



Bottled Water Production Cost Savings with Fuente II Final Filtration

Overview

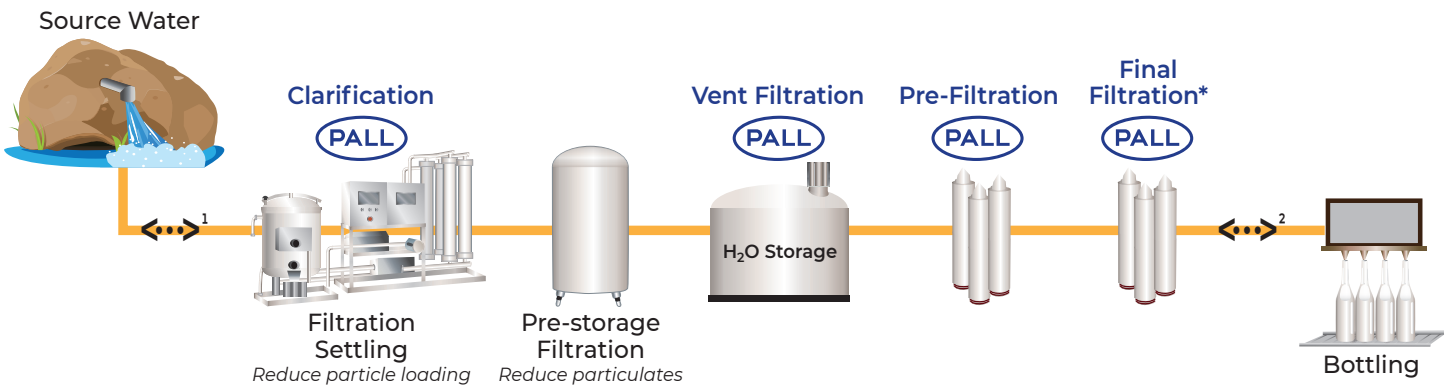
Bottled water over the past decade has become more synonymous with a healthy lifestyle in some regions and a key source for safe hydration in others. Demand for bottled water necessitates reliable bottling capacity from producers. With the SARS-CoV-2 pandemic of 2020, the volume of consumption per capita of bottled water grew faster than it had the year before in countries like the United States, China, and Mexico¹. As demand for bottled water is expected to increase, though not as fast as the previous year, bottled water producers face the challenge of providing reliable, safe-to-drink water while optimizing cost savings².



The Challenge

Compared to its other manufacturing sites, a global producer of bottled water faced a high consumption rate of final filters in a region that experienced heavy rains. With ultra-fine particles like silt present, they had already seen the benefits of using Pall products for upstream processing. They were using the Ultiplex[®] High Flow filter for upstream, coarse filtration and saw the benefits it offered as a large diameter filter ensuring the reduction in water variability and particulate load from water sourced underground. This change resulted in a reduction of pre-filtration costs and improvements to the protection of their membrane filters. To capitalize on these outcomes, the site partnered with the Pall team to further optimize their process in order to extend the lifetime and usage of their final filters. Pall recommended testing the sterilizing grade Fuente II final filters which offers increased total throughput over its lifetime.

Figure 1: Overview of bottled water process



1 **Possible Treatment Process** — Use is regulated depending on end product (Aeration, Decantation, Selective Removal, Sand, Carbon, Ion Exchange)

2 **Possible Disinfection Process** — (UV, Chlorine, Ozone)

* Fine Filtration — additional step prior to final filtration removing colloids when present

The Trial Period

Fuente II filters were designed with double the surface area than the average 0.2 micron final filter. Fuente II filters have an area of 3.12 m² per 30" inch filter cartridge compared to about 1.8m² for the standard 30" filter cartridge. Based on the properties of water and filtration mechanics, the team expected this difference to translate into Fuente II filters demonstrating about triple the service life and measurable cost savings to the customer.

The site installed 12 Fuente II filters along with 12- 3 micron Profile[®] Star filters and 12 - 1 micron Profile Star filters for pre-filtration protection on one of its 4 production lines. This recommendation was suggested after completing a water quality check using a silt density index (SDI) kits to evaluate their initial process and opportunities to reduce spend

per m² of membrane filter materials. The Pall team examined the process by measuring the differential pressure daily and ensuring proper housing ventilation.

Over the course of 6 weeks the team saw on average greater throughput with the Fuente II filters. Output ranged from 67% improvement to 300% improvement on a given day. Because of the site's policy to change its production schedule with the shift from wet season to dry season, the trial ended before the filters reached the end of their service life.

The Solution

Extrapolating from the data collected, the team found that they would only need to invest in 1 Fuente II filter cartridge compared to the 3 alternative filter cartridges they would typically consume in the same period. One of the biggest benefits this site saw in implementing the Pall solution of Fuente II cartridges with the Profile Star pre-filters were improvements in operating expenses (See table 1). Because of its greater surface area, the Fuente II filters delivered on providing a greater service life. This outcome also meant less frequent filter changeouts which not only leads to economic benefits of reduced labor costs and downtime but also product safety benefits.

Table 1: Extrapolated trial results

	Change out Frequency (weeks)	Number of change outs per year	Annual cartridge usage
Standard Pre-filter	6.0	8.7	416
Standard final filter	4.5	11.6	555
Profile Star filter	5.5	9.5	454
Fuente II filter	11	4.7	227
<i>Total cost savings per year</i>			28.80%



Fuente II filter cartridge

Each time a new membrane filter with correlation of integrity test to microbial removal is installed, integrity testing is required to ensure the filter has not been damaged by transit, installation or sanitization. As filters are installed, a major concern is that natural oils on the skin may encounter the membrane filter media causing a blind spot where the media is not wetted properly. This would cause a false integrity test failure which is why wearing disposable latex, rubber or plastic gloves during installation is recommended. In this case, there could be a reflush with higher backpressure to ensure full wetting. Alternatively, if there's enough interest, the bottled water manufacturing team may decide to perform reverse bubble point review of each filter to identify the culprit. This element would be replaced and the assembly would be put back into the initial sanitization process. However, this investigation would require not only significant investment in the team's attention, time and consequently money. Ultimately, bottled water processing depends on consistent filtration, so using a filter like Fuente II enables fewer filter changeouts with less human interaction thus reducing contamination risks.

A Clean, Fresh Future

For successful brand positioning, bottled water producers require solutions that enable microbial safety, process reliability and low operating costs. With these criteria in mind, the site chose Fuente II filters (with proper pre-filtration, usually 1 micron beta 1000 to 5000) as their quality and cost-effective final filtration solution. This solution has helped them for over the past 18 months and they are well poised to continue to produce clean and fresh bottled water.

The combination of exceptional product features translates into cost-saving benefits for the customer at a critical control point in their process. These include:

Features	Benefits
Cartridges resistant to numerous sanitization cycles	<ul style="list-style-type: none"> • Process reliability • Economical operation • Consistent filtrate quality
Hydrophilic PES media	<ul style="list-style-type: none"> • Microbial stabilization of bottled water • Easy to wet and integrity test
Ultraleaf filter construction with effective surface area of 1.04m ² per 10 inch filter and built-in pre-filtration layer	<ul style="list-style-type: none"> • High flow rate per module • Longer filter life • Lower operating costs • Added colloidal resistance in the absence of an upstream sacrificial colloidal membrane filter
Individually serialized modules	<ul style="list-style-type: none"> • Full traceability
Multiple adaptor options	<ul style="list-style-type: none"> • Easy installation into sanitary housings



References:

¹ https://bottledwater.org/wp-content/uploads/2021/07/2020BWstats_BMC_pub2021BWR.pdf

² <https://www.bevindustry.com/articles/93226-state-of-the-beverage-industry-all-bottled-water-segments-see-growth>

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Pall Corporation provides critical filtration, separation and purification solutions to meet the demanding needs of a broad spectrum of life sciences and industrial customers around the globe.

Across 80 locations and 10,000 people worldwide, we are unified by a singular drive: to solve our customers' biggest fluid management challenges. And in doing so advance health, safety and environmentally responsible technologies.



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