

1. Background: -

This Automobile Industry is situated in Halol, Gujarat, the western portion of India. This corporation, manufactures both types of vehicles which can run on fuels and electric as well. In this facility, cars are being painted as well as assembled. Two forms of influents, ELPO and PHOS, are generated as a result of various processing methods.

3. Special Technical Solution: -

As a solution we have supplied 'BactaServe- De-Bulking' to develop healthy biomass such as MLSS, MLVSS, decrease turbidity and have proper COD reduction through biological system. The dosage schedule of BactaServe- De-Bulking was as follows: -

Dosage protocol for Aeration Tank 4			
Sr No	Days	BactaServe Qty to be dosed per day	Total Qty
1	Day 1 – Day 10	2 Kg/day.	20 kg
2	Day 11 – Day 20	1 Kg/day.	10 kg
3	Day 21 – Day 30	0.5 Kg/day.	5 kg
Total Quantity			35 kg

Dosage protocol for Aeration Tank 3			
Sr No	Days	BactaServe Qty to be dosed per day	Total Qty
1	Day 1 – Day 10	3 Kg/day.	30 kg
2	Day 11 – Day 20	2 Kg/day.	20 kg
3	Day 21 – Day 30	1 Kg/day.	10 kg
Total Quantity			60 kg

Dosage protocol for Aeration Tank 2			
Sr No	Days	BactaServe Qty to be dosed per day	Total Qty
1	Day 1 – Day 10	2 Kg/day.	20 kg
2	Day 11 – Day 20	1 Kg/day.	10 kg
3	Day 21 – Day 30	0.5 Kg/day.	5 kg
Total Quantity			35 kg

As all issues related to quality of effluent from biological system are due to the dead bio sludge present in system the removal of its very much important. The removal of dead biomass present in the system is must, so we suggested to take wastage of the dead bio sludge from MBR tank. This volume of removal was specified by us, we removed biomass from the MBR over the course of 4 kl from July 25 to July 31, 6 kl from August 1 to 17, 9 kl from August 18 to 21, and 15 kl from August 22.

2. Challenges: -

The dead bio sludge which is present in the system causing water to get turbid, very less COD and BOD reduction and even sometimes causing increase in COD and BOD too and we have observed when analyzed for COD by 2 different methods for the same sample: -

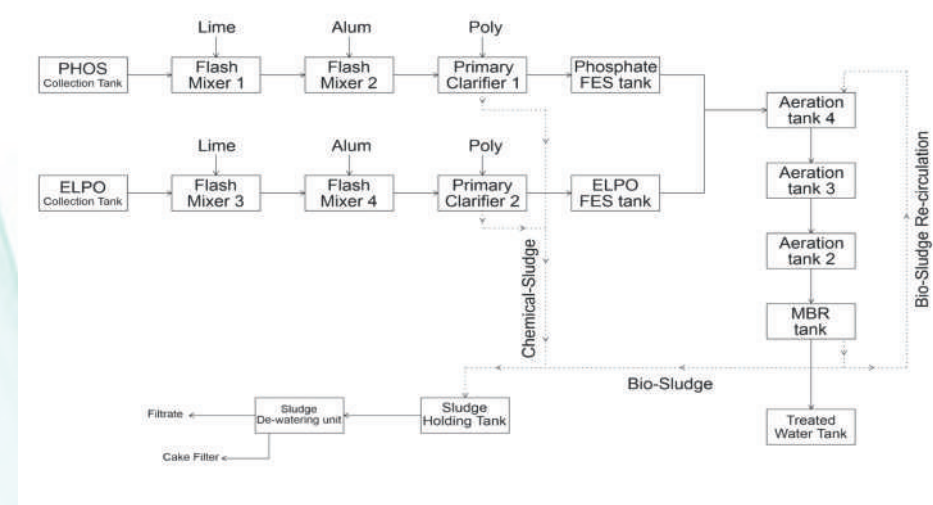
- Sample without filtration
- Filtered sample

The color of all aeration tanks and MBR tank are became greyish as they are going towards anoxic condition which are causing bacteria to dead in the biological system. On aeration tanks there is heavy foam present which is also greyish in color, which is also due to the dead biomass present in the system.

2.1. Plant Specifications: -

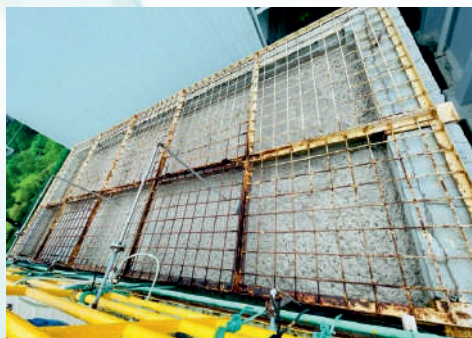
This plant has designed to treat 500 m³/day of combined influent. But the primary treatment for both of these influents is different as they have different chemical composition as a pollutant. After the primary treatment is over, the effluent from both the primary clarifier are combined and fed to the 3 aerations tanks in series and then fed to the MBR tank.

2.2. Process Flow Diagram: -

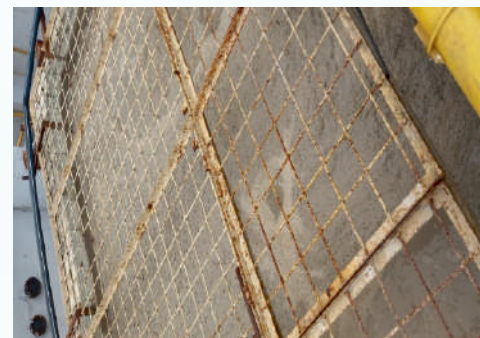


4. Results: -

A. Color of Aeration Tank: -



Before



After

B. Foaming in MBR Tank: -



Before

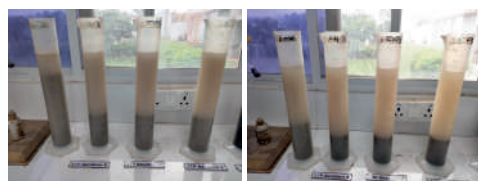


After

C. Turbidity: -

Date	Aeration tank 4	Aeration tank 3	Aeration tank 2	MBR tank
11-08-2023	270	252	218	244
12-08-2023	262	224	192	228
13-08-2023	249	213	206	231
14-08-2023	272	245	235	246
15-08-2023	262	218	200	240
16-08-2023	231	194	168	212
17-08-2023	244	215	194	230

If we see the above table, it has been seen that the turbidity on each day from aeration tank 4 to aeration tank 2 is reducing as it has been getting treated in the aeration tanks. But in case of MBR tank the increase in turbidity is due to the part of MLSS which is in dead form is in high value.



Before

After

Here we can see the improvement in turbidity of all aeration tanks as well as the MBR tank effluent.

D. MLSS, MLVSS, MLSS: MLVSS ratio & SVI: -

MLSS is consist of all the particulate matter which is in suspended form in the aeration tank that includes Organic and inorganic matter, Dead biomass, healthy biomass and the MLVSS is the part of MLSS which mainly consist of the healthy biomass present in the system.

This MLSS can also be increased or decreased by two parameters

a) Return activated sludge (RAS): - meaning a quantity of activated sludge has returned from MBR tank to the aeration tank 4.

b) Waste Activated Sludge (WAS): - meaning a quantity of activated sludge wasted through draining from MBR tank.

Mass Balance Equation: -

$$\text{inlet} - \text{Outlet} = \text{Accumulation}$$

$$\text{SVI} = \frac{(\text{SV30}) * 1000}{\text{MLSS}}$$

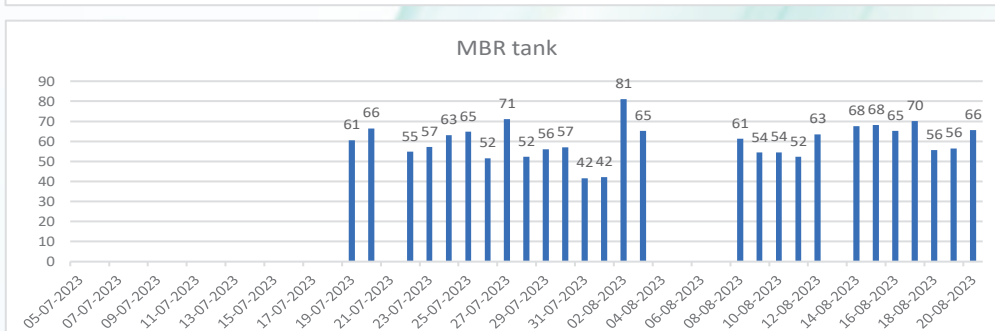
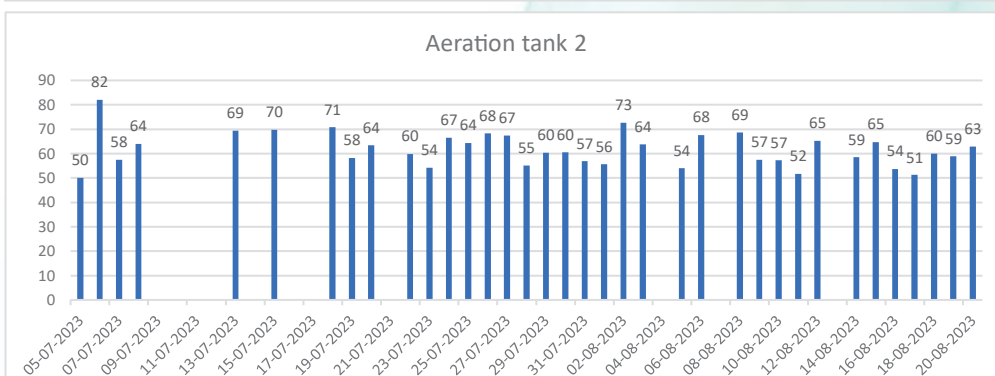
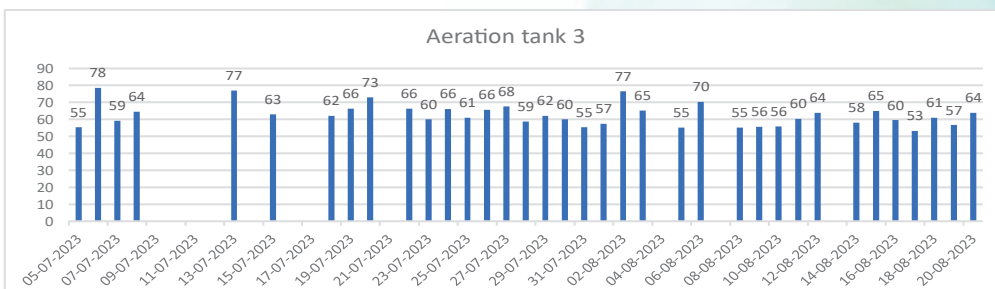
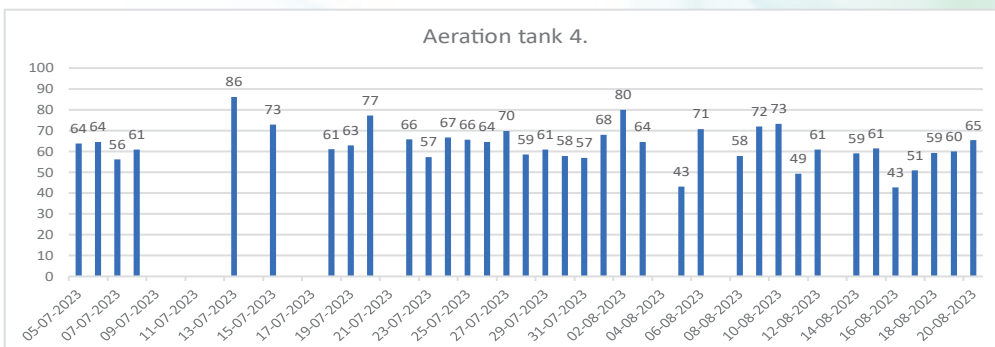
As MLSS, MLVSS, MLVSS:MLSS ratio & SVI are related to each other the fluctuations happen accordingly,

Note: -

The fluctuations in MLVSS: MLSS ratio, MLSS, MLVSS and SVI are related to each other and these fluctuations are dependent of concentration of MLSS, MLVSS getting loss in RAS and WAS.

We also recommended to waste a particular quantity of sludge on daily basis which has increased gradually. From 3 to 6, 6 to 9, 9 to 12 and 12- 15 kl/day, during a course of dosing period of 'BactaServe- De-Bulking.' Therefore, these fluctuations.

MLVSS:MLSS ratio Before and After Combined: -



E) COD degradation: -

Tank	COD without filtration mg/L	COD with filtration mg/L	Contribution of dead biomass in COD value mg/L
Aeration tank 4	760	247	513
Aeration tank 3	619	97	522
Aeration tank 2	628	168	460
MBR	792	176	616

There is a COD degradation but due to the presence of dead biomass in the system the COD rise is taking place.

If we see the values of COD of filtered sample, there is decrease in COD from 247 mg/ltr to 97 mg/ltr in aeration tank 3.

5.Executive Summary: -

Despite the COD being reduced, there is still a rise in COD since the system still contains dead biomass, which increases the COD value and must be removed. We need to keep dosing "BactaServe- De-Bulking" since when we remove this biomass from the system, we also need to create a robust and healthy biomass in the aeration tanks.

If we examine the plant, we can notice changes in the color of the aeration tank, which has changed from grey to brownish. We can also see improvements in the turbidity, which has improved, but there was a little fluctuation on August 14 owing to an organic shock load. These are all signs of good biomass and aeration tanks conditions in the MBR tank and all aerations tanks.