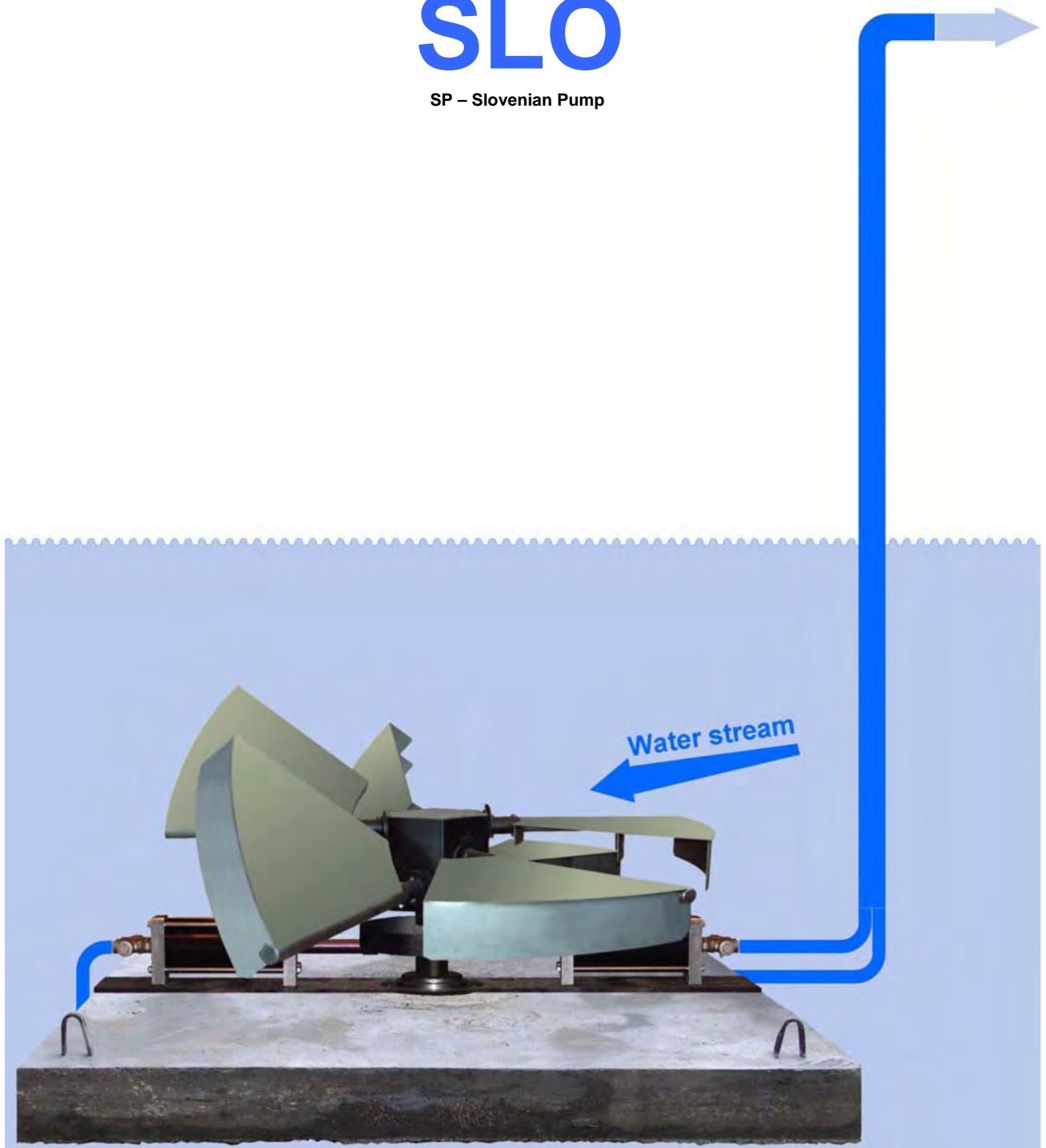


SLO

SP – Slovenian Pump



SP – SELF PROPELLED UNIT

Invented by Markovic

SP – A NEW APPROACH IN WATER TREATMENT

All people which are involved to the problems of natural sources and human environment will probably agree that after quality of air and atmosphere, the second most important natural element is clean, drinking water. Not only due to our needs of drinking, because the most of other living creatures and vegetation could not survive without water.

Today regarding all known facts it is clear that there are two main problems connected to water: complete quantity of existing drinking water is on nearly all continents big enough, but regarding specific needs – specially on the poorest continents like Africa, the most of Asia and many parts of Latin America, displacement of available water quantity is definitely not acceptable and it is not offering simple, cheap and easy solutions for serving the most of needs for common use and specially not for needs of irrigation. On other side in medium or highest developed countries the most of water is polluted due to industrial activities, but not less important are just classical organic pollutions as result of concentration of human population in big urban areas.

Many years ago as professional inventor I was asked from some people which were involved in mentioned problems to try inventing and creating some new system, which would be able to solve problems of easier water displacement, but on the cheapest possible way and without opening a new energetic or ecological problems on other important parts of environment.

It is known fact that quantity of theoretically existing hydro - potential power in all flowing waters is incomparably higher, than potential water energy which we are exploring today. Every new demand for further exploitation of this potential energy is connected with extremely high investments because available technology requires a local high energy concentration which means construction of water dams, artificial water - storage lakes, etc. Therefore it is very clear that also in the future we won't be able to place those installations anywhere we would like to have them.

Due to above mentioned problems, since century's engineers are trying to find appropriate technical solutions for the most efficient method to explore at least part of the potential energy from slow flowing waters. Water mill wheel was the first system that worked, but it has relatively low efficiency. Reason for that is in fact that it uses only upper layer of water stream, whose characteristics are totally different from entire water current. Here we are talking about simple fact that water (in comparison with air) is not squeezable medium. But this fact refers only to water in the biggest depth because on the top layer, coming to the barrier, generally not squeezable water is sliding to the upper direction of the air and completely loses characteristics of not squeezable media. For instance in the bigger depth, on every square meter of fixed barrier, water causes dynamical pressure, which is (at the same speed) app. 800 times larger than wind pressure on the identical surface of barrier!

All described facts tell us that for much bigger efficiency we must perform our exploitation of dynamic energy of slow water current, in biggest possible depths. Based on described laws of Physics I started to think, about inventing turbine which "behave like barrier", and which could be fixed to the bottom of the river to exploit at least a part of that extreme energy. At the beginning I made myself clear that driving - active part or "turbine" can not be shaped on the way like classic water or even wind turbines. Without possibilities to increase local speed of water and considering that hydrodynamics and aerodynamics are totally different by their effects, problem to be solved was definitely not small. So, I designed a system in which active "wings" shall be shaped like very big surface "barriers" to water stream but on opposite side of the turbine they will automatically turn against the stream – the smallest possible face. On described way, we received extremely large leverage on active side of turbine and very small (16-28 times smaller) on passive side of turbine. The same time, due to known reductions of efficiency on classic turbine systems caused by speed

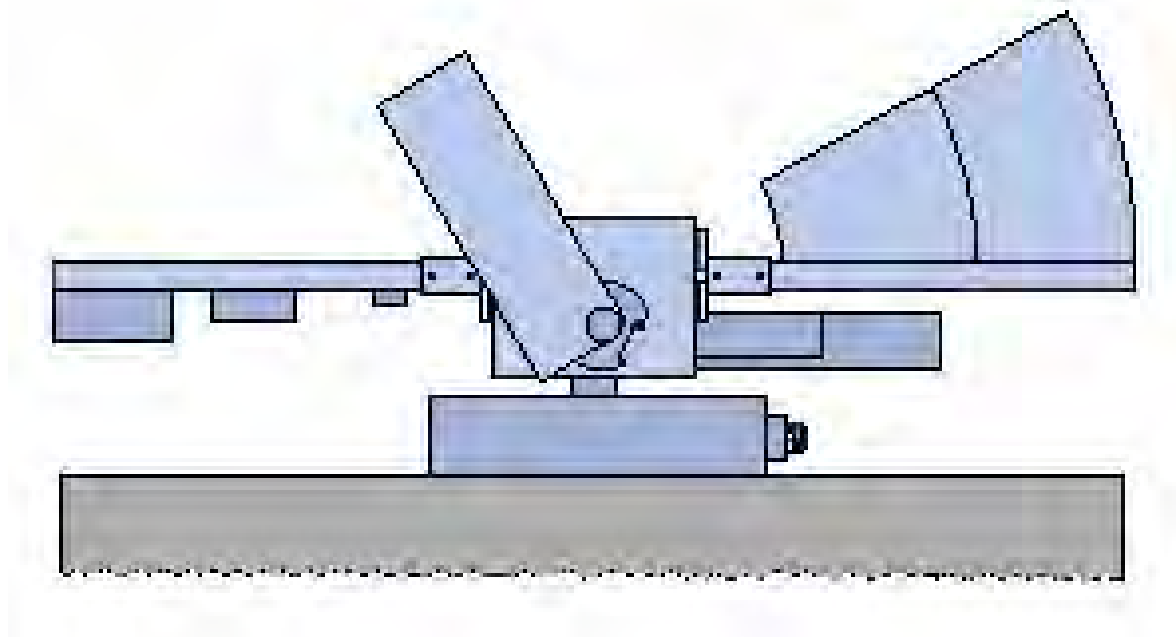
difference between speed of media and speed of turbine, our design allowed to the driving media to produce 10 to 20 times longer time of active pressure on each propelled wing with relatively very small speed difference between speed of water and rotational speed of wings.

Using classic known turbines and propellers, some very expensive projects fell through because of described reasons and one company in USA still claims that they will in 9 m deep water receive 35 kW of energy on unit with axial turbine (identical to wind turbines) with propeller diameter of 5 meters and set to the bottom of the slow moving water! Considering the facts how small number of river places with 9 meters of water depths are existing and calculating how deep, high and strong fundaments in the river bottom such design suppose to have, it seems to be that our approach was completely correct. With 5 meters of wings diameter our SP system can produce more tenth times larger leverage and much smaller number of revolutions which is definitely not coursing a danger to boats, ships and to the people in water. SP units needs as minimum only 1.5 m of water depth, are ecologically completely faultless and because of their extremely slow propelling speed (app. 10 revolutions per minute) certainly do not threats flora and fauna of the river.

From descriptions you can find out that we are talking about quite unusual design, which uses only dynamical pressure of slow water current. Even more, by larger water speed, its efficiency becomes lower ! Complete design is convenient to drive water pumps (for irrigation) or alternatively to drive directly submergible electric generator. It is also suitable for performing aggressive micro aeration, by which through hose is sucking air from the river bank and injects small bubbles (smaller than 0,2 mm) on the bottom of the river. That causes oxidation of organic polutions and elimination of the organic mud, which is mostly present on the bottom of the river and areas of the water dam lakes.

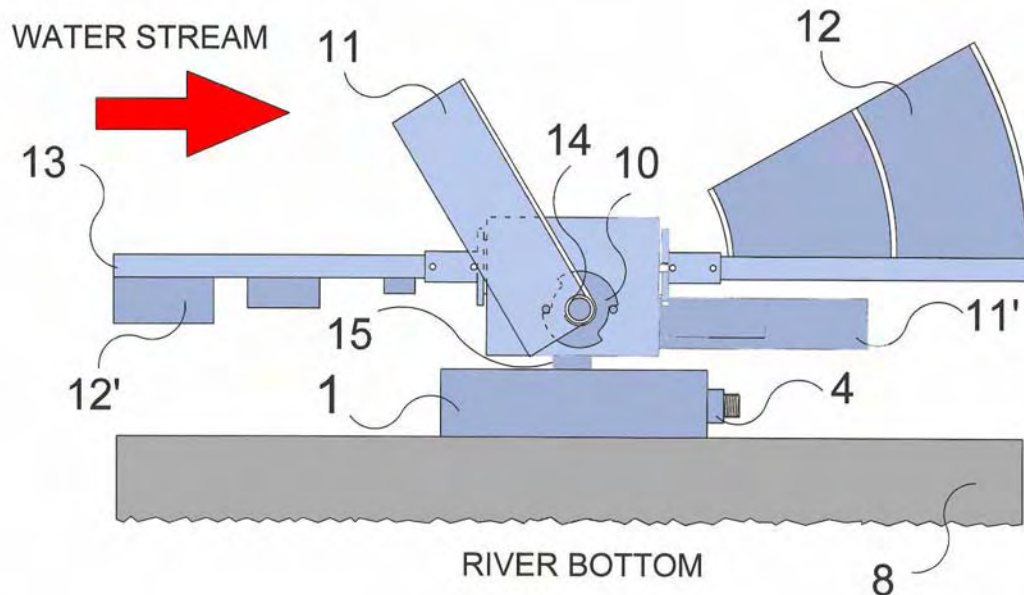
After nearly twenty years of activities, couple of years ago I found technical possibilities to design submergible unit which suppose to be fixed on the bottom of any kind – even smaller and very slow river. My idea was that complete unit is using hydrodynamic forces of slow movable water masses as propelled sources which will allow pumping of part of the same water with much higher pressure to other places where is needed.

On the following text and pictures you can see the explanations and principles how new self propelled pumps (SP) are working and nearly unbelievable possibilities of their use.

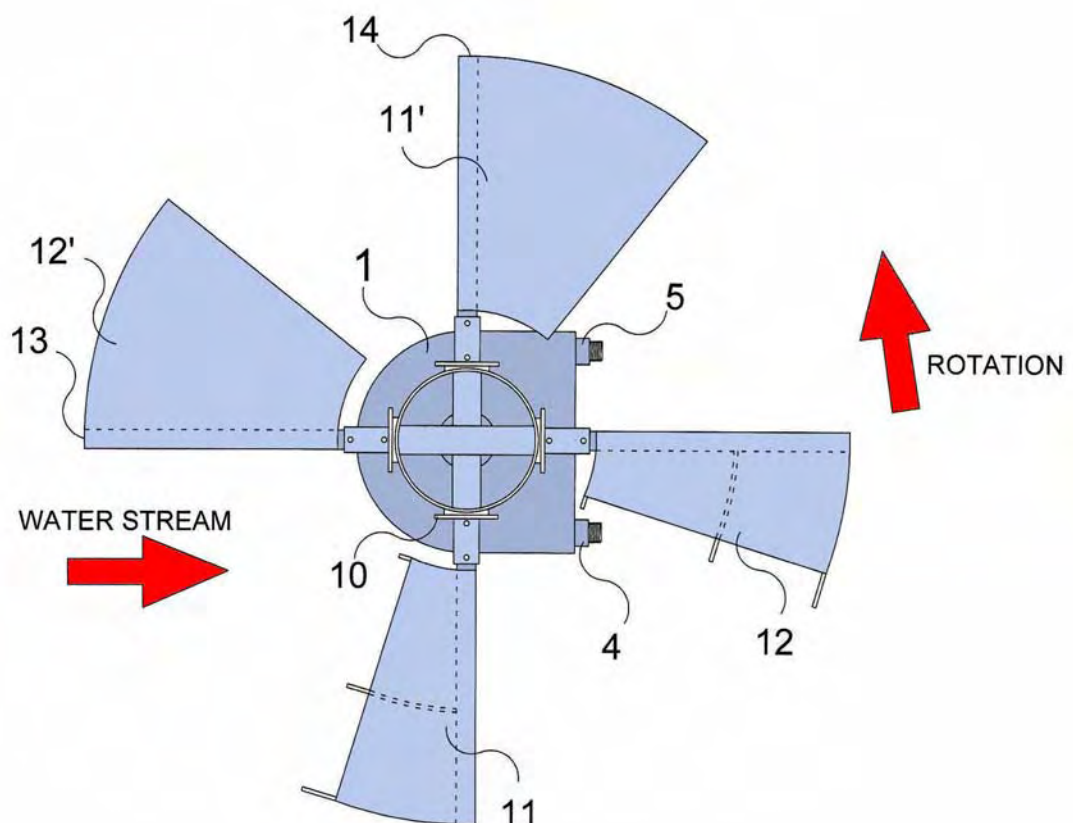


SP – A NEW WATER ENERGY TREATMENT

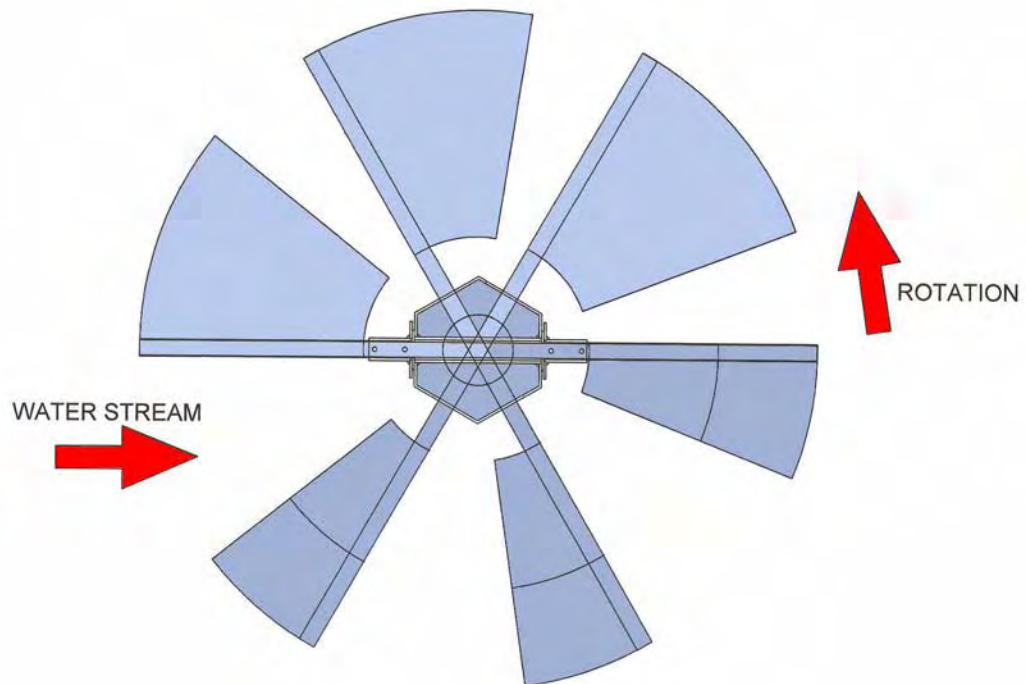
To understand how system works you must understand that our driving “wings” are operating always in pairs – two of them on the same axle. Both wings (for example 12 and 12') are fixed on the axle 13, but on such way that one wing is fixed on the axle horizontally (12') and opposite wing (12) is fixed with inclination of approx. 60°.



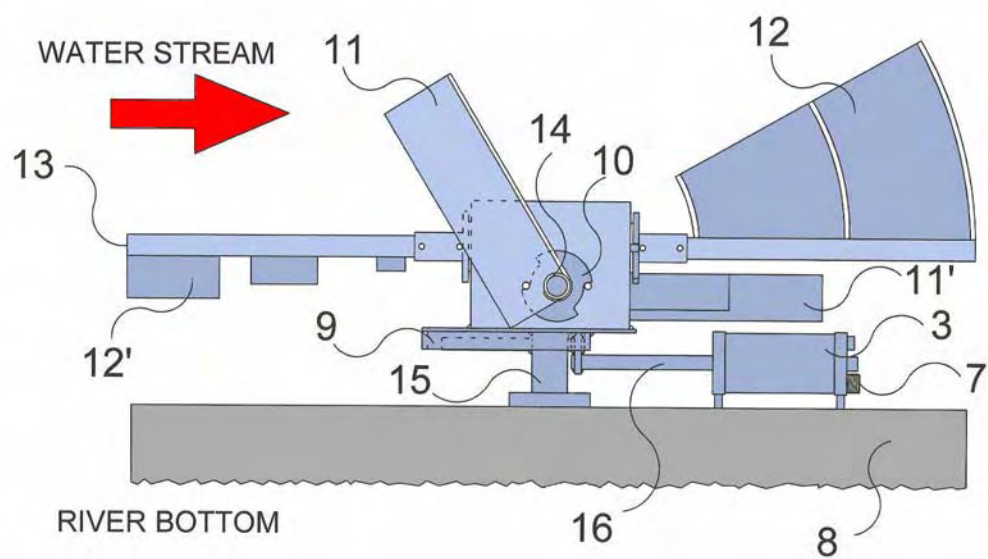
Therefore one side of such propelling system is always turning to the water stream the smallest surface and the second side (wing) is always turning to the water stream very big surface. When complete design turns around vertical axle for more than 180°, water stream is pushing down previously lifted wing and lifting up the opposite - previously horizontal wing.



Described designs we made in more prototypes with 4 and 6 wings and we already measured extremely high efficiencies comparing anything known or existing designs up to these days.



Up to now we made more designs with piston pumps, membrane pumps and very inconvenient centrifugal pumps.





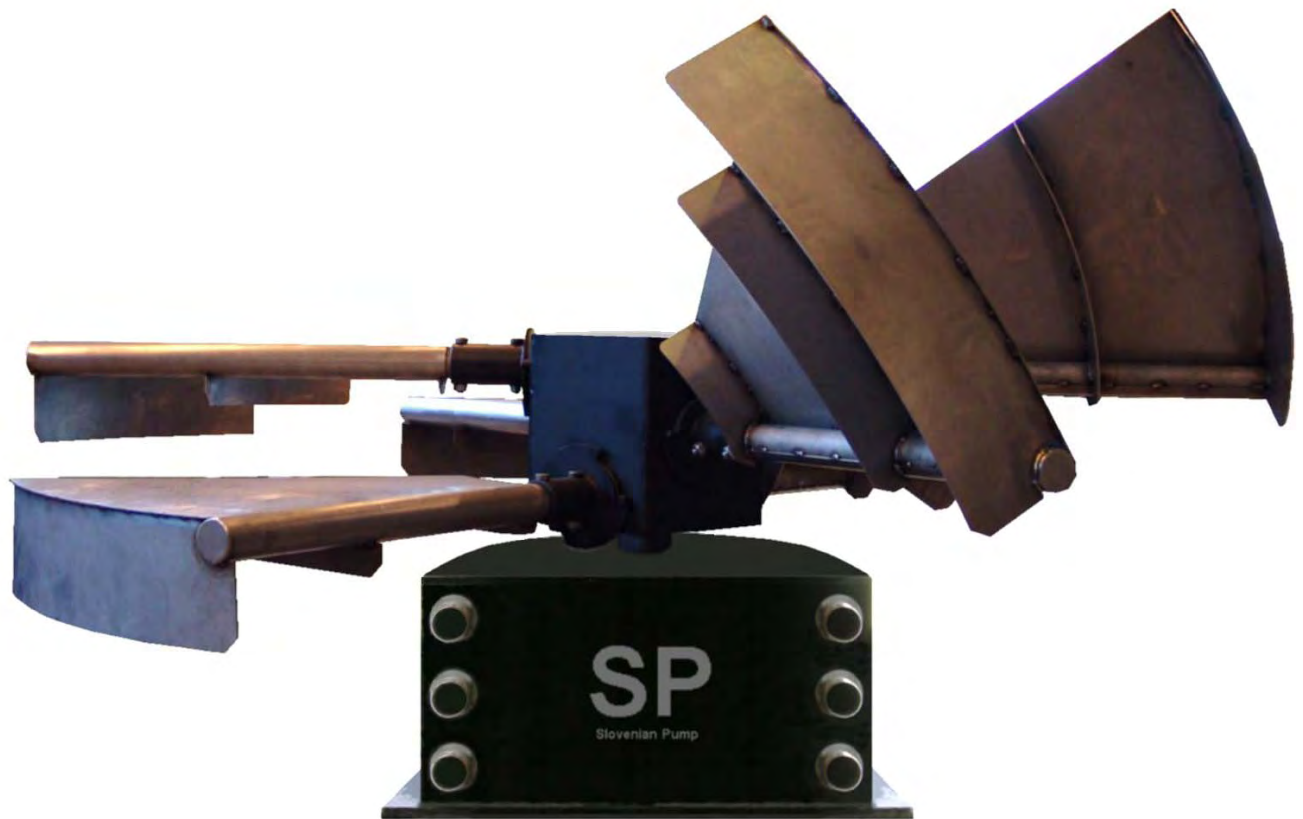
The first prototype from early development



The second prototype with 1,6 m diameter



Several years ago, (due to centrifugal pump) the second prototype was able to deliver only 1 liter/second of water based on 1,2 bar of pressure.



Our newest design of self-propelled submersible pump with 3 pairs of propelling wings with diameter of 2,4 m and completed with triple peristaltic submersible pump can deliver nearly 300.000 litres of water per day.

It is very important to emphasize that SP units are able to serve also much bigger number of needs as it looks at the first moment.

We can directly attach also submersible electric AC generator with power up to 20 kW.

For example, instead of submersible water pump, we can use also submersible air pump which must have attached the inlet hose for air. The opposite end of this hose must be fixed somewhere on the coast and out from the water. In that case, SP unit is sucking the Air and pressing it in very small bubbles on the bottom of the river where deficit of the oxygen is always the biggest – coursing a very quick “burning” of the mud and all kinds of organic pollutions. On described way we shall be able to “turn back” to our rivers a normal “health” which was taken by too high quantity of organic sediments on nearly all bottoms of slower rivers.

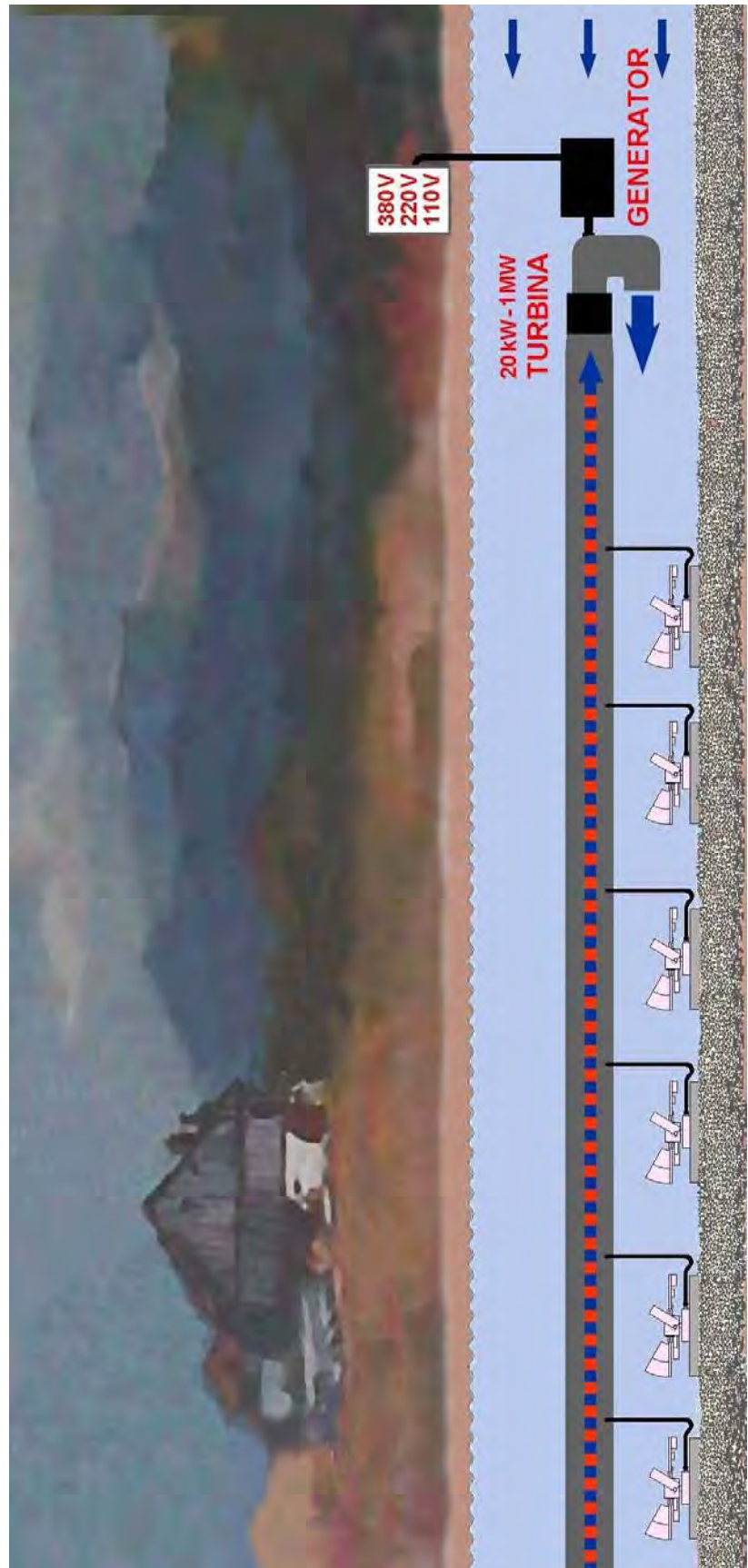
Basic idea for higher capacity of irrigation is to connect outlets of more SP units to the bigger diameter of main pipe. This can be done by means of connecting 50, 60, 100 or even more hundreds of SP units to the main pipe with diameter of up to even 2000 millimetres. In such case and specially if we combine such main pipe line with inside Air injecting system (produced from some of connected SP units), we shall be able even to combine consumption of water, transport of and simultaneous cleaning of water from organic pollutions.

On the right picture, you can see some other possible application in use of SP units:

For all cases where we could not use a classic system for installing a Power facility, very similar to previously Described connection of more SP units on main pipe, even more hundreds of units and main pipe can be placed on the bottom of the river. But, on the first end of the main pipe we can install a submergible turbine and Power generator which can offer us more than enough electric energy for some local use – or, can be connected to standard Power net system. The costs for such energetic installation are not to be higher than classic Power installation but more important is a fact that described installation can be done also on the places where usual Power systems are not possible. Of course, main hose can be also lifted on the coast and turbine and generator can be installed on the small building near the coast of the river.

It is important that presented solution is ecologically offering the best solution because all facilities can be placed and hidden on the bottom of the river and could not harm any aspect of local environment.

In research and development phase we learned that by size, 3 different models of SP units would be welcome on the market: a very small “hobby” unit with capacity of 1 l/second and wings diameter of 1,6 m ; “standard” SP unit with capacity of 3 l/second and wing diameter 2,4 m and “goliath” SP unit with capacity of 7 l/second and wings diameter of 5,5 meters.



It is important to remember that mentioned "Goliath" SP unit with single Power generator in quicker water flow (5,5 m/second) is offering nearly 20 kW of energy !

All mentioned capacities are valid with pressure up to 2 bar and can be reached with water speed in range of 3,8 m/sec. Of course, under the special conditions, also other dimensions and characteristics of SP units are possible but something must be clear: For relatively high Power of each SP unit there is the first condition to have enough big quantity and quickest possible water flow. But comparing to other known systems, even on very small river with only 2 meters of width and 1,5 m of depth (with water speed of only 1 m/second), using more SP units can offer much higher and much cheaper exploitation effects than any other known system which uses dynamical energy from water movement.

Generally speaking, short time ago we applied all needed patent applications and during priority period of nearly one year, we intend to apply this protection also in many other countries. All together, we have in possession four local companies in which we intend to organise serial production of at least three mentioned models of SP units. In four locations we have nearly 9.000 square meters of working area but at this moment all together, just couple more than 100 production workers.

Preliminary marketing research we made in this year is showing that theoretical sales possibilities are incomparably larger than we are able to produce – without very big and serious investments in proper production capacities and equipment. Therefore, we are inviting all interesting investors, companies or institutions to join us – with capital, sales organisation and other activities.



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