

Thesis Title	A Study of Out-Patient Building, 60 Beds of Public Hospital, at Amphur Bangplama, Suphanburi Province, for Thermal Comfort and Energy Saving
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Abstract

The purpose of this research was to study not only a architectural performance of out-patient building, 60 beds public hospital, but also energy saving in air conditioning area and thermal comfort in non-air conditioning area.

Many studies, the energy expenditure of hospital, indicated that more than 88% were for electrical power consumption, the others for gas and etc. The percentage of consumption in electrical power showed that more than 54% were for air conditioning, 20% for lighting and the other for electrical equipments.

In this research, showed the study of energy saving in electrical power consumption in air conditioning area, and also energy saving in lighting, using new concept of Ashrae Standard 90 a., instead of uniform lighting.

In this research, study areas were designed to divide into 2 parts, as following ;

1. A study of energy saving's factors in air conditioning areas.
2. A study of building features with thermal comfort in non air conditioning areas.

Air conditioning areas, in hospital, must be divided a study into 2 types, firstly restricted area, for the reason of anti-septic requirement, controlling the temperature level about 22-24°C and also not to use recycled air. Secondaly, the general air conditioning area, controlling the temperature level about 27°C.

By studies, it was found that the solar radiation effects directly the level of heat transfer or quantity of cooling load in air conditioned machines, so choosing suitable enveloped building materials, placing the window orientation, and also creation the surrounding for reducing the out-side temperature were the solutions.

Results indicated the new approaches of development, as shown ;

1. To redesign the building envelopes by adding the insulation materials, reduced the average of "U" value (over all coefficient of heat transfer) from 2.196 to 0.519 watts/sq.m.°C and also reduced the cooling load in conditioning area about 67.9% by comparison with conventional design.

2. Using the concept of natural cooling, coolth steel pipe, 6 meters, 3 mm. in thickness, and 30 cm. in diameter, under soil covering in shade area, the out-let velocity about 1 mps. showed the reducing different of air temperature was about 4°C by passing through the steel pipe.

The datas were analyzed by a study of response texture model, multiple comparison, orthogonal polynomial coefficient and regression coefficient.

The research results indicated that the coolth pipes, using in air conditioning area, reduced the cooling load about 50.7%, by comparison with conventional design, using out-side air directly.

3. To use the theory of Ashrae Standard 90 A. insted, dominated only working area or task area to define suitable illumination level.

The results indicated that the cooling load was reduced about 52.99%, comparison with conventional design of uniform lighting.

4. By the condition of case study surrounding and 7 air changes per hour, the results of non-air conditioning areas" study indicated the volumn per person by activities, sitting at rest about 9.1 cu.m./person, sedentary activity about 12.2 cu.m./person, and walking speed 4 km/h about 30.6 cu.m./person.

5. The results of the studies, annual wind speed & direction, effective opened areas of windows for naturally ventilation, effected the feature of out-patient building, especially in non-air conditioning areas.

Because of the one of the objective requirements of this Thesis was to present the feasibility study of money investment and the periods of money feed back.

From the studies showed that the total amount of money investment and the feed back period, by using the same condition of 20% per year of interest rating, for each projects, as following ;-

1. The development of building envelops with insulators, about 9 years of money feed back.

2. The coolth steel pipes, about 4 years of money feed back.

3. Adding 3 projects; the building envelops with insulators, coolth steel pipes and new concept of lighting, within 5 years of money feed back.

The comparison unit price of money investment per reducing wattage between 2 projects; firstly the development of building envelops with insulators , about 12.21 bath/watt, secondaly, the coolth steel pipes, about 6.09 bath/watt, showed the first project using much more money about 50.12% than second project.

The aim of this research project was to express the feature of High energy Efficiency Building by comparison the standard levels of the designed cooling load and lighting power.

From the calculation showed that the designed cooling load in this building was about 165.91 watt/sq.m., lower than mean level of standard, 245.09 watt/sq.m. and also the lighting power in this building was about 14.9 watt/sq.m., lower than mean level of standard, 15.1 watt/sq.m.

The final conclusion indicated that the out-patient building in this Thesis was the one of the high energy efficiency building, the typical hospital type.