

Cleaning of Underwater Objects Technology

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Received: 12 December 2018 Accepted: 2 January 2019 Published: 15 January 2019

Abstract

Sea-craft, ships and freshwater vessels of different glass (tankers, dry cargo ships, yachts, cutters) ; ? Stationary hydro-technical structures (piers, moles, moorages); ? Sea platforms for various purposes (oil, gas extraction); ? Pipelines and other stationary submarine objects. Underwater cleaning CAVIMAX TECHNOLOGY is based on the cavitation effect and is used for qualitative and high-speed destruction and removing of marine growth of any thickness (seaweed, shells, corals)', rust and peeling paint without damaging the hull and a protective coating. The surface can be cleaned Passive voice to bare metal with the help of the operating mode selection of the cavitating stream.

Index terms—

1 Cleaning of Underwater Objects Technology

Doktor Rodionov Viktor I.

2 Introducation

he uniquely designed and patented Cavimax Technology And Equipment is developed to clean underwater surfaces:

? Sea-craft, ships and freshwater vessels of different glass (tankers, dry cargo ships, yachts, cutters) ; ? Stationary hydro-technical structures (piers, moles, moorages); ? Sea platforms for various purposes (oil, gas extraction); ? Pipelines and other stationary submarine objects.

Underwater cleaning CAVIMAX TECHNOLOGY is based on the cavitation effect and is used for qualitative and high-speed destruction and removing of marine growth of any thickness (seaweed, shells, corals)', rust and peeling paint without damaging the hull and a protective coating. The surface can be cleaned Passive voice to bare metal with the help of the operating mode selection of the cavitating stream.

The CAVIMAX EQUIPMENT uses outboard sea or river water creating a speed cavitation max with microscopic Unusual word pair steam Possibly confused word of bubbles under 150-250 Bar with a capacity of 200 I/min (standard pumping plants). Upon contact with the surface being cleaned Passive voice, these bubbles implode. The result of the microscopic bubbles imploding is the destruction of marine growth, rust and, its removal from the work area. During this process, the working pressure reaches up to 10,000 Bar at the cleaned area. 1. Of the underwater accretion elimination technologies using the mechanic brushes (like "Sea Brush") and the Possibly miswritten world instrument series CAVIMAX.

voice. Out of the production of the PHOSMARINE company, being most wide-spread in the sphere of underwater cleansing, the Overused word "Sea Brush" mechanism with one disc brush weighs about 30 kg and has the productivity of 200-300m² /h while the Overused word mechanism with three-disc brushes "Brush Cart" weighs 170 kg and has the productivity of 1800 m² /h.

The Possibly miswritten word instrument of likewise productivity weighs 3 kg, correspondingly, whereas "Sea Brush" weighs 30 kg.

Divers, who cleanse the surfaces of the ships from accretion underwater, perform hard physical work, which requires oxygen consumption of 2. 5 -3. 0 liters/minute, the heart rate is 140-160 b/m. Such activities may be performed Passive voice in daylight only.

On the other hand, due to the low weight and safety of the Possibly miswritten word instrument, divers may perform their work with less physical effort at any time of the day.

It will take just one run of the instrument to cleanse the surface efficiently, unlike the brush devices, which require several Repetitive word for the same purpose.

One of the Overused word drawbacks of the brush devices is that they fail to function and shut down because of the water-plants rolled over the brush mechanism. Possibly miswritten word instruments Overused word cut all sorts of water-plants.

In Table 1 below you can see the comparative productivity indexes of the two cleansing methods for the tanker with the capacity of 50 000 tons and the under-water area of 10 000 m² (the comparison is between the one-brush mechanism "Sea Brush" with the productivity of 300 m² /h and the one cavitation instrument). Possibly miswritten word instrument CaviMax.

The cavitation driver -"cavitator" is designed in such a way, that it is not damaged during work, as the supercavitation cavern is the working organ and consists of many steam-gas bubbles, which are formed Passive voice outside the cavitation cut.

The brushes require periodical Unusual word pair replacement due to wear ability. The cost of the brush depends on the construction and is in USD, as is shown in Table 2.

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Global Journal of Researches in Engineering () Volume XIx X Issue V Version I The comparative properties and productivity of various instruments are given Passive voice in Table 4. Table ??: Comparative data on the quality of the jobs performed Cost of the job 10-15 \$/m² "Sea Brush"

Cost of the job 1-5 \$/m² Possibly miswritten word instrument Damages costly protective paint-and-varnish, anticorrosion and antiaccretion coverings (on the weld seams) due to the contact of the instrument and the surface being cleansed.

Due to the selection of the cavitation flow parameters the accretion cleansing takes place without damaging the protective covering (In some cases cleansing may reach metal).

Requires periodical replacement of the mechanical cleansing elements (costly brushes and scrabers), which makes the cleansing process slower and costlier.

Does not require replacement of the working elements quant nozzles), cleansing may be performed in non-stop duration regimen.

Non-productive for thick accretion and some types of accretion (like major balanus and long water-plants).

Universal for accretion of any type and thickness.

Application in hard-to-reach spots is limited (vint and helm group, kingstone valves, grates, boxes etc.).

The instrument set allows efficient cleansing of all surfaces and hard-to-reach spots.

The use of hydrogears may cause leakage of oils and result in the environment contamination.

The technology is environment-friendly, as the overboard water is the single working material.

Possibly miswritten word instrument CaviMax.

Efficient, the frame surface is not damaged.

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Global Journal of Researches in Engineering () Volume XIx X Issue V Version I 2. Research and Development Enterprise BUSINESS PROPOSAL Our company has been operating in the service market for four years already. We design, test, and manufacture plants that are used to clean parts of submerged centrifugal pumps. Our equipment is unparalleled in Russia [1, 2] and the entire world. (The company has an industrial patent "Parts Cleaning Method and the Device Used for Such Cleaning"; the engineering documents and test certificates compliant with the All-Union Standards are also available).

The unit is designed based on the newest environmentally friendly technology unparalleled in the world with a special Overused word emphasis on today's efficiency and quality requirements.

The technology used in the proposed unit is hugely advantageous if compared to the more commonly known one that is often applied at repair facilities in Russia and in other countries of the world. The disadvantages of the conventional technology Possibly confused word include the following:

First of all, a commonly known technology Repetitive word involves corrosive and erosive wear of the parts' surface and its undesirable deformation. The parts cleaned in this way are, as a result, quickly discarded. Secondly, the amount of power consumed increases immensely when the parts are cleaned Passive voice. And thirdly, the cleaning efficiency with the technology is rather low.

The proposed Unusual word pair technology eliminates all of the listed drawbacks because the working substance here is water and supercavitation steam-and-gas air bubbles. The cleaning efficiency offered by this technology lies within the range of 50-60 thousand parts per month, provided that the plant is operated Passive voice in two shifts. The plant is a universal semiautomatic device that helps clean pump irrespective of their configuration. The cleaning is performed to 100% at both the inner and outer surface of the Repetitive word with no further cleaning required. The flow diagram of the plant is shown Passive voice in Figure ??.

5 ?????????? ??????

Cleaning device Parts are cleaned using the developed and patented environmentally friendly technology with the help of supercavitation flows that originate from the system of patented Repetitive word cavitation agents.

The Plant is unique in the way its environmental friendliness is achieved Passive voice. The whole principle is based on the recycled water that acts as a working cleaning agent, which, after it is used Passive voice, passes through the multi-stage filtration system specially designed for this plant, is then freed from solid impurities, oily additives and paraffin that are collected Passive voice in Overused word tanks, and finally recycled.



Figure 1: TJ

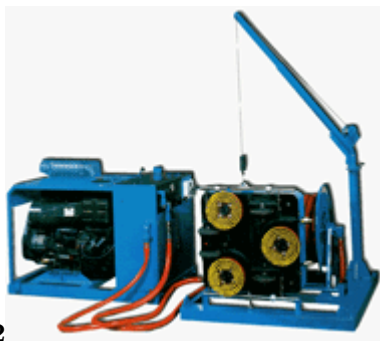


Figure 2: Figure 2 :

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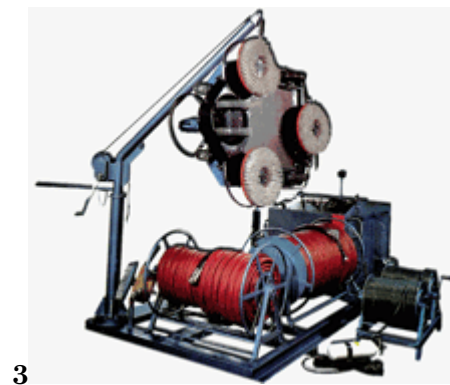


Figure 3: Figure 3 :



Figure 4: Figure 5 :



Figure 5: Figure 4 :



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Figure 6: Figure 6 :



Figure 7: Figure 7 :

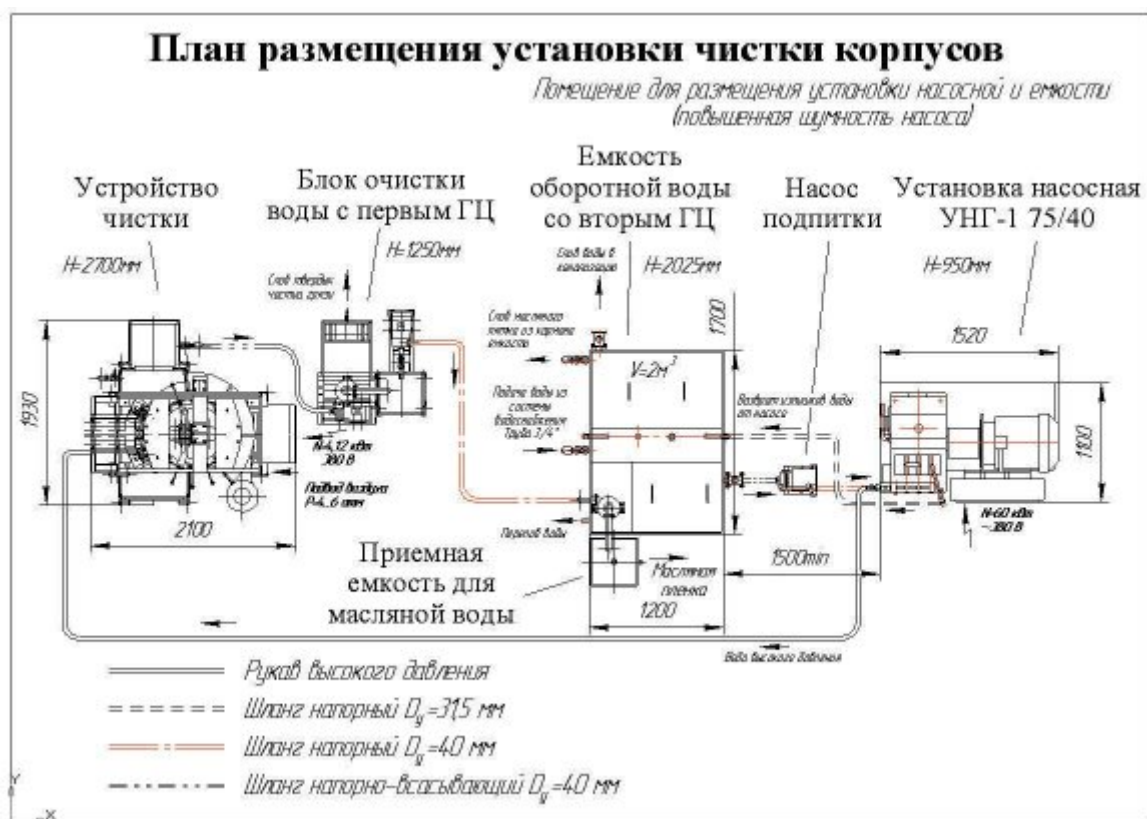


Figure 8: Figure 8 :



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Figure 9: Figure 9 :Figure 10 :Figure 13 :



Figure 10:



Figure 11:

1

INDEXES OF CLEANSING

METHODS OF CLEANSING

Rated productivity, m² /h
 Actual productivity, m² /h
 Tanker cleansing time, h

"Sea Brush"	device	Supercavitation
300		250
100		250
100		40

Figure 12: Table 1 :

2

Nylon	45	for soft accretion
Steel	52	for soft accretion
Steel enhanced	95	for hard accretion
Steel stainless	130	for hard accretion
Special	770	for very hard accretion
Brush kart		

Figure 13: Table 2 :

3

Work, abilities, effects	Mechanical	"Sea	Possibly miswritten
	Brush" technologies		word device
Cleansing the ship frame to the "white metal"	Impossible		Possible, time of cleansing extended
Cleansing of the king stone grates	Limited		Simultaneous cleansing of all sides
Cleansing of the vint and helm group	Limited		Without loss of productivity
Cleansing of the underwater parts of the sea-platforms and installations	Impossible		Cleansing of all types
Cleansing yachts and boats	Limited		Efficient, the frame surface is not damaged
Cleansing small-size objects (devices) and objects with complicated surface	Impossible		Without loss of productivity
Number of runs for the instrument to perform the cleansing required	Several (depending on the type and rate of accretion)	One	
Automation of the cleansing process	Very complicated technically	Realized by PTA installation	
Cleansing pipes, internal surfaces of the overland industrial surfaces	Impossible	Possible	
Damage of the protective covers	Inevitable	Absent	
Environment pollution	Inevitable (toxic elements of ship paint, hydrogear oil)	Absent	
Waste of materials and instrument wearability	Present (depending on the type and rate of accretion)	Absent	

Figure 14: Table 3 :

4

Category of accretion	Surfaces processed	Old technology m ² /h		New technology m ² /h	
		Scrabber		Sea Brush” head	Hydro pistol
I.	Side, bottom	25	800	1000	200
II.	Side, bottom	25	200	1000	200
III.	Side, bottom	10	100	800	150

Figure 15: Table 4 :

????	Pipe
??????? ???? ?	Water overflow
???????? ?	Oil film
???? ?	High-pressure water
????? ?	Return of extra water from the pump
???? ?	Delivery pump
???????? ?	Pumping plant UNG-1 75/40
??	Mm
???? ?	Dump of solid impurities
???? ?	Oily water receiving tank
??	kW
?	V
???? ?	

[Note: Water dump into sewage ???? ????Oil patch dump from the tank’s pool ???? ???? ????Water feed from the water supply system Year 2019 J]

Figure 16:

