

Case Study of 1500 m³/day ETP – Cosmo Seafoods, Tema, Ghana...

Cosmo Seafoods has a tuna fish processing plant located at Tema, Ghana. The factory was under construction and no effluent samples or test results were available when we were invited to quote; only indicative values from literature were given. They wanted an ETP to treat 1,500 m³/day of fish processing effluent from the factory to meet their EPA guidelines.



Fig.1 Cosmo Sea Foods

Fish processing effluent is not as simple as sewage, as everyone would know. One of their constraints was their factory was very closer to a main road leading to the country's main Port. So, in case of any smell, foam or such issues with the ETP, they would have to face a serious problem from the public and the Government. Also, their factory producing EU export food item and their office building were located very next to the ETP site and so, they wanted the odour and any impact of microorganisms to be eliminated completely in the surrounding.

Taking all these factors into account, we designed a ETP for them.

The client preferred to do the erection by themselves, as they were building their factory anyway. We generally recommend RCC keeping in view the cost advantage it brings. They have built the ETP using steel. Since their fish processing production capacity has not reached 100% capacity, the first phase of Commissioning was done only for 500 m³/day of effluent. Since our system is modular, we could commission part capacity without impacting efficiency of operation. With almost any other technology, efficiency of operation would have suffered, and the Client would have been spending a lot on electricity alone.

Initially we proposed a scheme of Anaerobic Reactor followed by FAICR followed by AICR reactor. But the client did not want Anaerobic Reactor due to its minimum 6 m height requirement, and so we offered chemical additives to coagulate, settle in a Clarifier and add an extra stage of FAICR reactor, in the place of Anaerobic Reactor.

In the Pre-Treatment, we gave an Oil Skimmer (2 of them running parallel) to remove the oil floating in the effluent. The removed oil is stored in a Collection tank for further testing and reusing. Following the Oil Skimmer are 2 Coagulant tanks for dosing with HCl and Poly Electrolyte to remove the colloidal effluent. The effluent that comes out of these tanks is then taken to Primary Clarifiers.



Fig 2. Ariel View of Pre-Treatment Process

We designed 2 Primary Clarifiers of about 8 m height and parallel arrangement. The treated effluent from the Clarifier was then taken to the FAICR Reactor. For the first phase, we used only 1 of the 2 Clarifiers.



Fig 3. View of the Primary Clarifiers

FAICR is Fluidized Advanced Immobilized Cell Reactor. Because of the complex nature of the Effluent, and also because of the absence of Anaerobic Reactor, we included 2 stages of FAICR Reactor. In each of the 2 stages, we included 3 identical reactors, each of them with capacity to treat 500 m³/day of effluent. A special activated carbon catalyst was added to the FAICR reactors and air blower was used to aerate the reactors. For the first phase, we used only one of these 3 reactors in each stage.



Fig 4. View of the FAICR Reactors

After the FAICR reactor, the final stage of treatment was the AICR (Advanced Immobilised Cell Reactor). Here again we again we gave 3 Identical reactors with capacity to handle 500 m³/day of effluent each. In this again, we added our proprietary Activated Carbon Catalyst and used Air blowers aerate the system. For the first phase, we used only of these 3 reactors.



Fig 5. View of AICR Reactors

The Treated water coming out of the AICR was colourless with no visible suspended solids and odour-free and was stored in a Treated water Tank and finally discharged into the existing drainage line. The client has plans to reuse the treated water at a later stage.



Fig 6. Comparison of Raw Water & Treated Water Samples

Table Showing Comparison of Key Raw Water and Treated Water Parameters after about a month from the Date of Commissioning:

S. No	Parameter	Raw Water	Treated Water
1	BOD (mg/l)	2640	31
2	COD (mg/l)	4280	300
3	TSS (mg/l)	1760	116
4	TDS (mg/l)	1710	1147
5	Oil & Grease (mg/l)	533	<3
6	Total Coliforms (MPN/100ml)	70000	1100

The Client chose not to do tertiary treatment as the same is not mandated. If it is done, the treated water could be made even better, esp with respect to Coliforms. The Client's Engineers who have worked in different ETPs said they had never seen such crystal clear treated water at the time of commissioning or later, in any other Fish Processing Plant ETP installation.