

ABSTRAK

Pada zaman modern ini, alat pengkondisi udara (*Air Conditioner* atau AC) bukan merupakan hal asing untuk ditemukan. Fungsi dari AC adalah untuk mengkondisikan udara di dalam ruangan tertentu agar mencapai kondisi udara ruangan seperti yang di inginkan. Tujuan penelitian ini adalah (a) merancang dan merakit mesin AC mobil sederhana. (b) mengetahui dan memahami karakteristik AC mobil bila putaran kipas inlet divariasikan, meliputi : besarnya kerja persatuan massa refrigeran yang dilakukan kompresor, besarnya energi kalor per satuan massa refrigeran yang diserap evaporator, besarnya energi kalor per satuan massa refrigeran yang dilepas kondensor, besarnya COP aktual dan COP ideal mesin AC mobil, besarnya efisiensi mesin AC mobil, besarnya laju aliran refrigeran yang mengalir pada mesin AC mobil.

Penelitian dilakukan di Laboratorium Teknik Mesin Universitas Sanata Dharma Yogyakarta. AC Mobil yang dibuat adalah AC Mobil yang menggunakan siklus kompresi uap terbuka dengan memanfaatkan udara buang dan udara luar untuk udara balik pada evaporator. AC Mobil ini menggunakan beberapa komponen utama, yaitu satu kompresor, satu kondesor, satu evaporator. Variasi yang digunakan adalah menggunakan kipas *inlet* dengan 3 kecepatan.

Hasil penelitian memberikan kesimpulan : a) kerja kompresor per satuan massa refrigeran terendah sebesar 39,79 kJ/kg, dan tertinggi sebesar 40,15 kJ/kg, b) kalor per satuan massa refrigeran yang diserap evaporator sebesar 164,72 kJ/kg, dan tertinggi sebesar 167,26 kJ/kg, c) kalor per satuan massa refrigeran yang dilepas kondensor terendah sebesar 204,51 kJ/kg, dan tertinggi sebesar 207,41 kJ/kg, d) COP_{aktual} terendah mesin AC mobil sebesar 4,140, dan tertinggi sebesar 4,166, e) COP_{ideal} terendah mesin AC mobil sebesar 4,978, dan tertinggi sebesar 5,112, f) Efisiensi mesin AC mobil terendah sebesar 80,97%, dan tertinggi sebesar 83,69%, g) Laju aliran massa refrigeran terendah adalah 0,0399 kg/s, tertinggi sebesar 0,0422 kg/s, h) Jumlah kompresor on tertinggi adalah 56 kali, waktu kompresor on tertinggi adalah 46 detik, waktu kompresor off tertinggi adalah 60 detik.

Kata Kunci : COP, Efisiensi

ABSTRACT

In modern times, air conditioning (Air Conditioner or AC) is not a strange thing to discover. The function of the air conditioner is to conditioned air in a certain room to achieve the air condition of the room as desired. The purpose of this research is (a) to design and assemble a simple car AC machine. (b) know and understand the characteristics of the car air conditioner when the inlet fan spins are varied, including: the amount of work of the mass union of refrigerant by the compressor, the amount of heat energy per unit of refrigerant mass absorbed by the evaporator, the amount of heat energy per unit of refrigerant mass released by the condenser, actual and ideal COP car air conditioning machine, the magnitude of the car air conditioning engine efficiency, the amount of refrigerant flow rate flowing on the car air conditioning machine.

The study was conducted at the Laboratory of Mechanical Engineering Sanata Dharma University in Yogyakarta. The car air conditioner that we made is use opened vapor compression cycle that uses exhaust and fresh air for return air in evaporator. This Car Air Conditioner has several main components: a compressor, a condenser, an evaporator. The variation that used on this study is one inlet fan with three speeds choices.

The results of the research concluded: a) compressor works per unit of the lowest refrigerant mass was 39,79 kJ/kg, and highest was 40,15 kJ/kg, b) heat per unit mass of refrigerant absorbed by evaporator was 164,72 kJ/kg, and highest was 167,26 kJ/kg, c) heat per unit of refrigerant mass released by the lowest condenser was 204,51 kJ/kg, and highest was 207,41 kJ/kg, d) The lowest COP_{actual} car air conditioner was 4,140, and the highest was 4,166, e) The lowest COP_{ideal} of the car air conditioning engine was 4,978, and the highest was 5,112, f) The lowest efficiency of air conditioner machine was 80,97%, and the highest was 83,69%, g) The lowest refrigerant mass flow rate was 0,0399 kg/s, highest of 0,0422 kg/s, h) The highest times of compressor turned on was 56 times, the highest times of compressor turned on was 46 seconds, the highest times of compressor turned off was 60 seconds.

Keywords : COP & Efficiency