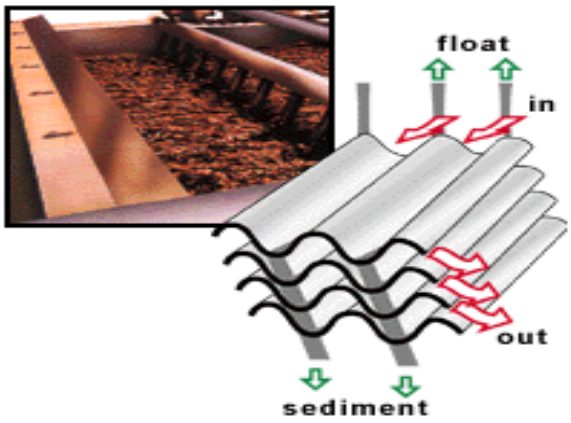
DISSOLVED AIR FLOTATION SYSTEM

DYNAMICS DAF the technology for removal of fluid (e.g. oil) and/or solid particles from water/waste water. The separators make use of gravitation. Because of the differences in density between water and it's contaminants, a separation can be archieved.

However, due to slight differences in density, it frequently occurs that the contaminants can not be separated. Small particles (dispersed or emulsified) can be made separable by means of physicochemical treatment (coagulation, flocculation and coalescence). The adherence of micronsized air bubble to solid particles results in a sufficient difference in density in order to effect fast flotation and efficient separation.

The above flotation system are provide with **corrugated plates**, each having a large separating surface area. This results is very compact separator for the treatment of small to very large flow capacities. For the optimal dewatering of the flotation material, This flotation system are equipped with a specially design concentrator and discharge system.



THE DYNAMICS DAF ADVANTAGES OF DESIGN

- High separation efficiency, with the large separation area corrugated plate.
- Optimal flotation layer (sludge) dewatering by unique concentrating system.
- Compact systems easy to operation and low energy consumption.

- If desired, available in materials other than stainless steel in conformity with customer's specifications.
- Standard system with short delivery times, for any desired capacity.
- The construction, start-up and service by chemical dynamics specialists.
- All equipment can be provided in local.

DYNAMICS DAF APPLICATIONS

Dynamics DAF, system can be applied both with and without chemical pretreatment (Flocculation).

Without chemical pretreatment for applications such as

- removal oil in refineries.
- fat seperation in slaughterhouses.
- final treatment of "production" water at oil production fields.
- biologically activated sludge flotation.

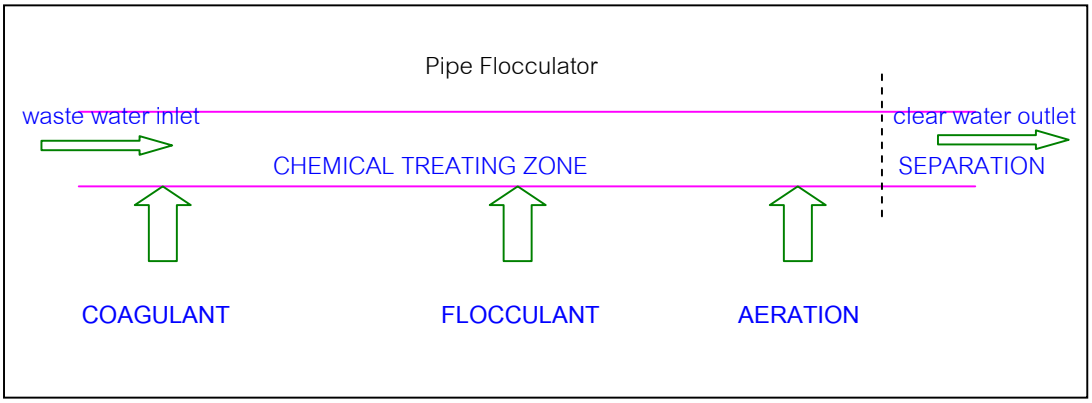
With chemical preteratment

- slaghterhouses
- meat-packing industry
- rendering plants
- papermaking industry
- vegetable oil processing industry
- oil production fields
- desalters
- tank cleaning
- refineries
- laundries
- biologicallly activated sludge flotation
- purifications of fruit juices.

The our service team can help you to find a good solution for your specific problem on the basis of their comprehensive experience and know-how. Test programmes indicate and/or determine what possibilities there are in your case.

TECHNICAL INFORMATION

Flocculation, which in case of colloidal solutions, is necessary to bring solid particles in to a separable form, proceeds, in general, in accordance with the diagram shown as below.



The mixing and reaction between chemicals and contaminant particles take place in a pipe, by means of controlled, calculated turbulance.

The air need for flotation is dissolved in a sub-flow of the purified water. A special multiple stage pump is used for mixing and increasing the pressure. Upon relief of the pressure, in specially designed valves, microscopically small air bubbles are released, which, upon mixing with the wastewater, adhere to the solid particles. In the DYNAMICS DAF seperator, the rising particles form a flotation layer, which is optimally dewatering by means of the DAF concentrator and discharge system.

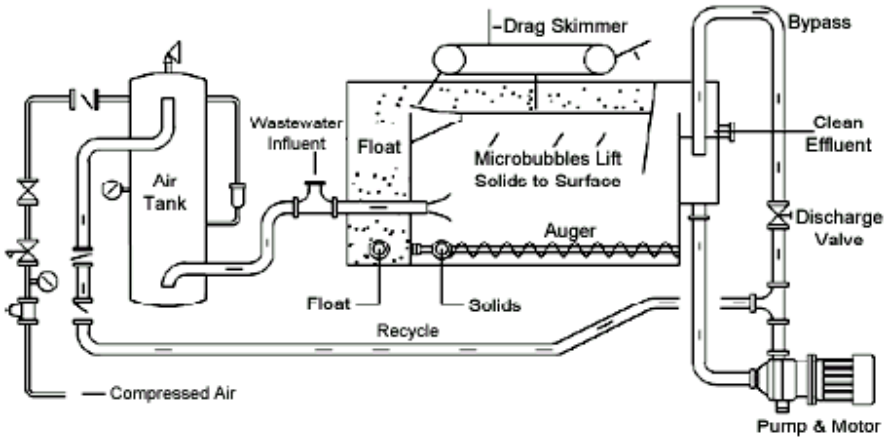
Particles with a lower flotating power are separated between the sheets and reach the flotation layer later through the tops of the corrugated sheets. Settling material is carried off via the throughs of the corrugated sheets to the sludge compartment and subsequetly removed via a sandtrap system.

Dissolved Air Flotation (DAF): The theory

Operational Theory

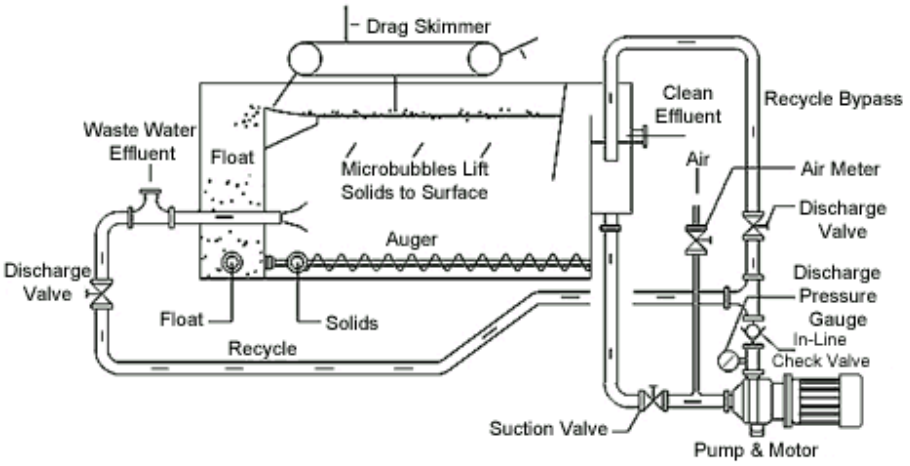
Dissolved Air Flotation (DAF) is the process of removing suspended solids, oils and other contaminants via the use of air bubble flotation. Air is dissolved into water, mixed with the wastestream and released from solution while in intimate contact with the contaminants. Air bubbles form, attach to the solids, increase their buoyancy and float the solids to the water's surface. A percentage of the clean effluent is recycled and super-saturated with air, mixed with the wastewater influent and injected into the DAF separation chamber.

The dissolved air comes out of solution, producing millions of microscopic bubbles. These bubbles attach to the solids and float them to the surface where they are mechanically skimmed and removed from the tank. The Pan America Environmental dissolved air flotation systems are designed to remove fats, oils & grease (FOG), suspended solids, food/animal production/processing wastes, industrial wastes, hydrocarbon oils/emulsions and many other contaminants. Clarification rates as high as 97% or more can be achieved using our dissolved air flotation systems. Chemical pre-treatment can often help to improve the performance of contaminant removal.



Conventional DAF saturation design uses a recycle pump combined with a saturation vessel and air compressor to dissolve air into the water. This type of system, while effective, is expensive, labor intensive and can destabilize its point of equilibrium, creating burps due to incorrect, loss or creeping of EQ set-point in the saturation vessel. This design is slow to recover and can upset the flotation process in the DAF. Air transfer efficiency is approximately 9% @ 80% entrainment. This style of operation can increase chemical use, labor costs, downtime, effluent loadings, production schedules and other detrimental domino effects due to EQ loss.

.



DAF sizing takes into consideration many criteria for sizing: Flow rate Water temperature Waste characteristics Chemical pre-treatment Solids loading (LBS/HR/Ft2) Hydraulic loading (GPM/FT2) Air to solids ratio (LBS of air/LBS of Solids)

DAFs are designed on the basis of the peak flow rate expected. The flow can range from 1 to 5 gallons per minute per square foot of surface area (GPM/Ft2). Bench testing of waste stream samples is usually the preferred starting point when sizing equipment and determining proper chemical processes prior to the DAF. The chemical pretreatment will assist and improve the DAF separation process.

Chemical Pretreatment often improves DAF solids removal efficiencies. The use of chemical flocculants with DAF is based on system efficiency, application (use of DAF) and cost. Commonly used chemicals include trivalent metallic salts of iron, such as FeCI2 or FeSO4 or aluminum, such as AISO4. Organic and inorganic polymers (cationic or anionic) are often used to enhance the DAF process.

The most commonly used inorganic polymers are the polyacrylamides. Chemical flocculant concentrations used normally range from 100 to 500 mg/l. (One mg/l in 1 million gallons per day is 8.34 lbs of material.) The wastewater pH may need to be adjusted between 4.5 and 5.5 for the ferric compounds or between 5.5 and 6.5 for the aluminum compounds using an acid such as H2SO4 or a base such as NaOH. In many applications, the DAF effluent requires pH adjustment utilizing a base such as NaOH to assure the DAF effluent pH is within the limits specified by the POTW (6-9 typically).

Attachment of most of the bubbles to solid particles can be effected through surface energies while others are trapped by the solids or by hydrous oxide flocs as the floc spreads out in the water column. Colloidal solids are normally too small to allow formation of sufficient air-particle bonding. They must first be coagulated by a chemical such as the aluminum or iron compounds mentioned above and then absorbed by the hydrous metal oxide floc generated by these compounds. Frequently, a coagulant aid is required in combination with the flocculant to agglomerate the hydrous oxide flocc, increase particle size and improve the rate of flotation. Mechanical/chemical emulsions can also be broken through pH and polymer reactions.

Where the float is to be used to feed animals used for human consumption, organic compounds such as chitosan, carrageenan, and lignosulfonic acid, or their derivatives can be used. Use only compounds approved by the Food and Drug Administration (FDA) Office of Veterinary Medicine.

Float Dewatering DAF float often contains 2 to l0 percent solids. The solids may need to be dewatered before disposal to reduce the sludge volume by reducing water content. Float dewatering is usually performed by using one of the following technologies: Filter press, Belt filter press, Centrifuge, Drying bed, Vacuum pre-coat filter.

1. MAIN DATA OF THE INSTALLATION

1.1 Design parameter

Type of influent	:	Wastewater from Pet Food Plant
Flow rate	:	10 m3/hr (approximately)
SS	:	N/A
TS	:	N/A
BOD	:	N/A
COD	:	N/A
pH	:	N/A
Oil&Greese	:	N/A
Temperature	:	N/A

The design of the system quoted is based on informations obtained from the client and from experience. The client should inform Chemical Dynamics if he feels that the design parameters, listed below, do not reflect, the actual situation.

Electrical supply	:	220/380 V
	:	3 phase
	:	50 Hz

1.2 Features of the plant

Type of installation : **DYNAMICS DAF10**

Chemical Dynamics waste water treatment dept. offer physco-chemical waste water treatment for the high rate purification of wastewater from poultry installations.

All **DYNAMICS DAF** system are standardised and based on corrugate plate seperator technology.

2. SYSTEM INFORMATIONS

2.1 Plant performance

The expected removal efficiencies are :

BOD	:	50%
Oil&Grease	:	95%
SS	:	< 30 ppm.

2.2 Utility consumptions

The consumption as design capacity are :

Compressed air	:	250 cu.ft./hr (minimum pressure 90 P.S.I)
Power	:	11.25 Kw

2.3 Site conditions

The equipment, process, and chemical storage are design for installation and operation in frost free area or indoors

2.4 Area

The area required for installation of the quoted equipment is as follows:

(available)

3. SPECIFICATION OF SUPPLY

Our offer includes the following components:

3.1 Microflotation system

The separator consists of a 6.0 mm. mild steel vessel (SS41) with supporting steelwork and stiffeners. The distribution manifold and adjustable outlet cuffs are made of mild steel, SS41

Type	:	DYNAMICS DAF10
Dimensions	:	
Length	:	3,000 mm.
Width	:	1,500 mm.
Height	:	1,500 mm.
Empty weight	:	1,650 kgs.(Approx.)
Number	:	1

3.1.1 Separating element

Type	:	Tube Sttler Separator
Material	:	PVC Special Grade
Manufacturer	:	Brentwood, U.S.A.

3.1.2 Skimmer

An electric driven skimmer made from non ferrous materials is mounted on the seperator. All parts coming into contact with the liquid are constructed from rubber or stainless SUS304.

3.2 Flocculation

3.2.1 Pipe Flocculator

Type	:	PFL-pipe flocculator
Capacity	:	10 m3/hr.
Materials piping	:	PVC 3”
Materials frame	:	SS41
Including	:	dosing point P.E., Coagulant and pH correction
number	:	1

3.2.2 Poly electrolyte Feeding unit

Type	:	Diaphragm pump
Metering Pump	:	Prominent BT5a 0232
Capacity	:	18 l/hr @ 4 bar
Metering Power	:	22W
Agitator Motor	:	0.375 kW

3.3 Pumps

3.3.1 Recirculation pump (1 sets)

Type	:	Centrifugal pump
Output	:	10 m^3/hr.
Material	:	Housing / cast iron
	:	Impellers / Bronze
Protection class	:	IP 55

3.3.2 Feed pump (1 set) (options)

Type	:	Centrifugal pump
Output	:	10 m^3/hr.
Material	:	Housing / cast iron
	:	Impellers / Bronze
Protection class	:	IP 55

3.3.3 Coagulant dosing pump

Type	:	Diaphragm pump
Metering Pump	:	Prominent BT5a 0232
Capacity	:	18 l/hr @ 4 bar
Metering Power	:	22W

3.3.4 pH adjustment pump

Type	:	Diaphragm pump
Metering Pump	:	Prominent BT5a 0232
Capacity	:	18 l/hr @ 4 bar
Metering Power	:	22W
Mode of Operation	:	Automatic by pH Controller

3.4 Switch and Control panels

3.4.1 Electrical Panel

This system consists of a panel which must be installed in dry room. The panel houses all switches and other devices to control the entire process.

The main panel also displays

- optical alarms as mentioned below
- “ hand “ or “ automatic “ switches of most electric components.

The following visual alarms and indications are included in the switch panel.:

- on/off position of the skimmer
- on/off position of the metering pump
- on/off position of the plant
- (option)high/low level of the sludge storage compartment