

# EcoMESH Case Study #2 - Adiabatic cooling of air on a medium sized chiller

## Introduction:

EcoMesh is installed to improve a chiller's COP during higher ambient temperatures above 30 C. Actual cooling efficiency is dependent on: coil air flow patterns, the mesh profile, spray area relative to coil surface area and volume of bypass air. For longer chillers, the inner meshes tend to be more efficient than outer meshes which are more open to outside air. The objective of this case study is to compare EcoMesh cooling on a chiller's outer coil and inner coil.

The air cooled chillers are Emicon RAE (8 fan) systems installed on a mezzanine roof top in Adelaide's north. There are two chillers with conventional vertical coils so all air is drawn in from the front and back of the unit. The date was 3PM, Mar 1st 2016.

Fig. 1 EcoMesh (4 panels) mounted along the front of the chiller



**Objective:** Measure the air temperature of inner meshes and outer meshes and combine to achieve "average cooling" across the coil

## Methodology:

Inner mesh - use temperature loggers to record cooling at the coil behind an inner mesh. To avoid false "wet bulb" readings, the loggers were placed inside plastic bottles. Three probes were used: one for ambient and two for the upper and lower part of the coil.

Outer mesh - use a standard temperature probe to measure air on coil between spray cycles

Fig. 2 Temp loggers behind inner meshes



Fig. 3 Hanna temperature probe



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## Summary of Results:

Inner mesh: Max cooling at the inner mesh was recorded to be up to 7C (as shown in the adjacent chart)

Outer mesh: cooling between sprays was around 3.2 C.

According to the BOM data, on this day for Edinburgh, SA at 3PM the air temperature was 32.2C, RH of 18% and air pressure of 1015.5 hpa. This suggests a WB of 16.8 and a Delta T of 15.4C.

## Conclusion:

EcoMesh is effective in cooling the incoming air for a chiller with vertical coils. Optimum cooling is achieved when the coil is drawing most air through wet mesh.

For inner meshes (surrounded by other meshes), the temp drop is 7C. The above BOM conditions (Delta T of 15.4C, therefore inner mesh cooling efficiency is around 45%.

For outer meshes (open to outside air), the temp drop is only 3.2C, suggesting a cooling efficiency of only 21%.

Therefore for a medium chiller with vertical coils, the average cooling across all the coils was around 5 C, or a cooling efficiency of around 33%.

Fig. 4 Temperature probe results

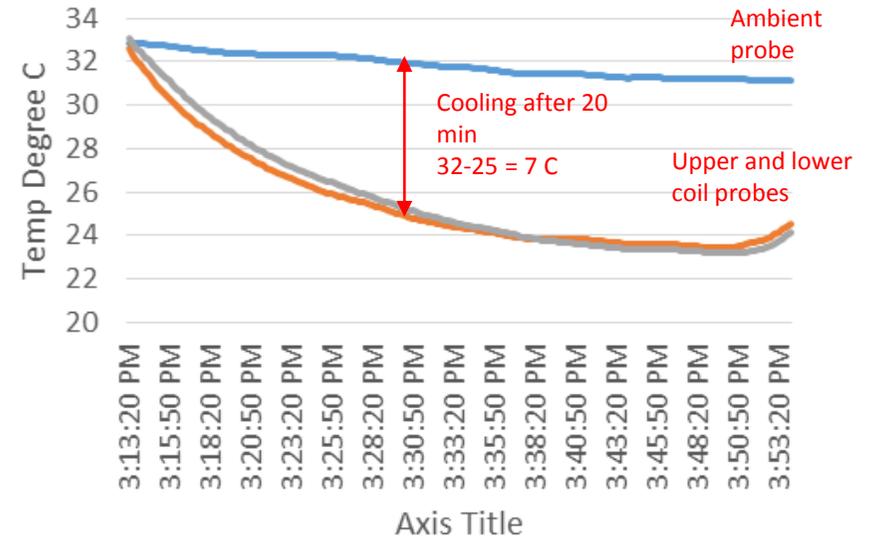


Fig. 5 Hanna probe - ambient of 32.2 C and the air on coil temp of 29C

