POE Ultrafiltration Surges Ahead

The point-of-entry (POE) market for ultrafiltration (UF) membrane systems has grown considerably in recent years. Respected market researchers Frost & Sullivan had predicted that the market for hollow fiber UF membranes would increase at a compounded annual growth rate of 12.9% from 2004 to 2010, though there are signs that the actual growth rate during the latter part of this period may be above original estimates.

By Andrew Warnes

Left: Rural estates and farms in New Zealand use UF membrane systems to capture and treat rainwater or to draw upon surface water supplies to meet government incentives for efficient water use.

Right: A winery in Napa Valley, Calif., uses a POU UF system to permit access to surface water irrigation supplies for process and public tasting room water supply.

There are several factors that have led to the red-hot POE UF market today. First and foremost is the relatively recent availability of POE UF membrane systems in the 8 to 12 gal per minute range. Second, water treatment professionals have become familiar with POE UF and the potential applications for it, and they have begun to apply it. Third, applications that were at one time experimental have become mainstream and are expanding outward. The cascading effects of these factors have fueled the rapid growth in POE UF membrane systems in this industry.

Product Evolution

Hollow fiber membrane systems were once the exclusive preserve of municipal markets. UF membrane systems have been used globally to treat drinking water on a large scale for approximately two decades, and a number of UF membrane-based plants are used to provide more than 100 million gal per day of municipally supplied drinking water.

Municipal UF membrane plants experienced a great surge in growth toward the end of the 1990s, as the technology became better than conventional treatment methods, delivered higher-quality results than conventional treatment in many cases and became more cost effective than technologies that had been in place for several decades.

Municipal UF membrane treatment also gained a boost from the "infrastructure aging gap" in developed countries. In many cases, old municipal plants were operating at or close to capacity but did not have the space or the funds to expand conventionally. Membrane-based UF systems matured at exactly the right time to permit cost-effective plant expansion with a smaller footprint, permitting older municipal plants to expand to meet anticipated needs.

Growth into municipal markets naturally led to thoughts of smaller systems to meet similar needs. Because large-scale membrane manufacturing capacity was already in place, because regulators were already accepting hollow fiber UF membrane technology, because the engineering expertise to develop such systems existed and because minds were focused on decentralized distribution—the movement away from large centralized municipal water treatment plants toward smaller, local and more cost-effective systems—the development of smaller membrane-based UF systems became almost inevitable. This convergence of minds, money and opportunities did not occur until some time around the year 2000.

The Pioneers

Standard POE UF systems were first launched on a large-scale sustainable basis in 2003 by a partnership between municipal plant heavyweight Zenon Environmental, which was acquired by GE in 2006, and consumer appliance heavyweight Maytag, which was acquired by Whirlpool in 2005. The partnership brought together engineering expertise with consumer market knowledge in a manner never previously established and led to the commercialization of what are now known as the Homespring line of POE UF membrane products. The partnership exposed many water treatment and appliance professionals to a new technology aimed at an unexploited market and established many of the basic principles behind the dynamics of the POE UF market that exists today.

Water treatment professionals were exposed to POE UF for the first time between 2003 and 2006. While intimately familiar with ion exchange devices and reverse osmosis systems, most had relatively little familiarity with UF or its potential applications. Some professionals decided to sit back and wait for the

technology to prove itself or to prove that a market existed at all, while a small but significant percentage became creative and sought applications for the systems.

After an experimental phase, the need, applications and market became clear. In remote and well water markets, POE UF began to penetrate into microbiological purification of ground and surface waters, turbidity and cyst reduction, colloidal silt and clay reduction and compliance applications for very small public water systems.

In markets already served by municipal water suppliers, POE UF applications were fueled by the bottled water backlash and grew into commercial foodservice and high-end consumer markets. The nonchemical, nonelectric capabilities of POE UF have supported eco-friendly market positioning to businesses and consumers alike.

POE UF has also gained a foothold in consumer applications that are "security conscious," and have been impacted by boil water alerts or a need for whole-house water treatment that goes beyond gross-particle filtration and extends into the submicron range. There is also a significant segment of educated consumers, many of them with medical or engineering degrees, who devote time and thought to water treatment technology, conduct thorough research and gravitate toward whole-house UF membrane systems because they realize the differences between this and other technologies available on the market.

Surging Ahead

From 2006 to present, water treatment professionals who had devoted time and effort into POE UF began to reap the rewards of earlier experimentation and investment. Applications became standard and accepted. Regulators began to gain enthusiasm for POE UF membrane devices as field trials and formally monitored experimentation provided tools to address issues that previously had no solution or involved considerable cost and complexity. The market for POE UF membrane systems became active and evolved into the incredibly dynamic and expanding market of today.

Water treatment professionals are generally a conservative group. Either because of a desire to focus on traditional systems or prior experience with the teething pains of new technologies, many take a wait-and-see approach, and POE UF membranes have been no exception. Adoption of these systems over the past seven years, successful applications across thousands of sites and advancements in system design and acceptance by regulators have fueled a boom in POE UF membrane systems that still have quite a way to go until the peak is reached.

These are still early days in the POE UF ramp-up and plenty of opportunities to benefit from an immature market still remain. Although economic concerns may slow the growth of more mature POE technologies, UF is just beginning to grow as applications in search of a solution latch onto this technology. *wqp*

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