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## OPTIMAL OPERATION OF MSF DESALINATION PROCESS TO MEET THE DAILY VARIABLE DEMAND OF FRESHWATER CONSUMPTION WITH CHANGING SEAWATER TEMPERATURE

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### ABSTRACT

For fixed top brine temperature, this work investigates how the operation is to be optimised and controlled in order to maintain a variable demand of freshwater consumption with changing seawater temperatures throughout the day. A storage tank is added to the MSF processes layout to provide additional operational flexibility and to ensure the availability of freshwater to customer at all times. A steady state process model for the MSF process coupled with a dynamic model for the storage tank is developed within gPROMS modelling software. The performance of MSF desalination process is evaluated in terms of minimising the total daily operating cost. Single and multiple intervals operating parameters strategies are used, yielding optimal seawater makeup and brine recycle policy. It is noticed from the optimization results that, the MSF desalination operated with single time interval for seawater make up and brine recycle were not sufficient to produce the variable freshwater demand. Also the total daily operating cost using three time intervals is lower than that using two time intervals. Moreover, the impact on the marine environment will be higher when the MSF plant operated using two control intervals due to higher discharge temperature .

**Keywords:** MSF process , Optimization, Operating cost, Time intervals operating.