

## CHAPTER V

### CONCLUSION AND RECOMMENDATION

#### Conclusion

This thesis aimed to test the heat performance in the small building which is coated by the high solar reflective paint (Beger Cool UV shield) compare with the small building with conventional paint coating, two shades of color namely white and white grey color, and without paint coating as well as compare the percentile of energy saving. The test results are as follows.

1. Test result show that white primer and white grey topcoat formulated with optimum amount of IR Pigment, microsphere ceramic, and Oxide Black pigment generate higher solar reflectivity than normal paint. From the fact that titanium dioxide molecule show high Brewster's angle of  $69.067^\circ$  compare to normal paint ingredient like calcium carbonate which shows Brewster's angle of  $58.911^\circ$ . These figures explain why Beger Cool UV Shield results in better solar reflectivity during the day time. These test results can lead to knowledge using to formulate paint system with higher solar reflectivity, which effectively reflects heat from entering the building.

2. Building painted by high solar reflective paint "Beger Cool UV shield" with 18% lower in conductivity shows the lowest surface and room temperature among 3 sample buildings. The average temperature of envelop (roof and wall) and room is lower by  $3-4^\circ\text{C}$  when comparing with conventional color coated. The OTTV, RTTV, and total heat gain through the building which was painted with Beger Cool UV Shield is lower than Conventional coated by 17% and lower than no coating by 22%.

The high solar reflective coating building consequently consumed significantly less electricity than the conventional coated by 858 kWh/year or 19% and uncoated building by 1,409 kWh/year or 27%. The percentile of energy saving of white color building is higher than that of white grey colored building in all conditions because of higher solar reflectivity property. Therefore the paint with higher solar reflectivity and lower thermal conductivity causes lower heat transfer into the building and result in greater reduction in cooling energy.

3. The numerical calculation of occurring wall temperature comparing between Beger Cool UV shield and conventional painting is presented. The mathematical model equation is obtained by using heat conduction on plane wall in one-dimension and differential equation method. The temperature results from mathematical model which are validated by simulation program show corresponding trend with actual experimental data. By adjusting the thermal conductivity and solar reflectivity, it is found that the Beger Cool UV shield paint created the lower outside temperature comparing with all conditions of the conventional paint and also without paint. This mathematical model is well proofed to represent good correlation of paint solar reflectivity, conductivity, outside surface temperature, and inside surface temperature.

### **Recommendation**

1. The experiment should record the solar heat flux in all day to set the condition in the numerical calculation.
2. It is difficult to record data because this experiment cannot control the environment. Also, the experiment should test in environmental control area in order to reduce data collection errors.
3. Mathematical model created from this study can be applied to calculate correlation of solar reflectivity, conductivity, and surface temperature of other building materials such as roof tile, metal sheet, window glass, aluminum composite, or even in automotive coating.