



OsmoBCTM System

OsmoBCTM Forward Osmosis Process For Pulp & Paper Plants

INTEGRATED FILTRATION SYSTEMS FOR INDUSTRIAL APPLICATIONS

IDEAL FOR FILTERING HIGH FOULING
WATER & WASTEWATER STREAMS

Application Background

It is estimated that industrial applications account for more than 50% of the volume of all water pollution, including the most harmful impurities, with millions of manufacturing facilities in large amounts of freshwater to eliminate wastes. Treatment and discharge of wastewater effectively, efficiently and in an economical manner is a challenge that Fluid Technology Solutions, Inc. has taken to the next level.

The Pulp & Paper making industry is especially vulnerable to pollution risks due to increasing reliance on water throughout the process.

Substantial volumes of effluent are generated from the paper-making which must be treated.

Steps such as digestion of wood chips to form the pulp, subsequent washing and bleaching steps to achieve whiteness, use of sizing agents, dyes, adhesives and other chemical additives to manufacture the paper products and steam to dry the final paper products.

Conventional Treatment Technologies

The paper industry's objective is to provide treatment to meet permits and / or to allow for in-mill recycling in a reliable and cost effective manner.

A common primary treatment method is the process of clarification to reduce and remove TSS and other particulate matter generated in the paper-making process. The amount of BOD is also lowered in the wastewater.

Secondary biological treatment is then used to remove residual BOD, COD and TSS. Other AOX and bacteria are also removed. Microbes and nutrients such as nitrogen and phosphorus are commonly used to further treat organic materials.

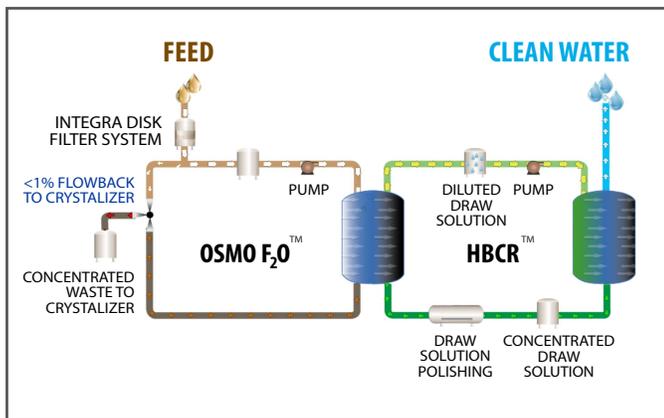
Anaerobic digestion may also be used to generate less sludge for the amount of BOD removed. As solids materials are broken down, biogas may be produced and can be used to harness energy onsite.

Tertiary and other advanced treatment technologies are also being incorporated at pulp and paper mills to generate clean water for reuse or local disposal.

The OsmoBC™ Treatment Process

Membrane technologies, such as forward osmosis are the most effective strategy for treating water for reuse in the process. Fluid Technology Solutions (FTS) recommends the OsmoBC™ treatment process for high-fouling plant wastewater containing high concentration of non-biodegradable BOD, COD, TDS and TSS. In paper plants, this advanced forward osmosis membrane process is capable of generating clean water without excessive pretreatment and without significantly degrading flux rates for long periods of operation.

The following diagram depicts how a Forward Osmosis (FO) system is combined with a High Brine Concentration and Recovery (HBCR™) system.



The FO system concentrates the feed and a draw solution extracts the clean water. The draw solution is continuously reconcentrated and recycled to the system.

The OsmoBC™ treatment process produces clean water for:

- High quality external and internal reuse
- Environmental discharge
- Agricultural irrigation

The concentrate may be sent to disposal, crystallization or other recovery methods.

FTS also offers our OsmoZLD™ process to reclaim high quality water and generate solids for further

use or disposal. We offer our low temperature evaporative crystallization technology capable of employing process waste heat as a thermal source while providing high efficiency process cooling. The final products are water vapor (released to the atmosphere) and salt solids.



Plant Streams Treated by Forward Osmosis

Membrane technologies may be applied to:

- White Water Treatment
- Concentration of White, Black or Green Liquor
- Process Condensate Reuse Water
- Wash Water
- Paper Mill Wastewater
- Primary or Secondary Clarification Dewatering
- Paper Products Processing Water Recycle
- Calcium Carbonate Concentration
- Phosphorus Reduction

The OsmoBC™ treatment process achieves up to 90% water recovery.

Product Recommendations

For optimizing water reuse and purification in Pulp & Paper Plant waters, we recommend our:

- OsmoF₂O™ FO-CTA-8040-85 Industrial Elements
- HBCR™ HBR-TFC-8040 Brine Concentration Elements

Legend

AOX = Adsorbable Organic Halides
 BOD = Biochemical Oxygen Demand
 COD = Chemical Oxygen Demand
 TDS = Total Dissolved Solids
 TSS = Total Suspended Solids