THERMAL ANALYSIS OF COMPOSITE MATERIALS FOR ROOFING

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ABSTRACT

Composite materials are desirable in many industrial applications, including manufacturing, construction, machinery and appliances. Improvements can be made on the heat transfer properties of composite materials if experiments are conducted on its thermal properties. In this work, we study the thermal properties of a composite material designed for the roofing, which is being used in many mosques in the country such as the mosque of Sultan Sallahuddin Abdul Aziz Shah, Shah Alam and Wilayah Persekutuan Mosque, in Kuala Lumpur. With this study we will be able to analyze the thermal properties, particularly the heat transfer and thermal conductivity of the dome composites and investigate about its appropriateness as a roofing material for use in tropical climates. The company that has provided the samples of the composites is a local manufacturing company called Dian Kreatif Sdn Bhd, located in Malacca. Up to date, the company has constructed at least 55 domes used for mosques throughout the world, including the Prophet Mosque in Medina and the Putrajaya Mosque and also 22 boats. Tests were conducted on several separate samples as well as samples of different combinations of the composites using the thermal conductivity apparatus. Air temperatures and surface temperatures were taken in the interior and exterior of square models of the dome placed in a solar radiation simulator used as a heat source. Both the thermal conductivity apparatus and the solar radiation simulator are situated at the Mechanical Engineering Faculty of Universiti Kebangsaan Malaysia. Results show that the composite materials, together with its strength and durability can be appropriately used as roofing materials. However, studies will have to be conducted on its cost effectiveness, as composites are very expensive.

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