ECOLOGICAL ASIA PTE LTD
Company Reg. & GST No.: 201408843H

Biological Restoration of a Textile Central Effluent Treatment Plant (CETP) Using MICROBE-LIFT® Bioaugmentation

Background

Figure 1. Biological Wastewater System

A Central Effluent Treatment Plant (CETP) located in Dhaka, Bangladesh, treating textile industrial wastewater, was experiencing severe underperformance of its biological treatment system.

The wastewater treatment plant began operation in 2012 and treats an average daily flow of 24,000 m^3 per day, with typical fluctuations ranging between 22,000 and 27,000 m^3 per day. The facility was originally designed as an activated sludge treatment system, consisting of three main aeration tanks with a total combined volume of 33,600 m^3.

Observed Performance Issues

Despite the large biological reactor volume, the system failed to operate effectively due to:

- Limited biological activity
- Minimal biological degradation
- Poor sludge settleability
- Lack of stable biofloc formation
- Absence of a functional Return Activated Sludge (RAS) system
- Insufficient clarifier capacity relative to hydraulic load

As a result, the plant became highly dependent on continuous electrochemical treatment (ECR) operation, leading to elevated operating and energy costs.

System Diagnosis

- The biological system was functionally inactive
- Low BOD: COD ratio of 0.30
- Clarifiers operated at only ~⅓ of the required capacity
- No sludge return → no MLSS build-up
- The biological system is only able to reduce the influent COD from 900 mg/L to 700mg/L
- High operational expenditure due to ECR reliance

Table 1. Influent Characteristics and Effluent Target

Parameter	Unit	Influent	Effluent Requirement
COD	mg/L	800-1,000	<200
BOD	mg/L	200-250	<50
TSS	mg/L	300-430	<150
pH	mg/L	10-11.5	6-9
DO	mg/L	0 mg/L	>4.5

To address these challenges, the plant operator sought a cost-effective biological restoration strategy that could reactivate the existing biological system, reduce dependence on electrochemical treatment, and consistently meet discharge standards.

MICROBE-LIFT® Bioaugmentation Program

The dosing program was based on the daily flow rate of 24,000 m3. The products used were:

- MICROBE-LIFT® /IND
- MICROBE-LIFT® /SA

Table 2. MICROBE-LIFT® Dosing Plan

Period	MICROBE-LIFT®IND (gal/day)	MICROBE-LIFT®SA (gal/day)
Days 1-2	40	30
Days 3-7	20	15
Days 8-30	8	4
Maintenance	4	2

Table 3. Summary of Product Consumption

Product	MICROBE-LIFT®IND (gallons)	MICROBE-LIFT®SA (gallons)
Month 1	340	215
Monthly Maintenance	120	60

Figure 2. MICROBE-LIFT® Application in the Aeration Tank

ECOLOGICAL ASIA PTE LTD
Company Reg. & GST No.: 201408843H

Operational Controls

To ensure biological stability:

- pH maintained at 7.0 to 8.0
- DO maintained ≥1.5 mg/L
- Nutrient balance (C:N:P) monitored
- RAS/WAS adjusted based on sludge settleability
- Flow temporarily reduced by 50% during startup to increase HRT

Performance Results

A. Biological System COD Reduction

Before bioaugmentation, the biological treatment system achieved limited performance, reducing COD from approximately 1,000 mg/L to 700 mg/L. After implementing the MICROBE-LIFT bioaugmentation program, biological treatment efficiency improved significantly, consistently reducing COD to approximately 350 mg/L and substantially reducing the load on downstream electrochemical reactors (ECR).

With continued biological stabilization, MICROBE-LIFT® alone further reduced COD to below 100 mg/L, exceeding discharge requirements. Within six months, the ECR operation was eliminated, resulting in significant reductions in electricity consumption and steel electrode replacement costs, while enabling the plant to meet regulatory standards independently.

Table 4. COD Reduction

Parameter	Before Bioaugmentation	After MICROBE-LIFT® Bioaugmentation
Influent COD (mg/L)	1,000	1,000
Effluent COD (mg/L)	700	<100
COD Reduction (mg/L)	300	900
Removal Efficiency (%)	30%	90%

B. Economic Impact

- Complete elimination of the ECR operation
- Significant reduction in electricity and chemical consumption
- Improved process stability and operational reliability

- Reduced maintenance and sludge handling costs

Table 4. Cost of Treatment

Item	Without MICROBE-LIFT®	With MICROBE-LIFT®
Electricity Cost per m^3	4.49 BDT	1.72 BDT
Steel Plate per m^3	6.51 BDT	-
Sludge Handling per m^3	0.36 BDT	0.14 BDT
MICROBE-LIFT® per m^3	-	2.25 BDT
Total per m^3	11.36 BDT	4.11 BDT

Note: 1 USD = 120 BDT

The implementation of MICROBE-LIFT® bioaugmentation resulted in an operating cost reduction of approximately 64% per cubic meter of wastewater treated, translating to estimated daily savings of around USD 1,400.00.