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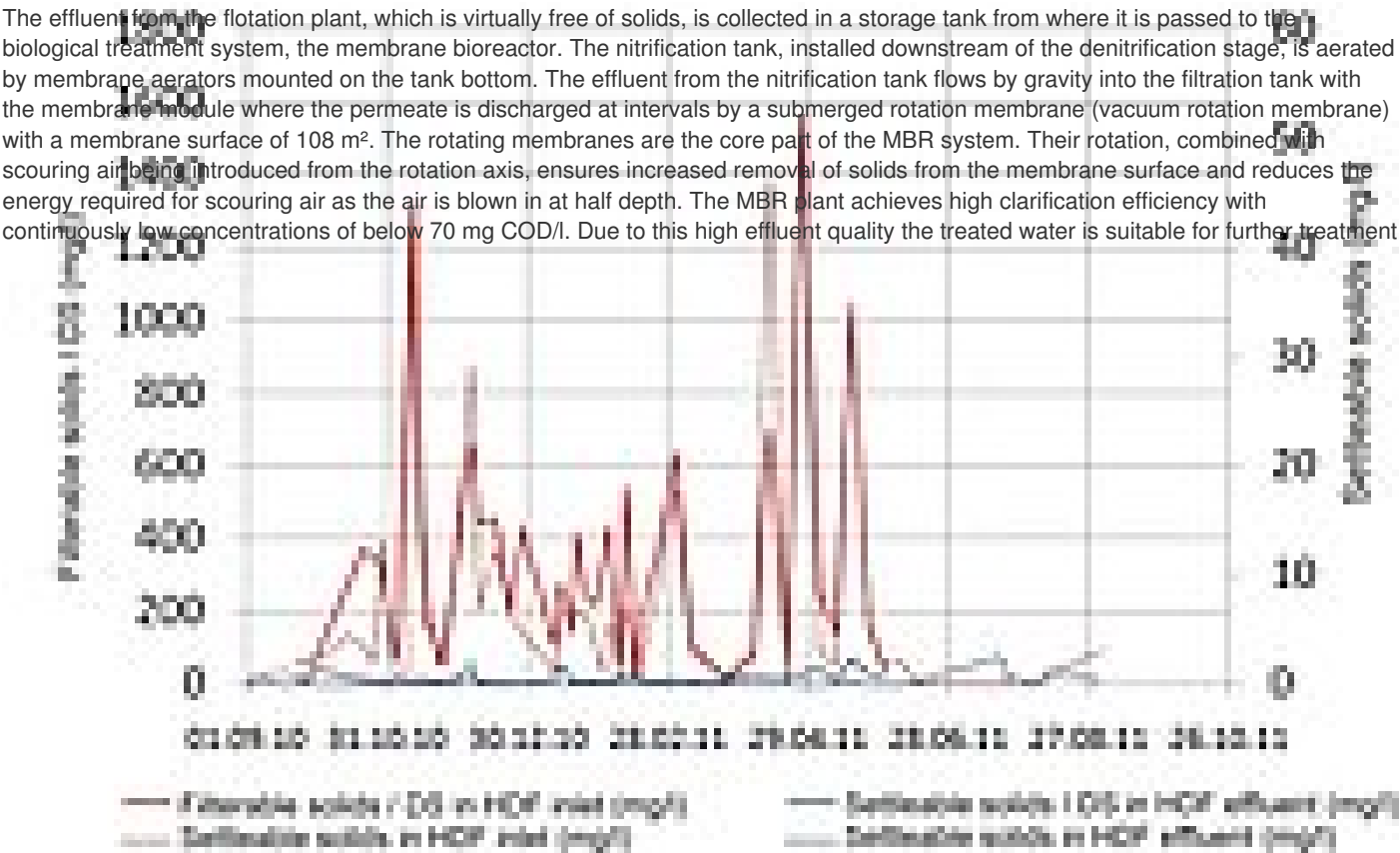
A total of 1,816.6 million hectolitres beer were produced worldwide in 2008. Assuming an average fresh water consumption of 400 litres for one hectolitre beer, this means a fresh water consumption of 726.6 million m<sup>3</sup>. About one third of the fresh water, however, could be replaced with service water as it is not necessary to use highest drinking water quality in all production areas. A part of the saving potential of 240 million m<sup>3</sup> water can only be exploited with the use of new technical solutions.

Under a research project of the Bavarian Research Foundation and in cooperation with the institutes of the technical university of Munich, we have therefore examined a process technology solution consisting of modular components for the advanced treatment of brewery wastewater. The aim of the project is reuse of treated water without the addition of chemicals, or with only a small amount of chemicals. We have installed a test plant at Erdinger Weißbräu Werner Brombach GmbH to treat a partial flow of the effluent from anaerobic reactors. The first treatment step is flotation with subsequent biological treatment in a membrane plant which uses immersed rotating ultrafiltration membranes. The wastewater to be treated flows through the feed line into the flotation tank and is intensively mixed with dissolved air in the inlet pipe already. The gas bubbles produced have a size of 20 µm to 70 µm and are passed into the plant via a clog-free valve. An additional integrated lamella separator increases the effective separation surface of the plant so that its maximum admissible hydraulic load is higher than that of conventional plants of equal dimensions.

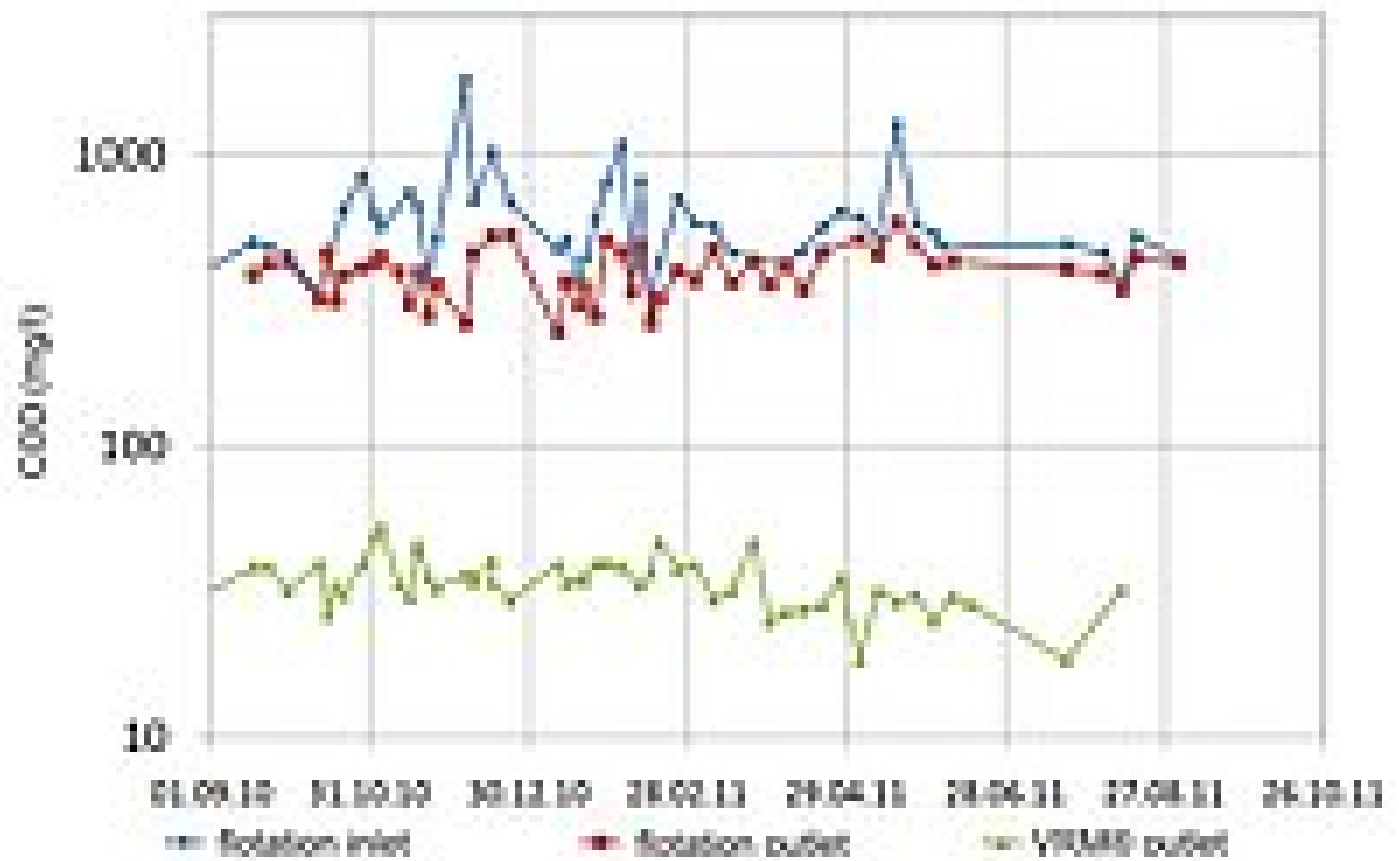


Containerised test plant at Erdinger brewery

The effluent from the flotation plant, which is virtually free of solids, is collected in a storage tank from where it is passed to the biological treatment system, the membrane bioreactor. The nitrification tank, installed downstream of the denitrification stage, is aerated by membrane aerators mounted on the tank bottom. The effluent from the nitrification tank flows by gravity into the filtration tank with the membrane module where the permeate is discharged at intervals by a submerged rotation membrane (vacuum rotation membrane) with a membrane surface of 108 m<sup>2</sup>. The rotating membranes are the core part of the MBR system. Their rotation, combined with scouring air being introduced from the rotation axis, ensures increased removal of solids from the membrane surface and reduces the energy required for scouring air as the air is blown in at half depth. The MBR plant achieves high clarification efficiency with continuously low concentrations of below 70 mg COD/l. Due to this high effluent quality the treated water is suitable for further treatment



Flotation for reliable particle removal



High MBR efficiency

or reuse.

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