

Operating cost reduction of a membrane bioreactor showcasing the industrial wastewater treatment plant of Thor, Speyer (Germany).



Case Study:

Energy optimization of an industrial membrane bioreactor by adapting the tube diameter of filtration modules

The Challenge

Located in Speyer, Germany, the Thor GmbH is part of a global group of companies engaging in the development, manufacture and distribution of specialty chemicals. The company's product range includes technical preservatives, flame retardants, personal care ingredients and other specialty chemicals.

As part of an optimization project for Thor's on-site wastewater treatment plant, options for reducing the operating cost of a membrane bioreactor (MBR) had to be evaluated and implemented. In particular, high suspended solids (MLSS) contents of up to 65 g/L, high salt loads and a large proportion of fibrous components in the wastewater each meant big challenges - more so, aiming at resolving all of them in one approach.

The Solution (in three steps)

Due to the smart choice of a suitable pre-separation, the braiding tendency of the tubular membranes could be eliminated in the first step.

As a result, after that the filtration system could be equipped with T-CUT UF series membrane modules with a significantly smaller inner membrane diameter.

This membrane tube ID reduction from a diameter of one inch (25.4 mm) to ½ inch (12.5 mm) vastly increased the packing density of the installed modules. In addition to the larger membrane area resulting thereof, the elimination of the braiding tendency was another reason why the specific pump output per permeate volume obtained could be kept stable per hour.

Location	Thor GmbH, Speyer, Germany
Type of waste water	Industrial waste water / chemical industry water
Capacity	1,900 L/h
UF Product	Customized solution T-CUT UF Series ½ inch (12,5 mm)



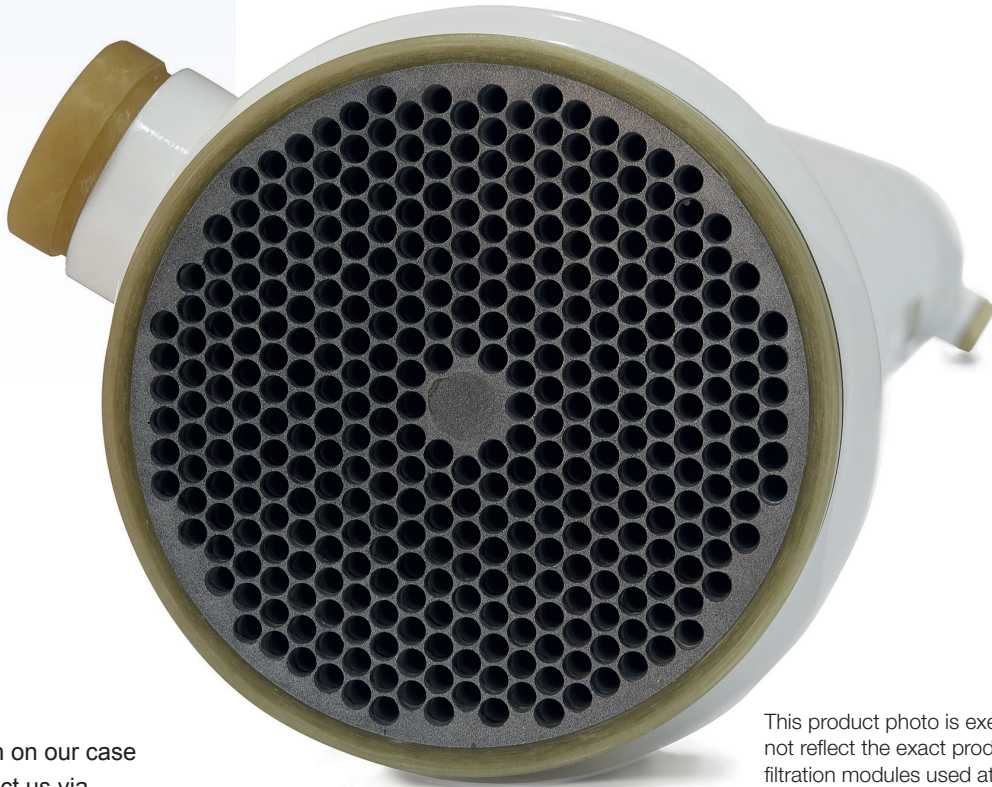
Technical Data T-CUT Tubular Modules

Length (L) / mm	3,000
Module diameter / mm	168
Membrane area / m ²	9.1
Housing material	stainless steel
Membrane diameter / mm	12.5
Membrane material	PES
MWCO / kda	150

The third success factor of the project was the MLSS reduction. By reducing the MLSS content, on the one hand the required flow velocity could be reduced and at the same time the flux of the T-CUT UF modules could be increased.

The sum of all optimization revealed a significant saving potential. Due to the measures taken, the total energy requirement of the filtration system has been reduced by around 30%.

Besides the energy optimization, with the new compact design the acquisition costs of filtration modules related to the membrane area have been cut massively. Another plus is the lower maintenance effort resulting from the selection of an improved connection type.



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This product photo is exemplary and does not reflect the exact product in use. The filtration modules used at Thor have been customized to accommodate a stainless steel housing.

Customized Filtration Solutions