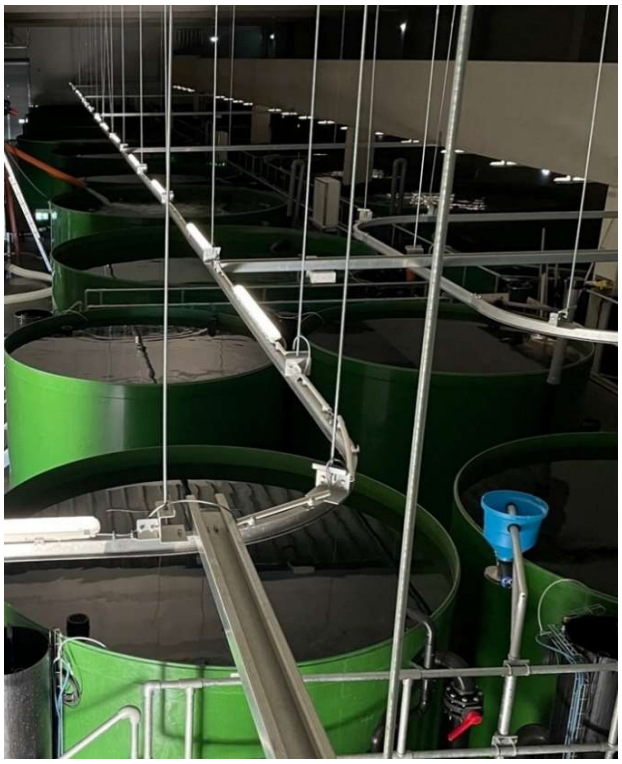
MUTAG

Biological Water Treatment

MUTAG BIOCHIP REFERENCE CASE – KAISERZANDER

A new high-tech recirculating aquaculture system (RAS) for pikeperch, KAISERZANDER, is being built in the German City of Porta Westfalica by the aquaculture specialists Glammeier + john aquakultur.



Aquaculture fish tanks at KAISERZANDER

The RAS system has a capacity of approx. 1'000 m^3 in total within the 22 fish tanks. The system consists of small tanks at 12 m^3 for small fish and when the fish grow bigger, they will be sorted (depending on their size) into bigger tanks. It is possible to house up to 120'000 pikeperch of all sizes in total. The young fish (fry) arrives at the facility at an age of 90 to 100 days, weighing about 15 g each. After 350 to 400 days, they grow to an average of 1'000 g with a size of up to 50 cm.

The annual production is approx. 100 t fish. The feeding is carried out automatically several times a day, but the aquaculture specialists balance and control the amount of fish food to prevent overfeeding which would result in a contamination of the water.

The lighting as well as the water temperature in the aquaculture system is being controlled to ensure the best conditions for the fish.

Challenges

The system of this aquaculture includes a fully recirculating water system (RAS), which only consist of a water exchange rate per day of 3 to 10 %. The remaining water is being treated in a biofilter and recirculated back into the fish tanks with a recirculating rate of 1.5 to 2.5 m^3/h. Besides that, KAISERZANDER has its own facilities for treating the wastewater from the system. The huge amount of water which is recirculated back into the fish tanks, sets several requirements for the quality of the water to ensure a healthy environment that maximizes fish growth and health. Some important parameters for the health of the fish are COD, ammonium (NH4), the pH-value and the oxygen content (DO) in the water.

Mutag BioChip 30™ in the biofilter of the RAS system (denitrification stage)

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The effluent from the fish tanks into the water treatment system varies with, for example, the amount of fish food used. This sets high requirements for the treatment of the water.

Solution

To deal with the demands of a low COD and ammonia content in the recirculated water, KAISERZANDER uses the biofilm carrier media Mutag BioChip 30™ for the biological treatment of the water in a 256 m^3 MBBR biofilter (Moving Bed Biofilm Reactor). This reduces the COD and the nitrification process will convert the ammonia in the water into nitrate. A part of the water runs through a 33 m^3 denitrification stage where the nitrate concentration is being reduced through the denitrification of nitrate into nitrogen gas. By using the Mutag BioChip 30™, it is possible to fill in a higher amount of carrier media due to the unique design and performance of the BioChip.

Wastewater treatment by means of Mutag BioChip 30™

The treatment of the wastewater from the aquaculture water system consists of a three-step MBBR and a denitrification step with the use of Mutag BioChip 30™ in all four stages.

Beneficial cooperation

As a leading manufacturer of carrier media for water and wastewater treatment, MUTAG takes pride in ongoing investigation and development of the product Mutag BioChip™.

MUTAG has a unique cooperation with KAISERZANDER, established by their interest in creating the optimum conditions for the fish and MUTAG's drive for optimization of its product's efficiency. By this, MUTAG has the opportunity to install a pilot plant next to the system where the water is being treated for recirculation. From the pilot plant's results, it is possible to investigate on the function of the product on-site and to continue the operation of modified BioChips.

Furthermore, during the start of the aquaculture operation, the close cooperation has been the foundation for continuous observation and optimization of the MBBR stage(s) and the denitrification systems.

Result

With the use of Mutag BioChip 30™, KAISERZANDER has obtained the water quality needed with concern to COD and ammonia concentrations for recirculating water in the fish tanks and provided healthy water conditions for their fish.