

Abstract

Earth construction is a form of natural architecture built with environmentally-friendly materials. In Thailand, the most widely used material in earth construction is adobe brick containing rice husk. It is important to consider the strength and moisture absorption of adobe brick. This research is focused on the utilization of agricultural by-products such as rice husk and bagasse to produce adobe brick with enhanced properties and suitable for construction.

The objective of this research was to study the influence of agricultural by-products such as rice husk and bagasse on the properties of adobe bricks including compressive strength, shrinkage and thermal properties. The percentage replacement of the agricultural fibers in adobe bricks were 0, 1, 2, 3 and 6% by weight. The adobe bricks were dried by oven-drying for 24 hours. The moisture absorption of the adobe brick walls were studied in comparison with the lightweight concrete masonry.

The test results indicated that rice husk and bagasse fibers can increase the compressive strength and reduce the drying shrinkage of adobe bricks. But replacing rice husk more than 3% tends to reduce the compressive strength of adobe bricks. The adobe brick containing bagasse yielded higher compressive strength than that of rice husk in each mix proportion. Increasing the replacement percentage of the agricultural by-products tends to reduce the thermal conductivity of adobe brick. The adobe bricks containing with bagasse had lower thermal conductivity than those of rice husk. In conclusion, the adobe brick containing 6% of bagasse by weight yield the highest compressive strength of 32.17 kg/cm^2 , the lowest drying shrinkage of 17.95%, and the lowest thermal conductivity of 0.45 W/m-K. The walls made of the adobe bricks containing rice husk and bagasse absorbed more moisture than that of lightweight concrete masonry, and the adobe bricks containing bagasse yielded moisture absorption less than that of rice husk. The results can be used as a guideline for producing adobe bricks, which is beneficial for developing alternative low-cost architecture for local people and also to the tourism industry for building hotels and recreation facilities.