

Depending on the specific wastewater characteristics, different wastewater treatment methods are applied; pretreatments operate by means of gravity and fluid dynamics. Using no energy, no chemicals and with an efficiency of up to 99.9%, this kind of modules separate Organic and inorganic matter sizes down to 15 µm and reduce the pollutant load for subsequent treatment steps materially. Ultrafiltration can be used in the oil field to separate hydrocarbons from produced and flowback wastewater.

Acting as a gravity thickener, sludge storage tanks remove solids in the primary treatment and sludge particles are separated by the membranes. The sludge from the biological stage is pumped into the sludge storage tank and a pressure probe measures the sludge level in the tank and controls the motor valve. Next, without adding flocculants or precipitation chemicals and with long lifetime and smooth operation, a bespoke compact sludge dewatering device thickens the sludge to a level of 17% DS (Dry Solids) or greater. The dry sludge is stored in a closed compartment within the plant. Disposal of the sludge can be scheduled in intervals as long as a month. When used in containerized wastewater treatment plants to avoid any gas release inside of the container, an integrated air management system is installed. Using sample ports installed on the tank's outside wall, the operator can evaluate the current level of the sludge blanket in the tank. Depending on the volume of the sludge, different sized compact chamber-filter presses are used.



THE COMPANY

OWAC Engineering Company is located in Palermo, Via Resuttana 360, Sicily, Italy; the company has been operating in the “waste to energy” for many years and has a long time experience in the field of management consultings for the development and diversification of industrial assets. In particular the company develops its activities in the designing and building of waste treatment plants and environmental remediation.

The more relevant characteristic of OWAC's activities is the development of an idea, the designing of the system and the management of the construction works all culminating with the start-up of the initiative. Therefore OWAC is the catalyst for all the phases which bring to the final start-up of industrial plants.

The working team is very flexible, qualified and adaptable, able to develop all the required activities with care, high precision and “tailor made” solutions. Company references and activities, both in progress and already made, are available on our website.



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WASTEWATER AND
SEWAGE TREATMENT



MEMBRANES

Innovative technology for wastewater and sewage treatment uses organic or inorganic membranes obtaining several advantages:

- minimized membrane surface fouling
- increased process efficiency
- significant cost reduction
- low energy consumption
- effortless cleaning procedure with long intervals between cleanings
- substantial extended membrane lifetime

Depending on the membrane type, the ultrafiltration removes particulates and free or emulsified oil components larger than 0.01 µm. Ensuring a constant operation at high performance levels between the CIPs (Clean-In-Place) and to lower the surface load, low fouling membranes with high hydrophilic membrane surface are integrated into the system.



THE PROCESS

Reverse Osmosis, commonly referred to as RO, is a process where water is demineralized by pushing it under pressure through a semi-permeable Reverse Osmosis Membrane. Osmosis is a naturally occurring phenomenon and one of the most important processes in nature. It is a process where a weaker saline solution will tend to migrate to a strong saline solution. Examples of osmosis are when plant roots absorb water from the soil and our kidneys absorb water from our blood. In other words, a solution that is less concentrated will have a natural tendency to migrate to a solution with a higher concentration.



Reverse Osmosis is the process of Osmosis in reverse: whereas Osmosis occurs naturally without energy required, to reverse the process of osmosis energy must be applied to the system; a reverse osmosis membrane is a semi-permeable membrane that allows the passage of water molecules but not the majority of dissolved salts, organics, bacteria and pyrogens. By “pushing” water through the reverse osmosis membrane applying pressure that is greater than the naturally occurring osmotic pressure desalinization is applied, allowing pure water through the semi-permeable membranes while holding back a majority of contaminants.

LEACHATE TREATMENT

Landfill leachate consists of liquids arising from organic and inorganic waste, as well as rainwater seeping into the landfill. Leachate is typically heavy loaded with COD, BOD, nitrogen, pesticides and partially with heavy metals. To protect surrounding soil, ground water and surface water, safe disposal of the leachate is undeniably an

environmental necessity. Producing an effluent suitable for direct environment discharge, industrial reuse or irrigation, the leachate treatment module is the complete, on-site solution. Since the leachate landfill load can vary over the course of time, the system applies either membrane bioreactor or ultrafiltration / reverse osmosis technologies. It utilizes a modular-system-approach to standardize each system; for turnkey operation, the fully automated module is delivered rack-mounted or containerized. Since the leachate is processed on-site, the high leachate transportation and disposal costs are reduced materially. The control system is designed for total automatic and remote operation; therefore, the entire system can be operated without permanent on-site supervision.



OIL-WATER SEPARATION

Another type of treatment module is a turnkey, custom designed oil-water separation system for oil and gas fields, separating even emulsified oil from water without requiring additional chemicals compared to conventional processes. The mobile systems can be operated close to the well site to optimize water quality for reinjection, drilling, fracturing, irrigation or discharge. The system is built from several modules; depending on the source and quality of the water and the specific effluent requirements, these modules can be employed individually or in combinations, in order to be most efficient in cost and size. By treating and / or reusing water on-site, all water related costs are reduced to a minimum.

For the treatment of produced water, current technologies available on the market such as electrocoagulation, centrifuges, pure chemical treatment or evaporation all have in common the use of large amounts of energy or chemicals, or both which leads to higher operational costs. The system uses pre-treatment to remove heavy and lightweight particles to prevent the system’s membranes from damaging or clogging. Dissolved gas flotation is combined with a settling process in which no energy and no chemicals are used, achieving an already high degree of oil-water separation. The subsequent separation process with oilrepellent, hydrophilic ultrafiltration membranes results in an effluent that is free from oil, oil emulsion, bacteria and filterable solids. These membranes are either ceramic or high-temperature polymeric membranes, operating in a cross-flow mode for stable operation.



SCRUB WATER TREATMENT IN LARGE SHIPS

The designed system aims at treating wastewater resulting from the washing of exhaust gases generated during combustion in the engines of large ships (Scrub water). The system can be implemented as on-board or onshore installation. For the latter, field proven membrane filtration technology and innovative process technologies are combined, setting new standards in terms of performance, quality, safety and economic value as well as ecological

efficiency. Effluent from the plant is suitable for recirculation or direct discharge into the open sea, coastal area and harbor, meeting strictest international legislation. Scrub water is typically highly contaminated with heavy metals, hydrocarbons and soot arising from the combustion of the heavy bunker oil used. Current treatment technologies available on the market such as hydro-cyclones and centrifuges are often overstrained with scrub water, especially in terms of eliminating the tiny lightweight soot particles that act as carriers for hydrocarbons. The system excels above other technologies available on the market; the membranes used for the treatment excel by a lifetime beyond five years before they have to be thoroughly cleansed or exchanged. Optimized membrane performance combined with constant automatic backwash allows effortless maintenance procedures with long intervals. Sludge arising from the treatment is compacted by an integrated chamber filter press and safely disposed of onshore to appropriate facilities such as landfills.

