# PRINCIPLES OF DAF SYSTEM – By Engr. Mansoor Ahmed

Basic influent seawater is passed through a mechanical coarse screen (mesh size up to 5 – 15 mm opening) followed by a mechanical fine screen (mesh size up to 0.02 – 1 mm mesh opening). This water is now hold into a feed tank from where it is pumped to a **Coagulation Tank** where coagulant (Alum mostly, or Ferrous Sulphate/Ferric Chloride) is added with a Rapid Mixer to prepare the Flocs of Suspended Particles. After this Process the water flows towards **Flocculation Tank** equipped with a Slow Mixer where flocculants (any polyelectrolyte or polymer) is added thus to form larger flocs by sticking the smaller flocs together to make larger flocs which could easily be floatable thus increasing the removal efficiency. Now the main water with larger flocs floats towards the **Floatation Tank (or DAF TANK).** The dissolved air with water is induced from bottom of Floatation Tank creating fine/micro bubbles and the flocculated particles are attached to the fine/micro air bubbles and are forced to move upward to the top surface of the water in Floatation Tank. This principle is opposite to the sedimentation process whereby the unwanted particles or flocs in the latter settle to the bottom of the tank and clarified water is collected at the top to undergo further filtration stage.

In the DAF system, size of the micro-bubbles is best maintained at 50 micrometer (microns) in order to increase the contact surface area with the flocs and therefore increase the solid separation efficiency. The particles are then removed as a floating sludge by mechanical skimming units (Skimmers/Scrappers), continuously transferred towards the Sludge Treatment Plant.

**Overview of a DAF Unit for Water Filtration**

**DAF Unit Floatation Tank (Thick Sludge Blanket on Top of Water being Skimmed by Skimmers/Scrapers**

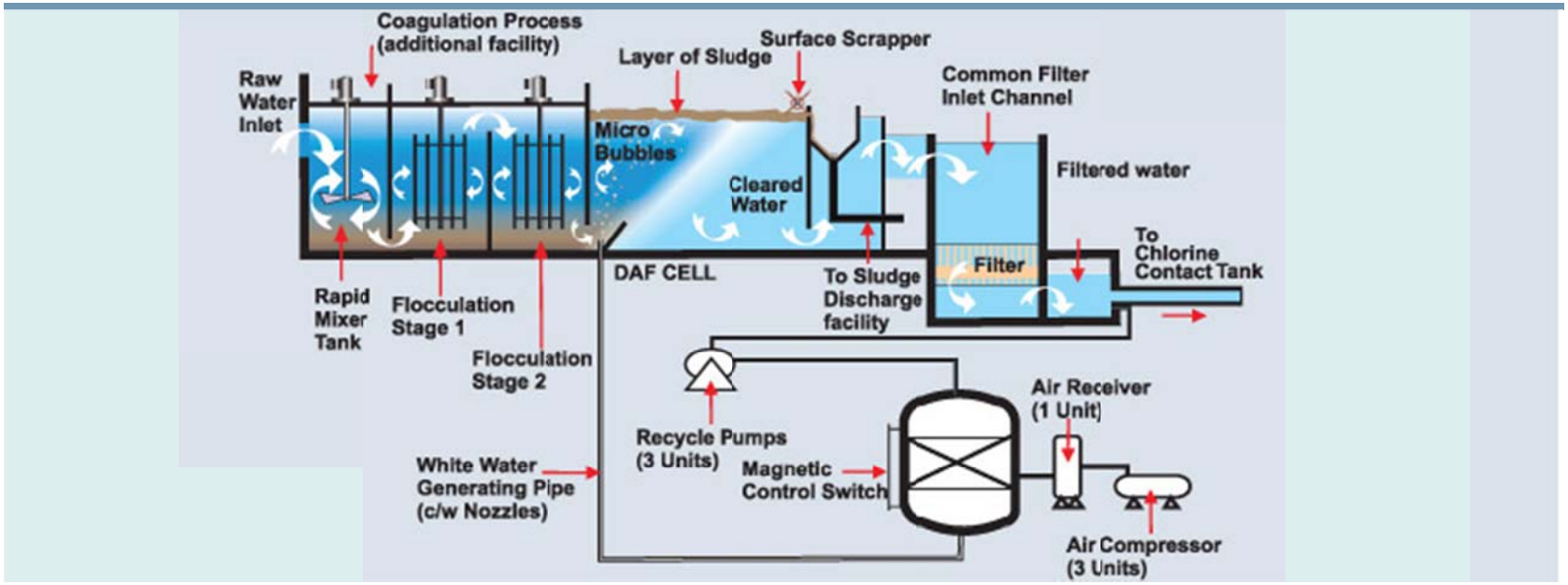
## Advantages of DAF System over Sedimentation System

- **Reduced chemical coagulant requirements in DAF Unit as compared to Sedimentation Tanks**
- **Small land area for installation as compare to Sedimentation Tanks**
- **Higher Concentration of Sludge Solids achieved as compare to Sedimentation Tanks**
- **Rapid stabilization of the system i.e. more efficient than Sedimentation Tanks**
- **Removal efficiency of small suspended particles**

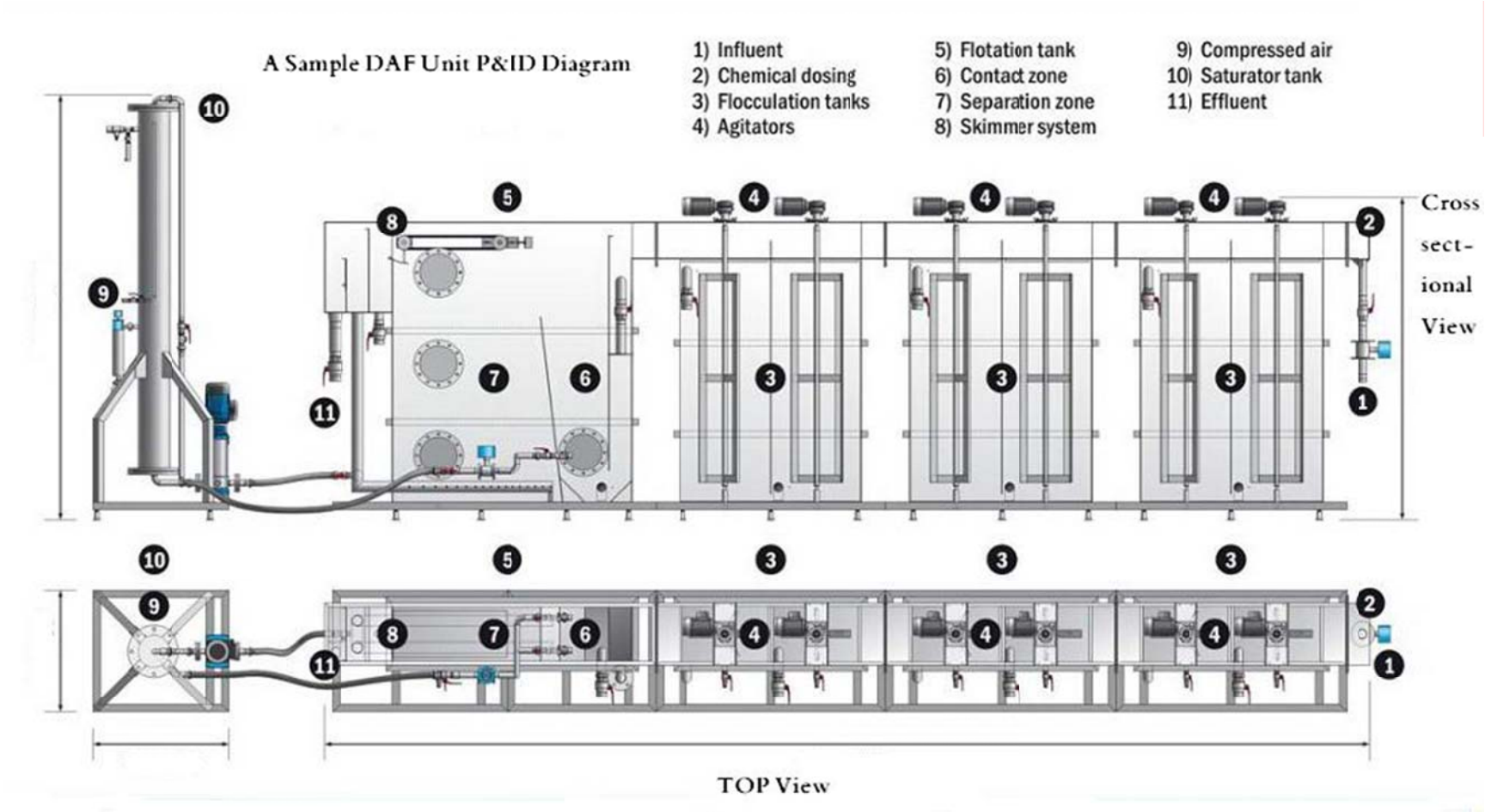
This solid-liquid separating system is more effective in separating light and small suspended solids that can hardly be separated by ordinary sedimentation. It was also reported that DAF is a more effective process as compared to a conventional sedimentation for treatment of water containing low-density particles such as **algae**.

In terms of **turbidity and iron** removal efficiency, DAF is consistently able to remove almost 83% - 89% of the contaminants. In fact, turbidity and iron in the water is almost completely removed after filtration process.

## DAF Application in Water Treatment Process




Process Flow Diagram of a Typical DAF Unit in for a Water Treatment System




A Sample P&ID of a Typical DAF Unit in for a Water Treatment System