

# INCREASE PERFORMANCE OF HEAT PUMP INTEGRATED WITH SUSTAINABLE FACTOR

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## ABSTRACT

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Primary energy consumption in today's world increases at an alarming rate, at the same time threatening the supply of resources in the future. Industrial industry is attributed as the most energy usage industry. Heat pump that absorbs waste heat at lower temperature region and rejects useful heat to higher temperature regime helps to reduce primary energy consumption and lower emissions. Three approaches are proposed for heat pump performance optimisation. Firstly, the target is to reduce waste heat by improving the coefficient of performance (COP) of a heat pump by lowering the temperature lift between condenser and evaporator. An average optimised heat pump COP of 4.12 is compared with its non-optimised unit at COP of 4.11. Reducing heat loss to minimise waste heat is the second approach. Insulation with expanded polystyrene (EPS) is implied to the heat pump piping. The last approach is to utilise waste heat to achieve energy and cost savings and ultimately help to cut down emissions. Various studies show that food and beverages as well as lumber drying are common industries in practicing good heat pump operations integrated with processes. Microsoft Excel 2007 is the helpful software in doing data analyses, mathematical operations and graph plotting in this project.

**Keywords:** Heat pump, performance optimisation, temperature lift, heat loss, insulation, waste heat recovery, sustainability.