

# WATER

**proved**

Maßgeschneiderte Aquakultur



Aquaculture Systems  
[www.water-proved.de](http://www.water-proved.de)



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## Tailormade Aquaculture Systems

### FISH FARMS MADE IN GERMANY

Welcome at **WATER proved's**, your specialist for tailormade aquaculture.

We design and build fish farms for a large variety of species: Trout, Salmon, Char, Pike Perch, Sturgeon, Shrimp, Tilapia, Perch, Carp etc. Depending on your site conditions we develop your farm as Flow Through or Recirculating Aquaculture System (RAS). We do of course also help you with modernization or modification of an existing farm.

Besides engineering and construction of farms, we sell lots of components for the aquaculture business: Drumfilter, biological filter, oxygenation, pumps, UV disinfection, monitoring and control systems, feeding systems, fish pumps and more.

We know what we are doing - our staff has practical farming background in recirc and flow through systems.

**Make the most of your farm - Contact us today!**

**WATER proved** was founded in 2011 by Master of Science in Fishery Science and Aquaculture Alexander Rose. Before starting his own company Alex worked as farm manager in Salmonids production and for an international turn key supplier.





## Design and construction of fish farms

**WATER proved** designs and constructs landbased fish farms. No matter if you want to work your farm as a Recirculating Aquaculture System (RAS) or a Flow Through System, we can do it!

We offer you individually designed RAS or Flow Through systems, providing you highest benefits.

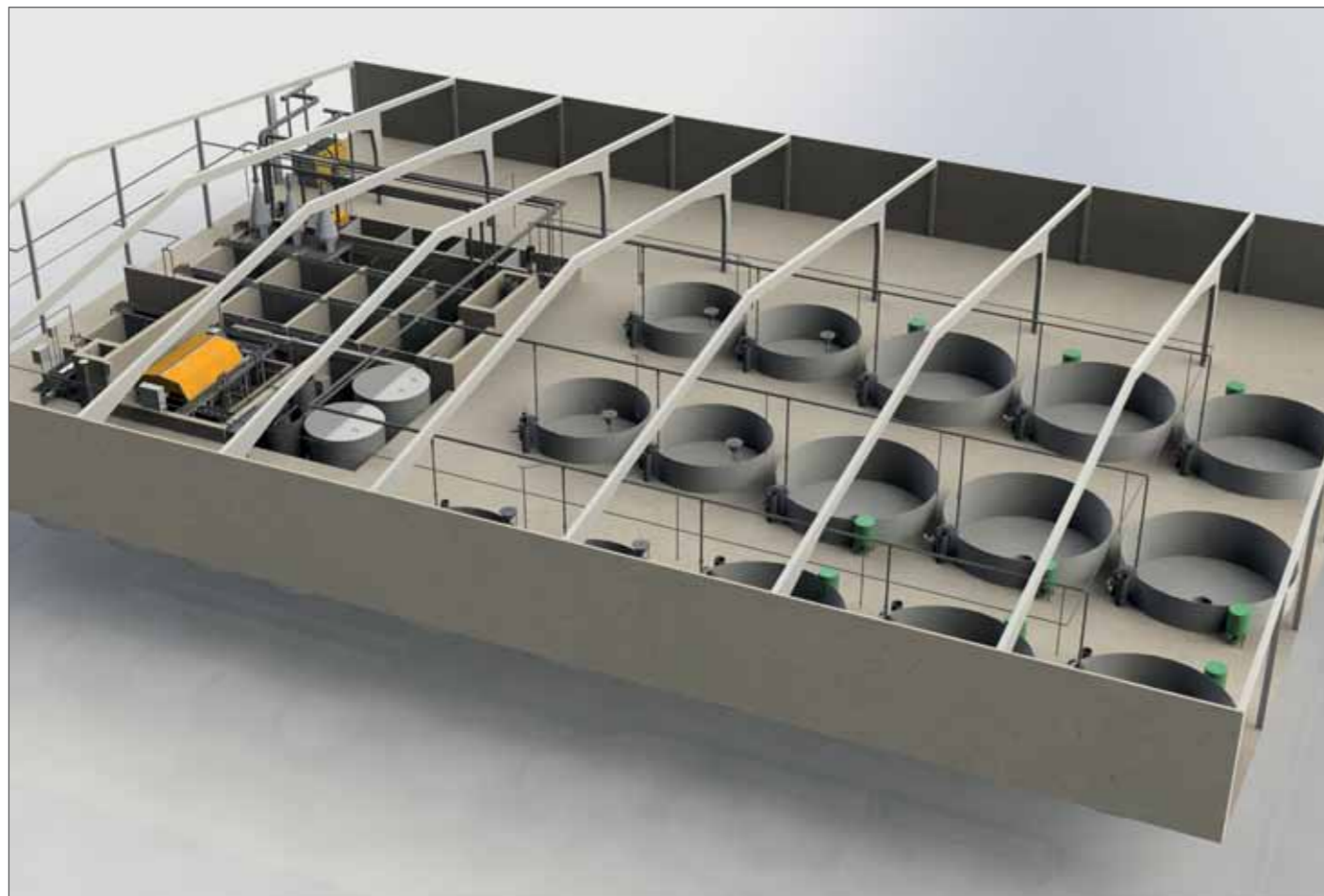
**WATER proved** does not work with standardized farm modules but finds the best solution for your site. The design is done completely in house by our aquaculture engineers using state of the art 3d design software. This optimizes the cooperation with our customers and suppliers and gives you the best possible fish farming solution.

We are only sourcing well proven material, all our suppliers have great experience in aquaculture.

We offer **24/7 service** for all our equipment and farms.



Engineering



## Recirculating Aquaculture Systems (RAS)

Recirculating Aquaculture Systems offer optimal growth conditions all year round. Stock is protected from predators and pathogens. Water quality and temperature is continuously monitored and adjusted.

RAS from **WATER proved** can be used as grow out and hatchery facilities.

Our systems are used for a large variety of species, including Trout, Char, Salmon, Pike Perch, Perch, Tilapia, Shrimp, Catfish and Carp.

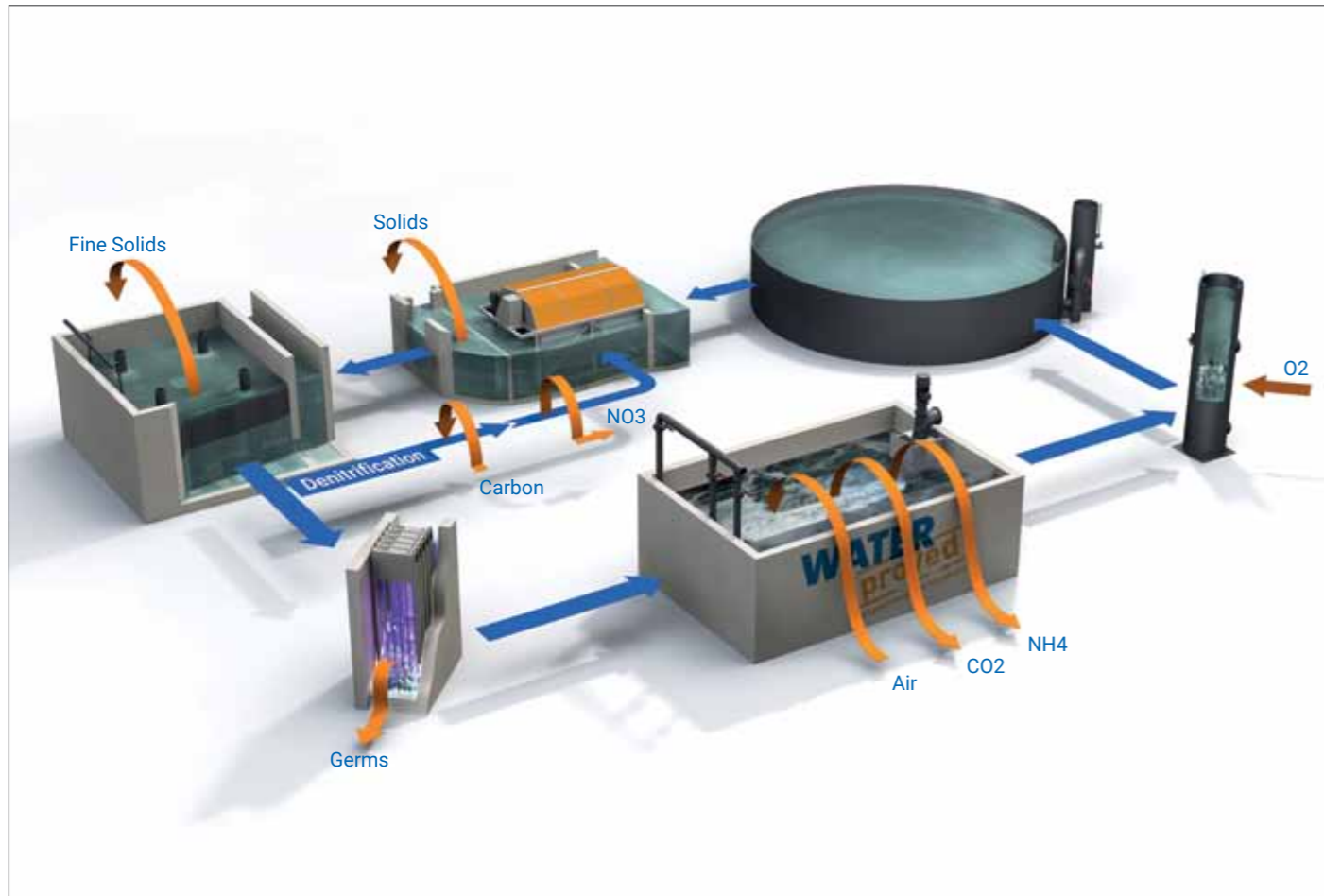
Every system is designed exclusively for your site. That is the only way to achieve best production results with optimal use of resources. It also makes the use of existing buildings very easy.



### FOR RAS WE OFFER:

- Design of turn key systems
- Set up of turn key systems
- Design and set up of single components:
  - Tanks
  - Drum filters
  - Fixed bed filters
  - Moving bed filters
  - Denitrification
  - Oxygenation
  - UV Disinfection
  - Ozone Disinfection
  - Monitoring systems
  - Feeding

**Engineering**



## WATER proved RAS consist of the following parts

### Tanks

Tank shape and size are adapted to the desired fish species and size. Round tanks, D-ended raceways and raceways are used.

### Mechanical filtration

Hydrotech drumfilter with 30, 40 or 60  $\mu$  and concentration of backwash water for further treatment.

### Fine particle removal

Depending on the farm size fixed bed filters or bead filters are used.

Efficient particle removal is the key to a well functioning RAS!

### Impeller pumps

High efficient impeller pumps lift the water once.

### Disinfection

Standard disinfection system is UV light in low head open channel systems. Ozone treatment can be implemented if required.

### Moving bed filter

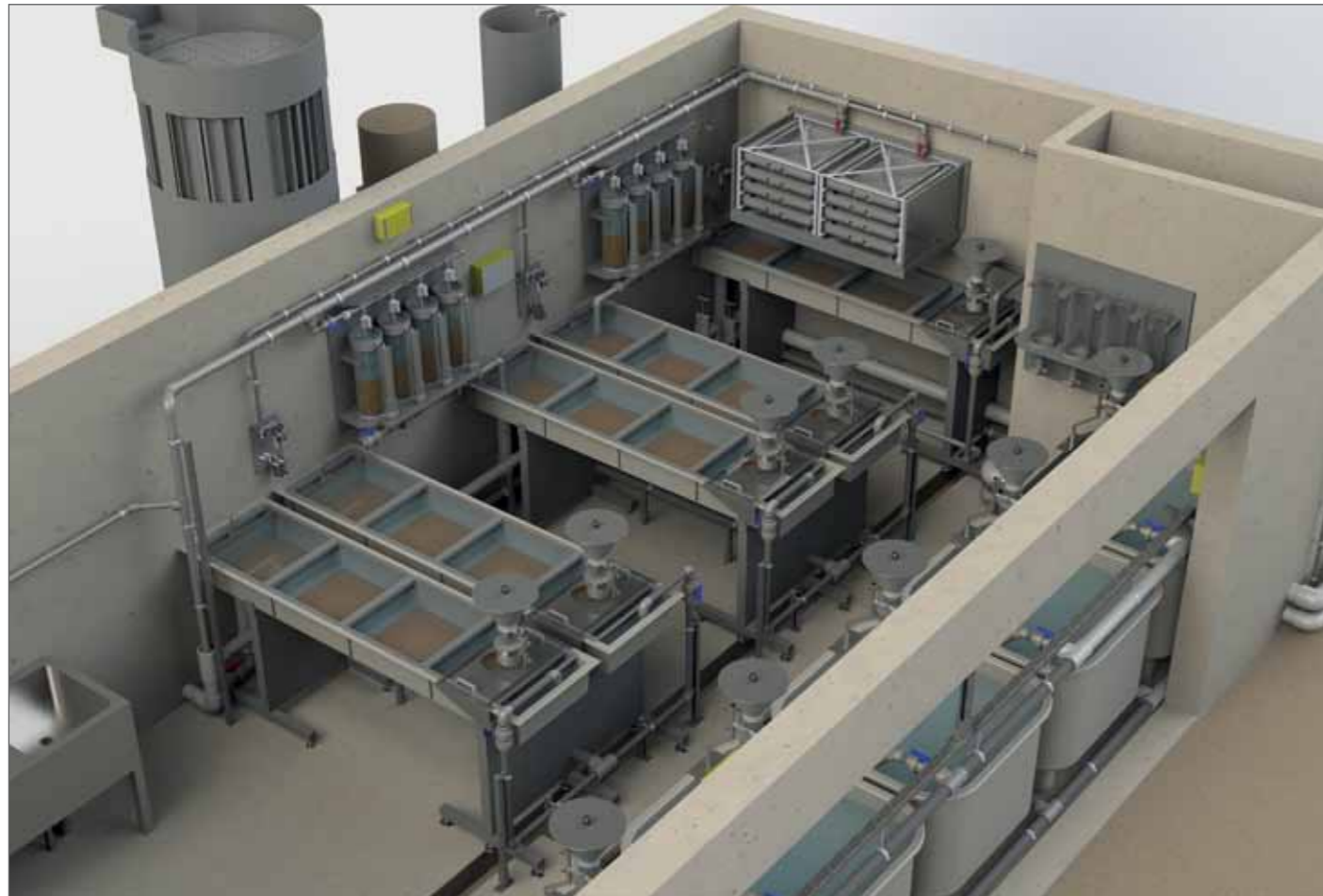
Nitrification, degassing and basic oxygenation.

### Oxygenation

Centralized or individual oxygenation by LHO - low head oxygenator, cone or u-tube.

### Monitoring & feeding system

Run time, levels, oxygen control, feed amount etc. for optimal production security.



## Flow Through Systems

Flow Through Systems have a significantly higher water demand than RAS. That's why they are only used for Salmonid species here in middle Europe.

According to the site conditions, water can be used several times anyway. Drumfilters are used and sometimes biological filters are installed to purify the effluent water or recirculate part of the water.



### FOR FLOW THROUGH SYSTEMS WE OFFER:

- Design of the farm, including drum filters, oxygenation, fish handling and effluent water treatment
- Supply and installation of components like filters, oxygenators etc.
- Farm monitoring and SCADA systems

Engineering



## Hydrotech drumfilter

### For inlet and outlet filtration and the use in RAS

Drumfilters are well proven when it comes to solid removal in aquaculture.

We use the No. 1 drumfilter: Hydrotech

With Hydrotech drum filters nutrient loads can be reduced significantly.

- Up to 80% of BOD
- Up to 84% of total P
- Up to 91% of TSS

### Applications

Drumfilters are used in a wide field of applications:

- Faeces removal in the effluent water of fish farms
- Mechanical filtration in Recirculating Aquaculture Systems (RAS).  
Microscreening enhances biological nitrification and increases the effectivity of UV and ozone disinfection.
- Sediment removal from the inlet water. Reduces solids sedimentation in the farm and gill problems
- Reduction of Saprolegnia infection with the combination of drumfilter and ozone in hatchery
- Algae removal in intake water from lakes
- Increase of dry matter content in sludge storage tanks
- Prevention of intruding of unwanted species into the farm

Hydrotech drumfilter



## Hydrotech drumfilter

### Hydrotech drumfilter

#### Drumfilter models

Hydrotech drumfilters are available in many varieties: open filters with open inlet, with pipe connection, filters with tank, for all applications in fresh and sea water.

Depending on the filter size and the mesh on the filter the flow varies from 5 up to 1.000 l/s.

#### Spare parts and maintenance

All essential spare parts are always available from our stock.

Consistent supply for old spare parts.

If you want, we do the repair and maintenance work for you.

If you are asking for spare parts, please name the serial number of your filter.

#### ADVANTAGES OF HYDROTECH DRUMFILTERS:

- Special structure of the filter panels: Even bigger particles are taken out of the water immediately: no grinding and leaching
- Up to even 20% more flow with the new generation of panels
- Different models allow perfect match to your farm
- Quality of material and manufacturing guarantees highest life time and performance
- Long time between backwash intervals due to high head loss in the filter
- Filterpanels from plastic or stainless steel
- Optimal choice of filter in cooperation with our and Hydrotech's engineers
- Global consulting and support





## Sludge concentration

Backwashwater from drumfilters, sludge cones or fixed bed filters usually has a relatively poor TSS content. As a result big volumes and surfaces are needed for the storage of the sludge what results in high leaching rates, especially of Phosphorus.

**WATER proved** offers two systems to increase the TSS concentration in backwash water quickly and with a small footprint:

- Concentration with a Radial Flow Settler
- Concentration with a beltfilter

### Radial flow settler

Radial flow settler are connected directly to the solids-outlet of the drumfilter. Because of their special design, solids sediment in the conical bottom of the device where they can be taken out automatically. Clear water is constantly going back to the system. TSS concentrations of up to 2% can be reached like that.

Depending on the water temperature, fish species, type of feed etc., a certain fraction of the sludge in the radial flow settler may start to float. This can be handled with our automatic skimmer.

All our radial flow settlers are custom made.

Sludge concentration



## Beltfilter

With a beltfilter the TSS concentration can be raised up to 13%. To increase the TSS concentration a flocculant is added to the incoming backwash water from drumfilters, sludge cones or fixed bed filters. The flocculated particles dry on the beltfilter's belt and are scraped into a hopper at the end of the filter.

Regulation of the process is water level depending and automatic.

The thickened sludge can be used as manure, in biogas plants or be composted.

## Accessories

Of course we provide all necessary accessories:

- Flocculant - Polymer
- Dosing and mixing units for flocculants
- Mixer tanks
- Sludge pumps
- Switch cabinet construction
- Phosphorus precipitation

### YOUR ADVANTAGES:

- Reduction of the storage footprint
- Prevention of nutrient leaching
- Improved effluent loads
- Low energy consumption

**Sludge concentration**



## Pumps

### Types of pumps

#### Propeller pumps

In aquaculture pumps with relatively low head and high volumes are needed. Propeller pumps are suited best for this job. We offer three types of propeller pumps:

**Open propeller pumps** were developed for lifting large water volumes at low delivery heads. The missing outlet elbow reduces the internal head loss in the pump and increases the efficiency. Installation can be done directly into a channel or with a custom made outlet hopper. The pump can also be put directly into a LHO - low head oxygenator.

**Vertical propeller pumps** - The classical propeller pump! - are most commonly used in aquaculture. They are perfectly suited for lifting large amounts of water at relatively low head. Due to their special construction, maintenance is very easy.

**Inline propeller pumps for pipe installation** - This relatively new generation of propeller pumps was developed during the last 15 years. They can be installed in a dry position outside of the pump sump. This results in very compact pump installations.

#### Other types of pumps

Besides propeller pumps we offer a wide range of pumps for different applications:

- Pumps for oxygen cones
- Submerged pumps for backwash water and sludge
- Pumps for creation of currents
- Mixers
- Dosing pumps
- Fish pumps

#### Airlifts

A special type of „pump“ is the airlift. It is used to move large volumes of water with a delivery head of only a few centimeters. At the same time they aerate the water flow. We design your airlifts and deliver all necessary equipment.



## ULTRAAQUA UV disinfection systems

### UV Disinfection

UV Disinfection systems are mostly used in Recirculating Aquaculture Systems (RAS). They provide important advantages:

- Higher stocking densities and growth rates
- Reduced mortality
- Stable production preconditions

Depending on the installation situation various models can be used. All models are very robust and easy to maintain. All important parts can be reached simply and without using tools. The ULTRAAQUA UV lamps have a long lifetime of 16.000 h. With four different sizes of lamps the systems fit every application.

Inline and open channel systems are available. Especially the open channel system make disinfection of large water flows with little head loss possible. All systems can be delivered as stainless steel or PP version.

#### Open channel systems made from stainless steel or PP

Open channel systems are perfectly suited for large water flows.

We offer the following versions: 220 W SS/PP series and 350 W SS/PP series

#### Inline systems made from stainless steel or PP

Inline systems can be integrated into a pipe system. They are very flexible in size and do not need a minimum water level.

We offer the following versions: 75 W SS/PP series, 220 W SS/PP series and 350 W SS/PP series

#### Control cabinets

All systems are delivered with a stainless steel or GRP control cabinet. The touch display provides important information concerning lamp status and lamp lifetime. Systems with the standard cabinet can be dimmed and have different interfaces for input and output signals.



## Oxygenation

- Sufficient oxygenation is one of the prerequisites for optimal performance of your stock
- Growth, feed conversion and security of your production are directly related to oxygenation
- Depending on the type of the farm different oxygenation systems are the optimal solution
- We calculate and offer you the optimal solution for your farm
- Oxygenation systems from **WATER proved** can of course be integrated into existing structures
- Additionally to the oxygenation system itself we offer according pumps, monitoring and oxygen dosing systems

### LHO (low head oxygenator, aka jetsystem)

In a LHO water flows through a jet system into a reaction chamber. The system works with a low pressure of 50 to 100 mbar. It is widely used for individual tank oxygenation or global oxygenation in the farm. Pressure of the incoming water or the circulations pumps is used to create the pressure in the LHO. Our LHOs are individually designed. They can be installed at the side of a tank or directly in a raceway.

Water flow per unit: 4 l/s .... 500 l/s

### Oxygen cone

Oxygen cones can be used as centralized or individual oxygenation systems. They are operated under pressure of 1 ... 2 bar. Oxygen and water are mixed inside the cone to create high supersaturation of oxygen in the water.

Flow per unit: 15 m<sup>3</sup>/h .... 140 m<sup>3</sup>/h

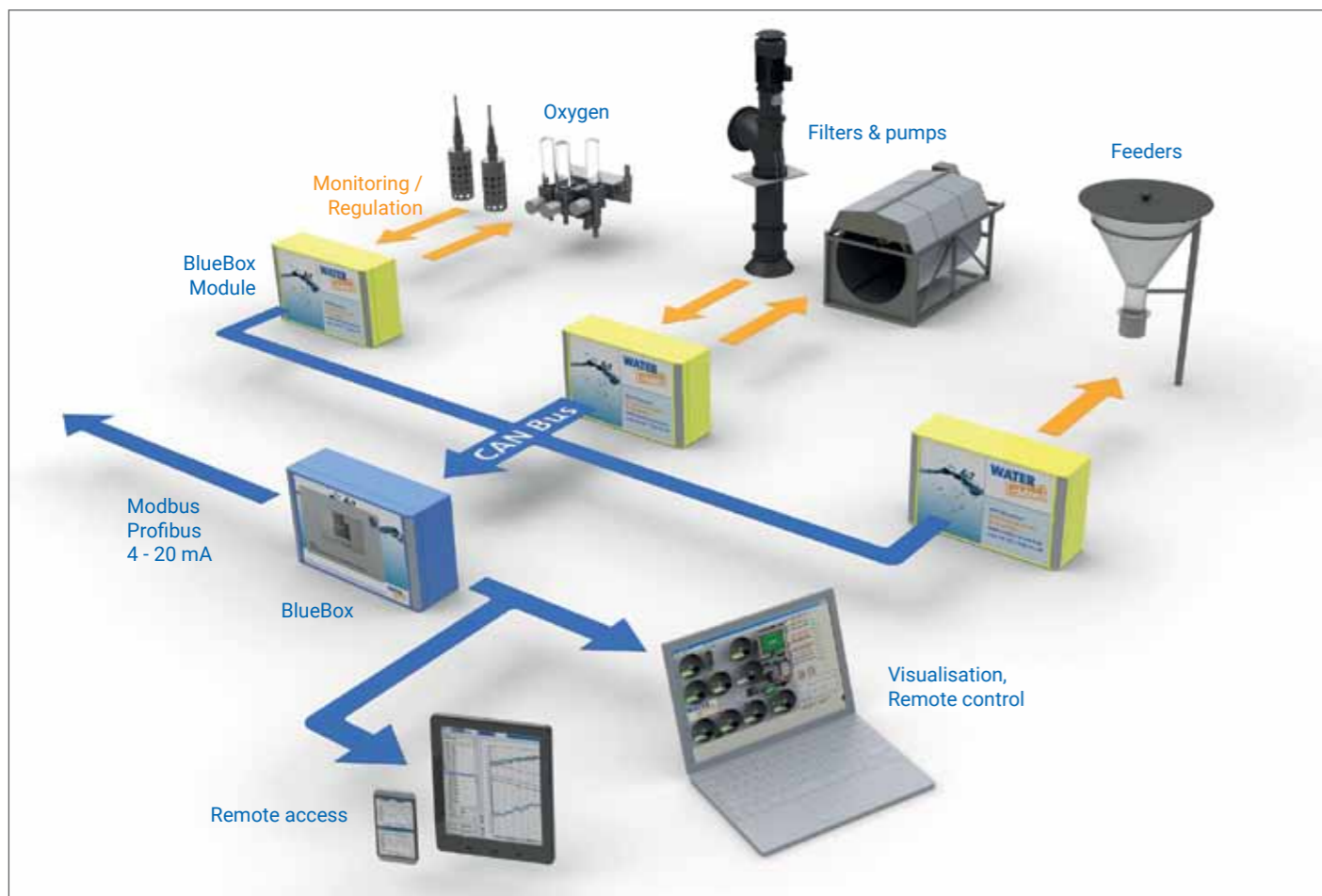
### U-tubes

U-tube systems use the natural pressure of a water column for oxygenation. They are installed into the ground, up to 20 m deep. U-Tubes systems are designed individually.

### Oxygen dosing and emergency oxygen supply

Besides oxygenation itself we of course also provide dosing equipment including flow meters, valves, solenoid valves, flow controllers etc. All equipment is custom mounted on racks to provide a plug and play solution for the customer. We also offer emergency oxygen systems including diffuser hose, valves etc.

# Oxygenation



## Monitoring & control systems for fish farms

In every farm there are lots of procedures and parameters that need to be controlled and regulated. This includes the function of pumps, blowers and filters as well as the measurement of oxygen and the control of oxygenation systems.

We offer the complete monitoring and control solution for your farm.

### Control and switch cabinet construction

For the control of the basic parameters we offer the complete switch board construction including an industry standard CPU. The latter controls and regulates the following functions:

- Monitoring of all devices like pumps, blowers, filters, UV disinfection etc.
- Control of the main circulation pump according to the pressure in the pipe or the water level in a header tank
- Control of filters, e.g. automated backwash procedures
- Monitoring of water levels

### Oxygen-management and feeding

Our BlueBox system provides information on the oxygen levels in your farm and manages the oxygenation and feeding system.

Handling of the system can be done with the BlueBox display or the individually created PC software.

The alarming from both systems is carried centrally over a land line or GSM / UMTS modem.

Sensors available for oxygen (mg/l and %), pH, salinity (PSS), level, redox (mV), turbidity (FNU / NTU) and pressure.

# Monitoring & control systems



## Monitoring & control systems

### Oxygen management and feeding

#### Oxygen management

The BlueBox serves as the main part of our management system. It is an extremely multifunctional free to program CPU. One single BlueBox can handle up to 60 oxygen probes and lots of valves, relays, level probes etc. Additionally up to 100 parameters concerning your fish stock and feeding are managed per BlueBox.

If the amount of connections is not sufficient, several BlueBoxes can be combined and are still controlled from one software interface.

Customized software application is programmed completely in-house. That allows us to create the most handy interface to your management system. When equipped with our system our customer of course get a 24/7 hotline to solve eventual problems. Besides oxygen we can of course measure pH, conductivity, ORP and other parameters.

#### Oxygen probe

Our oxygen probes work according to the galvanic cell principle. But unless with other sensors there's no need to change electrolyte and membranes. After the end of the life time the sensor cap can simple be removed and exchanged. All oxygen probes have a temperature probe included.

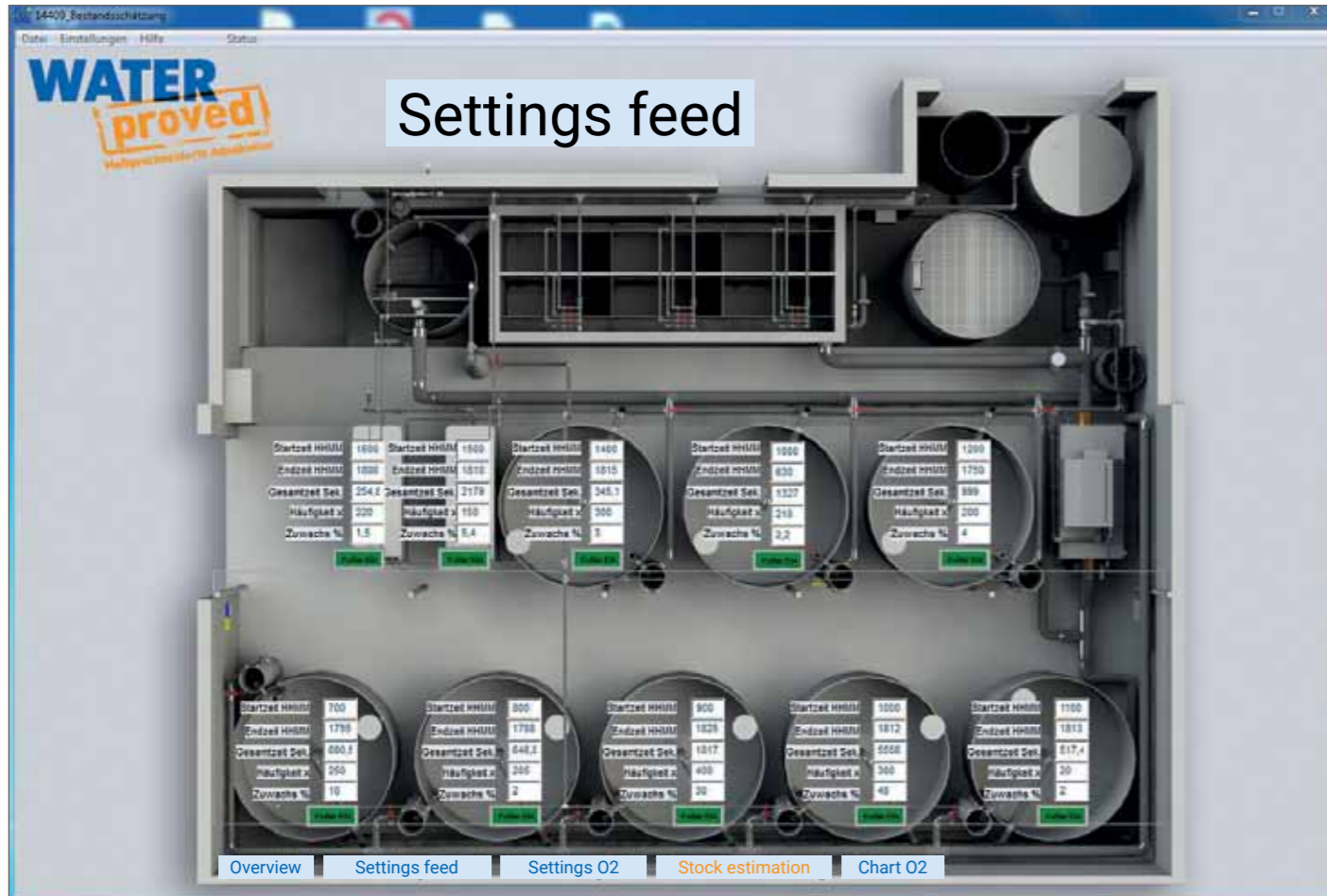
The oxygen probes can be completely submerged and are delivered in a protective case.

#### Feeding and stock management

With our feeding system, feeders from a wide range of manufacturers can be controlled.

With entering daily feed rate, start and end time of the feeding and frequency of the feeding the feeders are programmed. Daily growth is added each day automatically to the amount of feed given.

Besides management of the feeding in each tank, the system can also supervise the stock in the tanks and your farm.



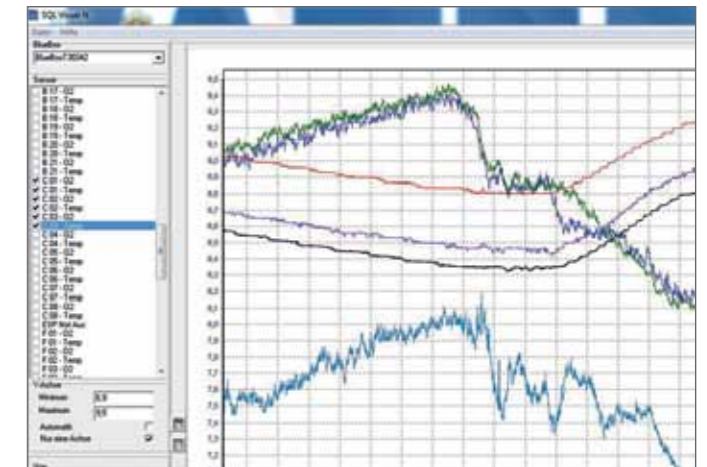
## Software solutions

All parameters can be entered via the display on the BlueBox. When you decide to purchase the PC software with your BlueBox we create a software surface for your farm and application.

Besides parameter input and display of data, value history can be shown as graphs.

Besides the individually created software tools, the BlueBox software comes with a lot of useful standard tools for calibration of sensors, database visualization, export etc.

This allows you to compare different events over several days, for example the development of feeding and oxygen gradient in one tank.



During the first three months after the installation of a BlueBox system we offer a free remote access to your system for the easy adaptation of eventual changes. After that three months the remote access is available with a monthly fee.

Prerequisite for remote access is a connection of the BlueBox to the internet via Ethernet or UMTS.

# Monitoring & control systems





## Biological filtration

### Biological filtration

In aquaculture biological filters are used for nitrification and denitrification. We offer filters for nitrification as fixed and moving bed filters. Those filters can be used inside the loop of the Recirculation Aquaculture System (RAS) or in the effluent of a RAS or a Flow Through System.

Bacteria in biological filters need to settle on a surface. To provide as much surface per volume unit in a biological filter special bio elements are used. We use bio elements with a surface of 750 m<sup>2</sup>/m<sup>3</sup>. Due to their special shape their self cleaning is very efficient.

#### Moving bed filters

In moving bed filters the bio elements are constantly moved with air. This results in a very good self cleaning and optimal oxygen distribution in the filter.

Moving bed filters can be used as round or rectangular filters. We usually build filters up to 10 m<sup>3</sup> as round filter. Bigger filters are build with a rectangular footprint.

We deliver round filters completely equipped as plug and play units. When filters are build as rectangular units the customer takes care of the construction works according to our design. We deliver and install diffusers, grids and blowers afterwards. Our moving bed filters can of course be used to modernize existing facilities. They are a powerful tool for farm suffering from water shortage or strict regulations. With a biofilter water intake can be reduced with a stable or increased production.

#### ADVANTAGES OF OUR MOVING BED FILTERS:

- Optimal flow
- Energy efficient due to carefully chosen blowers and aerators
- Short start up times
- High degradation rates



## Biological filtration

### Biological filtration

#### Fixed bed filters

Fixed bed filters are used like moving bed filters for nitrification. They are especially used in farms with cold water. Besides the biological degradation fixed bed filter work as a mechanical filter. Due to the structure of the fixed bed fine particles are kept inside the filter. Fixed bed filters need to be backwashed regularly.

Small fixed bed filters are build as round plug and play filters. Bigger filters are build in concrete by the customer according to our design. We deliver and install grids, diffusers and piping afterwards.

#### Denitrification

Denitrification systems degrade the nitrate in the water to atmospheric nitrogen. This job is carried out by micro-organisms. In contrast to nitrification processes denitrification is anaerobic, so it requires a nearly oxygen free atmosphere. The heterotrophic bacteria also need an additional carbon source.

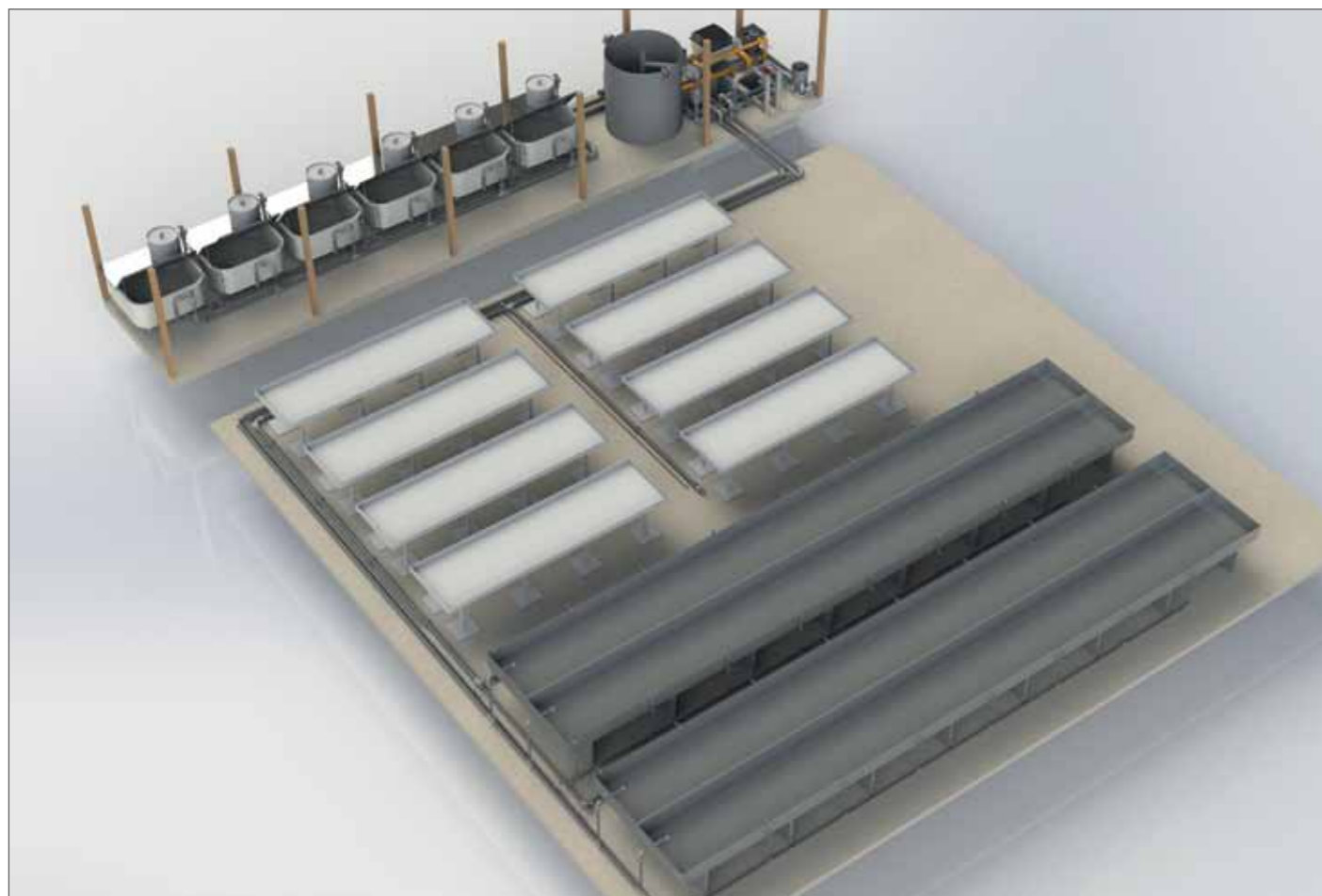
Denitrification reactors produce a lot of bacterial biomass. Conventional denitrification systems need to be backwashed regularly and with high effort, resulting in additional work for the personal and disturbances in the reactor.

Denitrification systems from **WATER proved** do not require manual backwashing. The bio carriers are mixed in short intervals creating extremely stable and regular conditions inside the reactor.

Our denitrification systems are delivered in HPDE tanks and are plug and play units.

#### YOUR ADVANTAGES OF DENITRIFICATION:

- High and stable degradation rate
- Automatic mixing and backwash
- Plug and play reactors
- Special constructions possible



## Aquaponic systems

Aquaponic is the combination of Aquaculture and Hydroponics. The combination can be implemented in different ways. The horticulture can either be integrated into the loop of the Recirculating Aquaculture System (RAS) meaning that the water flow from the plants returns to the fish. Another way is to use a part of the aquaculture water flow for the plants that does not return.

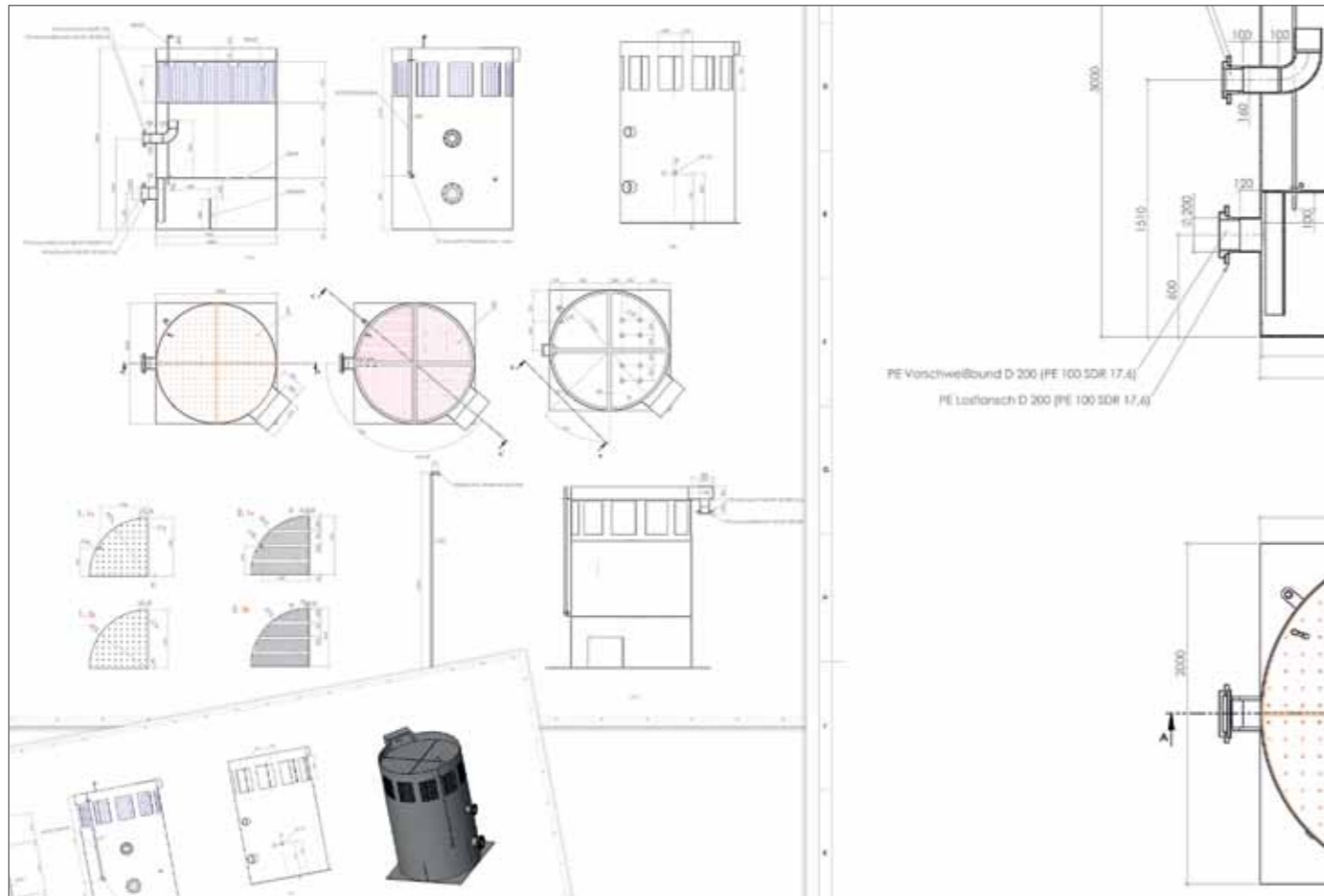


Aquaponic can be done with a wide variety of fish and plant species.

[WATER proved](#) is your competent partner for the design and set up of your aquaponic system.

[WATER proved](#) designs both parts of aquaponic systems: aquaculture and horticulture. We can supply and install the complete aquaculture system and connect it to the horticultural system, too.

**Aquaponic systems**



## Other products and services

### Other products and services

We offer several products and services for the aquaculture industry besides our main portfolio such as:

#### Services:

- Consulting in all aspects of aquaculture for fish farmers, investors, companies, associations and private persons
- Modernization and optimization of an existing farm
- Creation and start up of a fish farm
- Improvement of existing components: solids removal, oxygenation, energy demand etc.
- Feasibility studies for investors
- Comparing different types of production concerning output, investment, operational costs etc.
- Installation and maintenance service for all our products
- Design of tanks, degassing towers, diffusers etc.

#### Products:

- Construction of tanks, degassing towers, diffusers etc.
- Fish counters
- Fish pumps
- Phosphorus precipitation
- Etc.



# FISH FARMS MADE IN GERMANY



Fish farm design: RAS and Flow Through

Denitrification

UV disinfection

Farm control systems

Oxygenation

Drumfilters

Fixed bed filters

Oxygen monitoring

Moved bed filters

Feeding systems

Turn key systems

WATER – proved GmbH  
Wassermesstechnik & Aquakultur  
[www.water-proved.de](http://www.water-proved.de)

Gustav-Weißkopf-Straße 12  
90768 Fürth / Germany  
[info@water-proved.de](mailto:info@water-proved.de)

Tel.: +49 (0) 911 / 2001 830  
Fax: +49 (0) 911 / 2001 835  
Mobil: +49 (0) 176 / 643 210 28