



## CASE STUDY - Pulp and Paper Mill

Objective: Augment existing WWTP to intensify treatment of organic load and ammonia

### Project highlights

Industry: Over 500,000 metric tons of specialized paper and 300,000 metric tons of kraft pulp

Products: 15 ECOFIXE modules and 10 BIOFIXE installed in the aerated lagoon

Economic benefits:

- 44% less expensive to acquire than the closest solution

Total investment: CAN\$2,700,000

Impact:

- 26% increase in organic load treatment capacity
- 47% increase in ammonia treatment capacity
- Reduction in energy consumption
- Greenhouse gas (GHG) emissions avoidance

### Baseline



*Aerated lagoon installation*

The mill produces specialized paper and kraft pulp. The wastewater is treated biologically in a typical aerated lagoon installation. The following table presents the design parameters, the current situation and the needs to be addressed.

### Industry Overview

The pulp and paper industry has undergone major transformations in the last decade. Companies in this sector have had to redefine themselves to ensure their sustainability and growth.

As newsprint demand decreases, successful mills focus on new market segments where demand is increasing such as specialized paper, packaging, tissue and cellulosic fibre.

Adapting to these significant changes, the pulp and paper industry remains a pillar of the North American economy.

Parameters	Design	Current	Needs
Flow <b>US gal/min</b> (m <sup>3</sup> /d)	<b>9,165</b> (60,000)	<b>9,930</b> (65,000)	<b>11,915</b> (78,000)
Organic load <b>US ton/d</b> (kg BOD <sub>5</sub> /d)	<b>34.1</b> (31,000)	<b>38.5</b> (35,000)	<b>46.3</b> (42,000)
Chemical oxygen demand <b>US ton/d</b> (kg COD/d)	<b>97.5</b> (88,500)	<b>109</b> (98,800)	<b>151.7</b> (137,670)
Ammoniacal nitrogen <b>mg/L</b> (kg N /d)	<b>4.5</b> (270)	<b>5.5</b> (358)	<b>6.5</b> (507)
Total suspended solids <b>mg/L</b> (kg TSS/d)	<b>2020</b> (121,200)	<b>2155</b> (140,075)	<b>2400</b> (187,200)



## CASE STUDY - Pulp and Paper Mill

Objective: Augment existing WWTP to intensify treatment of organic load and ammonia

### Challenges

The company has been in operation for more than 40 years and had reached the full treatment capacity of its wastewater treatment facilities. Plans to invest in increasing the plant's production capacity and introduce a new manufacturing process could not proceed without an upgrade of the wastewater treatment facilities.

In addition to the lack of processing capacity, the company was also facing a limited supply of energy. The solution must be energy efficient, or even energy saving, while increasing the performance of the existing installation.

The company places high value on the protection of the environment and positive relations with the local community. The management team sought to implement a solution that would be well aligned with these values.

### Options Considered

Among the solutions evaluated by the company, increased aeration in the lagoons was considered. This was problematic because the powerful surface aerators already in place consumed all the energy available on site. Additional aerators would require a costly and complex expansion of electrical capacity and still be insufficient for meeting longer term needs.

A second option was the use of bacteria in the aerated lagoons. This solution had insufficient increases in treatment capacity and sporadic results. It would have required the company to introduce an additional consumable and to repeat the bacteria add-on operation on a regular basis. Financially, this option was expensive.

Finally, the expansion of the aerated lagoons themselves was an option that was not desired by the company since it was too costly both financially and for energy consumption.

### The ECOFIXE and BIOFIXE solutions

ECOFIXE and BIOFIXE are biological wastewater treatment modules that will increase the treatment capacity of biological reactors by 20 to 60%.

They are installed directly in the biological reactor thus avoiding the need to construct new lagoons. The ECOFIXE module is designed for organic load removal; the BIOFIXE module's patented coating maximizes the removal of ammonia even under extreme cold weather conditions.

Each module has an anchored stainless-steel enclosure with a flotation system and contains fixed bed media which attracts, supports and maximizes biomass development. The media intensifies treatment capacity by increasing the surface area available to attached growth microorganisms. An increase in SRT means more processing is done without producing more sludge.

Each module is equipped with a fine-bubble aeration system placed under the module which oxygenates the biomass and ensures maximum oxygen transfer. This aeration system is more efficient than standard coarse bubble aeration resulting in a net reduction of energy consumption. Once installed, the ECOFIXE and BIOFIXE systems are self-sufficient and do not require an operator to be present. The modules can be installed without interrupting the treatment process.

#### ADVANTAGES OF THE MODULES

- No new construction required;
- Fast and simple assembly and installation (ten days for 25 modules);
- Energy efficient, (net energy reduction);
- Low maintenance and operating costs;
- No chemicals;
- Modular; locally manufactured;
- Sturdy;
- 100% of the flow treated; no sludge increase
- Stable and constant performance.

