Aqua-Q and Aqua-Q's product

Aqua-Q is a Swedish Cleantech SME founded in 1992. The core technology of Aqua-Q, AQUATRACK®, is a real-time early warning & sampling system to prevent contamination in drinking water. The United Nations defines Water Security as "the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability." Changes in water quality present a high probability of increasing pollutant, or microbiological growth, which can be harmful to the environment and human consumption.

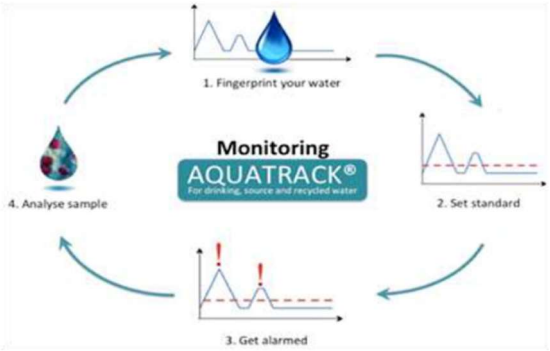
In connection to the innovated AQUATRACK® system, Aqua-Q also provides an Ozone polishing system to simultaneously remove chemical and biological contamination. As pharmaceutical residues are increasingly found in rivers, lakes, and other water bodies, and cause an emerging environmental problem for both developed and developing countries, Aqua-Q's product can provide simple solution to maintain water quality for human consumption.

AQUATRACK® - function

AQUATRACK® is a real-time early warning and sampling system on water quality. It is a stand-alone machine with building software to monitoring water and take water sample. It is also easy to instal and maintain.

AQUATRACK® is designed to provide preventive information on changes in water quality due to infiltration of surface water into collecting systems, pollutions, or technical breakdown of filtration system that post a risk of biological and chemical contamination in water. As the sensors of AQUATRACK® detect deviation in water quality standard, an immediate warning signal will be sent out to allow actions being taken. At the same time, AQUATRACK® will also take sample of the contaminated water for further analysis.

AQUATRACK® use dynamic fingerprint, an innovated technology to create a base standard of the effluent water. This fingerprint contains information of micro particles/micro debris in the water. As AQUATRACK® is running, an optical laser sensor will be used to detects all possible forms of variations in the effluent water and compare to the fingerprint of the baseline standard.



4 steps of the applicability process of AQUATRACK®

AQUATRACK® can monitor the change in water quality in real-time. As soon as a deviation is detected, the management of the water treatment facilities will be notified for potential water contamination. AQUATRACK® can communicate wirelessly, e.g., notifying a mobile device, and allow data access remotely. Moreover, contaminated water sample will also be taken immediately for further analysis to identify possible pollutants.

The function of AQUATRACK® is verified by European Environmental Technology Verification (ETV) Program. Aqua-Q and AQUATRACK® was and the recipient of Gold Innovation Award from International Water Association (IWA) in 2018.

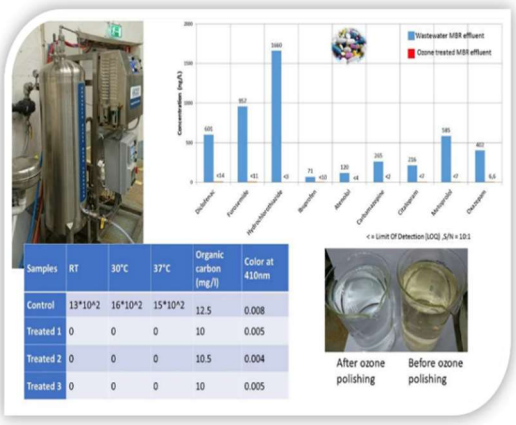
Benefits of AQUATRACK®:

AQUATRACK® can bring benefit to the management of water safety and security. AQUATRACK® **c**an be used in natural water, e.g., rivers, lakes, ground water, and coastal waters, as well as reclaimed and recycled water. AQUATRACK® can play a crucial role in informing the quality of water for human consumption and usage, e.g. for, and for community water plant and swimming pool. It can also be applied to water needs to be in substantial high quality, such as in the medical centres, nursing homes, and food industry.

1. AQUATRACK® functions as a real-time monitoring system capturing the change of water quality without time delay.
2. AQUATRACK® represents a cost effective and accurate way to monitor MBR, UF, NF and RO filters and alarm if there is any breakdown.
3. AQUATRACK® is easy to install, and maintain. With its advance technology, AQUATRACK® can be managed remotely.

Ozone polishing system

Aqua-Q has developed a modular ozone polishing system to treat contaminated water. It has been successfully demonstrated that Ozone is a cost-effective way to remove pharmaceuticals residues and pathogens in the water. The ozone gas and the effluent water is mixed in a closed circulation tank. With a minimum dose of ozone gas mixing with effluent water, micro bubbles can be created to facilitate the removal of unwanted particles. Once the dissolved ozone concentration has obtained the pre-determined value the water is discharged to outlet.



Samples	RT	30°C	37°C	Organic carbon [mg/l]	Color at 410nm
Control	13*10^2	16*10^2	15*10^2	12.5	0.008
Treated 1	0	0	0	10	0.005
Treated 2	0	0	0	10.5	0.004
Treated 3	0	0	0	10	0.005

Ozone polishing system have been demonstrated in the water treatment plant in Hammarby Sjöstadsverk in Stockholm. The effluent water from the MBR in the plant was treated by the Ozone polishing system, and the result show that Ozone has successfully reduced the pharmaceutical residue to below the limit, and no bacterial and other pathogens were found treatment. Ozone treatment can also reduce the (total organic carbon) TOC and the colour of the effluent water.

Benefits of Ozone polishing

The Ozone polishing system can be connected to AQUATRACK® to allow real-time early warning and monitoring and treatment on water quality. This this combination system, there is no need to wait for the lab test result before cleaning the contaminated water.

1. Ozone polishing cost effectively eliminates both pharmaceutical residues and pathogens in effluent water with minimum dissolved ozone 0.08 ppm.
2. Require no secondary treatment with active carbon as no by products are observed.
3. No costly pharmaceutical analyses are required on regular basis for prioritized drug residues as above.
4. Properly applied at correct position on a wastewater treatment process ozone is a most environmental and effective tool to decompose organic substances and pathogens in the effluent and can have GRAS status.

Aqua-Q's international operation

As a start-up, Aqua-Q's main focus was to demonstrate its technology and to appeal interest from the end customers. Most of the demonstrations that Aqua-Q ran have restricted in Sweden, for example:

- **Monitoring and sampling of water for consumption and usage:**
    1. Source water for drinking, Stockholm.
    2. Drinking water, Nässjö.
    3. Water in municipal swimming pools, Stockholm and Malmö.
- **Monitoring and sampling of treated water to ensure there are no harmful contaminants or residue:**
    1. MBR effluent, Stockholm (FoU).
    2. Traditional STP effluent to technical water, Arboga.

In overseas, Aqua-Q has also run two demonstrations in treated water in Spain:

1. MBR effluent for agriculture, Spain.
2. MBR effluent discharge to river, Spain.

Additionally, Aqua-Q also joined a European consortium to deploy AQUATRACK® to monitoring MBR effluent discharge to Ganga river in India (currently on hold due to the Coronavirus pandemic).

Aqua-Q and the IHMEC Project

Aqua-Q officially joined the IHMEC Project and sign an agreement with Uppsala University (Swedish coordinator of the IHMEC Project) on the 20th of August 2019. Aqua-Q was recommended to the IHMEC Project through KTH (Royal Institute of Technology), is one of the Swedish partners in the project, as they have previously collaborated in a water quality research project. Aqua-Q and the IHMEC Project share the same concern over the quality of water inside a built environment and determine to work together to promote this agenda to a wilder audience.

In September 2019, the founder of Aqua-Q, Sudhir and Ulla Chowdury joined other IHMEC companies to attend the Global Health Exhibition held in Riyadh, Saudi Arabia where Aqua-Q's innovative product was introduced. The IHMEC project also organised workshop in various hospital, e.g., King Faisal Specialist Hospital (KFSH), and Aqua-Q's innovation in detecting water contamination in real time has greatly attracted interest.

Aqua-Q also had a chance to discuss issues relating to market entry to Saudi with Dr Mohammed Garout, a well-respected infection control specialist and a IHMEC consultant. Through this business visit, Aqua-Q became more aware about the potential market opportunities from not only in Saudi but also for the Gulf Region.

Outcome of the collaboration with IHMEC

After the joint business trip to Global Health Exhibition in Riyadh, Aqua-Q has received contact from several interesting parties regarding to the innovative AQUATRACK® and Ozon polishing system. A potential distributor in Saudi, Integrated Solutions for Business (ISB), has held multiple meetings with Aqua-Q to discuss the potential of introducing AQUATRACK® and Ozon polishing system to King Faisal Specialist Hospital (KFSH) as a demonstration project. After continuing discussion last for a few months, Aqua-Q and ISB signed a Non-Disclosure Agreement (NDA) as a cornerstone for future collaborations.

Challenges and take-away points

Aqua-Qs ground-breaking Innovation AQUATRACK® world's first "Early Warning for water contamination & Smart Dynamic Sampling" was not so easy to explain for adaptation, due to many reasons like language barrier, culture barrier, travel barrier due to Covid-19 and lack of funding to demonstrate SME innovation.

Despite the innovativeness of its product and great enthusiasm received from the market initially, Aqua-Q's attempt to enter Saudi market is not without challenges. The ongoing communication with Saudi partner has not been easy due to the difference in business culture, which inevitably increase misunderstanding and delay the speed of collaboration. Due to the geographic distance and corona pandemic, all the communications were conducted online, and unfortunately there is limitation on not being to discuss in person particular during the beginning of collaboration.

Additionally, distributors, customers and local stakeholders were also seemed to have difficulties to envision how the product can be applied and integrated in the existing operations. The lack of an existing reference case is particularly challenging to explain the critical usage of an advance technology.

A couple take-away points can be addressed. It takes time, experience and commitment to enter a foreign market with significantly difference. The progress of internationalization of a firm may be facilitated through involving networks that have been established previously. Having a suitable product for internationalization can be rather critical and determine the success in achieving the result.