

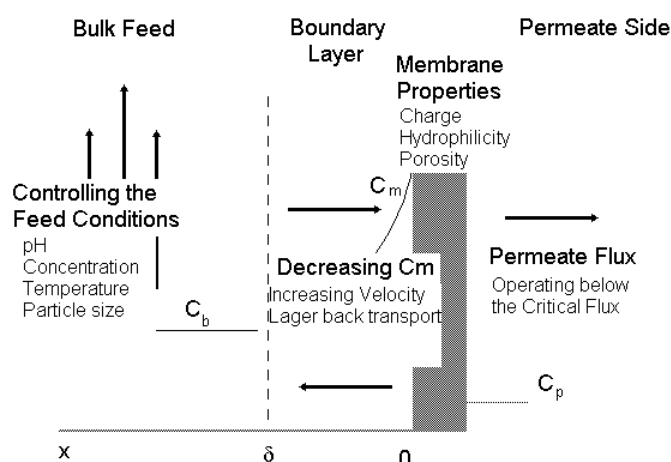
Strategies to prevent membrane fouling during the filtration of wastewater

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Although membrane filtration is a well know process for separation issues, membrane fouling is still the Achilles´ heel of the processes. Depending on the fouling the economics benefit of the process can be dramatically reduced.

Fouling is the accumulation or deposition of suspended and dissolved particles on the membrane surface or in the structure of the membrane. The fouling can vary from large suspended particles to small colloids, molecules or bacteria.

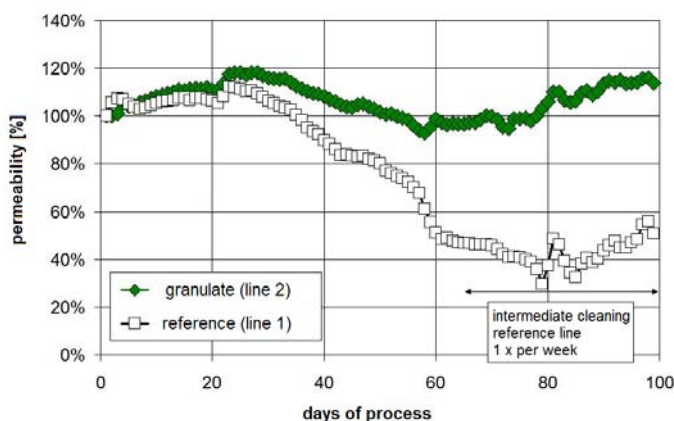
It is essential to analyse the nature of this fouling to develop a proper strategy. Generally there are four basic tools which can influence the fouling behavior. These are the bulk feed solution properties, the membrane properties, the effect of the boundary layer and the permeate flux as shown in following figure.



While the conditions of the bulk feed is difficult to adjust, the parameters are determined by the process, the boundary layer which is an effect of the rejected particles can be controlled. This can be done e.g. by an increasing feed velocity. Similar it is to operate with an operational pressure below the critical flux. This will increase the required membrane area, but decrease the fouling.

The membrane material is

usually chosen by the required chemical stability. Hydrophilic polymers are less stable than hydrophobic. But even in a low fouling process a cleaning is required after a certain time. Usually this cleaning is carried out with chemicals, but a newly developed mechanical cleaning process (BIO-CEL[®]-MCP) utilizing granulates which is integrated to the submerged membrane bioreactor (MBR) can reduce the amount of chemicals drastically.



Due to their small footprint and superior effluent quality, MBR plants are the next generation of biological wastewater treatment. The driving force for the new cleaning technique is the more environmentally friendly cleaning of the membrane modules. This allows a chemical free operation and even more importantly a significant enhancement of flux (see diagram).

The usage of the MCP is even suitable for external membrane cleaning of the fouled membranes in any condition. In terms of sustainability with this cleaning process the environment can be protected (no usage of chemicals and therefore no chemical by-products). Additionally the cost can be reduced.

Both processes are running under low pressure which emphasises that a well balanced process not only reduces the fouling and save costs; it also protects the environment by saving chemicals.