FABRICATION OF OIL WATER SEPARATOR MACHINE IN OIL INDUSTRIES

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Abstract. This paper deals with the working of oil roll skimmer. The oil roll skimmer is a drum that extends across the width of the separator, normally of metallic construction, and partially submerged in the surface of the wastewater. The oil roll skimmer contains an external drive, which rotates the drum. As the drum rotates, free oil adheres to the specially prepared surface of the drum, and a doctor blade removes the accumulated oil from the surface of the skimmer as it rotates .This paper gives review of different research papers on oil water seaparation methods that has been implemented so far.

Keywords: oil water separator, waste water, skimmer.

1.1 Introduction

The oil and water separator is normally the first, and arguably most important, waste water treatment step in most petroleum refineries. For years, refineries have attempted to use other technologies or treatment scenarios as an alternative to the oil and water separator. But most refineries ultimately select, or return to, the oil and water separator as the technology of choice for their wastewater treatment primary oil/solids separation step.

The primary function of a properly designed oil and water separator is to remove gross quantities of oil and suspended solids from refinery wastewater prior to subsequent downstream wastewater treatment processes – normally a second oil/water separator polishing step and some form of advanced treatment for removal of dissolved organic compounds (typically biological treatment, though other treatment technologies have been used).

The oil and water separator was developed over 70 years ago in a joint effort by The American Petroleum Institute (API) and Siemens Water Technologies Envirex Products (then Rex Chain Belt). The first oil and water separator was provided in 1933 to Atlantic Refining's Philadelphia refinery, and since then, hundreds of refineries around the world have installed oil and water separators in their wastewater treatment plants.

1.2 Design Consideration / Specifications

Some of the most important design criteria developed for oil and water separators include:

- Length to width ratio: A minimum length to width ratio of 5:1 is recommended for all OIL AND WATER separator designs to keep operating conditions as close to plug flow as possible, minimizing the potential for short circuiting.

- Depth to width ratio: A minimum depth to width ratio of 0.3 to 0.5 is recommended so that separation units are not excessively deep, minimizing the amount of time it takes for oil particles to rise to the surface.

- Maximum channel width and depth ratio: The maximum oil and water separator channel width is 20 unit ; maximum depth is 8 unit.

- Horizontal velocity:. Maintaining a horizontal velocity of no more than 3.0 units/sec has been shown to minimize turbulence and its effect on interfering with the separation of oil from wastewater.

- Inlet distribution: To minimize the effect of high wastewater inlet velocities into the oil and water separator, and possible short circuiting associated with these high velocities, reaction jet baffles are recommended to diffuse influent flows across the width and depth of the oil and water separator.

- Oil particle size: Majority of oil particles in most refinery wastewaters are 150 micron in size or larger. Therefore, the design standards for oil and water separators were developed for the removal of oil particles of this size. Particles smaller than 150 micron will normally exit an oil and water separator and will need to be removed by downstream treatment processes, unless allowances are made in the sizing of the oil and water separator to remove these smaller particles.

2.1 Literature Survey :

Wang et al [1] have used a phase isolation process of upward oil-water flow using centrifugal method. They have used optimized style of centrifugal device for the oil water phase isolation and the method was experimentally validated. LIU et al [2] experimentally studied oil/water separation in me rate on the oil/water separation performance. As the flow split ratio increases the separation efficiency is enhanced.Saththasivam et al [3] studied gas floatation system mechanism is governed by the difference in density between bubble particle and water. In gas floatatiion gas bubbles introduced, contact between gas bubbles and oil droplet then rise of aggregates and skimming of sluge. Ahmed [4] did experimental analysis on separator made of Tee junction consist of run arm placed horizontally and branch arm placed vertically having small opening through which water drained at control rate. By changing length of branch arm volume flow rate and quality of separated densed liquid measured. ZENG et al [5] analyzed based on combination flow pattern ,pipe serial

parallel theory, model of oil water two phase flow is developed to predict flow rate and water content which compared with CFD result. Due to high viscosity of oil takes respective path and water is heavier then takes frictional path.

Jun et al [6] have used helical pipes for the separation of oil from water & its study was conducted through numerical simulation and number of experiment.Yu et al [7] have separated oil from water with mesh membranes by capillarity mesh membranes with extreme, selective wettability can efficiently remove oil or water from oil or water mixture through a simple filtration process using gravity.Soares et al [8] studied Sobrent material are of great importance for the removal of the remained oil after skimming operation. Herein new magnetic nanosorbents composed of magnetic nanoparticles functionalized with chitosan hybrid siliceous shells were successfully prepared using a one-step sol-gel encapculation method.song et al [9] analyzed the separation efficiency is improved fabrication of superhydrophobic copper mesh by an immersion process and exploited it as an advanced platform for oil-water separation. They can collect the floating oil through the pores of the copper mesh while repelling water completed and the oil collection efficiency is upto 99.5%.Jiang et al [10] studied have proposed a facile approach to fabricate Janus membrane showing switchable separation of oil in water.

Schie et al [11] have a suparator which uses flow dynamics to collect, concentrate & separate traces of oil, and remove it from process, continuously and quickly.loganathn et al [12] analyzed gas flotation is capable of reducing oil concentration from approximately below 1000 ppm to 10 ppm. Oil bubble attachment by the means of full encapsulation yields the least the best removal efficiency. Gas flotation technologies namely dissolved and induced flotation system.zunce et al [13] studied that downhole oil water separator (dhow) applied to separate oil from water under the well, separated oil is lifted to ground and output water is injected directly into another level. It is helpful to reduce environmental pollution and dhows with different inlet patterns are studied by cfd method and experiment research. Zhao et al [14] studied RNG k-epsiv turbulence model is used to numerically simulate oil-water separation in helical pipe by computation fluid dynamics (CFD). According to the simulation results, experimental study was carried out, the effect of flowrate on separation efficiency is analyzed, and the optimum inlet flowrate is obtained. Comparing the results of experiment and simulation of the oil distribution, verifies the correctness of RNG k-epsiv model.Radzuan et al [15] studied that dissolved air separator is used to increase quality of waste water. The main aim of DAF experiment was to measure oil droplet removal efficiency 15-80μm in oil water mixture. A droplet counting and oil in water measuring methods were used to estimate the efficiency. Dimentional analysis

concluded that the efficiency in this experiment is function of eight other dimensionless group and the experiment data has been subjected to multivariable linear regression ter and water in oil emulsions.

Song et al [16] studied that magnetic sorbent was designed via electrospinning of suspension containing polymer and magnetic nano-particles in one step for remote and efficient pil absorption.It was found that this composition sorbent has good magnetic response,special wettability and remote oil separation capacity. Fibrous sorbent could be used as a promising material for the remote oil/water separation.Liu et al [17] have proposed a one- step facile method to fabricate superhydrophobic magnetic sponge and the sponge can be driven by a magnet to effectively separate oil from water.Wang et al [18] studied an active oil water hydrocylone separator with three outlets. By using computational fluid dynamics and the Reynold's stress model,some relations between efficiency and the performance parameter can be gotten easily.Wylie et al [19] studied an industrial prototype of a non-instrusive, real time, phase area fraction meter which uses the different electromagnetic properties of the pipeline contents to determine their relative properties as they flow through the sensor.Meribout et al [20] studied a device which have been installed in a vessel through on 8-in flange, consist of a 1-D ray of tens of ultrasonic transducers. The result obtained from the extensive experiments indicates that the device can determine the profile of the 2-phase liquid within a relative error of ±3.

Chen [21] have used electrochemical technology for the treatment of waste water by treating the waste water he has recovered number of heavy metals. Those heavy metals which are recovered from the stream was recycled and reused . Biachi et al [22] have reused the waste water from textile industry by using the treatment such as filtration and chemical oxidation which helps to remove particulates from textile industry . Hanif and Raza [23] have processed the domestic water by treating the human excreta . the process used for the treatment is decomposition and treated water is used for gardening and flushing . Kamtekar et al [24] have used natural wetlands to save electric costs for treatment of waste water . they have reused gray water for residential buildings with two pipe system.Vrushali et al [25] have done the chlorination treatment by processing the sludge present in the waste water . They have taken a step towards water conservation by treating the waste water

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Conclusion:

The separator is one of the most important wastewater treatment steps in refineries and petrochemical plants. Proper design and selection of support equipment are crucial to proper operation, and special plant circumstances can affect operation as well.

We hope this article provides a good starting point for improving existing oil and water separator operation, as well as making sure that new oil and water separators will meet performance expectations.

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