ABSTRAK

Tujuan penelitian adalah (a) pertambahan kandungan uap air di udara dari saat udara masuk sampai saat udara keluar (b) laju aliran volume udara saat melewati *cooling pad* (c) laju aliran massa udara saat melewati *cooling pad* (d) energi kalor sensibel yang dilepas dilepas oleh udara saat melewati *cooling pad* (e) jumlah air yang menguap per menit saat melewati *cooling pad* (f) suhu udara bola kering yang keluar di *air cooler* (g) efektivitas pendinginan saat melewati cooling pad.

Penelitian ini dilakukan secara eksperimen di laboratorium Perpindahan Kalor Teknik Mesin, Universitas Sanata Dharma Yogyakarta. dengan memvariasikan kecepatan aliran udara sebagai : 1,6 m/s, 2,34 m/s, dan 2,94 m/s. Dengan *cooling pad* berbahan rayon. Pompa air yang dipergunakan model celup ukuran 70 watt menggunakan 2 buah pompa air celup. Kipas dengan diameter 60 cm, daya 80 watt, Ukuran *air cooler* adalah panjang 150 cm, tinggi 120 cm, lebar 80 cm. *Cooling pad* berukuran panjang 81 cm, lebar 78 cm diameter rayon 1 cm jumlah rayon 6.318 buah. Tampungan air atas dan bawah memiliki ukuran panjang 98 cm, lebar 86 cm, tinggi 12 cm.

Setelah melakukan penelitian dapat diketahui hasilnya sebagai berikut. (a) pertambahan kandungan uap air di udara dari saat udara masuk sampai saat udara keluar paling tinggi terjadi pada kecepatan aliran udara 1,6 m/s dengan pengering udara sebesar 0,0027 kg_{air}/kg_{udara} (b) laju aliran volume udara saat melewati *cooling pad* paling tinggi terjadi pada kecepatan aliran udara 2,94 m/s sebesar 2,646 m^3/s (c) laju aliran massa udara saat melewati *cooling pad* paling tinggi terjadi pada kecepatan aliran udara 2,94 m/s sebesar 3,0137 kg $_{udara}$/s (d) energi kalor sensibel yang dilepas oleh udara saat melewati *cooling pad* paling tinggi terjadi pada kecepatan aliran udara 2,94 m/s dengan pengering udara sebesar 30,137 kJ/s (e) jumlah air yang menguap per menit saat melewati *cooling pad* paling tinggi terjadi pada kecepatan aliran udara 2,94 m/s sebesar 0,875 (f) suhu udara bola kering yang keluar di *air cooler* paling tinggi terjadi pada kecepatan aliran udara 1,6 m/s dengan tambahan alat pengering udara sebesar 22,8°C (g) efektivitas pendinginan saat melewati *cooling pad* paling tinggi terjadi pada kecepatan aliran udara 2,94 m/s dengan pengering udara sebesar 0,4160 $kg_{air}/_{menit}$.

Kata kunci : *air cooler,* pendingin, *cooling pad,* rayon

ABSTRACT

The research objectives are (a) The increase in water vapor content in the air from the time the air enters to the time the air leaves (b) flow rate of air volume as it passes through the cooling pad (c) mass flow rate of air as it passes through the cooling pad (d) the sensible heat energy released is released by the air as it passes through the cooling pad (e) the amount of water that evaporates per minute as it passes through the cooling pad (f) the dry bulb air temperature coming out of the air cooler (g) cooling effectiveness as it passes through the cooling pad.

This research was conducted experimentally in the Mechanical Engineering Heat Transfer Laboratory, University of Sanata Dharma Yogyakarta. by varying the air flow velocity as: 1.6 m/s, 2.34 m/s, and 2.94 m/s. With a cooling pad made of rayon. The water pump used is a 70 watt submersible model using 2 submersible water pumps. Fan with a diameter of 60 cm, 80 watts of power, the size of the air cooler is 150 cm long, 120 cm high, 80 cm wide. Cooling pad measuring 81 cm long, 78 cm wide, 1 cm diameter rayon, 6,318 pieces of rayon. The top and bottom water reservoirs measure 98 cm long, 86 cm wide, and 12 cm high.

After conducting the research, the results can be seen as follows. (a) The increase in the water vapor content in the air from the time the air enters until the air exits is highest at an air flow speed of 1.6 m/s with an air dryer of 0.0027 kg_{water}/kg_{air} (b) The highest air volume flow rate when passing through the cooling pad occurs at an air flow velocity of 2.94 m/s at 2.646 m3/s (c) The highest mass flow rate of air as it passes through the cooling pad occurs at an air flow velocity of 2.94 m/s at 3.0137 kg_{air}/s (d) The highest sensible heat energy released by the air as it passes through the cooling pad occurs at an air flow velocity of 2.94 m/s with an air dryer of 30.137 kJ/s (e) the highest amount of water that evaporates per minute as it passes through the cooling pad occurs at an air flow velocity of 2.94 m/s of 0.875 (f) The highest dry bulb air temperature that comes out of the air cooler occurs at an air flow velocity of 1.6 m/s with the addition of an air dryer of 22.8°C (g) The highest cooling effectiveness when passing through the cooling pad occurs at an air flow speed of 2.94 m/s with an air dryer of 0.4160 $kg_{water}/_{minute}$.

Keywords : air cooler, cooling pad, rayon