



CONCENTRATION & DEMINERALIZATION OF WHEY USING UF AND NF TECHNOLOGY

Case study

Lower-cost whey production at an integrated dairy in India with the DairyUF and DairyNF membranes

The

PROBLEM

A fully integrated dairy in Maharashtra, India, processes around 500,000 liters of cow milk every day and produces a variety of products. The dairy installed UF membrane system to produce Whey Protein Concentrate (WPC) and the NF membrane system to demineralize whey to make baby food products.

Previously, the dairy used UF and NF membranes of some other brand, which needed replacement annually due to high leakage of WPC and Total Solids (TS) through UF and NF membranes respectively. Short membrane life increased the production cost for the dairy and hence the customer was looking for advanced UF and NF membranes which could be used for at least 24 months without any replacement.



The

SOLUTION

Hydranautics Team visited the plant and recommended to use DairyUF 10K and DairyNF membranes. In 2014, the dairy pilot-tested and chose Hydranautics' DairyUF 10K 3838-30, DairyUF 10K 3838-46 and DairyNF 8040-30 membranes to meet their WPC and TS leakage goals. By 2016, all dairy Ultra-filtration and Nano-filtration systems were replaced with Hydranautics' products.

The DairyUF membranes made of polysulfone with a MWCO rating of 10000 Daltons. DairyNF membranes are designed for separation of divalent ions and organic molecules greater than 200 Daltons. Both these membranes are manufactured using highly controlled, ISO 9001-compliant processes, ensuring

highest quality and consistent performance. These membranes are of full fit design with the polypropylene outer wrap to get bypass flow around the membrane module to keep bio growth under control.

The UF system consisted of total six stages, with stages 1 & 2 with 12 vessels, stages 3 & 4 with 10 vessels each containing 4 membranes and stages 5 & 6 with 9 vessels, each containing 3 membranes. The feed capacity was 34 m³/h and the temperature 50° Celsius. NF system consisted of just one stage with 3 vessels, each containing 4 membranes. Feed capacity was 10 m³/h and temperature 10° Celsius. Please refer to table 1 for details.

Table 1

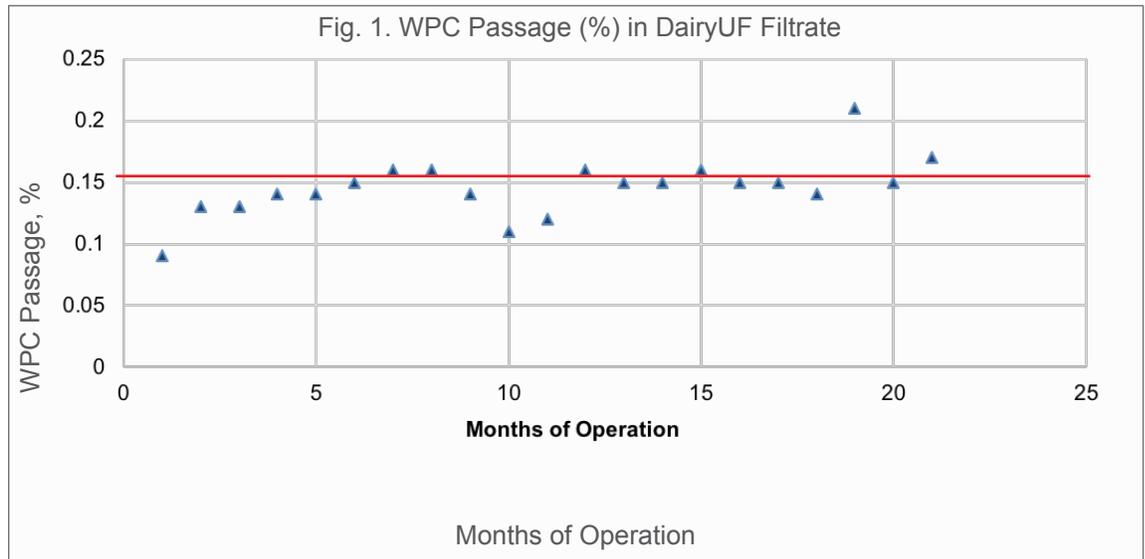
	UF System	NF System
Feed Flow, m ³ /h	34	10
Membranes Model	DairyUF 10K 3838-30 DairyUF 10K 3838-46	DairyNF 8-30
Number of Stages	6	1
Total Membrane Quantity	230	12
Permeate Flow, m ³ /h	30	5
Retentate Flow, m ³ /h	4	5
Feed Pressure, bar	2 to 6	9 to 17
Feed Temperature, Celsius	50°	10°

The

IMPACT

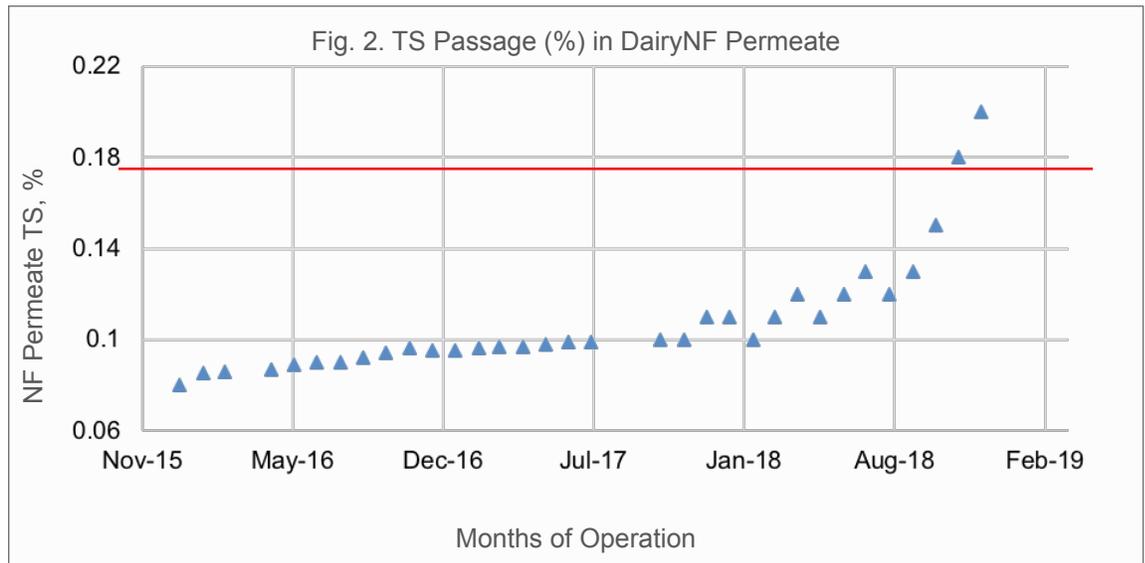
The first set of DairyUF membranes installed in the fourth stage of the plant. The protein passage in DairyUF filtrate was measured as < 0.2 % (as is basis) (Fig.1). The average system flux was 16.5 l/mh (9.7 gfd). The plant achieved an average membrane life

of 24 months that was double compared to the previous brand. Durability of the DairyUF membranes permitted use of aggressive cleaning chemicals including chlorine and provided stable flux throughout daily 16-20 hour operations.



The first order of DairyNF membranes installed in the existing plant. TS passage in DairyNF permeate was measured as < 0.2 % (as is basis) (Fig.2).

The average system flux was 11.6 l/mh (6.8 gfd). The plant achieved an average membrane life of over 30 months that was more than double when compared to other brand's membrane life.



Hydranautics' DairyUF and DairyNF membranes provided consistent performance with respect to minimum product passage for over two years. With longer membrane life the dairy was able to cut its membrane replacement cost.

Overall the dairy has saved around USD 250K annually by using Hydranautics' membranes. The customer is extremely satisfied with performance of the DairyUF and DairyNF membranes, as well as with the timely support of Hydranautics' technical team.

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About Hydranautics

Since our founding in 1963, Hydranautics has been committed to the highest standards of technology research, product excellence and customer fulfillment. Hydranautics entered the Reverse Osmosis (RO) water treatment field in 1970 and is now one of the global leaders in Integrated Membrane Solutions. Hydranautics became a part of the Nitto Group in 1987. Nitto is Japan's leading diversified materials manufacturer. The group offers over 13,000 high value specialty products worldwide including optical films for liquid crystal displays, automotive materials, reverse osmosis membranes for desalination and transversal drug delivery patches.

As leaders of high quality membrane solutions, we believe our commitments extend beyond manufacturing and selling our products. Our skilled staff of technicians, engineers and service professionals assist in designing, operating and maintaining a robust, reliable and efficient membrane system to meet your requirements and exceed your expectations.