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Water & wastewater

Advances in filtration systems for waste-water treatment

In this article Anthony Bennett reviews some recent innovations in filtration and separation systems for wastewater treatment by profiling four companies involved in the sector, and he provides some thoughts on current developments and future trends in the industry. His discussions were with Mario Schnee at CUT Membrane Technology, Oliver Rappich at H+E GmbH, Friedrich Edelmeier at Haver and Boecker and Caroline Hoffmann at MICRODYN-NADIR.

Reducing energy consumption and minimising or eliminating liquid waste have become a major focus for filtration media manufacturers and system design engineers over recent years.

In developed markets the main factors driving the industry are the increasing costs for energy and costs associated with waste disposal.

"Climate change will challenge water treatment technologies too," explained Caroline Hoffmann at MICRODYN-NADIR. "More rainfall in a shorter time frame on one side and longer dry periods on the other side make efficient water treatment a must."

"The main drivers for this development," added Oliver Rappich at H+E GmbH, "are either governmental regulations, regional based issues like, for example, missing infrastructure or water scarcity and economic benefits like for example raw material recycling.

Figure 1. Tubular membrane modules. Image courtesy of CUT Membrane Technologies

"In developed countries the commitment to go green is sometimes also a driver for these developments and in many cases that is then used for marketing communication purposes."

'Green-washing' is a form of spin in which 'green PR' or 'green marketing communications' are deceptively used to promote the perception that an organisation's products, aims or policies are environmentally friendly, when in fact they are not.

"There is certainly a current trend towards using green-washing as a marketing tool," added Mario Schnee at CUT Membrane Technology. He also explained that there is an increasing awareness in the industry of cyclic processes.

"Rising markets are being pressed by the international community to reduce pollution," Schnee added.

"The main driver for reducing energy consumption," said Hoffmann, "certainly is the cost of energy and therefore the overall economic efficiency of a plant.

"Some of the more innovative technologies will greatly enhance effluent quality but at the same time they require additional energy. It has to be the goal then to reduce that additional energy requirement to the lowest level possible while still maintaining the added value from these innovations.

"Minimising liquid waste is mainly driven by the fact that disposing of liquid waste has become much more expensive. A more responsible use of resources is expected of all systems put into place."

"Any progress begins with someone asking the right questions," explained Friedrich Edelmeier at Haver and Boecker, "and the main one is how can we optimise the energy efficiency of the filtration process."

"Processing substantially more volume in a given time or being able to downsize the footprint of a new plant because of a significantly increased flow rate were the main factors that drove us to developing our new family of woven metal filter cloth. Our goal was to provide a material contribution towards energy efficiency, longer filter service life,

Figure 2. Evaporation tower in zero liquid discharge system. Image courtesy of H+E GmbH.

shorter cleaning cycles and minimised machine setup time."

Applications, research and development

The main applications for CUT are in landfill leachate treatment, with other involvement in automotive wastewater and municipal sewage treatment.

H+E GmbH are mainly focused on chemical, steel, oil, gas, mining, pulp, paper and food and beverage applications for wastewater treatment but they are also involved in the semiconductor, solar, pharmaceutical, power generation, aerospace and transport sectors.

Haver and Boecker typically supply their filtration media or finished components to manufacturers and developers of filtration systems who in turn provide solutions for applications such as sewage or wastewater treatment.

MICRDOYN-NADIR is a membrane and module manufacturer producing microfiltration (MF), ultrafiltration (UF) and nanofiltration (NF) technology. In the wastewater segment they offer their flat sheet membranes to a variety of module manufacturers on membrane bioreactor (MBR) applications but they also manufacture spiral wound elements which are used in a variety of waste water treatment applications. They have their own submerged BIO-CEL module.

The main priorities for research and development at MICRDOYN-NADIR are