

Dissolved air flotation (DAF) is used to treat industrial wastewater effluents. Many industrial processes like oil refineries, chemical plants, paper mills, and general industrial facilities, treat water for use throughout the production cycles. DAF systems utilize small gas bubbles that attach to impurities and particles and float them to the water's surface. The particles are then skimmed from the surface and clean water is recovered. The clean water is often reused for process, discharged, or recycled back to the DAF process.

### Chemical Treatment in DAF Systems

Coagulation treatment and flocculation polymer agents are often used to pretreat waste water before it enters the DAF system. Coagulation clumps particles together and polymers remove them from liquids, clarification, sludge thickening, and solids dewatering.

Coagulants neutralize the negative electrical charge on particles, which destabilizes the forces keeping colloids apart. Water treatment coagulants are comprised of positively charged molecules that, when added to the water and mixed, accomplish this neutral charge and are typically used to treat water for suspended solids removal.

Flocculants gather the destabilized particles together, cause them to form large clusters of particulate and drop out of solution. The microbubbles released by the DAF system float these clusters to the surface where they are harvested by scrapers for removal.

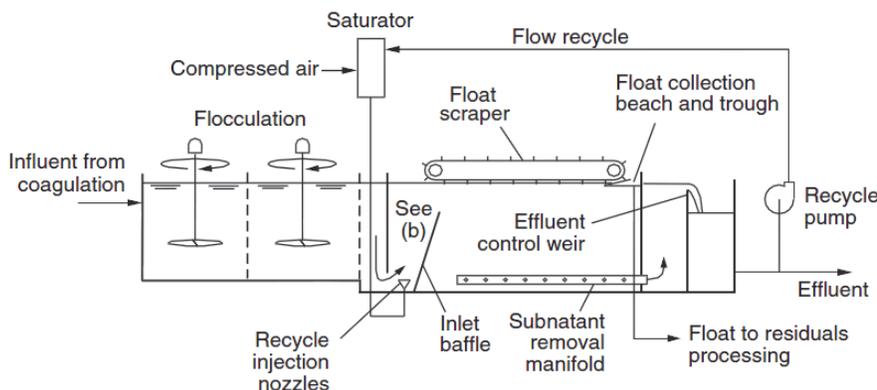


Diagram: Typical DAF system

## HIGHLIGHTS

**Industry:** Oil refining  
**Service:** Flow Rate/Total  
**Fluid:** Polymers

### Application

Polymer injection into static mixing and DAF systems

### Problem

- Polymers need to be added to DAF static mixer to ensure proper dosing
- Need an accurate way to measure flow rate from pulsating diaphragm pumps
- System optimization to ensure proper polymer injection based on influent flow rate

### Solution

- EL 2200 Series Electromagnetic Flow Meter
- MC608 A/B Transmitter
- DC-I Series Positive Displacement Flow Meter
- BR30 Rate/Totalizer Display

## **Customer Application and Solution**

An oil refinery has been dosing their DAF system's coagulant and flocculant based on the average influent water flow. This caused over and under dosing during high and low flow conditions, leading to reduced effluent quality and higher cost for downstream processes that were being adversely affected by the water quality. The refinery wanted to optimize their system and chemical usage. By measuring the influent flow and monitoring the turbidity, they could have tighter control over the dosing of coagulant and flocculant.

The influent flow was handled by Flow Technology's EL 2200 electromagnetic flowmeter, excellent for conductive liquids and with no moving parts to foul with solids in the fluid stream, and an MC608 A/B transmitter to display rate and total. Since the coagulant and flocculant are of a higher viscosity (500 cP) and not conductive, a wide flow range to cover dose rates from low to high influent rates was needed. Flow Technology recommended the DC-I Series positive displacement flowmeter because the meter's robust, loose geometry construction handles high viscosity liquids and can provide a 1000:1 turndown at viscosities over threshold. A BR3000 Series rate/total display was paired with the PD meters to provide a local display of rate and total and a 4-20mA output to the customer's programmable logic controller.