ABSTRACT

Indonesia is a tropical country that has the characteristics of an average temperature of 35^0C, so that the thermal conditioning of the building is a major concern in order to achieve thermal comfort for building occupants. The concept of thermal mass is a mechanism to absorb, store and release heat on building materials that aim to reduce peak temperature and peak cooling loads in buildings that use air-conditioning. Buildings that have good thermal mass must be built with materials to suit the local climate. Parameters that can represent the thermal mass is the heat capacity, thermal effusivity, thermal diffusivity, terms of time, volume and surface area in the building. The buildings are constructed with concrete material may simply have better thermal mass when compared to buildings constructed with wood of the same thickness as the concrete has a value greater heat capacity than wood, but when two buildings constructed with concrete materials of different types, cannot be determined easily that which buildings have better thermal mass. It is therefore necessary thermal mass calculations and simulations on each type of building to obtain the optimum thermal mass. Optimum thermal mass is the value of thermal mass that has no effect anymore to changes in temperature and cooling loads in buildings.

In this study conducted a simple 3D building modeling consisting of various combinations of building type, thickness, material, and geometry, thereafter simulation and calculation parameters for each combination of thermal mass of the building to determine the peak temperature of the building, the peak cooling load and thermal mass parameter. Furthermore, correlate and analyze the simulation results and calculation parameters of the thermal mass of the building all the combinations to get optimum thermal mass in the tropics.

Results obtained parameters that most represents the thermal mass is the thermal time, because it has the highest level of correlation to the temperature inside the building that is equal to -0.85. Optimum thermal time amounted to 181 042 s (≈50 hours).), If t> 50 hours then the thermal time is no longer effective, as there was no significant decrease in the temperature in the building. Results from the study also showed that the longer the thermal time then fluctuations in the surface temperature of the building will be more stable.

Keyword: Thermal conditioning, thermal mass, peak temperature, peak cooling load