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Development of Saline Water Desalination System

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Abstract : *In recent years, numerous large-scale seawater desalination plants have been built in water-stressed countries to augment available water resources, and construction of new desalination plants is expected to increase in the near future. Despite major advancements in desalination technologies, seawater desalination is still more energy intensive compared to conventional technologies for the treatment of fresh water. There are also concerns about the potential environmental impacts of large-scale seawater desalination plants. Here, we review the possible reductions in energy demand by state-of-the-art seawater desalination technologies, the potential role of advanced materials and innovative technologies in improving performance, and the sustainability of desalination as a technological solution to global water shortages.*

Keywords – *Condensation, Desalination, Evaporation, Filtration, Saline Water.*

I. INTRODUCTION

Fresh water crisis is increased worldwide in recent years. Sources of fresh water are ground water, rivers, lakes, reservoirs. According to a survey, by 2050 India's total water demand will increase 32 per cent from now. One increasingly important solution to freshwater scarcity is treating saline water through a process known as desalination, or desalinization. There are two common means of desalination, evaporative desalination where salt water is evaporated and then condensed to produce fresh water and desalination through reverse osmosis.

Desalination is a process that takes away mineral components from saline water. More generally, desalination refers to the removal of salts and minerals from a target substance. Saltwater is desalinated to produce water suitable for human consumption or irrigation. The by-product of the desalination process is brine. Desalination is used on many seagoing ships and submarines. Most of the modern interest in desalination is focused on cost-effective provision of fresh water for human use. Along with recycled wastewater, it is one of the few rainfall-independent water sources.

There are approximately 16,000 operational desalination plants, located across 177 countries, which generate an estimated 95 million m^3/day of freshwater. Currently, desalination accounts for about one percent of the world's drinking water. Desalination is particularly prevalent in countries located in the Middle East and North Africa region, such as Saudi Arabia, the UAE, and Kuwait. Desalination is also an important source of water in the Small Island Developing States.

Due to its energy consumption, desalinating sea water is generally more costly than fresh water from surface water or groundwater, water recycling and water conservation. However, these alternatives are not always available, and depletion of reserves is a critical problem worldwide.

II. METHODOLOGY

2.1 Need

Increasing population increases the load on of freshwater sources which leads to the scarcity of water. Rainfalls are the major source for fresh water. Due to climate changes the rainfalls are becoming irregular in nature. Also, as in some areas the amount of rain fall is negligible. So in order to overcome the problem new modern methods should be accepted to fulfil the need of water. One such method is of Desalination of sea water which is in trends. By the process of Desalination, the need for fresh water can be solved.

2.2 Data Collection

As the need of the project topic is understood the next step is to collect the necessary data required for the development of the project. By reviewing various Patent reports, Design reports, research papers we get idea how Desalination process works, and different methods use for desalination.

2.3 Finalizing process

The collected data is then analysed and the process for Desalination is formed. The process consists of the entire Desalination process of saline water.

- In the first stage of desalination process saline water is passed through a pre-filtration unit to remove solid particles and other waste.
- Then filtered water is supplied to the evaporation chamber and heated with the help of coil to convert water in vapour and remove salt and other impurities from it.
- The evaporated vapour is then condensed passing through condenser tubes converting vapour phase into liquid phase by means of cooling fan.
- After condensation, the desalinated water cools down and is passed through various filtration units.
- The filtration consists of a three-stage unit with first being activated charcoal following will be ultrafiltration and lastly UV filtration.
- The desalinated purified water is then stored for further use.

2.4 Solid Modelling

On Finalizing the process, the model of the system can be designed. The model consists of the components to be used while manufacturing the system. By designing a CAD model, it gives an idea about the manufacturing of the system. The CAD model gives the flexibility to the changes to be made in the construction of the system. The system is then manufactured according to the CAD model.

2.5 Manufacturing and Testing

2.5.1 Manufacturing and Assembly

The step of manufacturing starts with manufacturing of customized components which are required for model. The components are manufactured according to the designed CAD model. Then next step is assembly of all the components according to the design.

2.5.2 Testing and Modification

After assembly, the model will be tested to check its proper working and to compare actual results with theoretical results. By checking the results and working required modifications will be made and test it again to get expected output.

2.6 Working on Aesthetics of model

The final step is of improving the aesthetics of the setup. Looks and ease of handling for the end user is considered while working on aesthetics.

III. FIGURES AND TABLES

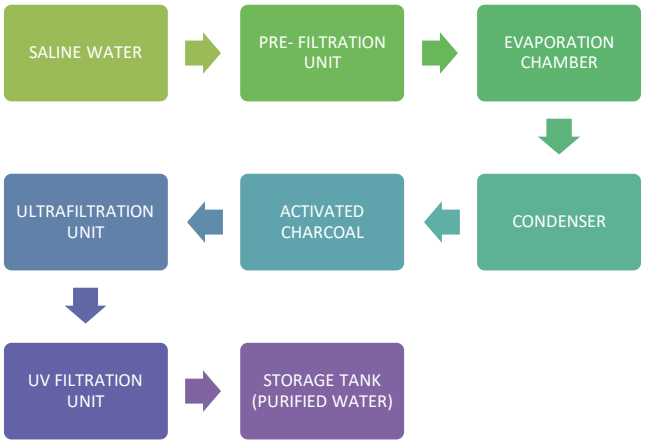

Fig .1 .Process of Desalination of Saline Water

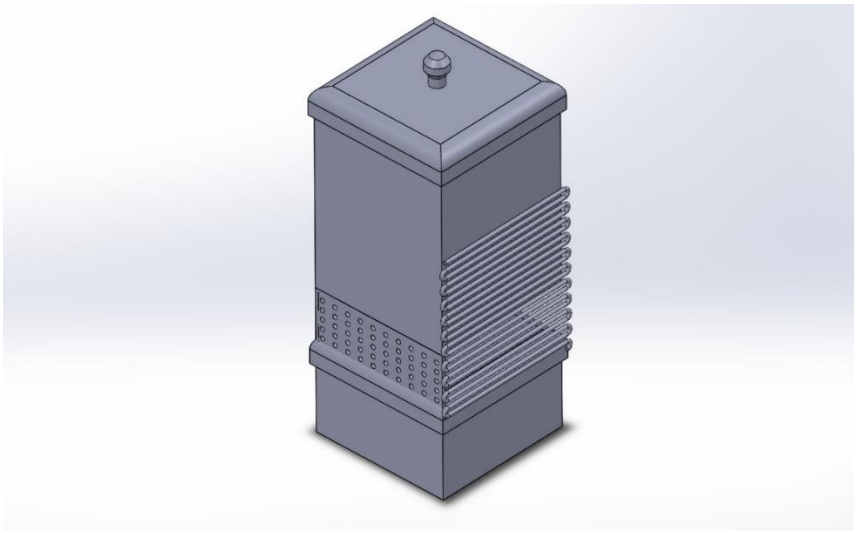

Fig.2 3D Model

IV. CONCLUSION

In an overall process we start with what are the needs of our project. After viewing and finalizing the objectives and needs we had begun with literature review and found the particulars which we are going to design & manufacture of our project model and arrange in a sequence. After assembly, the test phase will be carried out to minimize the errors or increase in efficiency. After achieving satisfactory results, the final step i.e aesthetics is taken into consideration. Hence, we conclude that our project literature review, methodology, designing of model and modifications is done.

REFERENCES

Journal Papers:

[1] Pasupati Sadhukhan "Process of desalination by direct contact heat transfer" La Verne, California, 1978.

[2] Clarence A. Kemper, Waltham, George F. Harper, Framingham, and George A. Brown "Multiphase ejector distillation apparatus and desalination process" Massachusetts, 1962.

[3] Garth Davey "Desalination" Sommerville (AU), 2008.

[4] Bruce S. Frank "Desalination of sea water" 7057 North Fairchild circle, Milwaukee, Wisconsin, 1970.

[5] Michael L. Rives "Saltwater distillation system" Linden la., Kirksey, KY(US), 2006.

[6] Ata M. Hassan "Process for desalination of saline water especially water having increased product yield and end quality" San Diego, California (US), 1997.