ΤΕΧΝΟΛΟΓΙΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΥΠΡΟΥ

ΣΧΟΛΗ ΜΗΧΑΝΙΚΗΣ ΚΑΙ ΤΕΧΝΟΛΟΓΙΑΣ

ΠΤΥΧΙΑΚΗ ΕΡΓΑΣΙΑ

ΣΧΕΔΙΑΣΜΟΣ, ΔΙΑΣΤΑΣΙΟΛΟΓΙΣΗ ΚΑΙ ΕΝΕΡΓΕΙΑΚΗ ΑΝΑΛΥΣΗ ΚΕΝΤΡΙΚΟΥ ΣΥΣΤΗΜΑΤΟΣ ΚΛΙΜΑΤΙΣΜΟΥ ΓΙΑ ΣΥΓΚΕΚΡΙΜΕΝΟ ΚΤΙΡΙΟ ΑΒΡΑΑΜ ΑΒΡΑΑΜ

ΛΕΜΕΣΟΣ 2011

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ΣΧΟΛΗ ΜΗΧΑΝΙΚΗΣ ΚΑΙ ΤΕΧΝΟΛΟΓΩΝ

ΤΜΗΜΑ ΜΗΧΑΝΟΛΟΓΩΝ ΜΗΧΑΝΙΚΩΝ

ΚΑΙ ΕΠΙΣΤΗΜΗΣ ΚΑΙ ΜΗΧΑΝΙΚΗΣ ΥΛΙΚΩΝ

Πτυχιακή Εργασία

ΣΧΕΔΙΑΣΜΟΣ, ΔΙΑΣΤΑΣΙΟΛΟΓΙΣΗ ΚΑΙ ΕΝΕΡΓΕΙΑΚΗ ΑΝΑΛΥΣΗ ΚΕΝΤΡΙΚΟΥ ΣΥΣΤΗΜΑΤΟΣ ΚΛΙΜΑΤΙΣΜΟΥ ΓΙΑ ΣΥΓΚΕΚΡΙΜΕΝΟ ΚΤΙΡΙΟ

Αβραάμ Αβραάμ

Επιβλέπων καθηγητής

Δρ. Ιωάννης Μιχαηλίδης

Summary

The main Purpose of this project is to analyze a central climate system as concern as energy consumption for a certain building. At the beginning a flash back is done for the human needs for climate control and how in nowadays lots of money are spent for air conditioning. After this the term thermal comfort for human and the factors affecting it are explained.

After finding the prober building which is about to be under consideration an analysis of the way the thermal and cooling loads are calculated is shown and also the maximum loads are calculated with the use of a prober software. These loads are necessary for the proper dimensioning of the machinery needed for the air-conditioning of the building.

The building under observation is a Conference room of which the thermal resistances of the shell of the building are not reaching the minimum standards needed by the law for thermal insulation for buildings. For this reason some changes were performed in the shell of the Conference room and for every change the thermal and cooling loads were calculated as

well as an economic consideration is made for the cost for buying this thermal insulation and the amount of money saved during a lifetime of 30 years for the building under normal operating conditions. In order to calculate the actual needs of the building for energy consumption, weather data for Limas sol in degree days were used from the archive of Meteorological Service of Cyprus for the last 45 years.

An analysis is then made concerning the types of air conditioning systems which are available in the market on which we were based for the selection of the prober one for the building. A central climate system with steady flow of air volume was selected in order to secure the minimum quantity of fresh air and also a boiler burning distillate oil was about to be used for heating and electricity for cooling by using a chiller. After an economic survey and considering the cost for buying and also working costs it was made obvious that the use of electricity for both heating and cooling by using a heat pump is the most economic solution.

The duct sizing was made with the shell of the building on its initial state and is seen on Technical drawing 1. A lot of technical problems had to be faced concerning the air flow which should be uniform in all building and also enough space for the ducts and machinery had to be found.

In order to be more reliable also the pressure drop in the ducts was calculated in order to define the motor size needed for the air flow in the ducts.

Knowing all data concerning loads, air volume, fresh air requirements and the dimensions of the ducts then the machinery needed can know be located.

At first a separate system for the air and a heat pump was about to be purchased but the costs were too high and the solution for Package Units having also incorporated and the control systems was fount to be the best solution. Also the use of four Package Units having each one two compressors the one with capacity 33% of the maximum load and the other with a capacity of 66% was the best working solution having in mind that the thermal load is three times smaller than the cooling load. By this way we establish both economic purchasing as well as economic working of the heat pumps.

Finally the way of installing the air ducts is shown and the thermal insulation needed for the air ducts is pointed.