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To Proposing a Natural Cooling Strategies for a Building in Hot and Humid Climatical Zone

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ABSTRACT
Climate change on a global scale Increasing the number of energy consumers has become a difficult task for governments all around the world. The force of energy compression system uses 30% of the total energy consumed and comes from primary sources. These are mostly reduced through the installation of an air consumption system to offer open space cooling for residents of a building. In order to increase air consumption, the atmospheric air temperature must be reduced below its dew point, which is inconvenient for maintaining the required comfort zone in the building. The goal of this study is to look at how different natural cooling approaches can help people feel more comfortable in hot and humid climates. It is beneficial to the comfort level passive cooling strategies when it comes to the air consumption system.

Keyword – energy in building, humidity, Thermal Comfort, space cooling.

I. INTRODUCTION

Natural cooling uses local energy, available from the natural environment, combined witharchitectural design of parts of the building, rather than mechanical systems learn to dissipate heat. Thus, free cooling depends not only on the architectural design of the building, but also on how the area's natural resources are used as heat sinks. Examples of local heat dissipation are the upper atmosphere (night sky), outside air (wind), and earth/ground. Due to different climate zones, the electricity consumption in different climates such as hot and dry, hot and humid, hot and humid.

It should be understood that free cooling is a building design that focuses on increasing heat in the building to improve low energy consumption in the amenity area. In this system cooling of the building structure is carried out without thermal mass. This claims to work by blocking heat from the interior area of the building by preventing natural cooling. in the use of natural cooling on and around the site, energy is required from the natural environment of the architectural design in hot and humid climates. Natural cooling plays an important role in the stability and construction of buildings. Today we use a widely used mechanical system. In hot and humid climates, an AC system treats indoor air humidity by reducing the air temperature below its dew point. Free cooling requirements for subtropical climates to determine the most effective approach to providing a comfort zone in a building.

AIM

- To study the application of natural cooling techniques to enhance the quality of building.

OBJECTIVE

- To study the natural cooling ventilation.
- To determine the impact of the regional climatic zone.
- To study the factor of hot and humid climatical zone.
- To study the different types of function and techniques used for natural cooling ventilation.
- To study the wind velocity and wind direction.

HYPOTHESIS

- Natural cooling ventilation in building opening.

RESEARCH QUESTION

- How to apply natural cooling techniques to building structures .

SCOPE

- To minimize the external energy, and space saving.
- A thermal comfort can be acquired with less economically

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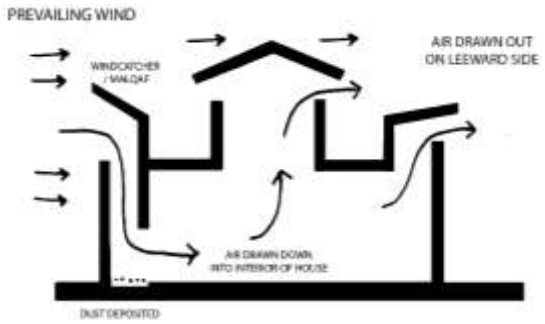
LIMITATIONS

- To study the natural cooling strategies to a building in hot and humid climates.

II. NATURAL COOLING VENTILATION

Natural cooling is the natural process of supplying and removing air from a location through openable windows, door and ventilation system. Since it is not dependent on any external energy source, natural cooling ventilation and air movement can be easily achieved through structural control.



Natural cooling strategies in building

III. EFFECT OF NATURAL COOLING IN REGIONAL CLIMATICAL ZONE

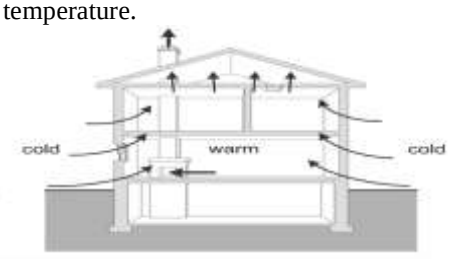
The climate weather condition that prevailing over a large area and for a long period of time.

- Hot and dry
- Warm and humid
- Composite

IV. TYPES OF FUNCATION AND TECHNIQUES IN NATURAL COOLING

5.1 STACK EFFECT

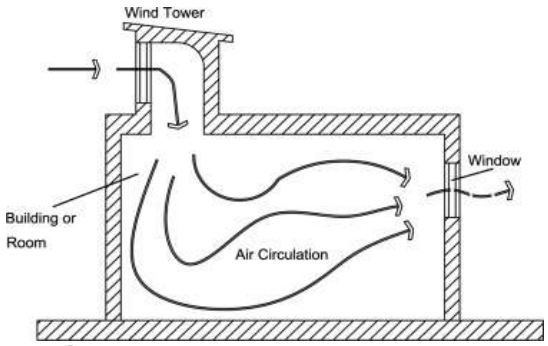
The stack effect it is creating a air flow by using natural force of air pressure , temperature and density level between corresponding indoor andoutdoor space .it is depends on thermal force and temperature.



Stack effect creating air flow by natural force of air

1.2 WIND TOWER

The wind tower is cooling down for air movement throughout the opening.



A wind tower section

1.3 COURTYARD EFFECT

Due to the solar radiation in the courtyard air get warmer and rise cool air from ground level flow through the lower level opening.

1.4 Thermal Comfort For Hot And Humid Climate

This humidity is one of the interior environmental elements that might affect a building's thermal comfort. The majority of the studies on thermal comfort at greater humidity levels were conducted in climate chambers or air-conditioned environments. The effort to open the building's spaces necessitated working in a hot and humid environment where the temperature did not fluctuate from day to night. In the direction of the prevailing wind, open windows and doors on opposing sides of the building. Creating a huge opening in the building's wind direction for natural cooling. Warm air can exit through vents towards the top of the stacks, while cooler air enters through openings near the ground.

1.5 Cooling Load In Hot And Humid Climate

A amount of air in the form of latent heat is responsible for a portion of the cooling load in buildings. The HVAC system in the building failed to adequately dehumidify the outside air it supplied. Furthermore, due to design and construction flaws, the HVAC systems regularly drew damp outside air into the building through the building exterior. The building's heating, ventilation, and air-conditioning (HVAC) system was not planned or built to maintain adequate moisture conditions, causing widespread mould growth on furnishings and inside the wall cavity.

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1.6 Mechanical Vapour Compression System

Mechanical vapour compression systems dominate the market for building air conditioning because of their consistent performance and comfort controllability. Residential buildings employ individual air conditioners because they are easier to install and maintain, whereas commercial buildings use a centralised water chiller.

Individual system

One condenser is used for each evaporator unit in a single air conditioner. The evaporator unit is often installed on the inside of the building, while the condenser unit is installed on the outside.

Centralised system

Typically, a central air-conditioned building consists of one large indoor unit connected to ventilation ducts that connect to every room in the building.

1.7 TECHNIQUES FOR PASSIVE COOLING

Evaporative cooling reduces air temperature to that of a wet bulb by converting the latent heat of water evaporation into perceptible heat loss. Evaporative cooling systems' cooling capability is commonly defined as the difference between the dry bulb temperature and the wet bulb temperature of the air to be cooled.

DIRECT SYSTEM

The direct evaporative cooler (DEC) cools air by passing it through a wetted material (typically porous) and allowing the water to evaporate. When hot air travels over a wetted material, some of the sensible energy is used to evaporate the water, releasing latent heat in the form of moisture. The air then exits the medium on the opposite side, with a lower temperature and higher humidity.

INDIRECT SYSTEM

The cooling process of an indirect evaporative cooling (IEC) system is carried out utilising a heat exchanger with two airflows. To induce evaporation, the working air goes over a wetted side, while the product/supply air passes over the opposite dry side. The evaporation process cools and humidifies the working air while also absorbing heat from the dry air and cooling the air on the dry side.

V. NATURAL COOLING VENTILATION OF EXTERNAL FEATURES

- Building form and orientation
- Cross ventilation
- Opening types for ventilation

BUILDING FORM AND ORIENTATION

The high rises building tower, faced away from the wind, then the air up through the building drive by negative pressure on leeward side of the building. The cross ventilation can be enhance by planting and placing of outlet in the side wall of building and use of wind wall.

CROSS VENTILATION

When the air inflow and outflow openings in external wall have been internal flow circulation between them. The characteristics by the combined effect of wind and temperature difference.

OPENING TYPES FOR VENTILATION

In the opening of airflow through the rooms are very useful when deciding on window design. when the openings of window for a building is to look at traditional window design of the area. That they provide clues for innovation for new building. In window there are fewer openings in a glazed area but it is very important to controlling airflow through a space. The room occupants to hot air at the top of room and coming fresh air in lower down. It is also considering area of the room in which internal wind shadow

VI. CONCLUSION

In this research a natural cooling techniques , Energy consumption in buildings which needs to higher energy consumption and environmental impact, in the hot and humid climates. cooling demand to the overall building energy consumption significantly. natural cooling techniques could be used as low-energy cooling alternative to conventional air conditioning systems.

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