



**Thesis Title** Reduction of Energy Used During Ice Generation of an Ice Thermal Energy Storage by Compressor Operation Controlling

**Author** Mr. Yotsapong Rojananukulpong

**Degree** Master of Engineering (Energy Engineering)

**Thesis Advisor** Prof. Dr. Tanongkiat Kiatsiriroat

### ABSTRACT

This research work is to reduce the electrical energy used for generating ice in an ice thermal energy storage (ITES) by using fuzzy logic control. The technique adjusts the compressor speed during the ice production by changing the output membership suited to the ice thickness which results in the effective use of electrical energy. In the study a 4 ton R-22 ice on coil ITES having water-cooled condenser is used for the experimental test. The unit extracts heat with cold ethalene-glycol solution. Fuzzy logic functions were tested using an interface connected to a personal computer.

The experiments found that the suitable compressor speed for heat extraction from water at  $0^{\circ}\text{C}$  is 2,700 rpm and when the ice radius is 0.56 mm. of which the change of water level is 7 mm., the speed is at 1,800 rpm. When the thickness is at 8.61 mm(water level 19 mm), the speed is controlled at 2,100 rpm till the ice thickness is at the set value. The result thickness has been set at 8.91, 11.84 and 14.62 mm, respectively and it could be found that the electrical energy could be reduced 29.9, 36.24, and 42.42% respectively.