

## HOW THE SHAPE OF A MEMBRANE MAKES ANAEROBIC MBR A SUCCESS

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In the search of membrane enhancements, a newly shaped membrane, tubular in nature was developed. By adding a helical shape within the membrane, performance of membrane jumped from 20 – 80% compared to standard smooth membrane tubes.

As the base process conditions of cross flow filtration relies on or is subject to the turbulence in the membrane tubes, this helix formed at the membrane surface is changing the dynamics at the membrane surface. Is the turbulence driving the cake layer in the system, the helix has shown substantial differences in comparison to smooth membranes of same pore size.

As one of the evaluations on any cross- flow process is the energy consumption, this is highly related to the cross-flow speed in the process. With the helix a new evaluation can be done, to use the improved turbulence/ performance of these membranes by changing the cross-flow velocity to reach a new optimum for operation.

The paper covers the development of the membrane and its enhancements further in a case study on treating wastewater by anaerobic MBR treatment. History of an MBR and improvements made by changing the shape of the membranes will be explained. Starting with smooth bore membranes the process was developed and over time process and membranes were improved to reach the current state of operation. Starting with an energy requirement of approximately 5 - 10 kWh/m<sup>3</sup>, the developments have reached power requirement of well under 0,5 kWh/m<sup>3</sup>, which supports the other drive on applying the an MBR technology: to reuse energy from the waste water treated, by the use of the biogas in the factory.

As an example, the results of a year operation of the helix membranes in industrial waste water treatment will be shown.