

## Project ID

<b>Company:</b>	Tuaspring Seawater Desalination Plant	
<b>Location:</b>	Singapore	
<b>Year:</b>	2018	
<b>Application:</b>	SeaWater Reverse Osmosis (SWRO) Pre-Filtration	
<b>Goal:</b>	Turbidity, suspended solids and SDI reduction	
<b>Pilot Capacity:</b>	2.5 m <sup>3</sup> /hour	
<b>Full Scale Capacity:</b>	10,000 m <sup>3</sup> /hour	



## The Challenge

- Variation in sea water quality. For example: turbidity varied between 1-20 NTU.
- Frequent clogging of existing Ultra-Filtration (UF) and cartridge pre-filtration as a result of organic and biological fouling. That led to intensive operation costs.
- Frequent clogging of RO membranes. That led to intensive operation costs.

Parameter	Existing Values	Required Values
Turbidity (NTU)	< 20	< 1 @ 90% of the time
Total Suspended Solids(TSS) (mg/L)	< 40	< 1 @ 80% of the time
SDI	Non Magerable	< 5@ 80% of the time

## Solution

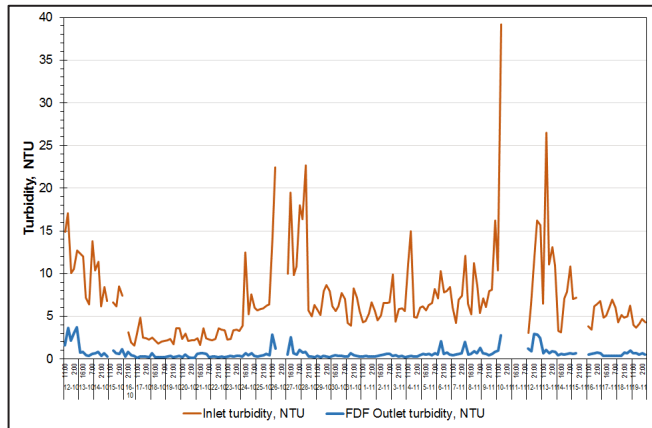
A 2.5 m<sup>3</sup>/h Fiber Disc Filter pilot unit ran at Tuaspring Desalination plant for 6 consecutive weeks. The Fiber Disc Filter was located on a side stream after a preliminary filtration of 150 micron.

The Fiber Disc Filter ran in automatic mode, constantly recording the hydraulic parameters of flow and differential pressure, with daily manual sampling of TSS, Turbidity (on filter inlet and outlet) and SDI (on filter outlet).



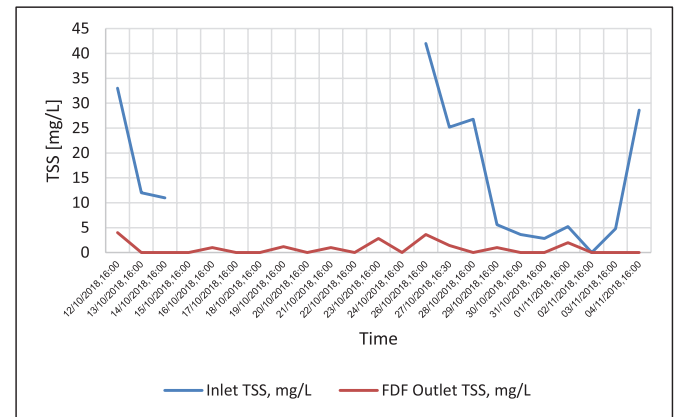
## Results

The filter achieved >93% turbidity removal with highly challenging inlet turbidity (average of 7-8 NTU), and SDI15 < 5 for 78% of the data collected, corresponding to inlet turbidity of less than 10 NTU.



Fiber Disc Filter performance - inlet vs. outlet turbidity over time

Throughout these six consecutive weeks, the general filtrate suspended solid concentration was consistently low, < 1 mg/L while the inlet concentration was above 10 mg/L most of the time.



Fiber Disc Filter performance - inlet vs. outlet TSS over time

Delta pressure throughout the tests was extremely low-around 50 cm of water.

Parameter	Required Values	Values Achieved
Turbidity (NTU)	< 1 @ 90% of the time	✓
Total Suspended Solids (TSS) (mg/L)	< 1 @ 80% of the time	✓
SDI	< 5 @ 80% of the time	✓

## Conclusions

The consistent turbidity and suspended solids removal, and achieving the required SDI indicates that the filter is able to perform steadily and efficiently as a pre-filtration stage in Tuaspring Seawater Desalination Plant. That is especially promising given the challenging sea water conditions which were detected on site.

**The extremely low delta pressure throughout the tests indicates the low energy requirement for filter operation, and the ability to operate it even with very low inlet pressure conditions.**