

Water Pump with Dual Vane Flow

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Abstract: In the world of modernization, the evolution and distribution of water supply have attained the zenith, but it still lacks the necessary applications which can transform and help to achieve contaminated free water at the initial stage. Today, most of the households have one or the other way for cleaning water supplied by municipalities or reached from the ground. The standard candle filters or Reverse osmosis process helps to obtain clean and contaminated free water for drinking purpose, but still, we lack in one area. The water, used for many other purposes, and that also requires less contaminated water. By reducing the pollutant level before entering the water storage tanks will lead to contaminated free water. Our research also considers the price importance for the general class, including this prospect, the pumps connected with honeycomb filter just before the impeller. The filter consists of the 'alum,' gravel and activated charcoal which placed on the same shaft of the impeller, as the impeller starts moving, the filter also starts rotating. The TDS sensors help to know the TDS value and the pump provide warning signal if the value is above the provided TDS value and can be automatically off, if the kill switch button is turned on. The pump equipped with the flow sensor which does not allow the pump to run idle, as the water stops flowing from the pump, it automatically cuts off. It saves pump from heating and damage. The eco and power mode of the pumps helps the user to increase the suction and discharge flow as per the need. The power mode consists of the radial impeller empowered by 1 H.P. motor and the axial impeller powered by 0.5 H.P. motor. It helps to increase the suction and discharge flow, at the time of need. The eco mode consists of the only radial impeller, so it saves energy when more power is not required.

Keywords- filter, TDS, honeycomb, axial, motor.

I. INTRODUCTION

In today's world almost each and every household depends on the centrifugal pumps for elevating of the water. With the urbanization, the quality and quantity of water have become a major problem. Our research elucidates the application to reduce the impurities by adding the pump with the honeycomb-gravel filter which initially filters the hard solid particles present inside the water before entering the impeller. The filter comprises of gravel, alum, activated charcoal and the thin layer of hydro sponge in a honeycomb shell. The water pollution is increasing, and even water supplied by the municipalities, contaminated with the solids and fine impurities which require sieving. The honeycomb filter is equipped with the radial impeller on the same shaft, as the impeller starts moving, the filter also starts running. It provides the rotating motion, helping to remove the contaminants. The water pumps come with two basic

applications which revolutionize the usage. The user can select the TDS level on the TDS meter available on the pump, and if the water comes above the TDS level, the pump will respond warning, and if the connected kill switch is on then, the pump will automatically cut off. It helps to protect the users from having the water which has high dissolved solids. The pump also contains a sensor which detects the flow of water and if the pump is running idle, without the movement of water, the pump again shuts off. It protects the pump from heat up and saves it from damage. The water pump comes with two working modes: power and eco mode. In power mode, the pump works with two motors and two impellers. The one horsepower motor connected with the radial impeller which operates in both ways [1]. The 0.5 horsepower motor is related to the axial impeller and works only at the time of power mode along with radial impeller to provide more suction and discharge flow [2].

II. SENSORS MECHANISM

Water flow meter helps to detect the movement of water inside the water pumps, and if there is no flow of water then by the support of Hall effect transducer, the water pump signals the warning and next power is cut off. The Hall-effect sensor varies voltage in response to a magnetic field. As the water enters the cylindrical sensor, there is a change in the magnetic field inside the sensor, but when there is no water input, it triggers warning alarm and later power is cut off [3]. It helps to protect the pump from additional heating and damage. This application aids to save power supply as well. TDS sensor measures total dissolved solutions of water. It measures the electrical conductivity of water. The sensor calculates the total amount of mobile charged ions. The user can fix a particular TDs value, and if the value of supplied water is above then the TDS input value done by the user, then the pump shows the warning and can be automatically switched off. The kill switch button must be on, to automatically cut off the power supply.

III. HONEYCOMB FILTER

The research focuses on the honeycomb gravel filter. The filter consists of the gravel, alum and activated charcoal. The honeycomb shell comprises of cleaning materials bounded in the hydro sponge. The shell is on the same shaft of the impeller. The impeller starts rotating, with it, the honeycomb filter also turns. The filter kept between the impeller and inlet

point. The water from inlet passes through the honeycomb filter, where activated charcoal by trapping toxins and chemicals in its millions of tiny pores [4]. The mechanism works through the chemical process of adsorption. The porous surface of activated charcoal has a negative electric charge that causes positive charged toxins and gas to bond with it. It traps impurities in water including solvents, pesticides, industrial waste and other chemicals. The activated carbon filters remove some fluoride. The activated charcoal uses to remove toxin and chemicals in the event of ingestion. Most organic compounds, mercury, fertilizer and bleach bind to the activated charcoal carbon, allowing for fast elimination while closing the absorption in the body. The filter consists of essential elements which are capable to pariah small bugs or organism's algae, particles of 'floc' formed by coagulation. The gravel helps to provide natural minerals and makes water free from large particles. It contributes to removing many coagulated particles. Aluminum Sulphate popularly known as Alum, when it comes in contact with untreated raw water with the bicarbonate alkalinities present in water and forms a gelatinous precipitate. This precipitate combines with other fine particles and suspended minerals in fresh water and settles down at the bottom of the filter. The water over this sediment is almost clean other than some fine particles dissolved in it [5]. The honeycomb filter is changeable and can be easily removed from the water pump shell, whenever the efficiency of filter decreases, it will lead to high TDS value, to attain better efficiency, the filter can be changed. The water pump design is kept simple so that it can quickly acquire the TDS sensor, water flow meter, and the honeycomb filter.

IV. POWER AND ECO MODE

The need emerges the technology to improve and perform in adverse conditions. The water pump owns the technique to work in two modes: Power and Eco modes. Many times, the user needs more water suction and discharge in emergency cases where water is available for limited times. The user has the options to choose the power and echo mode of the water pump. The design of the pump consists of the two vane mechanisms: the axial vane and the radial vane. The water enters from the inlet point through the honeycomb filter, and then it crosses checks with the input TDS value, if the attained TDS value after the filtration by honeycomb filter is above the value of entry then the TDS sensor will show the warning sign. The pump can be automatically cut off if the TDS value achieved is above the input value by switching on the kill switch. The water attained to the radial vane by the help of 1 horse power motor [6]. It is the Eco mode where the only 1 H.P. motor comes into work, after the radial discharge the water bypasses the axial vane mechanism. The axial mechanism can only be switched on by the user, as per the requirement. Many times when we have limited time and require more suction and discharge, the user can automate the

axial vane powered by the 0.5 H.P. motor. It is attained by the push button technique which provides the closed loop to perform. The axial vane mechanisms just act like ram effect, enhance the suction and discharge capabilities. The axial vane helps to discharge more water. This complete mode is the power model where two vane mechanisms contribute to attaining better discharge and suction. This aid the user to use the water pump as the engine of the car where many modes of functioning are accomplished, performance and efficiency both can be achieved simultaneously. In the power, the efficiency effects and the consumption increase slightly but helps the user to get the better discharge. The pump also consists of flow meter sensor which does not allow a pump to work if there is no water intake. The flow meter sensor is kept between the honeycomb filter and the radial vane.

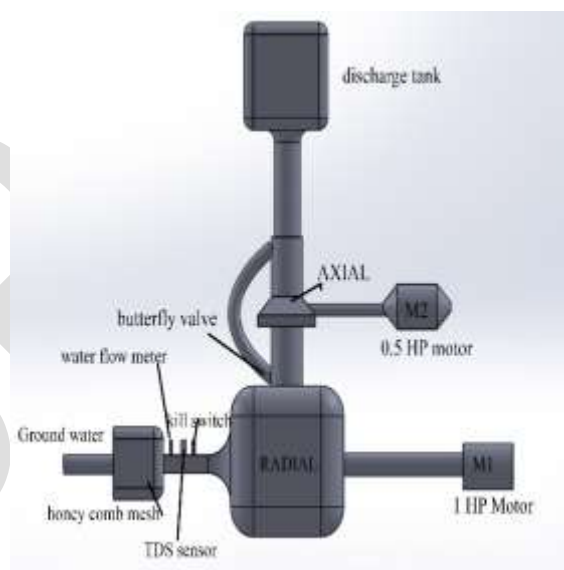


Fig. 1 CAD model - inside view of Water Pump

V. CONCLUSION

The research elucidates about the usage of sensors which may transform the user's experience, quality, and quantity of water service. The water pump available in two modes provides two different experiences. The pump helps to increase the suction and discharge flow by the aid of radial and axial impellers powered by two separate motors. The honeycomb filter consisting of activated charcoal, alum, gravel and hydro sponge filter contributes to decrease the TDS value. It helps to provide more safe water. The water flow meters save water pumps from excessive heating when there is no flow of water, hence protecting it from damage. The TDS sensor helps to know the TDS value, and if the TDS value is above the input value, then the sensor raises the alarm. The water pump can be automatically switched when the TDS value is above the value of entry by using the kill switch.

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