

Fabrication of Oil Separator in Industry

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Abstract: This paper deals with the separation of oil from refinery industries, sugar factories and many small scale industries to find out the better solution for oil recovery from the water surface to produce oil free water. Also a deal with the fabrication of mechanical equipment to separate oil from the water. Oil and water separator is mechanical equipment, which is used in the environment pollution control from oil spillage. Oil separator helps in removing the oily from the waste water. By removing the oil from waste water, it becomes free of oil pollution. This is mainly due to oleophilic material used in the oil separator. This oil separator can be used in the effluent treatment plant. This project consists of construction, fabrication details, assembly, working and applications of oil and water separator. The belt speed, oil recovery rate and oil recovery efficiency are the operating parameters of oil separator. The oil recovery rate and the oil recovery efficiency, the two most important parameters displayed the performance of the oil separator.

Keywords: Oleophilic belt, Gear motor, Separator, U-Block bearing, Spur gear,

1. Introduction

The world is knocking the door of 21st century. Rapid industrialization has made our country as the 10th most industrial country in the world. India is ranking 3rd in world in respect of technological talent and the manpower. Rapid industrialization played a crucial role to improve our economy. There are lots of good outcomes but it also created plenty number of problems. "Pollution problem" is versatile one.

Pollution has created lot of problem in industries. Sugar factories, Automobile industries, are captured by pollution. Water pollution is a big problem which is unavoidable. The processed water at factory has created pollution. The factory requires huge amount of water daily and the processed water has to be wasted to the river.

The processed water contains low PH Value, which in turn makes the land salty. It can't be used for agriculture. The oil and grease contents in water effect on the land as well as on human beings. Due to chemicals present in water, the water lives are on the edge of destroying.

Oil separator is mechanical equipment, which is used in the environment pollution control from oil spillage. Oil separator helps in removing the oily effluent from the waste water. By removing the oil from waste water, it becomes free of oil pollution. Oil separator can remove even a thin floating film of oil from the water. This is mainly due to oleophilic material used in the oil separator. These oil separators manufactured are required for the effluent treatment plant.

2. Construction and Working

A. Working Principle

Oil and grease always on the water surface. They do not mix with water. Separation of it is based on the surface tension, specific gravity and viscosity of them. The "oil and grease separator unit has special purpose belt,

which is rotated by mechanical means such that it just touches the surface of water the oil and grease particle stick to the belt material and travels with the belt up to scrapping arrangement where scrapping of oil and grease occurs and oil grease are collected.

B. Construction and Working

This unit mainly consists of rectangular frame. In first stage of unit at the top surface of frame motor and gears are fitted. The Quarter H.P gear motor is used having 30 rpm and the spur gear is used for reducing the motor speed almost 10 rpm. One small gear having 36 teeth & 60mm diameter is fitted with gear motor and another bigger gear having 55 teeth & 82mm diameter is fitted with pulley. The driver pulley is fitted suitable U-Block bearing arrangement for easily placed at the top of the frame. At the bottom of frame driven pulley is placed in the tightening arrangement. This arrangement is provided for the movement of the shaft as per the requirement.

On one side of frame a scrapping arrangement is attached which removes the oil and grease from the surface of belt. The removed oil and grease is carried through the collector channel to the oil tray. Initially half of the apparatus immersed in the water & oil mixture. When the unit is switched on, motor starts, which is coupled to spur gear. The motion of motor shaft is given to spur gear, which reduce the speed. This reduced speed is given to the driver shaft. The upper shaft is rotated, because of the driven gear rotates at 18 to 20 rpm. The belt rotates over the water surface, and then floating oil on water surface get sticks to the belt. After that stickled oil particles wiped out by wiper in collected in oil tray by the help of channel. The belt after scrapping again goes to the downward in water channel. This cycle is repeated continuously.



Figure 1: Oil Separator Model

Author Profile

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3. Results & Discussion

The Oil Recovery Rate and the Oil Recovery Efficiency, the two most important parameters displayed the performance of the belt separator.

A. Oil Recovery Rate:

Oil recovery rate means how much of oil extracted from the oleophilic belt & collected in tray.

B. Oil Recovery Efficiency:

It is the ratio of extracted oil from the water to the oil mixed in the water.

$$\text{Efficiency} = \frac{\text{Oil Extracted from the water}}{\text{Oil Mixed in the water}} \times 100$$

Table 1: oil removal rates & efficiency

| Test No. | Initial | Output | Time | Efficiency |
|----------|---------|--------|-------|------------|
| 1 | 250ml | 150ml | 5min | 60% |
| 2 | 500ml | 310ml | 10min | 62% |
| 3 | 750ml | 490ml | 15min | 65% |
| 4 | 1 Liter | 680ml | 20min | 68% |

4. Conclusion

- Easy to operate
- Smooth running
- Economical
- Effective means to control pollution
- Higher oil removal rates

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