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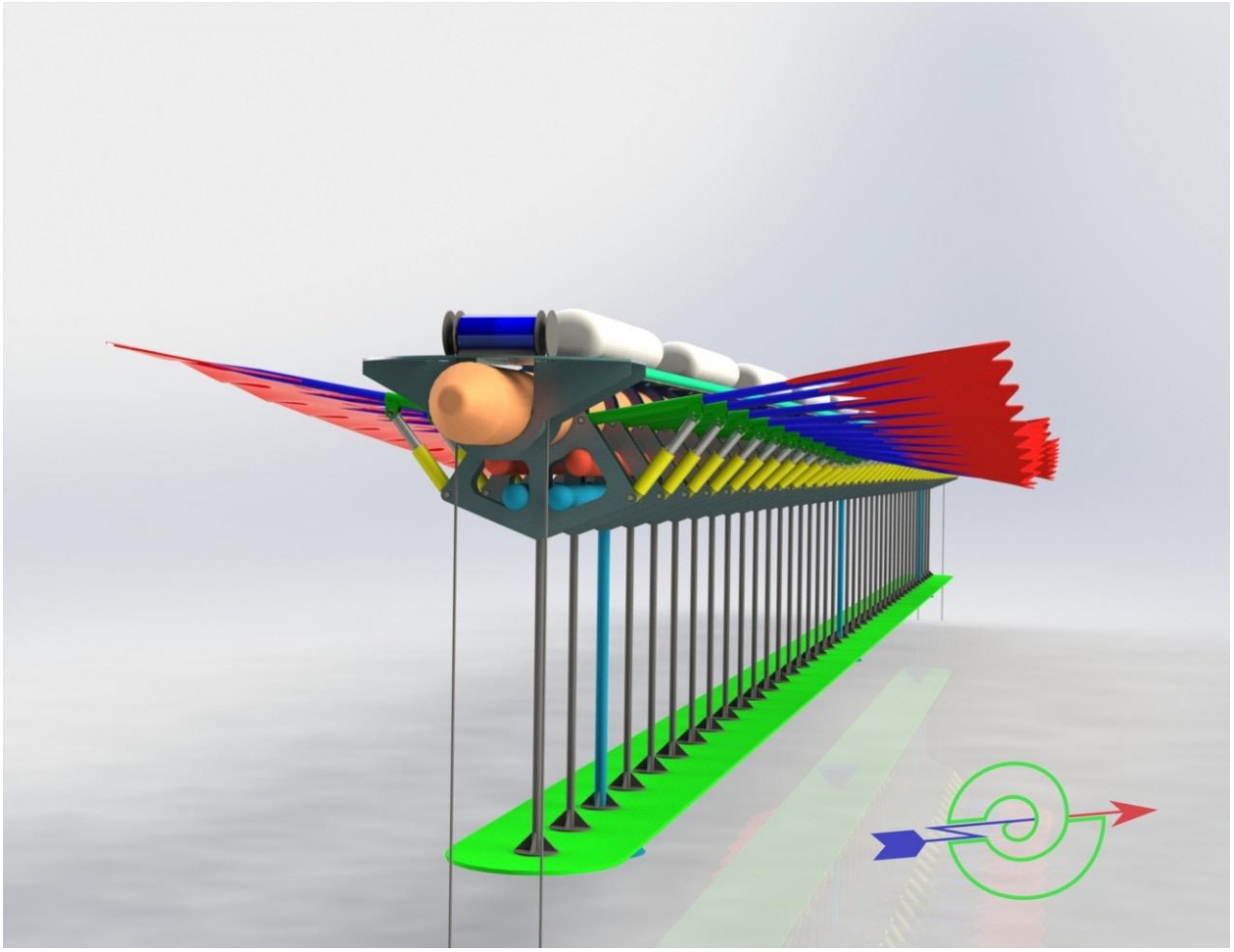
Ovsiankin Wave Station



2020

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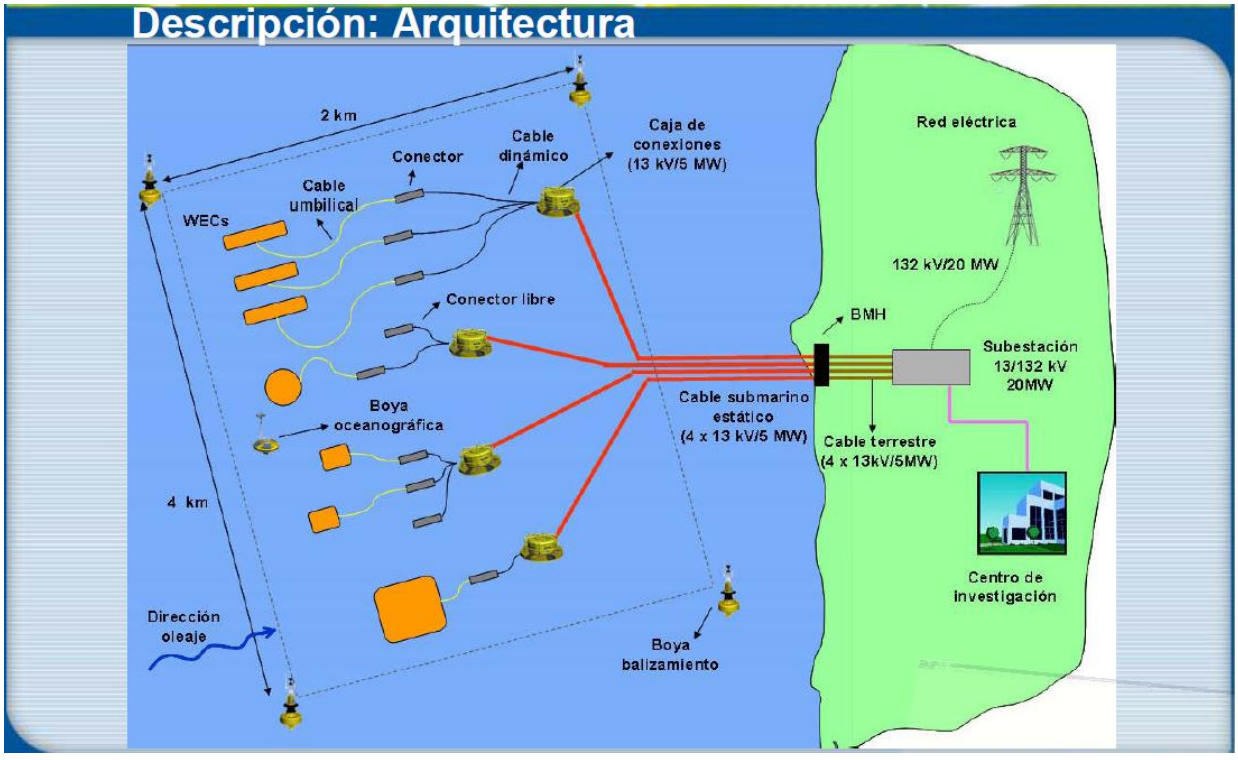
1. Information about the project.

The aim of the project is the creation of desalination and electricity generating capacities that operate on renewable energy of sea waves and currents.

The implementation of the project for the construction of wave stations of the Ovsiankin design will provide the not only with clean electricity from renewable sources, but also provide the opportunity to receive desalinated water in the required quantities. Moreover, for desalination using reverse osmosis technology, a hydraulic transmission is installed at the wind farm, which provides the supply of sea water under pressure to the membranes of desalination plants. When placing desalination plants at the wind farm, fresh water is supplied to the shore.

Government in the waters of its territorial waters, should mark the area of sea area (platform) to install the station and communication systems.

An example of the installation of a wave station in the water area is shown in Figures 1 and 2.



Figures 1. Water infrastructure

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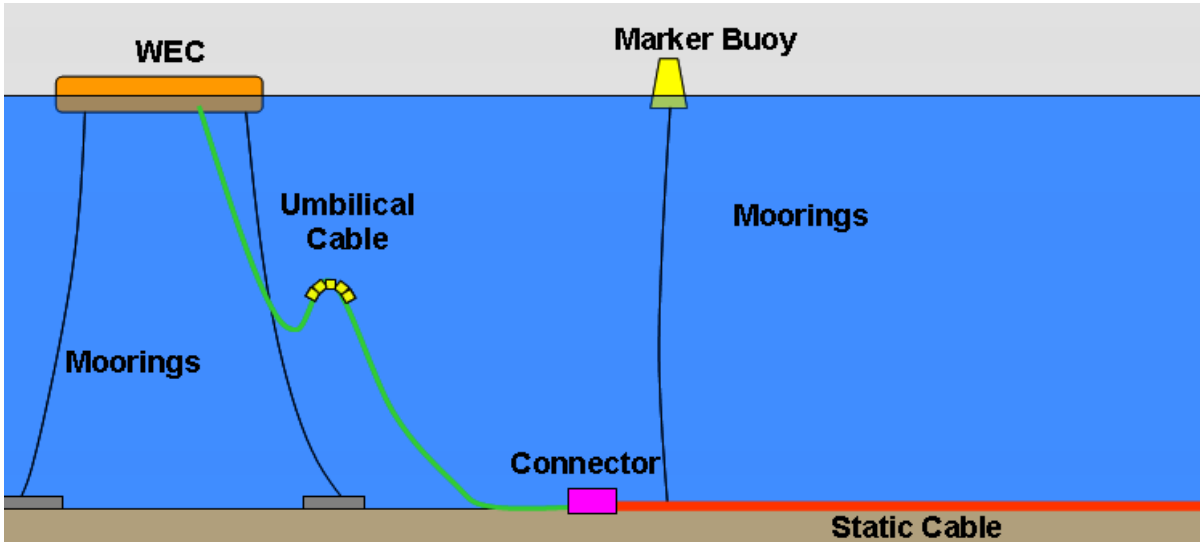

Figures 2. Water infrastructure

2. Energy potential of water area.

Preliminary assessment of the energy potential of the waters allotted to Graph that characterizes the average data on the characteristics of waves in the area shown in Figure 3.

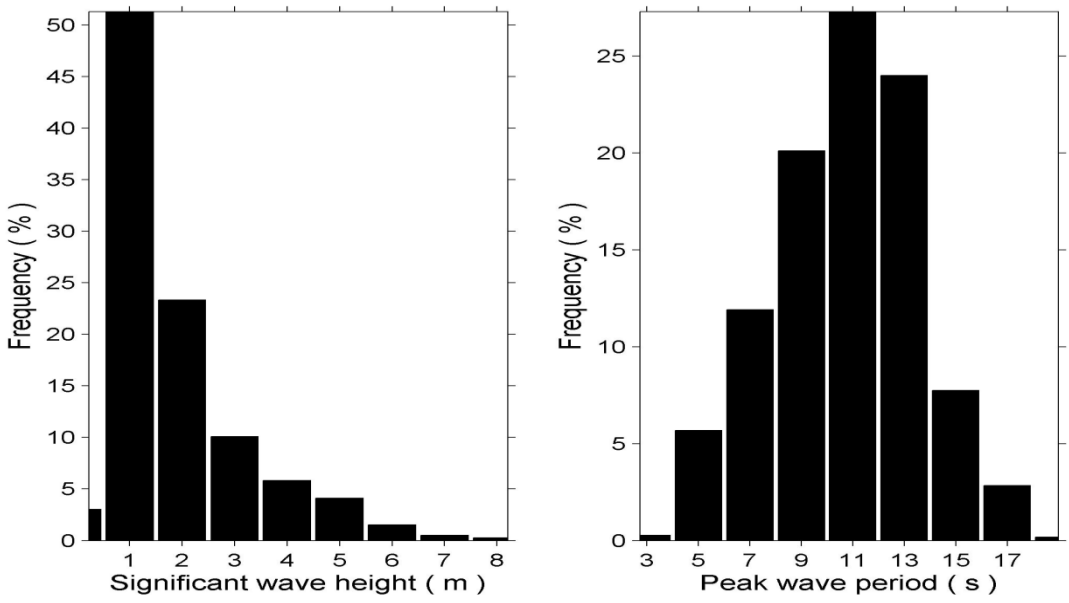

Figure 3. Graduation of waves

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Entering these data as input in the "Program for calculating the parameters of the element energy taking wave power," which was developed by specialists of scientific production company "Krok-1" and the National Aviation University, obtain preliminary technical parameters of the wave power output of. Technical parameters see "Technical Aspects.".

3. Analysis of existent wave power-stations.

At present, the wave power to transform wave energy converters are used, tracking the wave profile, using variations of the water column and underwater devices.

To the transmitter that tracks the wave profile, are primarily the development of professor Salter of Edinburg university and named in his honor - "Salter Duck" (Fig. 4). Technical name of the project - an oscillating wing.

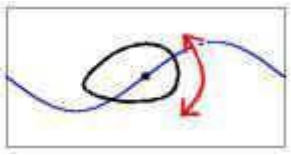

Fig.5 «Duck» of Salter.

Waves, running into a «duck», compel it to hesitate. Power is taken off from the axis of the oscillating system. Garland of twenty metres "ducks" weighing 16 tons was tested for four months in different wave conditions, Loch Ness lake and showing efficiency 0.5%.

Major weaknesses - the complexity of manufacturing and installation, high shock loads from the effects of maximum waves.

Another option is Converters energy out of this type - Contour Cockerell raft (Fig. 5). Which has been tested in the Straits of Solent near Southampton.

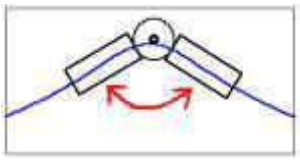

Fig.6. Cockerell Raft

Variant of wave power station on the principle of the raft Cockerell implemented in the project "Wave Farm» (Wave Farm) Scottish firm Pelamis Wave Power (former Ocean Power Delivery). Four sections which are connected pivotally, wave-induced bend that activates the hydraulic cylinders, which pumped oil to hydraulic motors drive

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the generators. Electricity generated by cable, dropped to the bottom, is transmitted to the bank.

Fig. 7 shows three transmitter, built off the coast of Portugal. Each transmitter (called the Pelamis Wave Energy Converter) is comparable in length and cross section with small trains of length 120m and weighing 700 tons.

Power of one such converter - 700 kW.

This is only the first phase of the project,:further provided an addendum to the same wave farm near the shore Agusadory 25 more "snakes" that he would raise aggregate power station to 21 Mwt.

Fig.7 Transfonners of Pelamis Wave Energy

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The main disadvantages of these converters:

- High consumption of materials;
- average annual capacity factor less than 0.4;
- High level of capital costs, about $ 6000 per KWt

There are also converters, which use the energy of an oscillating water column, Figure 8. When piling waves on a partially submerged chamber under an open water column of fluid in the cavity varies, causing a change in pressure in the gas above the liquid. Cavity communicates with the atmosphere through the turbine. Flow can be adjusted so that would pass through the turbine in one direction.

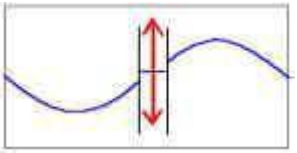

Figure 8. Transformers, using energy of hesitating aquatic post

According to this principle work Converters "column Masuda (Japan) and the turbine of Wales (England).

The disadvantages of these converters are low efficiency and a large consumption of materials.

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4. Ovsiankin wave station (technical and business aspects).

The wave desalination station is designed for desalination of sea water due to the renewable, environmentally clean energy of sea waves and currents in the open sea. The wave desalination station module is shown in the Figures 9 and 10.

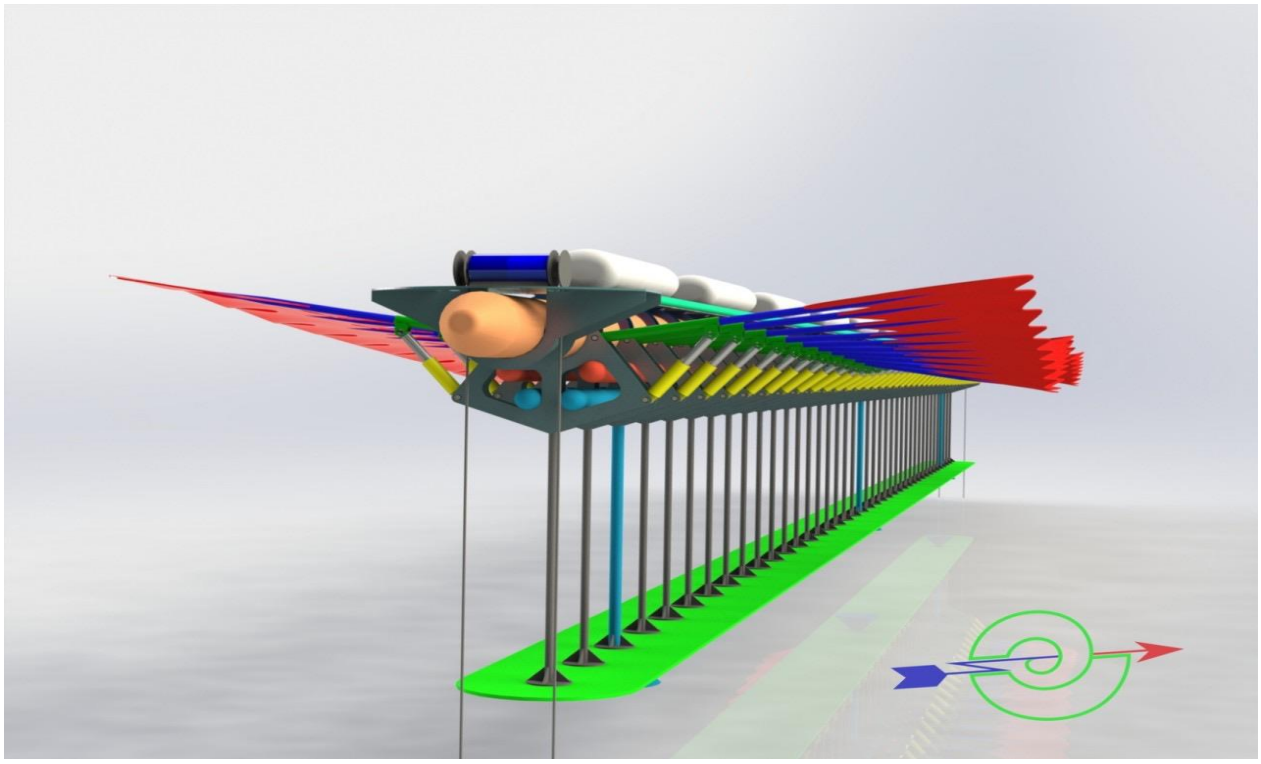

Figure 9. Wave desalination station module (front view)

The efficiency of the wave station is ensured by its main properties such as:
- presence of a flexible energy-absorbing element, which changes its shape from a flat longitudinal body to a spatial spiral under influence of each incident wave;
- the design of the station is permeable to waves and has the ability to dive to a depth in the zone of action of calculated parameters waves;
- main structural elements of the station are made of composite polymer materials;
- presence of several desalination sections with holders of reverse osmosis membranes, connected to work consistently. it depends on wave situation in the water area.

The design of the wave station is protected by five patents of Ukraine, Russia. Today it is carried out patenting in other countries. The productivity of one module of the wave station for the oceans will be up to 1000 cubic meters per hour (or 6 MW / hour), for inland seas - up to 300 cubic meters per hour (or 1.5 MW / hour).

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The specific investment per unit of installed capacity (m^3 / h) of the desalination wave station will be 15,000 - 20,000 €, (kW/h power plants – 3500 €) .
The cost price of one cubic meter of fresh water will be 0.15-0.2 €, kW/h 0,03-0,04 €.

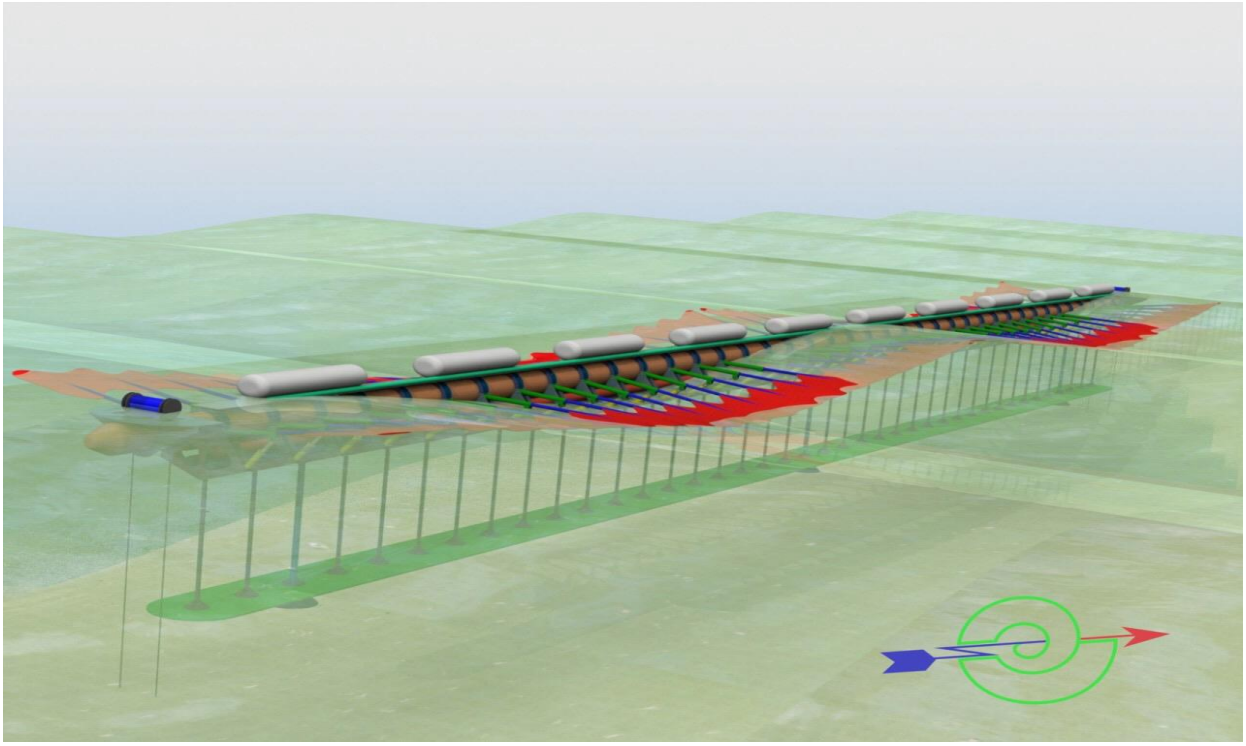

Figure 10. Wave desalination station module

Preliminary technical parameters of the module project area listed below:

Dimensions, m 160x25x10
Operational life of 20 years.
During construction, the station is certified with one of the marine insurance companies.
For such a power the average utilization of installed capacity will amount to 0.7-0.8.

Work on the creation of the wave stations by "Krok- 1" were for over than 20 years.

During this period, were held on 8 stages of testing stations and layout of the prototype 10 kW (VES-10).

Tests of the models were carried out in the wave pool of the Institute of Hydromechanics of the National Academy of Sciences of Ukraine and are shown below with photographs.

The test results confirmed the efficiency of the layouts and made it possible to obtain initial data for the design of a prototype station.

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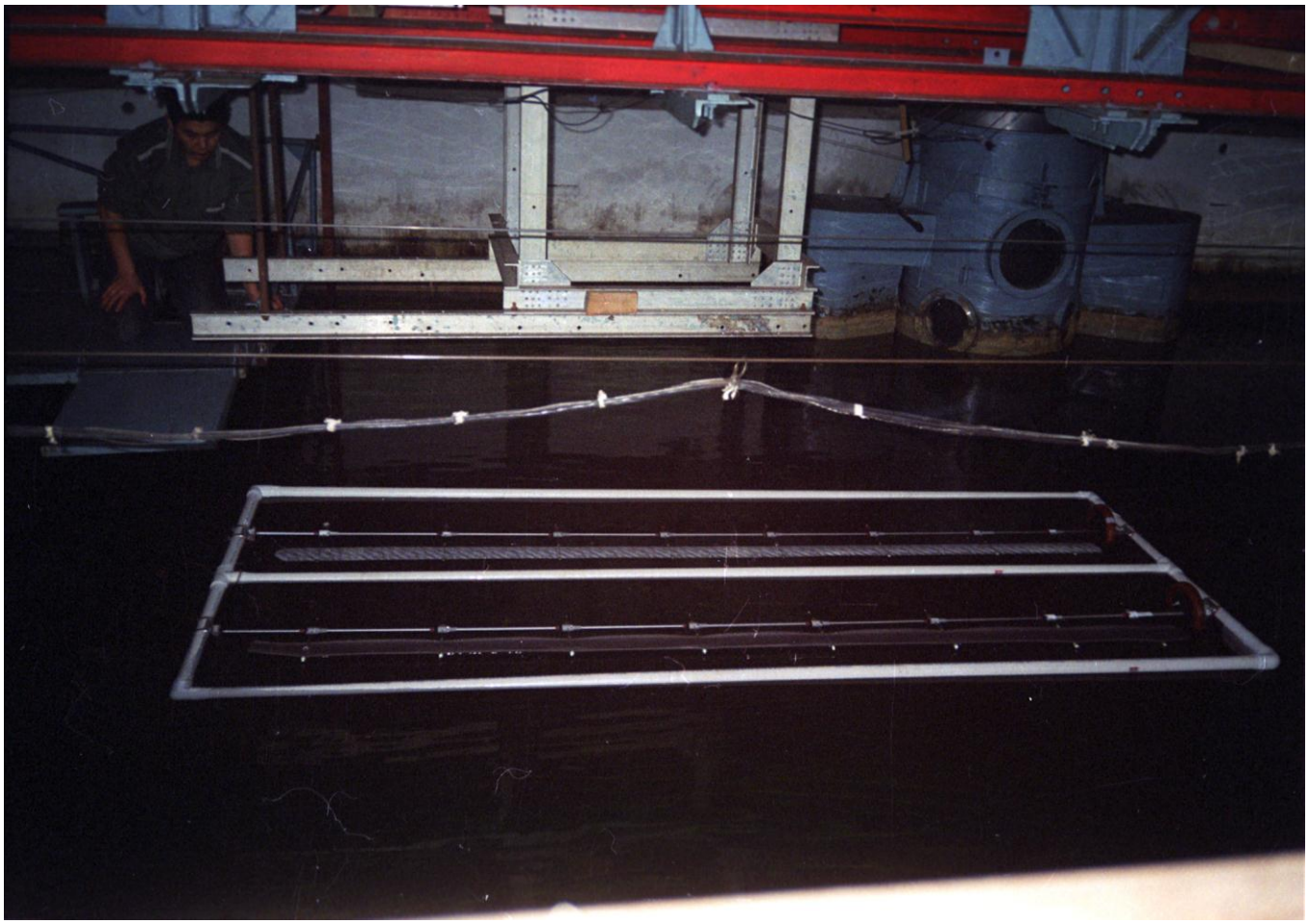

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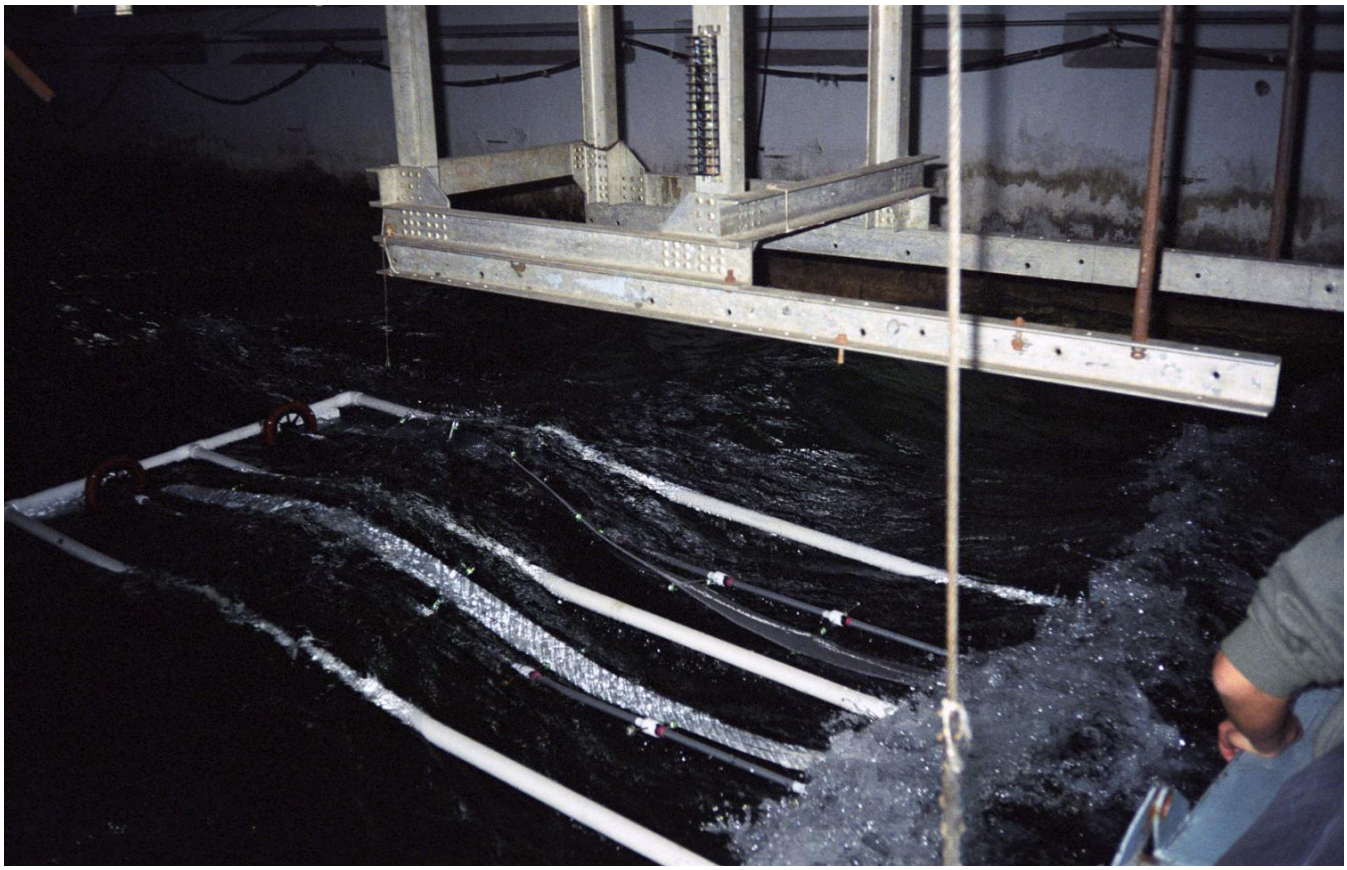

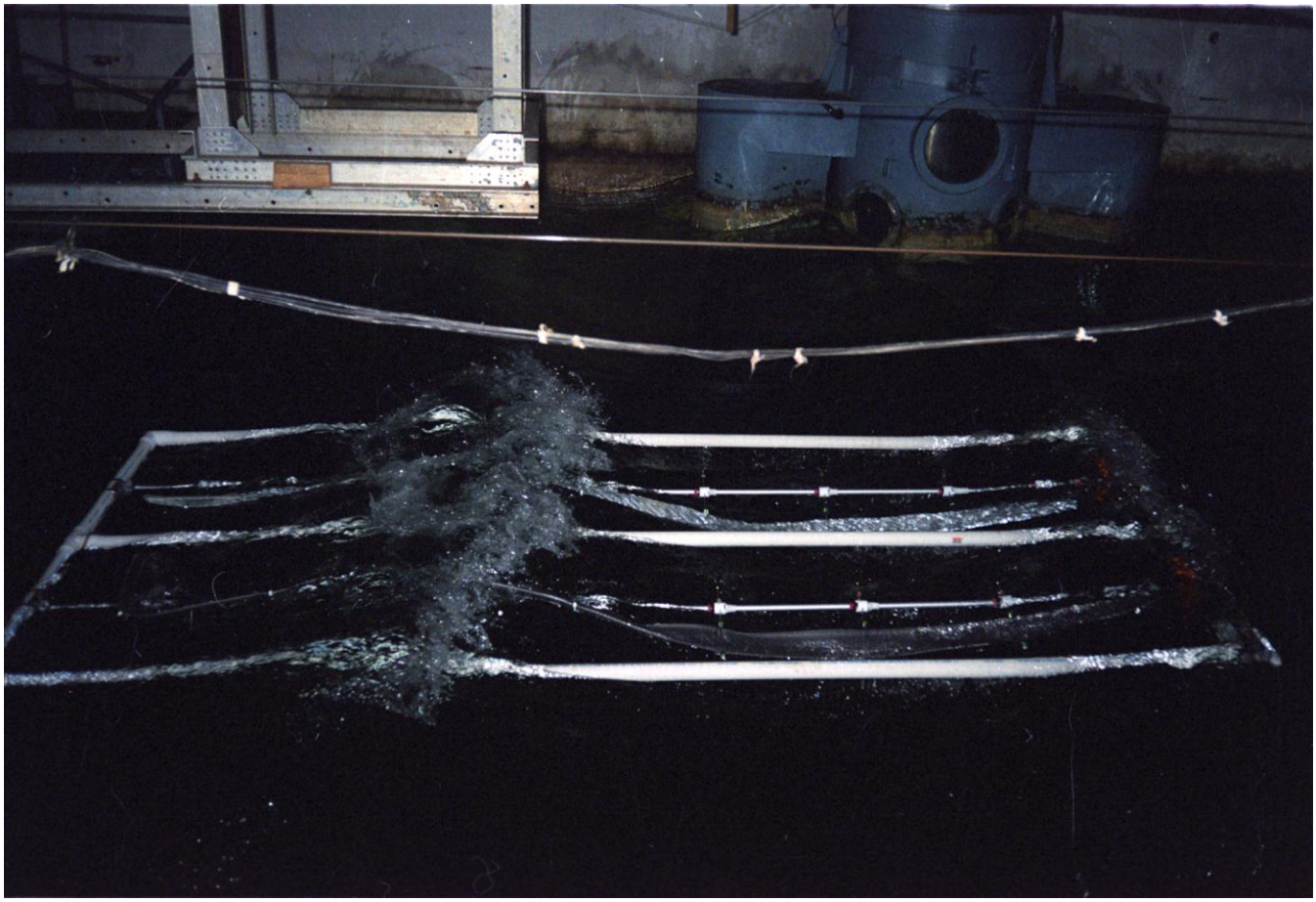

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The prototype VES-10 was manufactured in 2006.by Kiev shipyard. Prototype testing conducted in spring 2007 based on scientific Research Center of the armed forces of Ukraine "State Oceanarium" (Sevastopol).

Video of the pilot module in the Black sea:
https://www.youtube.com/watch?v=fV0632i4_pM&feature=youtu.be

Fig. 11a, 11b and 11c shows a prototype of the VES-10 in the sea.
The operation of a wave power plant in various wave conditions is shown in Figure 12a and 12b.

Fig. 11a. The prototype VES- 10

Control and monitoring station VES-10

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Fig. 11b. The prototype VES- 10

Fig. 11c. The prototype VES- 10

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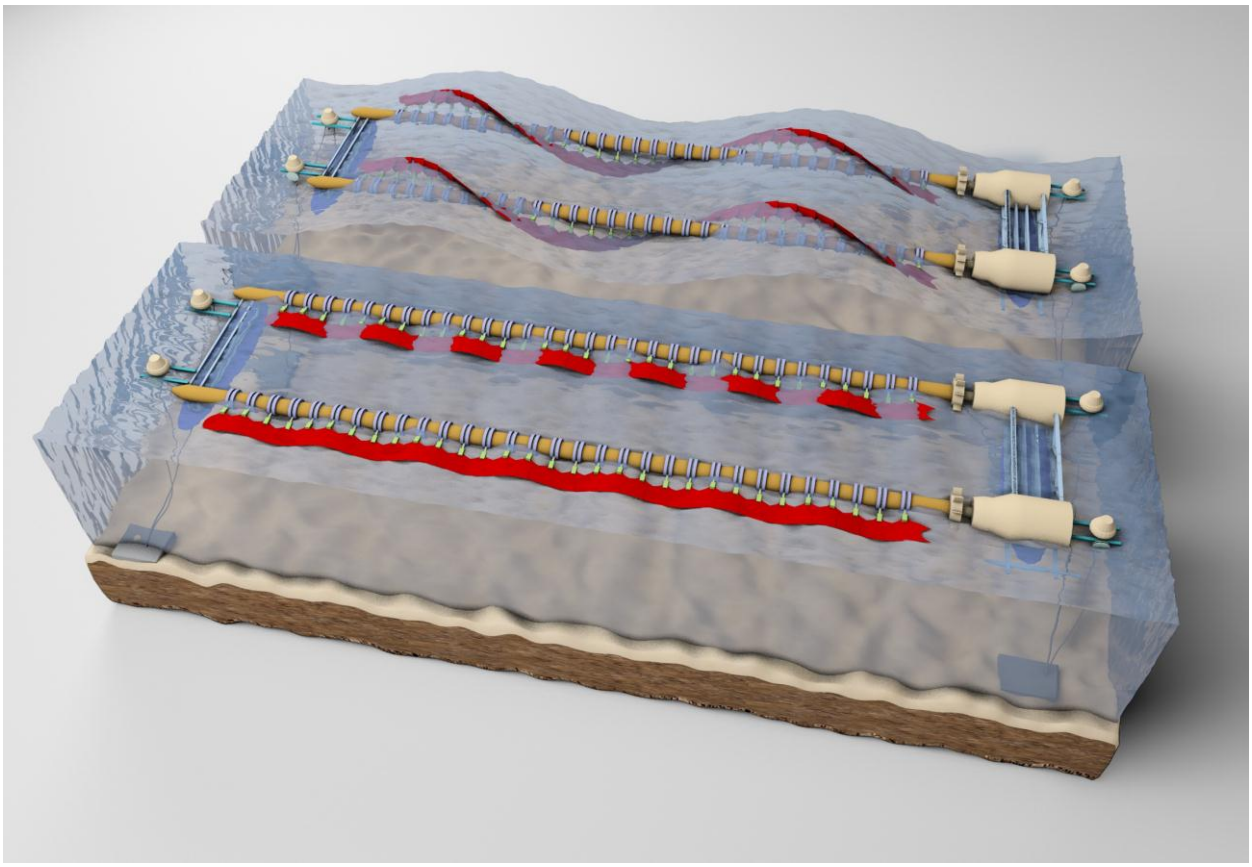

Fig. 12A Types of unit of wave power station

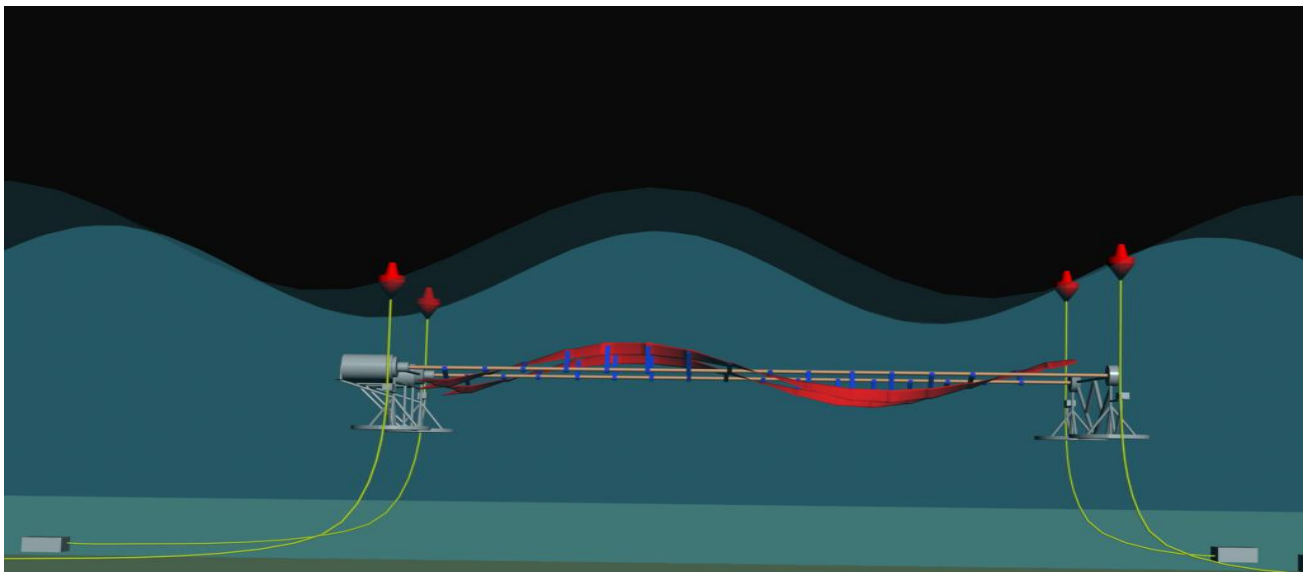

Fig. 12B Types of unit of wave power station

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5. Company information

Scientific production company KROK-1 was established in 1990.
Since the inception to the present day founder and director of the company is Ovsyankin Vyacheslav.

KROK-1 is specialized in performing all kind of investigation in relation with high technology, in developing better equipment and precision instruments, in engineering investigations and its application.

Based on the unique metal and alloy processing technologies developed by the company, 12 production facilities were created in Ukraine, Russia, Lithuania. These industries envisage hardening and restoration of cylinder liners for ship, diesel, tank and automobile engines.

Nowadays KROK-1 is an official corporate provider of equipment for all nuclear power stations in Ukraine and also makes different repairs. In particular, we perform work of modernizing and repairing the dome handlers nuclear reactors, repairing of hydraulic equipment, recovering of functional status than twenty hydraulic lift 1000 tons each, etc…

Scientific production company more than 20 years working to create an efficient and reliable wave power station. In these studies, attended the National Aviation University, National University of Shipbuilding, Institute of Hydromechanics NASU, Kiev Shipyard, etc.

Today signed a memorandum with the Bosch Rexroth Corporation on joint participation in the construction of wave power station.

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https://ceowatermandate.org/posts/krok-1-commits-ceo-water-mandate/

Video of the pilot module in the Black sea:
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