

INDUSTRIAL CASE STUDY

IFM Retrofits Old DAF into New Installation



IFM recently took part in a design /build project for a Northwest Ohio based food manufacturing company. The company contracted IFM to provide process and permit engineering along with project management of wastewater treatment improvements. The company has been proactive in designing and completing the necessary wastewater plant improvements to concur with the company's growth and expansion. The influent characteristics include high levels of CBOD5 (1500 mg/L), TKN (150 mg/L), and Total Phosphorus (50-85 mg/L), all of which impact effluent parameters, including accelerated algae growth due to the high nutrient load. DAF improvements were considered to remove TSS, FOG, Phosphorus and insoluble TKN.

*The project was based on past design and consulting services provided by IFM, using our technical staff and parent company, Poggemeyer Design Groups' Environmental Department. This was phase 3 of treatment improvements for the existing lagoon system. Phase 1 included fine screening and improved flow utilization of the lagoon systems to minimize short circuiting through the lagoons. Phase 2 was the expansion and improvement of aeration utilizing AquaAerobics AquaJet II aerators in the # 3 lagoon.

Phase 3 included the installation and construction of a new DAF building. Dissolved Air Flootation (DAF) was evaluated by IFM in the past utilizing our lab size DAF unit prior to the start of the design of this project. Following phase 1, IFM assisted the client with the installation of a temporary coagulant and polymer feed system from the screen building to lagoon # 1. The # 1 lagoon became a mixing cell with lagoon 2 serving as the settling basin to reduce the amount of TSS and organics carrying over into further polishing cells. The facility was forced to clean out the # 2 lagoon annually until permanent improvements for sludge were considered.

It was determined that controlled discharge events were problematic in meeting discharge limits due to the organic and nutrient load fertilizing excessive algae blooms.



The third lagoon often experienced a reddish hue or possibly red algae concurrent with food manufacturing and excessive nutrients. This eventually carried over into lagoon 4 leading to high TSS effluent results. Elevated levels of TKN, NH₃-N and Phosphorus were often recorded in lagoon 4 as well, which spurred the urgency in the Phase 3 construction.

By retrofitting at another location, the client had a “spare” DAF to implement at this facility. After laboratory and field consideration, it was determined that a DAF was a likely improvement for the removal

of total suspended solids and phosphorus removal with chemical precipitation through the DAF. This would also help provide positive effects downstream, by removal of solids prior to the anaerobic degradation in cell 2 which releases soluble CBOD₅ and NH₃N during residence time in that cell.

IFM assisted the client with existing DAF review, improvement of the DAF process, project management of the design, and installation and startup, including instrumentation selection and commissioning. Project integrations services by IFM included written sequence of operations for programming personnel, start up review and training along with equipment startup.



DAF processes were improved from the previous installation through slow mix polymer flocculation and recirculation improvements utilizing multistage pump technology from the previous saturation column technology used at the other facility’s treatment system.

Edur DAF pump technology was selected as a method to reduce the need for compressed air and DAF saturation column. This DAF recirculation pump technology allows a centrifugal pump to operate with atmospheric air being introduced into the pump suction inlet. The pump with its stages, vanes and diffuser blades takes the introduced atmospheric air to mix with treated DAF water to produce an air saturated water solution that when being pumped through the DAF produces the necessary fine bubble needed to float flocculated particles from the chemical portion of the DAF.

Following startup, the system has successfully reduced TSS and Phosphorus concentrations substantially. Total Phosphorus levels have been reduced as much as 94% through the DAF to date.

	CBOD5	Total Suspended Solids	Phosphorus, Total	Oil & Grease
Influent to DAF	1700 mg/L	510 mg/L	86.5 mg/L	200-3000 mg/L
DAF Effluent	About 500 mg/L	70 mg/L	4.62 mg/L	<5.0 mg/L

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