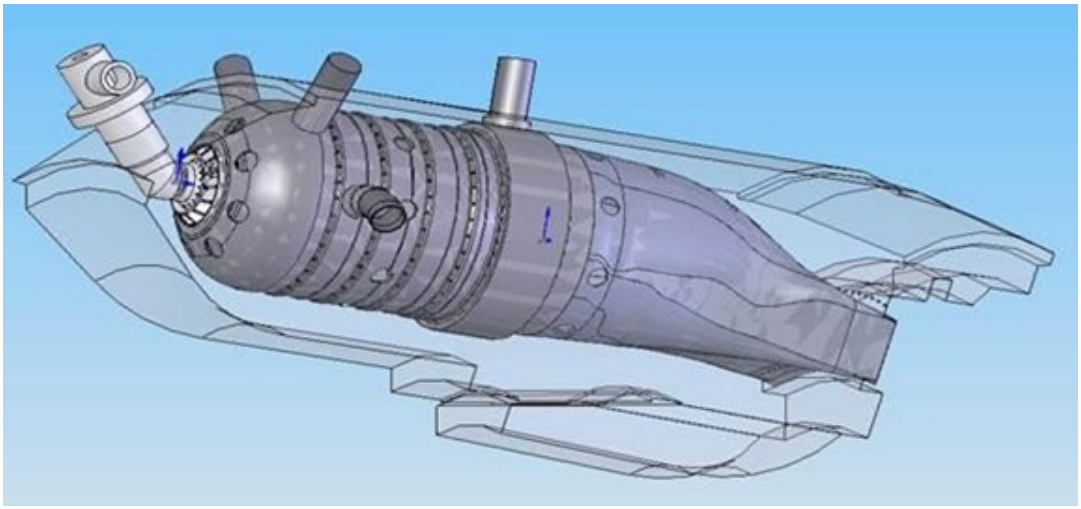
The technologies have been tested at the enterprises of the gas turbine field in Ukraine and China

State of the intellectual property protection, Number of the scientific publications

5 author certificates and patents have been received, more than 50 scientific publications have been published in the professional publications







EXPERIMENTAL STAND FOR RESEARCH OF THERMOCHEMICAL TREATMENT SYSTEMS OF FUELS

Purpose and scope of development

It is used in the conceptual and preliminary design of systems for thermochemical fuel treatment for power plants of various purposes, performed by research institutes, design bureaus and project institutions in the field of power engineering

The main characteristics of the development

An experimental stand for researching the energy efficiency of thermochemical processing of alternative fuels at pressures that correspond to the conditions of supplying hydrogenous fuel gas to heat engines

The main advantages:

The developed stand provides the opportunity to carry out a comprehensive analysis of the influence of parameters of thermochemical processing of fuels with different composition on the efficiency of steam conversion with the formation of hydrogen-containing gases

Market demand

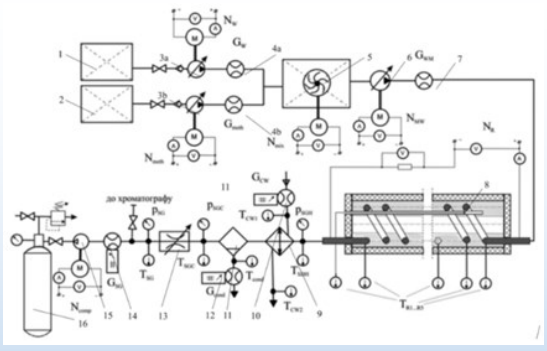
The development is relevant for research institutes, design bureaus and design institutions in the field of power engineering

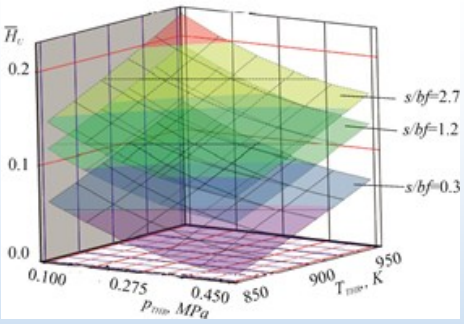
Ready state

Numerical studies were carried out, calculation data were verified

State of intellectual property, scientific publications

A patent for the invention was obtained, and a number of scientific articles based on research results were published





Scheme of the experimental stand:

1 – water tank, 2 – ethanol tank; 3a, 3b – dosing pumps for water and ethanol, respectively; 4a, 4b – water and ethanol flow meters, respectively; 5 – mechanical activator of the mixture; 6 – feeding pump; 7 – mixture flow meter; 8 – reactor for thermochemical treatment of the mixture; 9 – cooler of synthetic gas; 10 – cooling water flow meter; 11 – condensate trap; 12 – condensate flow meter; 13 – throttle valve; 14 – synthesis gas flow meter; 15 – compressor; 16 – synthesis gas storage cylinder

THERMOCHEMICAL TECHNOLOGY OF UTILIZATION OF SECONDARY ENERGY RESOURCES OF HEAT ENGINES

Purpose and scope of development

Heat engines and power plants, which are intended for use as means of reliable, efficient and fast supply of electricity to a wide range of marine infrastructure facilities, vessels of various purposes, as well as stationary and mobile energy complexes

The main characteristics of the development

The technology is based on the idea of utilizing the heat of exhaust gases from engines by performing non-catalytic steam conversion of traditional and alternative fuels with further processing of the obtained hydrogen-containing gas and its low-emission combustion in gas turbine and combined diesel-gas turbine units, or use in fuel cells

The main advantages

The use of heat engines with thermochemical utilization of waste heat as part of power plants ensures:

- reduction of CO_2 emissions by 1.4-1.5 times;
- an increase in the efficiency of the installation up to 4%

Ready state

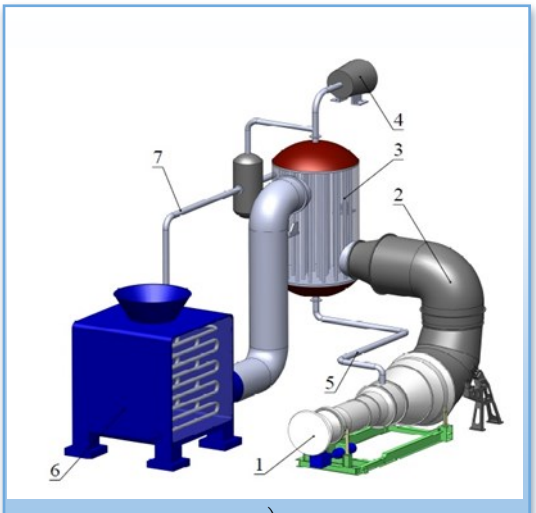
The technology is implemented in the form of scientifically based schematic solutions of power plants, methods of determining rational equipment parameters, calculation software

Market demand

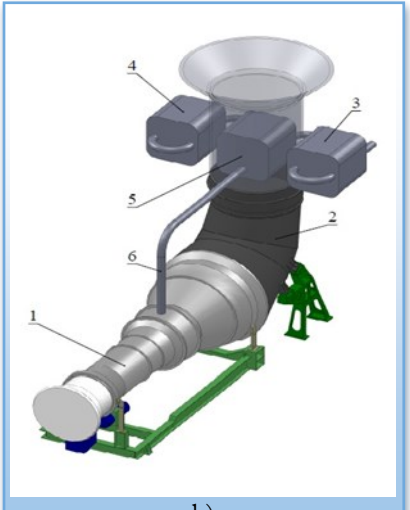
The technology can be implemented in the development of highly efficient and competitive power plants based on new generation gas turbines with a capacity of 3-32 MW for their use as a means of reliable, economical and quick supply of electricity to a wide range of objects

State of intellectual property, scientific publications

Received 4 patents, published more than 50 scientific articles in professional publications, defended a doctoral dissertation



a)



b)

3D models of gas turbine plants with thermochemical utilization:

a) 1 – gas turbine engine (GTE); 2 – gas outlet; 3 – thermochemical reactor; 4 – fuel supply compressor; 5 – synthesis gas supply pipeline to the gas station; 6 – recycling boiler; 7 – steam pipeline;

b) 1 – GTE; 2 – gas outlet; 3 – fuel section of the heat exchanger; 4 – steam-water section of the heat exchanger; 5 – thermochemical reactor; 6 – the pipeline for the supply of synthesis gas to the gas station

HIGH-TEMPERATURE THERMAL ACCUMULATORS

Purpose and sphere of the development

The accumulation of the high-temperature thermal energy for the use in the power plants of the different purpose

Essence and main characteristics of the development

The designed thermal accumulators provide the functioning of the individual power plants, which use the high-temperature thermal energy and need the minimal mass overall size indices

Main advantages of the development

– the potential of the thermal energy accumulating with temperatures up to до 3000 K;

– the possibility of the operation with different types of the transformers of the thermal energy

Demand at the market

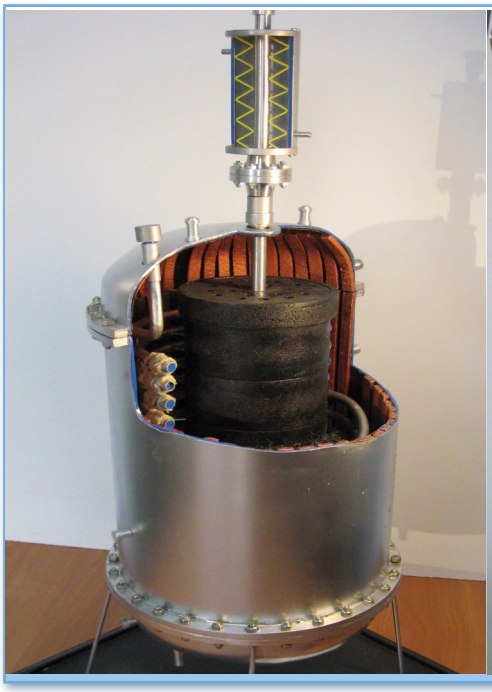
It is specified by the needs of the design of the individual power plants with the use of the high-temperature thermal accumulators

State of the development ready

The research samples

State of the intellectual property protection, number of the scientific publications

The development has been defended by 3 patents of Ukraine . It is in 2 monographs and in 23 scientific publications



ENERGY SAVING TECHNOLOGIES ON THE BASE OF THE THERMOGAS DYNAMIC COMPRESSION FOR THE SYSTEMS OF THE POWER PLANTS HEAT UTILIZATION

Purpose and the sphere of the development use

The gas turbine and diesel plants, the power plants of the industrial and municipal energetics, the transport, refrigerating plants

Essence and main characteristics of the development

The base of the proposed technologies is the use of the thermogas dynamic compression, the essence of it is the increase of the pressure as the result of the momentary evaporation of the mist liquid, injected into the increased flow of the heated fumes or gas. Due to the increase of the pressure of the boiling flow , the consumption of the power is decreasing for the work body compressing, the coefficient of efficiency is increasing and the consumption of the fuel—power resources by plants is decreasing. The peculiarity of the proposed technologies is that they use the low -potential heat of the engines and the power plants , the utilization of it by use of the traditional methods: in the steam and water tank is problematic due to the temperature of the sources of the overflow heat. In the refrigerating energetics the use of the thermogas dynamic compression gives possibility to provide the decrease of the power consumption for the compressing of the low-boiling working body in the refrigerating machines with use of heat. Due to this the cool production is increasing , and appropriately the temperature of the cycle wind of engines and power plants and at the finite calculation, is decreasing , and the reduce of the fuel consumption by them

State of the development ready

The main elements and the circuit solutions have been researched and produced.
It is implemented into production

Demand at the market

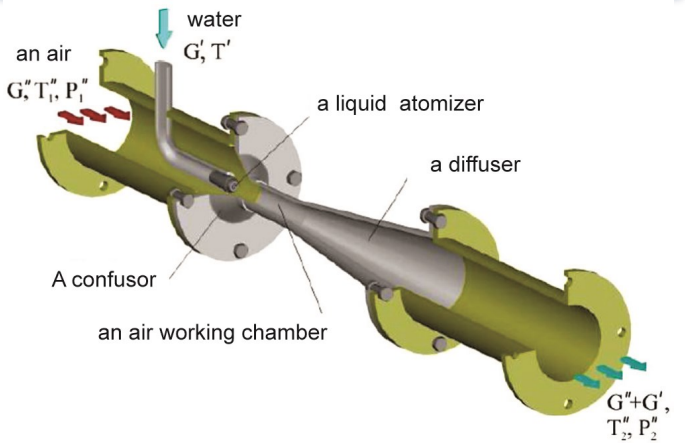
The methods of the design and the circuit simulation solutions can be used by the organizations which execute the design and use of the power plants , and also the higher scientific establishments of MESU, which train the specialists on speciality : «Power machine building» and «Heat-and-power Engineering»

State of the intellectual property protection, number of the scientific publications

Patents of Ukraine - 8
The articles in the professional issues - 32

Main advantages of the development

The realization of the principles of the rational organization of the operational processes in the circuit solutions of the cool produced plants provides the efficient use of the overflow potential of the power plants at the higher temperatures of wind. The fuel consumption reduce by the power plants is 5...10%



Realization of the process of the thermogas dynamic compression in the aerothermopressor unit

ENERGY –SAVING TECHNOLOGIES WITH THE CONDENSATION HEAT SURFACES FOR THE SYSTEMS OF THE POWER PLANTS HEAT UTILIZATION

Purpose and the sphere of the development use

The boiler and diesel plants, the power plants of the industrial and municipal energetics, which use the liquid fuels

Essence and the main characteristics of the development

The base of the proposed technology is the burning of the water-burning emulsions with water component of 30 %, in the engines, which provides the reduce of the intensity of the low-temperature corrosion of the surfaces of heat less than the admissible level 0,25 mm/year. It allows to establish the condensation surfaces of the heat in the utilization tank and to increase the depth of the utilization of the outgoing gases up to 70 % (instead of 45 %), due to it the tanks COE is increasing up to 95 % comparing with 90 %. The establishment of the condensate surface of heat reduces the content of Nitrogen oxide in gases for 55 %, Sulphur oxide - for 50 %, and the content of the solid particles - вin 3 times. The reduce of the injections provides the reduce of the pollution of the surfaces of heat , which increases the period between the clearance of the surfaces of heat in 2,5 times

Main advantages of the development

The burning of the water-burning emulsions with water component of 30% in the diesel plants allows to reduce the fuel consumption by the power plants up to 8...15%

Demand at the market

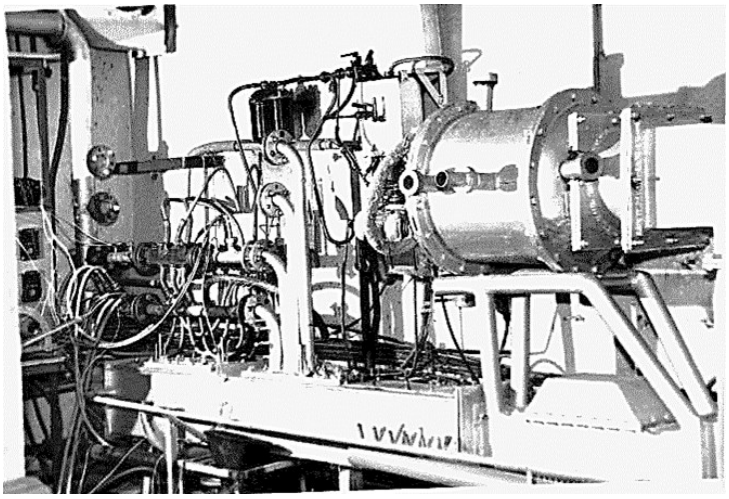
The methods of the design and the circuit simulation solutions can be used by the organizations which execute the design and use of the power plants, and also the higher scientific establishments of MESU, which train the specialists on speciality: «Heat-and-power Engineering»

State of the development ready

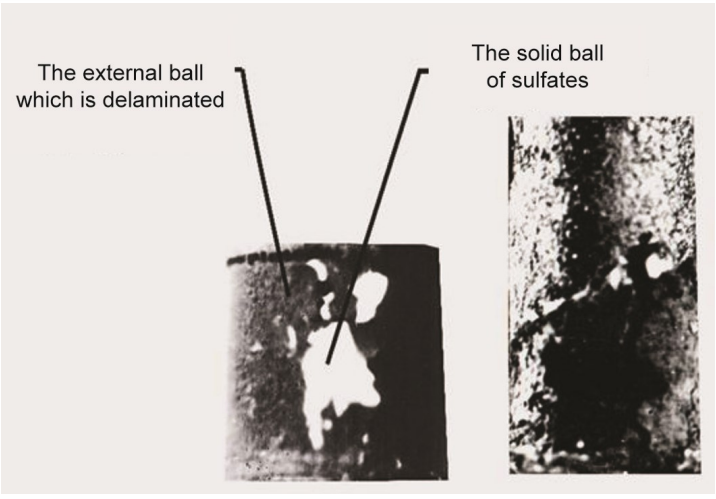
The main elements and the circuit solutions have been researched and produced. It is implemented into production of SE "Teplotechnika"

State of the intellectual property protection, number of the scientific publications

Patents of Ukraine - 2; the articles in the professional issues - 10



General view of the experimental unit



a) b)

Appearance of the precipitations at the burning:
a) water-burning emulsion with the water of 30 %; b) fuel oil

INCREASE OF THE COOLING SYSTEM EFFICIENCY OF THE BOOSTED AIR FOR THE SHIP LOW-SPEED DIESELS

Purpose and the sphere of the development use

The design of the thermal used system of cooling , which utilizes the heat of the boosted air of the ship low-speed diesel and provides its cooling for temperature which is lower than the temperature of the outboard water at the high temperatures of the environment air and the outboard water

Essence and main characteristics of the development

The conditions of the use of the ship low-speed diesels are different by the great change of the temperature of the environment air during the trip, and the air on the input of the turbine compressor and the boosted air behind the turbine compressor. The fuel efficiency of the low-speed diesels, excluding the parameters of the air on the input of the turbine compressor, depends on the temperature of the boosted air on the input of the boosted receiver, which depends on the temperature of the cooling (outboard) water. At high temperatures of the outboard water the standard coolants of the boosted air don't support its temperature at the specified level, which is enough for the damping of the increased temperatures of air on the input of the turbine compressor and the provision of the high fuel efficiency of the low-speed diesels

State of the development ready

The main elements and the circuit solutions have been researched and designed. The results of the work (the method of the calculation of the rational parameters of the processes of the air cooling, the constructive characteristics of the coolants; the scheme of the systems of utilization and cooling) have been used during design of the system of cooling and the utilization of heat, the heat-exchange equipment of ship and stationary power complexes : " Teplotechnika"Ltd, "Megaimpex" Ltd, "Energocomplect" Ltd. (Kherson town), "Zavod Ekvator" Plc (Nikolaev town), in production, at NUS educational process

Main advantages of the development

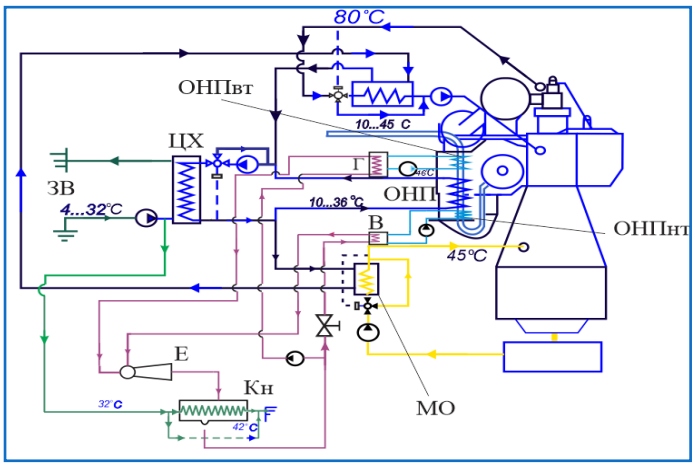
The realization of the principles of the rational organization of the working processes in the system of the deep cooling of the boosted air of the ship low-speed diesels provides the efficient use of the heat energy at increased temperatures of air and water. The reduce of the fuel consumption by the power plants is 2%

Demand at the market

The methods of the design and the circuit solutions can be used at design of the modern ship engines by the advanced firms - producers of the engines

State of the intellectual property protection, number of the scientific publications

Patent of Ukraine - 4; The articles in the professional issues –more than 40



Thermal used system of the cooling of the boosted air of the ship ICE: ЦХ - a central refrigerator; ОНП - a cooling of the boosted air; ЗВ - an outboard water; МО - an oil cooling; Е - an injector Кн - a condenser

THERMOPRESS UNIT FOR COOLING OF THE BOOSTED AIR OF THE SHIP ENGINE

Purpose and the sphere of the development use

The diesel power plants of the industrial and municipal energetics, ship power plants

Essence and main characteristics of the development

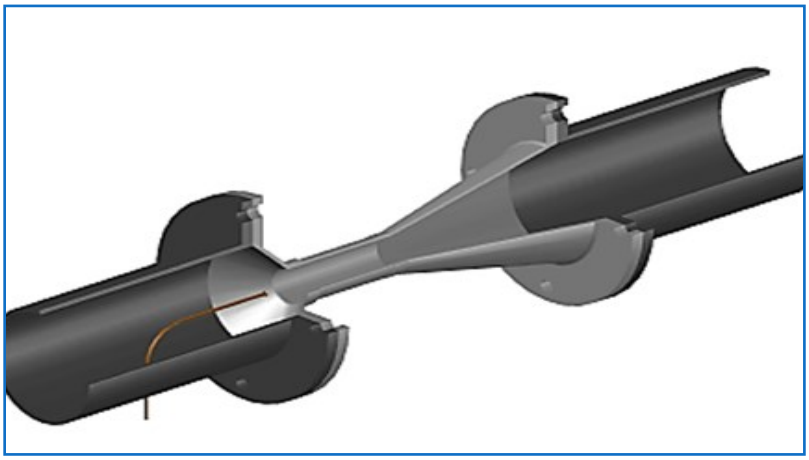
For modern power plants on the base of ICE, it is usual that, the increase of power is executed by use of the useful operation of the wide range of the combustion products with the reduce of the consumption of the power for the compression of the working substance. It is executed by use of cooling of the cycling air, which leads to the reduce of ICE specific fuel consumption. The use of cooling of the boosted air allows to increase the power of ICE on 2,5…3,0 % on each 10 °C of the air temperature reduce. One of the perspective method of the contact cooling of the air is the use of the thermogas dynamic compression. The units in which the thermogas dynamic compression is used , have the name thermopressor. The use of the thermospressor in the system of the в системі turbocharging of ICE is the perspective direction of the increase of the efficiency of the heat engine , because the triplet effect can be achieved : the cooling of the boosted air; the increase of the boosted air pressure; the reduce of the nitrogen oxides emission NO_x (the ecological humidifying)

Main advantages of the development

The realization of the rational organization principles concerning the working processes in the circuit solutions of the diesel power plants provides the efficient use of the boosted air potential. The reduce of the fuel consumption by diesel power plants is 2...5%

Demand at the market

The schemes of the boosted air cooling can be used by the organizations which execute the design and the use of the diesel power plants, higher educational and scientific establishments , universities which train the specialists on the speciality : «Power machine building» and can be implemented at the shipbuilding organizations



Thermopress unit

State of the development ready

The developed method of the calculation and the mathematical model of the thermopress system of cooling of the boosted air of the diesel unit, aand also the efficient rational scheme of the thermopress systems of cooling of the boosted air

ENERGY-SAVING TECHNOLOGIES WITH USE OF THE HEAT PUMP STEAM GENERATING UNIT FOR THE SYSTEMS OF THE POWER PLANTS HEAT UTILIZATION

Purpose and the sphere of the development use

The diesel power plants of the industrial and municipal energetics, ship power plants, the heat pump plants

Essence and main characteristics of the development

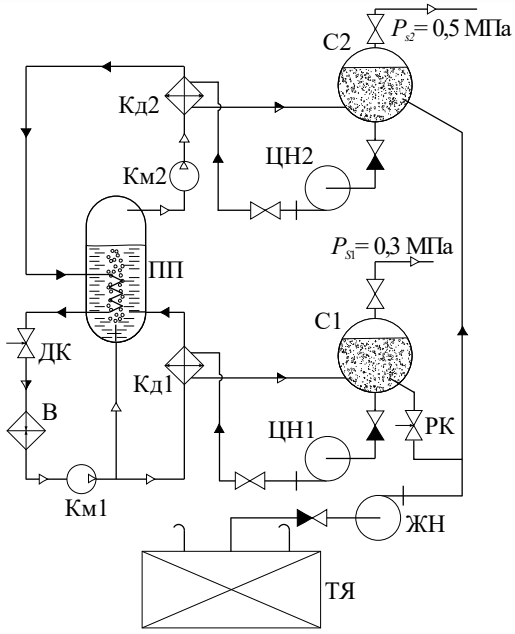
The base of the proposed technologies is the use of the heat pump steam generating plant, the essence of it is the increase of the temperature potential of the low-potential source of the water heat, the system of ICE cylinders bushings with the content of the water fumes of the necessary parameters for ship fumes users. Due to the receiving of the water saturated fumes in the heat pump steam generating plant, the fuel consumption is reduces for the receiving of the water fumes in the auxiliary tank on board the ship. The peculiarity of the proposed technologies is they use the waste low-potential heat of the engines and the power plants, the utilization of which by the traditional methods is problematical due to the low temperature of the waste heat sources . In ship energetics the use of the heat pump steam generating plants gives possibility to provide the reduce of the fuel energetic resources due to the reduce of the use of the mature sources of energy in the auxiliary tank for the receiving of the water fumes

State of the intellectual property protection, number of the scientific publications

The patents of Ukraine for the useful model - 2; the articles in the professional issues - 18

State of the development ready

The circuit solutions have been researched and designed. The use in the production



Scheme of HPSGU with receiving of the water fumes of 2 pressures:

Км – a compressor ; В – an evaporator; ДК – a drill –throttle valve; КД – a condenser; ПП – a borderline can; ЦН – a circulating pump of water; С – a separator of the water fumes; РК – a reducing valve; ЖН – a supply pump; ТЯ –a warm case

Main advantages of the development

The use of the ship heat pump steam generating plant provides the efficient use of the low– potential waste source of the water heat of the system of cooling of the ship ICE with the content of the deficit water saturated fumes for the ship user reduces the consumption of fuel in the auxiliary tank for 12...18%

Demand at the market

The methods of design and circuit solutions can be used by the organizations , which execute design and use of the steam generating plants , and also the higher educational scientific establishments of MESU, universities train specialities on speciality : «Power machine building» and «Heat power engineering»

REGENERATION DEVICE FOR INTERNAL-COMBUSTION ENGINE

Purpose and the sphere of the development use

The device is used for the regeneration of the part of the heat energy of the exhaust of the petrol engine of the internal combustion into the electrical energy and further –in the mechanical energy of the car movement. The sphere of the device use is the re-equipment of the work models of the car with the purpose of the fuel consumption economy

Essence and main characteristics of the development

The device is the thermoelectric generator with section construction, which works on the thermal energy of the exhaust. It has been proposed the use of the wind cooling of the generator sections for the receiving the optimal COE for the regeneration. The possibility of the receiving up to 1 kW of the electrical energy during it use has been showed

Main advantages of the development

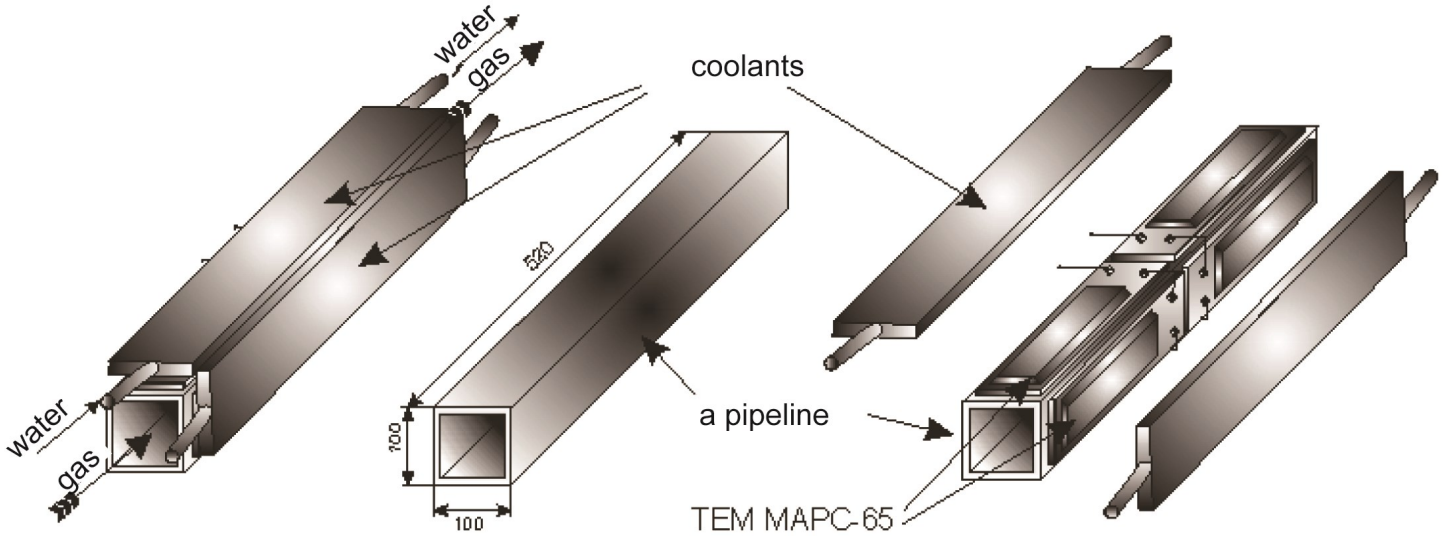
The sectional thermoelectric generator allows to execute the change of the electromechanical generator of the car with further use of the excess regeneration energy. The energy which has been saved as result of the regeneration, during the recalculation of the used fuel is not less than 2%, it is the important like in the economical so in the ecological aspects

State of the development ready

The experimental sample of the section has been executed, the basic schemes have been described, the proposed characteristics have been confirmed

Demand at the market

It is used at the market of Ukraine and at the international market



Construction of the thermoelectric generator section

METHOD OF THE DIESEL ENGINE ALTERNATIVE FUEL COMPOSITION REGULATION

Purpose and the sphere of the development use

It is used for wide range of the diesel engines of the stationary purpose and for transport vehicles

Essence and main characteristics of the development

This method allows to change the composition of the fuel for the diesel engine, which uses the alternative additions to the base fuel, and to determine their influence into efficient indices of the engine. It gives possibility to combine the different fuel combinations for regulation of the efficiency and the ecological compatibility parameters

Main advantages of the development

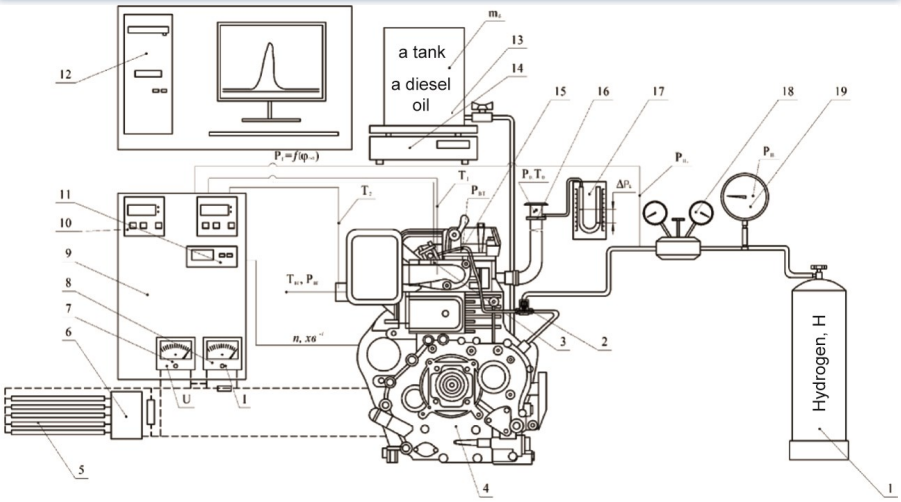
Due to the use of the mixture device without the additional re-equipment, it can be possible to use the wide range of the alternative fuels

Demand at the market

The use of this method allow s to reduce the costs for the fuel and to improve the efficient indices of ICE

State of the development ready

The experimental sample has been executed, which has been tested

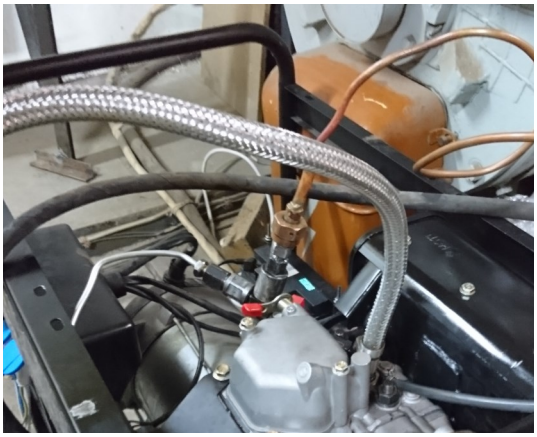


1- hydrogen bottles; 2 - an irreversible valve for hydrogen addition; 3 - a sensor of the pressure; 4 - a diesel engine; 5 - a block; 6 - a system of the loading control; 7 - a voltmeter; 8 - an ammeter; 9 - a device panel; 10 - a device; 11 - a tachometer; 12 - PC; 13 - a tank with fuel; 14 - a weight; 15 - a sensor of the combustible mixture; 16 -an orifice disk

Scheme of the experimental unit

State of the intellectual property protection, Number of the scientific publications

3 scientific works have been published in the professional issues of Ukraine in accordance with the results of the research



Experimental sample of the device for the combination of the alternative fuels in the fuel system of the diesel ICE

COMBINING CHAMBER OF THE THERMOCHEMICAL REACTOR

Purpose and the sphere of the development use

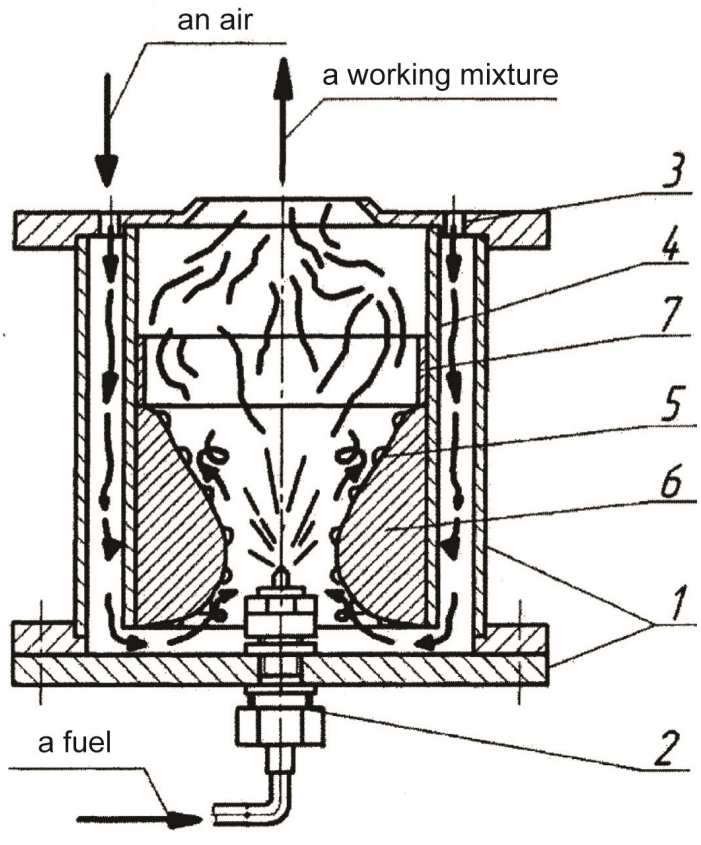
The improvement of the economical and ecological indices of the thermal engines due to the fuel conversion

Essence and main characteristics of the development

The base of the technical solution is the task of the design of the thermochemical reactor combining chamber , where due to the constructive peculiarities can be possible to create the turbulent movement of the work mixture flow and protect the magnetic diffuser from the influence of the high temperature. Due to this the economical and ecological characteristics of the internal –combustion engine work can be increased

State of the development ready

The specification for the design and assembly of the thermochemical reactor experimental sample has been executed for stand on the base of the engine ДГ100 (an engine 6Ч18/22) on board the ship 1565 (of the type «Trubezh»). The mathematical modelling of the processes in the reactor has been executed



Main advantages of the development

The provision of the diesel fuel economy from 8 % (foe engine 6Ч18/22) up to 10 % (for engine 6Ч12/14). The common reduce of the dangerous exhaust in the air with the discharge gases is provided by the reduce of the diesel fuel consumption and the burning of the combustion component of the discharge gases due to the additional discharge of H_2 at the fuel conversion.The save work of the engine at the partial fuel conversion with the discharge of the additional quantity of H_2. The simplicity of the maintenance of the thermochemical reactor on board the ships has been used in industry for the conversion treatment of the work mixtures in the power plants

Demand at the market

The developed innovation technology can be used by the land and water transport for the improvement of the fuel and ecological efficiency of the internal-combustion engines work

State of the intellectual property protection, number of the scientific publications

2 patents of the №126971, МПК F02M 27/04 (2006.1) і 106969, МПК F02M 65/00

General view of the combining chamber of the thermochemical reactor

1 - a reactor hull; *2* –injector; *3* - channels of the air receipt; *4* - a cylinder pipe from nonmagnetic material; *5* - ring shoulders ; *6* - a magnetic diffuser; *7* - a titanium cylinder glass

SHIP HEAT-ACCUMULATING SYSTEMS

Purpose and sphere of the development use

The increase of the efficiency of the ship power systems operation and the prolongation of the internal combustion engine resource

Essence and main characteristics of the development

The use of the heat accumulators in the content of the ship power systems of the small-capacity ships allows to reduce the wear of the internal combustion engine, to reduce the escape of the pollutants, to increase the ability of the engine for start

Main advantages of the development

– the workability;
– the low cost ;
– the small duration for payback

Demand at the market

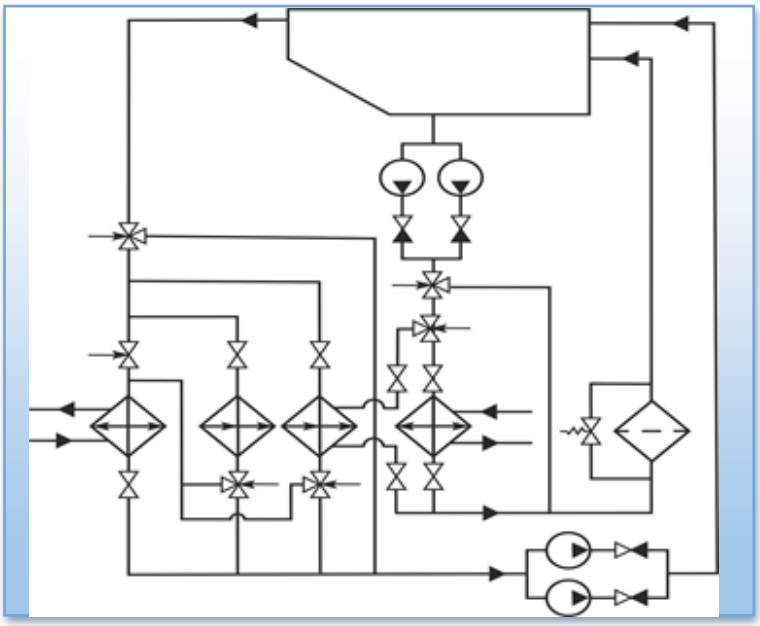
It is specified by the number of the small-capacity ships which are in operation

State of the development ready

The research sample

State of the intellectual property protection, number of the scientific publications

The development has been protected by 5 patents of Ukraine. It is in 1 monograph and 4 articles



VIBRATIONAL SHIP WIND GENERATOR

Purpose and the sphere of the development use

It is used for the transformation of the wind energy into the electrical energy for the ship network.

It is used like the alternative source of the energy in shipbuilding

Essence and main characteristics of the development

The device is the electrical generator with the section construction, which works on the mechanical energy of wind. The vibrational movement of the blade is provided automatically by change of the wing list. It is proposed the transformation of the vibrational linear movement of the windmill blades into the electrical energy by use of the motor-wheel with the standard microcontroller like the generator for the receiving of the optimal COE of the transformation. The power is determined by the blades square and can be up to 1 Kw

Main advantages of the development

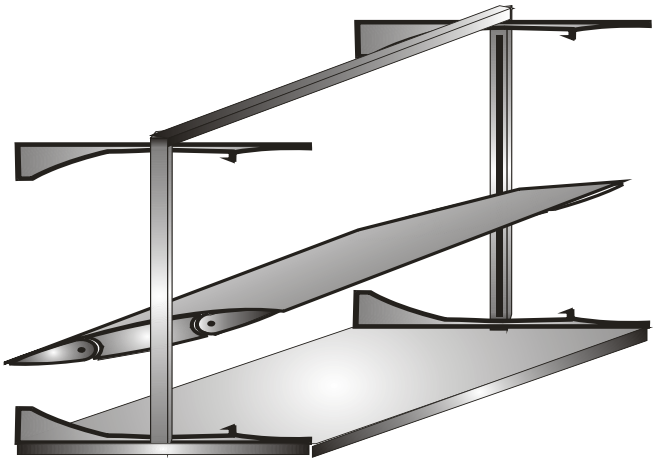
The vibrational movement of the wing reduces its mechanical safety, the level of the noise and the influence into the environment of the high frequency vibrations during the sunlight passage. The low –speed (up to 1m/s) movement of the blades is regulated automatically by the electrical voltage change

State of the development ready

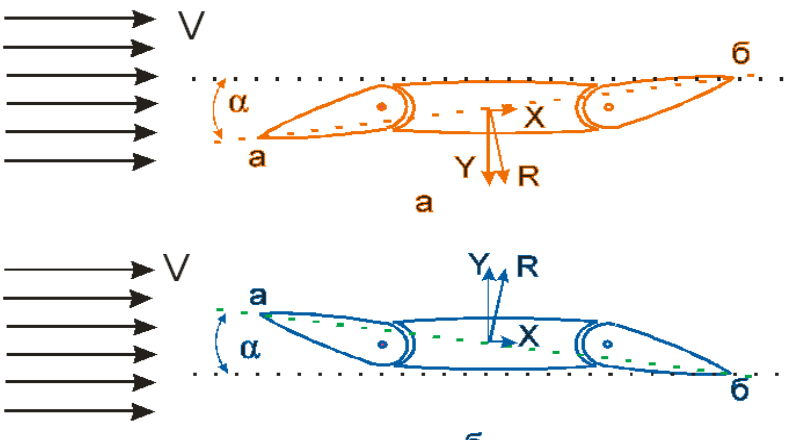
The experimental sample has been executed, the schematic circuits have been developed, the expected characteristics have been confirmed.

Demand at the market

It is used at the market of Ukraine and at the international market



Construction of the wind generator section



Direction of the forces action and the movement of the wing blade depending on the position of the stem and stern

MAGNETIC ACTUATOR OF FUEL

Purpose and the sphere of the development use

The improvement of the economical and ecological indices of the heat engines due to the treatment of fuel by magnetic field

Essence and main characteristics of the development

It is used for the improvement of the economical and ecological characteristics of the heat engines due to the treatment of the fuel by magnetic field. It provides more efficient fuel combustion, and the uniform division of the local temperatures in the volume of the combustion chamber. The realization of the method does not require the immediate change of the diesel construction, but it requires only the modernization of the fuel pipe by use of the innovation nanotechnologies. It is the use of the magnetic actuator for the influence into fuel before fuel supply to the engine cylinder

Main advantages of the development

The executed tests of the ICE at the partial regimes of load (up to 25% from nominal) confirmed the increase of their efficiency during the treatment of fuel by magnetic field up to 6-8%. In this range of the load of the engines, the waste of the most dangerous component is increasing (the reduce of NOx quantity up to 4 times). The effect of the fuel saving is stabilizing (~2%), during the further increase of the engine load (more than 20%). The reduce of the dangerous NOx waste is on the level of 25% from the base variant

State of the development ready

The methods of design, technologies of production and the experimental samples of the magnetic treatment devices into the liquid carbohydrate fuelД have been developed. The fuel actuators tests have been executed on stands, especially in the engines of type СМД20, 2Ч10,5/13. The recommendations of the further use of the technology in the production have been executed

Demand at the market

The developed innovation technology can be used in the land and the water transport for the improvement of the fuel and ecological efficiency of the heat engines operation

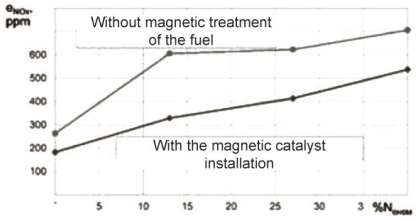
State of the intellectual property protection, number of the scientific publications

The theoretical ground of the proposed method of the carbohydrate fuel treatment by magnetic field has been executed. 2 patents have been received for the useful model (№106969, МПК F02M 65/00 і №126971, МПК F02M 27/04 (2006.1)

Picture 1 General view of the magnetic actuator

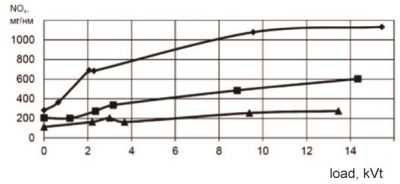
Picture 2 General view of the magnetic actuator (false type)

Picture 3 Stand for test of the magnetic actuators on the base of engine 2Ч10,5/13



Picture 4 Change of the dangerous waste NOx quantity

Picture 5 Unit for treatment of the fuel device pulse magnetic field ОИМП-101



Picture. 6 Relation of the dangerous NOx waste from number of the used actuators at different load (an engine СМД-20)

MATHEMATICAL MODEL OF THE INTERNAL COMBUSTION ENGINES INDICATOR CYCLE

Purpose and the sphere of the development use

The optimization, the speedup and the increase of quality of the process of the internal combustion engines creation at stage of design. It is used for students and for MA course students , for engineers-researches and for scientists

Essence and main characteristics of the development

The base of the method of the calculation is the law of conservation of energy, which has been realized in the modern program area VBA (Visual Basic for Applications). Due to this, the sequence of the calculations is differ greatly from well-known methods (foe example, the method of Grinevectkiy-Mazing). The classical concept of the polytrope is absent. It makes closer the results of the real processes which are in the engine cylinder

Main advantages of the development

1. The reduce of the operational consumption of the engine due to the optimal solutions , received at the model research;
2. The improvement of the product qualityї;
3. The increase of the engine operation resource;
4. The execution of the calculation scientific and research works by students

State of the development ready

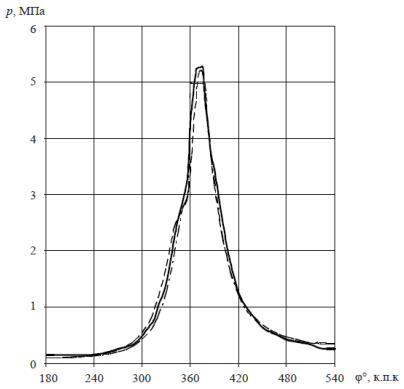
The test has been executed at the international scientific and practical conference. The development has been used at the educational process of NUS Kherson branch

Demand at the market

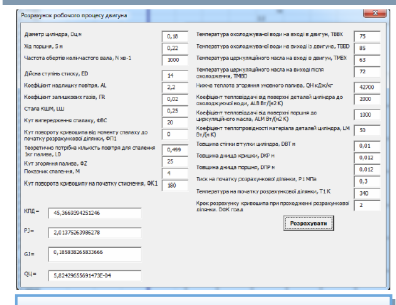
The innovation mathematical model of the indicator cycle of ICE calculation has been executed ,which can be used in the scientific and research establishments and at the MA course of speciality 142 "Power machine building"

State of the intellectual property protection, number of the scientific publications

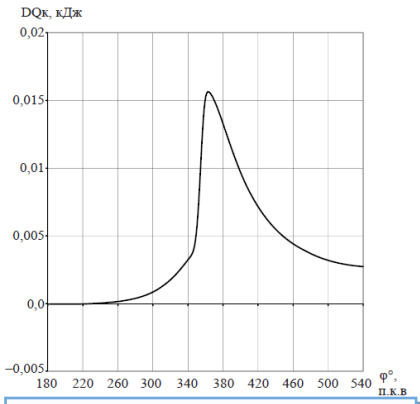
Besides the scientific publications, the text book has been published by following authors : V.Nalivaiko., S.Tkachenko, V. Khomenko, R.Avdyunin.»Basics of the computer design of ICE», for students of speciality. 142 "Power machine building" (specialization "Internal Combustion Engines") / V.Nalivaiko and other authors; NUS. - Nikolaev: V.Torubara [issue], 2017. - p.35, [2] c. - ISBN 978-617-7472-03-1.



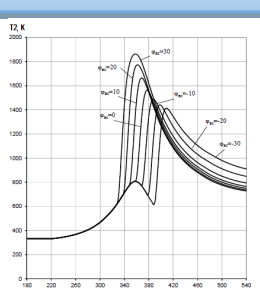
Picture 1. Indicator diagram of engine ЧН 25/34



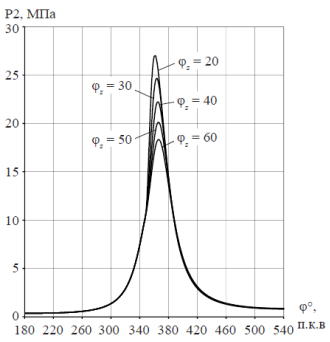
Picture 2. Window of data



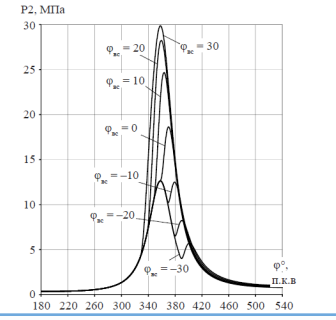
Picture 3. Dependence of the heat loss through the cover of cylinder at stages of the compression and expansion of gases



Picture 4. Dependence of the gas temperature in cylinder from the turning angle of the shaft at different angles of flame and burning of fuel $\varphi_z = 30°$



Picture 5. Dependence of the gas pressure in cylinder from the turning angle of shaft at different angles of burning of gas φ_z



Picture 6. Dependence of the gas temperature in cylinder from the turning angle of the shaft at constant angle of flame and burning of fuel $\varphi_z = 30°$

MATHEMATICAL MODELLING OF THE AIR CHARGE OZONIZATION INFLUENCE

Purpose and the sphere of the development use

The optimization of the method of the working cycle calculation concerning the use of the boosted air ozonator

Essence of the development

The project recommendations concerning the choice of the ways and the method of the use of the air ozonization have been developed. The propositions concerning taking into account the received regularities have been introduced. They have been received during the development of the methodical support of the calculation of the schemes for the improvement of the ecological indices of ICE at the use of the boosted air

State of the development ready

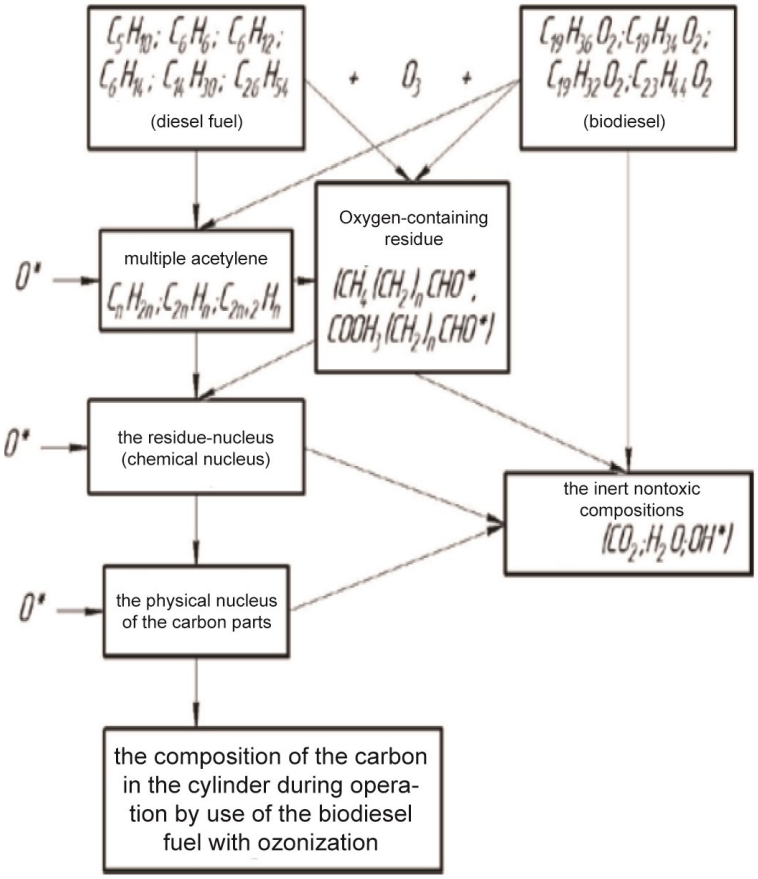
The model has been tested at the experimental stand

Main advantages of the development

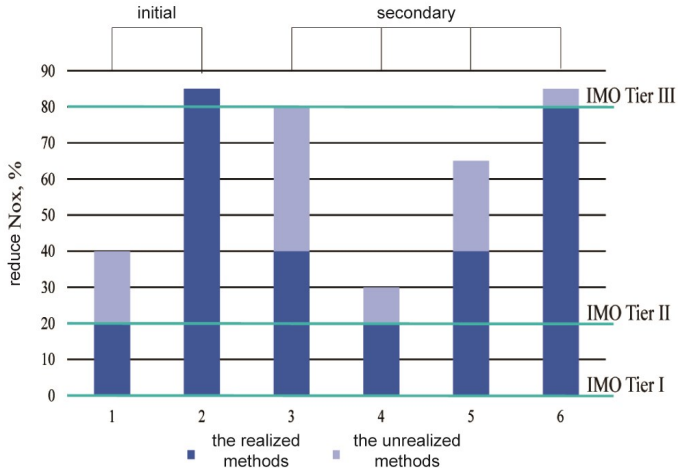
Take into account the questions connected with the improvement of the elements of the ship power plants , which are in great interest continuously. The execution of the research allows to increase the reliability and the efficiency of the ship power plants

Demand at the market

The model is required for the execution of the research of the implementation of the technology of the ozonation of the modern transport and stationary ICE



Method of the creation of the solid particles in the combustion chamber of the diesel



Efficiency of the different ways of NOx discharge reduce

INTELLECTUAL CONSTRUCTION OF THE WIND GENERATOR WITH THE ADAPTIVE BLADES

Purpose and sphere of the development use

The adaptive blades which made of the anisotropic materials are the intellectual constructions. The angle twisting of the blades is appeared depending on the work aerodynamical loads (wind speed). The support of the blade optimal turning angle is possible by use of the special scheme of the blades reinforcement

Essence and main characteristics of the development

- The length of the blade - 2,5 m
- The rotor - 3 blades
- The power of the windgenerator 5000 W
- Wind speed - 30 m/s
- The blade limit angle error - 12,5 °
- The content of the blade material:
- - The unidirectional graphite and glass material 0 °, ± 45°, 90°;
- The epoxide resin

Main advantages of the development

The anisotropic blade reacts into the change of the external load by the change of the geometry of its form,i.e.it adapts to the wind speed.
It allows to increase the work range of the blade practical operation from the strong wind (15 m/s) up to windsquall (25–30 m/s)

State of the development ready

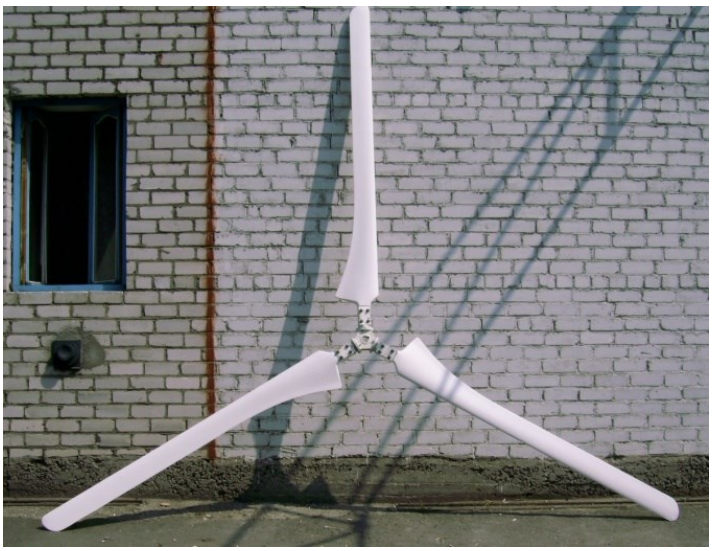
The development has been used in the experimental construction of the wind generator which has been ordered by USA , it has been developed by University and PCB“Pivdenne”, Dnipro city

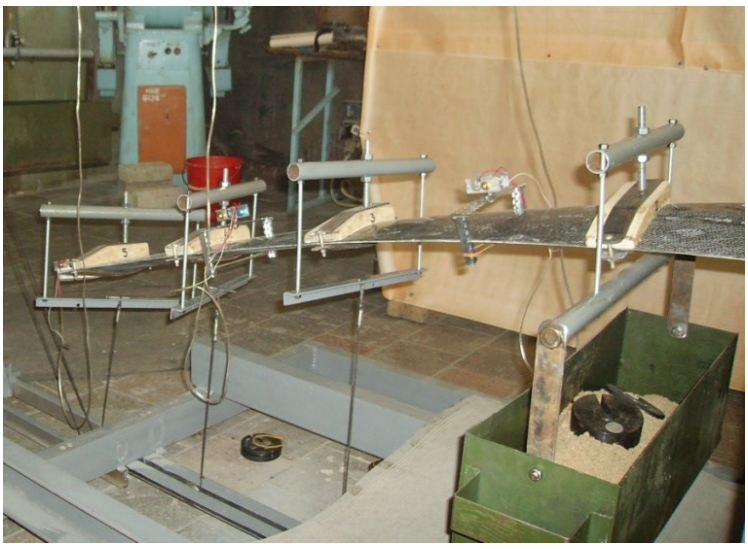
Demand at the market

The development is perspective for the use in the Black Sea stepper area of Ukraine

State of the intellectual property protection, number of the scientific publications

The publications - 5.
The authors certificates - 1





METHOD OF PREDICTION OF THE RESIDUAL LIFE OF THE ROLLING CONTACT BEARING PUMP EQUIPMENT

Purpose and the sphere of the development use

The use of the method of prediction of the residual life of the rolling contact bearings is proposed for the use of the pump units of the industry enterprises and the domestic consumers

Essence and main characteristics of the development

For the assessment of the technical state of the bearings of the pump equipment the range of the envelope high frequency vibration of the bearing unit is used widely , i.e. the partial depth of the amplitude modulation of the information frequencies of the bearings vibration has been measured

Main advantages of the development

Due to establishment of the improved frequency filter F_{cp} = 8 kHz, the frequency of the research has been calculated . It allows to execute more exact diagnostics of the researched units

Demand at the market

Many enterprises of Ukraine are required the prediction of the residual life of the rolling contact bearings

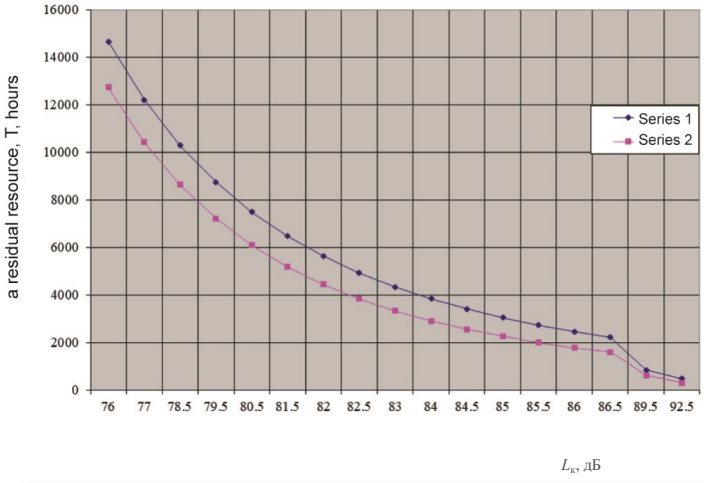
State of the development ready

The experimental sample has been executed. It has been tested successfully

State of the intellectual property protection, number of the scientific publications

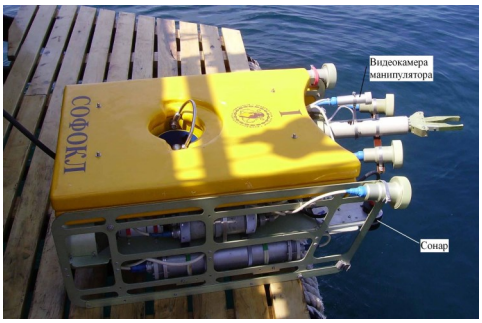
In accordance with results, more than 10 scientific works have been published

Experimental sample of the device for the execution of the vibration –based diagnostics of type CA-2



Dependence of the resource of the rolling contact bearings T from general level of the vibration acceleration Lк in дБ of the pump equipment bearing screen: a line 1 – for the ball -bearing; a line 2 – for the roller-bearing.

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
ADMIRAL MAKAROV NATIONAL UNIVERSITY OF SHIPBUILDING



INFRASTRUCTURE RESEARCHES

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Scientific and research department - Phone +0380512424280. e-mail: university@nuos.edu.ua

METHODOLOGY OF THE FORMATION AND THE REALIZATION OF THE SEA AND RIVER PORTS INFRASTRUCTURE DEVELOPMENT PROJECTS

Purpose and sphere of the development ready

The support of the ports competitiveness by the port infrastructure use efficiency increase

Essence and main characteristics of the development

The specified main criteria and the order of the processes of the formation and the realization of the projects of the modernization and the reconstruction of the main elements of the port infrastructure, which take into account the principles of the sea area planning and the technological platform of SMART-Port

Main advantages of the development

The reduce of the self-cost of the cargo reprocessing; the storage or the improvement of the ecological state of the environment; the increase of the freight turnover volume

State of the development ready

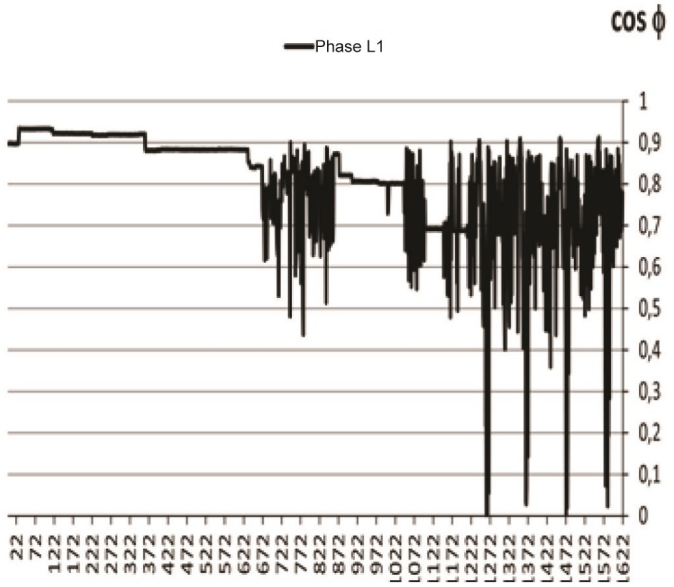
The methodology of the formation and the realization of the projects of the sea and river ports infrastructure development is passing the test

Demand at the market

It is specified by the needs of the increase of the freight turnover, the increase of the ecological compatibility and the development of the river transport ways

State of the intellectual property protection, Number of the scientific publications

The development is in more than 20 publications



METHODOLOGY OF THE FORMATION AND THE REALIZATION OF THE PROJECTS OF THE MUNICIPAL CONSTRUCTIONS INFRASTRUCTURE DEVELOPMENT

Purpose and sphere of the development use

The support of the efficient functioning of the main elements of the municipal infrastructure : the systems of the heat-, water-, gas-, electricity supply, lighting, the control of the domestic waste

Essence and main characteristics of the development

The main criteria and the order of the processes of the formation and the realization of the modernization and the reconstruction of the main elements of the municipal system have been specified

Main advantages of the development

– the reduce of the costs for the modernization, the reconstruction and the functioning;

– the save and the improvement of the ecological state of the environment

State of the development ready

The methodology of the formation and the realization of the projects of the municipal structures infrastructure development has been used at the execution of the specified projects

Demand at the market

It is specified by the needs of the increase of the functioning efficiency of the municipal infrastructure objects and the specified solutions of the state authority

State of the intellectual property protection, Number of the scientific publications

The development is in 2monographes and in more than 50 publications

FLOATING PONTON BRIDGE

Purpose and sphere of the development use

It is in the sphere of the bridges building and its purpose is the support of the making decision of the water problems by use of the motor transport

Essence and main characteristics of the development

The increase of the reliability of the ponton bridge use by way of the reduce of the waves amplitude of the ponton bridge , which appear under effect of the dynamic loads from the transport on the bridge, the wind and wave loads and the bulk by the water transport. The problem is decided by the use of the implemented on the pontons the reactive turning hydraulic nozzles. This system has the system of the automated control of the position in the environment and the time of the hydraulic nozzles fastening pints on the pontons

Main advantages of the development use

The turning of the hydraulic nozzles vertically provides the vertical forces , which during operation in the antiphase with the dynamic loads from the transport, from the wind and wave loads provide the receiving of the technical result, i.e. the reduced amplitudes of the poton bridge waves. The turning of the hydraulic nozzles horizontally provides the horizontal forces,which protect the bridge from the bulk of the water transport and the ice load. At the assembly of the bridge the additional technical result is received - the possibility of the poton bridge movement without the assistance of the tugs and the coastal winches,and also the use of the poton bridge like the self-propelled ferry

State of the development ready

The schematic scheme of the device of the bridge waves reduce has been designed

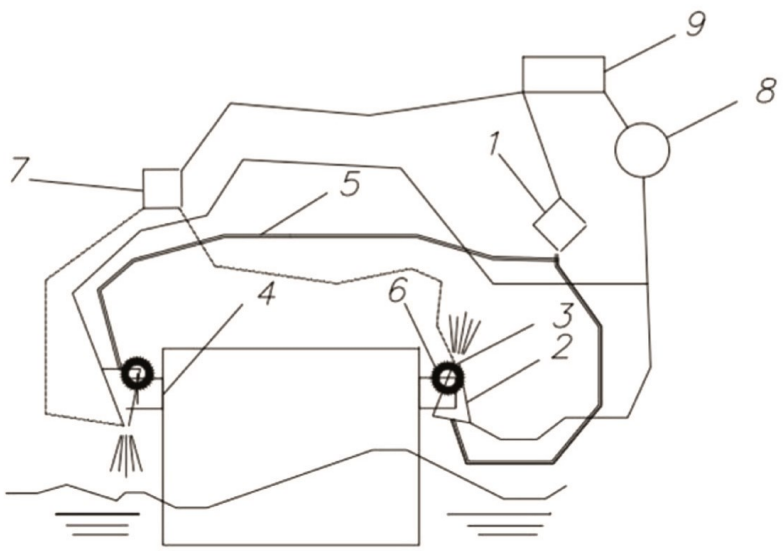
Demand at the market

The most of the stationary bridges in Ukraine are in accident condition, that's why there is the demand for such bridges

State of the intellectual property protection, number of the scientific publications

The patent of Ukraine has been received

a device for the decrease of the pontoon bridge vibrations



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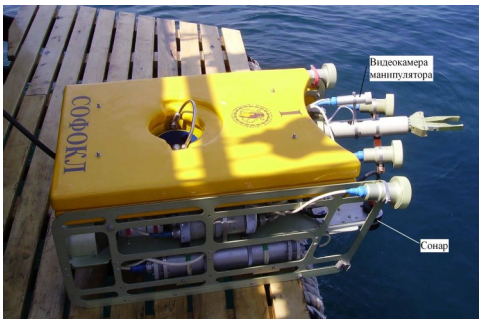
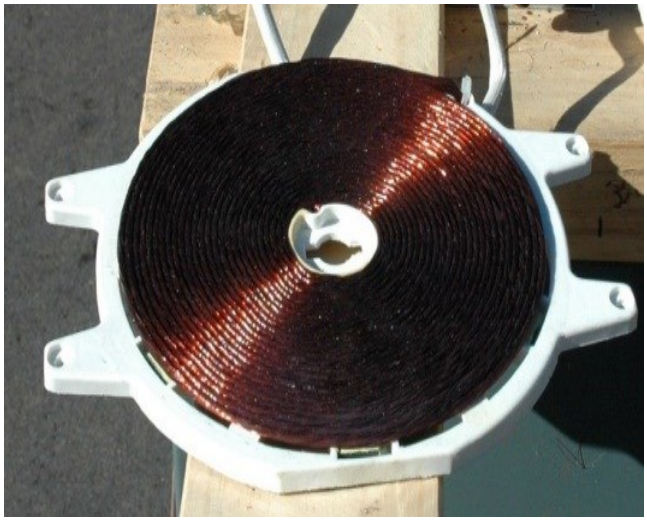
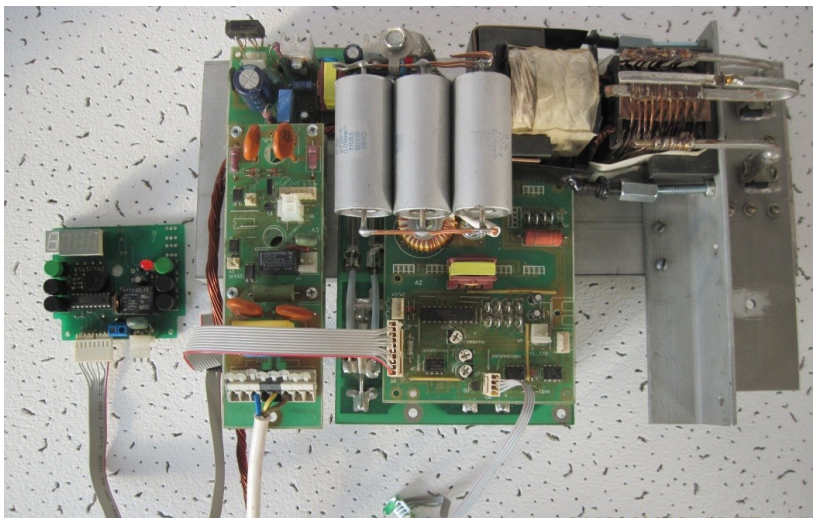
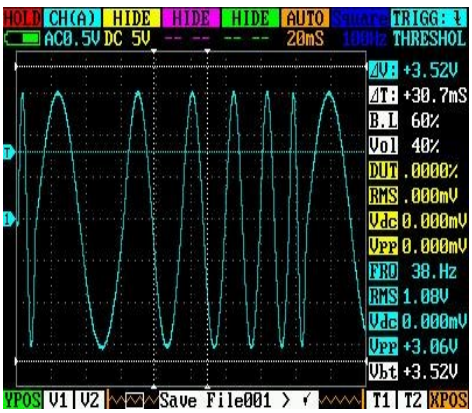
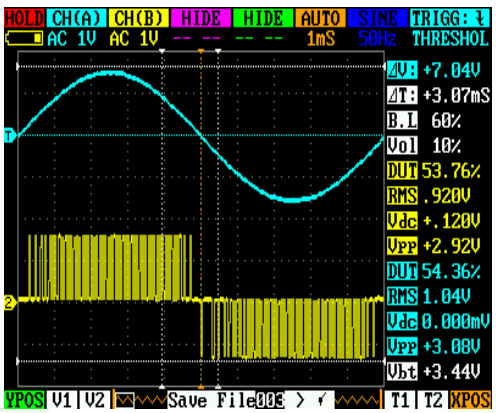


TECHNOLOGIES AND DEVELOPMENTS IN AUTOMATICS AND ELECTRICAL ENGINEERING





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FREQUENCY TRANSFORMER ON THE BASE OF THE RESONANT INVERTOR WITH TIME – PULSE CONTROL

Purpose and the sphere of the development use

The research of the frequency transformer for the secondary power supply of the sensitive to the unsinusoidality of the input voltage of the users of the ship board network of the autonomic moved and local objects with the purpose of the increase of the reliability, power and economical efficiency of the device.

Essence and main characteristics of the development

The proposed method of control by the frequency transformer allows to reduce greatly the level of the dynamic losses of the force key elements , which increases COE of the device. The use of the resonant inverter in the content of the transformer allows to reduce the level of the generated electromagnetic obstruction. The use in its structure the corrector of the power coefficient provides the electromagnetic compatibility of the device with the network. The developed method of the calculation of the parameters of the accumulator elements of the scheme allows to execute the calculation of the parameters of any transformer with the further resonant chain and the output low –frequency LC-filter

State of the development ready

The completion phase of the development

Main advantages of the development

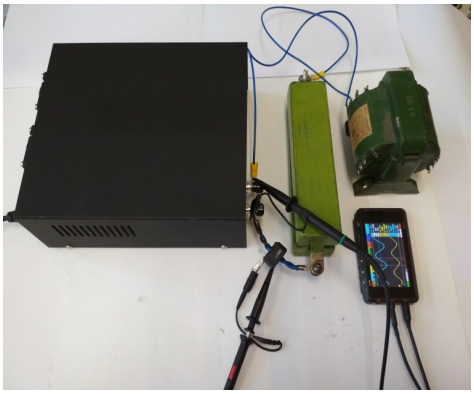
- COE 95%;
- Electromagnetic compatibility with network;
- Stable sinusoidal voltage of the load during change of its character and the value in the range of 2 orders.

State of the intellectual property protection, number of the scientific publications

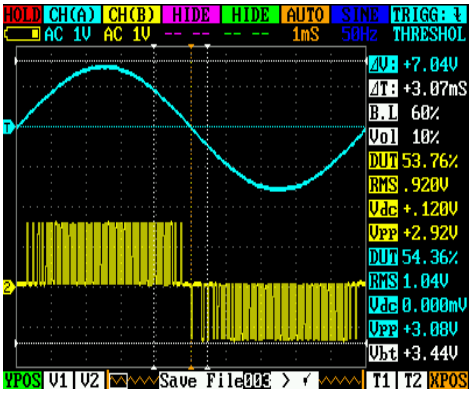
Patents – 2;

Articles in the professional journals – 10;

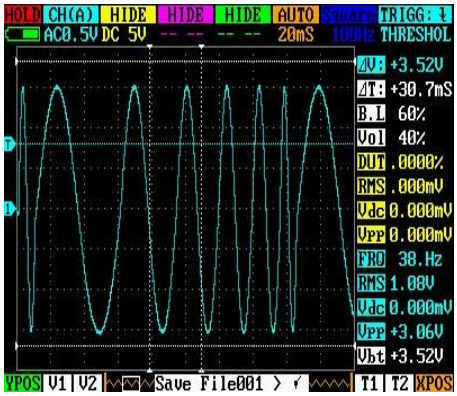
Thesis of the reports – 9.



Experimental sample of the frequency transformer



Voltage of the load and power of the resonant condenser



Voltage of the change frequency

RESONANCE INVERTERS FOR THE NONCONTACT CHARGING OF THE ELECTRIC CARS

Purpose and the sphere of the development use

The devices for the noncontact inductive transfer of the electrical energy are the semiconductor inverters, which consist of the magnetic systems with big wind interval. These devices are used in different fields of industry, especially for the continuous electricity supply of the moved parts of radar ,the server devices of the manipulators chains , the engines of the industrial and passenger electric transport, the charging of the accumulators of the autonomous underwater robots and electric cars

Essence and main characteristics of the development

In this work the best inverter for the inductive noncontact transfer of the electrical energy has been introduced. T he method of the number-pulse control of the resonance inverter has been improved. The mathematical model of the consistent-consistent and the consistent-parallel resonance inverters for the noncontact charging of the electric cars has been designed. The intellectual system of control by the connectionist elements has been designed. It provides the solution of the tasks for control in the regime of real time in accordance with the operational frequency of the resonance inverters for the noncontact inductive transfer of the electrical energy

Main advantages of the development

- The possibility of the noncontact charging of the electric cars in the special equipped places;
- High power (up to 500 кW);
- Low energy consumption;
- High electromagnetic compatibility;

State of the intellectual property protection, number of the scientific publications

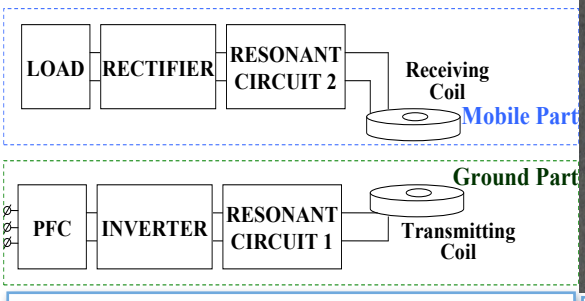
The patents of Ukraine – 8;
The articles in the professional journals – 11;
The reports thesis – 2 .

State of the development ready

The completing stage of the development

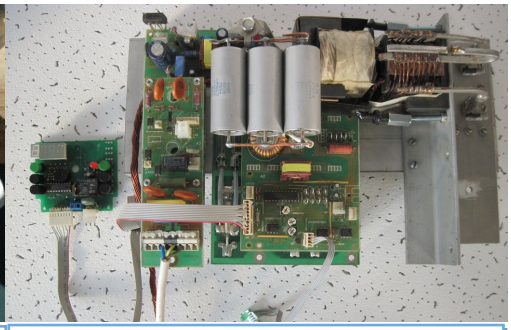
Demand at the market

It has the high demand at the market of the modern electrical transport



Structural scheme of the resonance inverter for the noncontact transfer of electric power

Stationary unit of the transformer for the noncontact transfer of electric power



Experimental sample of the resonance inverter for the noncontact transfer of electric power

TECHNOLOGY OF THE PRODUCTION OF THE SEMICONDUCTOR DEVICES WITH THE USE OF THE CELLULAR ANODE Si OXIDE

Purpose and the sphere of the development use

The technology is used for the production of the different Si devices (varicaps, Schottky diode, the high-voltage diodes and etc.).It allows to receive the devices with high technical and economic indices at the reduced prime cost

Essence and main characteristics of the development

The technology is s based on the received thick balls of the cellular Si oxide with vertical walls in the solutions of weak acids at the high anode voltage

Main advantages of the development

The technology allows comparing with well-known analog :

- to reduce the prime cost due to the reduce of the number of photolitographics ;
- to reduce the influence into environment due to the use of the more weak acid;
- to reduce the range of the parameters and the characteristics of the different sets devices

State of the development ready

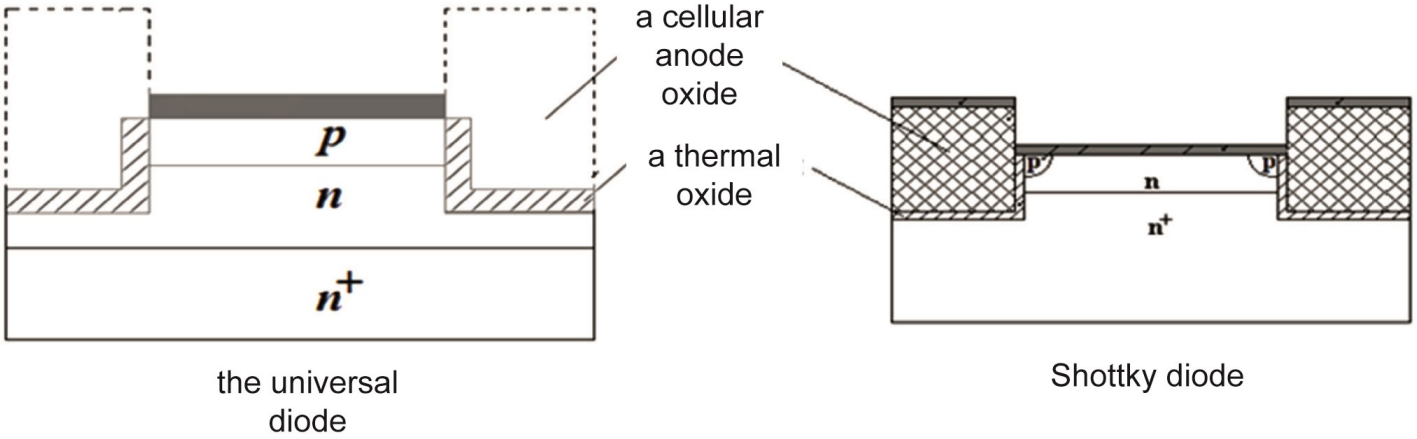
The technological scheme. The technology is at the stage of the experiment

State of the intellectual property protection, number of the scientific publications

The patents of Ukraine – 4;
The articles in the professional journals – 1;
Thesis in the conferences – 1.

Demand at the market

The similar technologies can be used for the production of the modern semiconductor devices of the domestic and military purpose



Structure of diodes with the cellular Si anode

ELECTROMETER

Purpose and the sphere of the development use

The electrometer is used for the measurement of the electric charges,their volumetric density and the potentials in the electrical fields,which are created by the electrolysis of the moved oil products through the pipes. The device is used by the specialists, which are responsible for the safety during the filling or the discharge of the fire-hazardous liquids

Essence and main characteristics of the development

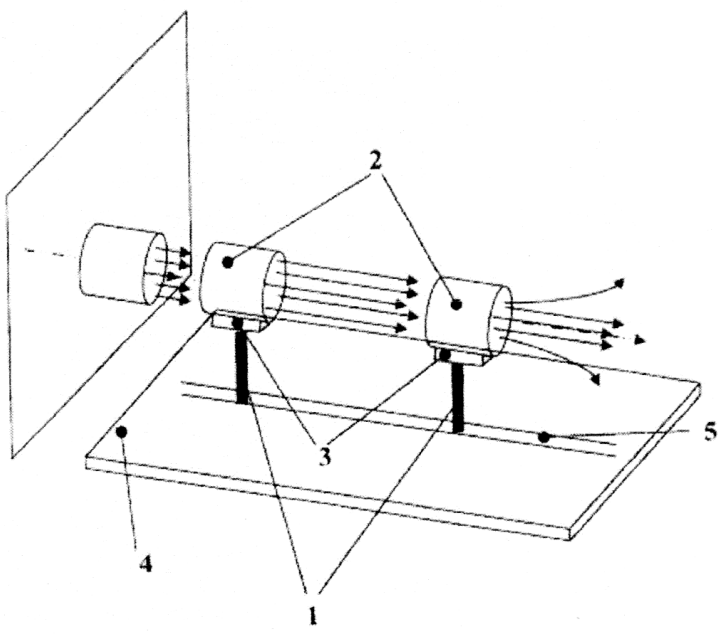
The proposed construction has not the modulator like the typical constructions. This construction has been realized by simple method of the execution of the electrical scheme in accordance with two rings , which are in the flow of the moved liquid. This process repeats the movement of the electric charges in the pipe of the flow of the dielectric, which can be introduced by current

Main advantages of the development

The sensor of the model can be placed in the area of the inlet gate in tank , through it the electrified liquid moves into the volume. The ring form of the electrodes repeats the form of the liquid flow

State of the development ready

The proposed prototype cam be produced at the presence of the metric parameters of the inlet pipeline , Cu electrodes, the dielectric backings and the current-carrying conductors. The development has been used at the test of the electric characteristics of the current of the moved dielectric liquid



Schematic circuit of the electrometer sensor

Demand at the market

The proposed electrometer has the simple construction. It is comfortable in use . It has the enough accuracy and mobility , it can be used during transfer and load of the oil products in the ship tanks. It can be used for the safety control during the filling or discharge of the oil product with low conductivity

State of the intellectual property protection, number of the scientific publications

The results of the development have been introduced at the scientific and research conferences. The patent of Ukraine UA№34735 dated 26.08.2008. The article in the professional journal – 1

CURRENT PROTECTION OF THE POWERNETWORK, BASED ON THE NEW CRITERION

Purpose and the sphere of the development use

The relay protection plays the important role in the systems of the current supply and the electric drive in the industry and at the transport. One of the main type of the protection is the protection from the short circuit or the maximum current protection

Essence and main characteristics of the development

It is known that at the short circuit in the power current network its voltage is reducing. The most strong, practically its linear reduce is at the first moment of time of the accident transient process (in the place of the short circuit and in the points of the which are closed to the zero at the metal short circuit). The sign of the maximum current protection is the speed of the TL– voltage reduce line

Main advantages of the development

The maximum current protection, based on the measurement of the speed of the voltage level change, is duffer by the high sensitivity to the short circuit independently of the distance to its appearance (i.e. from the current level in the point of the network and where the protection units have been established)

State of the development ready

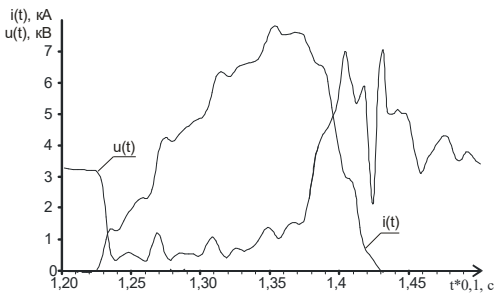
The designed methods of the calculation, design and building of the maximum current protection on the principle of the measurement of the speed of the TL– voltage reduce line

State of the intellectual property protection, number of the scientific publications

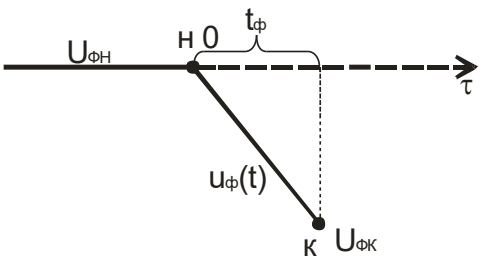
The results of the development have been introduced at the scientific-technical conferences and publications, and in the

Demand at the market

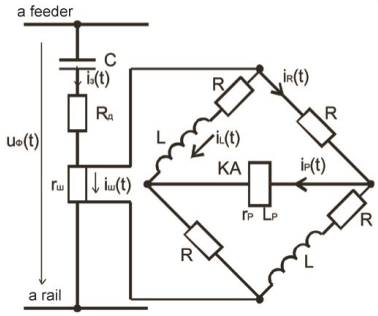
The maximum current protection on the principle of the measurement of the speed of the TL– voltage, especially required for the protection of the long power electric networks and the lead electric networks of the moved content.



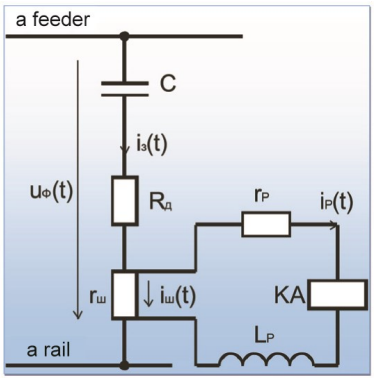
Pic. 1 Experimental researches of the close К3 ТП Verchivctevo, 2×ВАБ-43



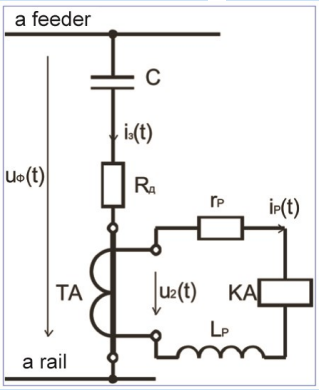
Pic. 2 Time diagram of TL– voltage in the moment of the short circuit.



Pic. 3 Turn-on of the current relay through the bridge scheme.



Pic. 4 – Turn-off of the current relay in the protection turn through the shunt.



Pic. 5 Turn-off of the current relay in the turn of the protection through the transformer of the current .

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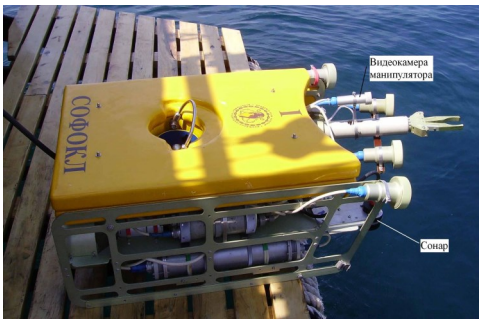
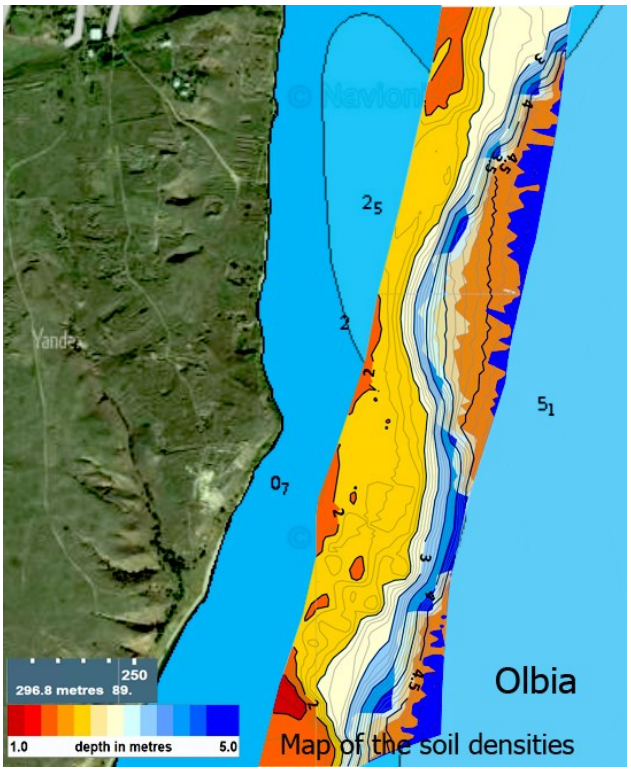
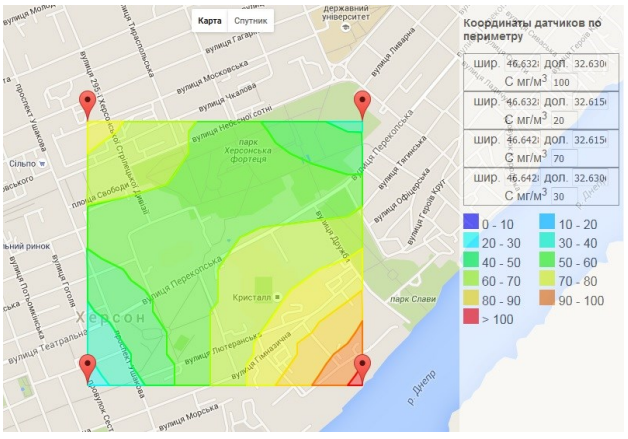


ECOLOGY AND SAFETY ON WATER





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PROJECT OF THE ADJUSTING WATER SUPPLY OF TILIGULSKIY ESTUARY BY USE OF THE DNIEPER OUTFLOW

Purpose and the sphere of the development use

The project is used for the ways concerning the deletion of the fresh water deficit. Tiligulskiy estuary and the recovering of its salt water status, which allows to save the unique water and environmental ecosystems of the estuary

Essence and main characteristics of the development

The recovering and the saving of Tiligulskiy estuary in conditions of the modern climate changes at the increased levels of the evaporation and the termination of the river Tiligul discharge requires to add up to 1 km^3 water every year. In real life only 0,3-0,4 km^3 adds to the estuary due to the surface discharge and the straight supply of the sea water through the cut. This method has been used from 1949 року. It leads to the creation of up to 60 thousand t of salt each year . The fresh waters of the surface discharge goes to the sea. For the recovering of the water in the estuary , the additional water supply is necessary , 0,5-0,6 km^3 each year which must be low-salt (5-6‰). The source of such water supply can be the use of discharge of Dnieper-Bugskiy estuary.The main condition of the use is the controlled supply of the surface low-salt waters and the stop of the salt sea waters supply during the south winds

Main advantages of the development

The project is ecological rational and allows to use the discharge waters of river Dnieper to make water of Tiligulskiy estuary fresh, to recover the waters and to obstruct the sea water supply into fresh water

Demand at the market

The project is perspective for the realization instead of the temporary realization of the basin recovering by use of the sea water supply

State of the development ready

The designed and tested at 5 national and international project and competitions 2016-2018

State of the intellectual property protection, number of the scientific publications

The publications in the professional issues - 9;
The claim for the patent has been given in 2019

Zone of Tiligulskiy estuary filling and the placement of the sea channel

Placement of the existed and the projected channels on the filling of Tiligulskiy estuary

GIS OF THE RADIOAC AND DANGEROUS CHEMICAL SUBSTANCES CONCENTRATION MONITORING DUE TO THE EMERGENCY SITUATION

Purpose and the sphere of the development use

In case of the emergency situation, connected with the discharge in the environment of the radiac or dangerous chemical substance , the information is required concerning the substance, the square of the contamination, and the value of the concentration of the toxic or radiac substances in the zones of the contamination. The information is necessary for the operative subdivisions of the regional level, which take part in the elimination of the emergency situation

Essence and main characteristics of the development

Software and hardware complex has been designed for the monitoring of the object data of the radiac and dangerous chemical substances concentration in the places of the position of the sensors, in real time. The sensors are placed at the stationary posts of the information gathering and in the operative moved laboratories which are equipped by the appropriate communication channels with server of the automated monitoring system

Main advantages of the development

The sectional thermoelectric generator allows to execute the change of the electromechanical generator of the car with further use of the excessive energy of the recuperation. The energy , which has been saved as result of the recuperation, in recalculation of the consumer fuel, is not less than 2%. It is important in the economical and ecological aspects

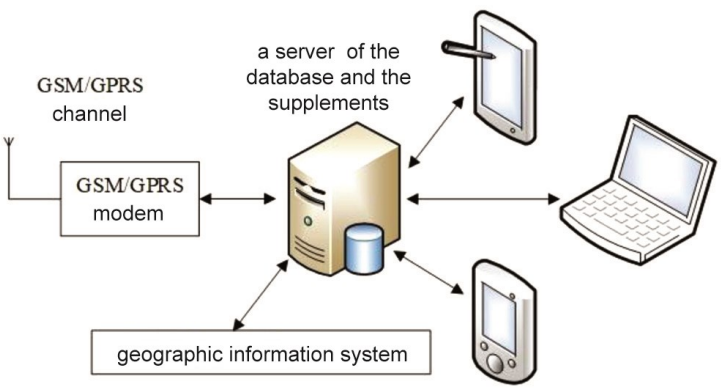
State of the development ready

The sample of the monitoring software and hardware complex has been designed , the structure of the complex system building, the algorithm and program support

Demand at the market

It is practical to use at the operative subdivisions of the State service of Ukraine on the emergency situations of the regional level

Increase of the dangerous substances concentration



Subsystem of the information processing and analysis

PORTABLE COMPLEX FOR DIGITAL PLOTTING OF THE WATER AREA BOTTOM SURFACE

Purpose and the sphere of the development use

The portable complex is used for the execution of the sounding operations and the receiving of the digital charts of the bottom surface by use of the hydroacoustic and the satellite technologies, the creation of the chart-scheme of the bottom surface in the different coordinate systems (Krasovskiy projection, WGS84)

Essence and main characteristics of the development

The complex is used from the board of the small sized ship or the motor boat.It provides the high productivity and the low cost of the plotting. It can be used for the operative plotting of the bottom surface in the interests of the hydrographical , dredging , SAR procedures at the depths from 0,2 m up to 450 m

Main advantages of the development

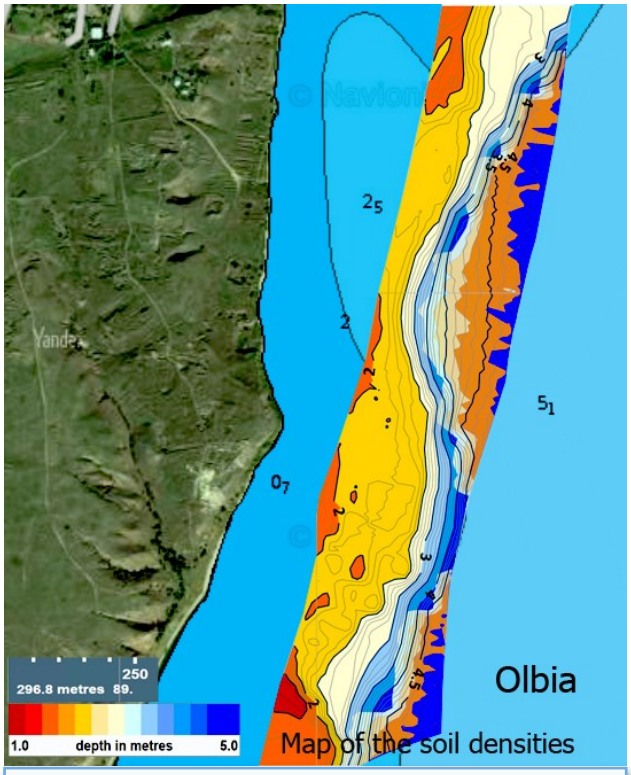
The complex can be used for the sounding of the bottom with accuracy 10 sm along the deep and the distance between the profiles 20 m. ReafMaster provides the use of software and hardware of the complex

State of the development ready

The complex has been tested successfully at the soundings of the sea (Sevastopol port) and river (the Dnieper river , the river Yuzhnuy Bug) water areas

Demand at the market

The demand at the market is stipulated by the need of the execution of the sounding operations in the water areas of the country, the operative and high qualified documentation of the technical state of the ports water areas , the navigable fairways, the recreational zones of the coastal water areas

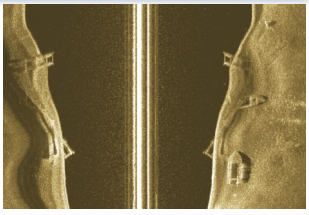


River bottom

State of the intellectual property protection, number of the scientific publications The patent of Ukraine

Equipment complex

Supply block



Sonogram
Sunk subjects

Work from the motor boat

Advertising-information issue

CATALOG OF THE SCIENTIFIC PRODUCT

ADMIRAL MAKAROV NATIONAL UNIVERSITY OF SHIPBUILDING

Computer typesetting and layout: NUS Scientific-Research Department,
in accordance with materials, received from the developments authors.

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Свідоцтво суб'єкта видавничої справи ДК №2506 від 25.05.2006р.