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MECHANICAL PROPERTIES OF COMPRESSED ADOBE BRICK

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In this research, authors tried to achieve maximum compressive strength with minimum specific gravity for Adobe material, by presenting, testing and comparing different mix designs. Clay, cement, sand and water were used as main materials in this study and also pumice, sawdust and Polypropylene fiber were used as additives. Laboratory investigations indicated that by adding pumice and Polypropylene fiber to the mixture, maximum strength with the minimum specific gravity would be obtained for Adobe material. Besides, Water absorption and sound wave absorption tests were performed on specimens. Furthermore, numerical studies using ABAQUS software was implemented on specimens and outputs of numerical studies were compatible with laboratory results and both can verify each other.

Table 1. The investigated mix designs in this study.

Id	Gravel	Sand	Cement	Clay	Pumice	Sawdust	Poly-Propylene Fibers	Water	Theoretical Specific Weight	Practical Specific Weight
T1	153	688.5	180	688.5	-	26.66	-	192.6	1800	1805
T2	229.5	688.5	180	612	-	-	-	192.6	1800	1851
T3	126	567	360	567	-	26.66	-	192.6	1800	1790
T4	-	360	180	875	120	26.66	-	428.45	1535	1478
T5	-	270	270	875	120	26.66	-	448	1535	1539
T6	-	180	270	787.5	180	26.66	-	425.18	1417	1441
T7	-	180	270	787.5	180	-	12.75	420.15	1430	1445

In order to obtain the compressive strength of the specimens, after straightening the surface of the samples, the samples were loaded and tested using the compression machine test the results are presented in below:

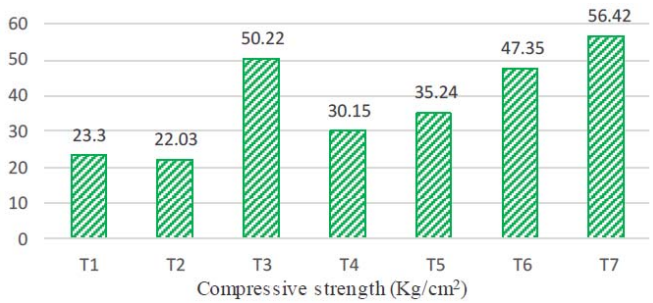

Figure 1. Compressive strength of specimens.

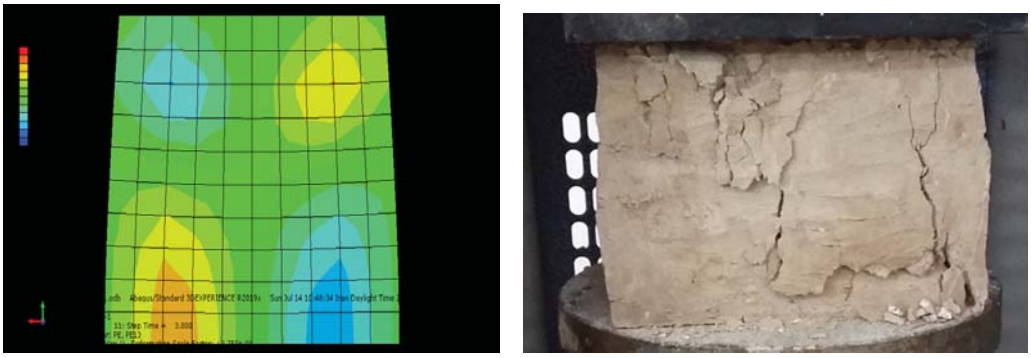

Figure 2. Comparison of experimental and numerical studies.

The following results were obtained from experiments and studies on the mix designs:

1- The addition of natural and synthetic fibers to the mix design of the materials improved the crack expansion and increased compressive strength. According to the ratio of compressive strength to the specific weight of specimens, the T7 mix design was the most optimal.

2- From the results of the water absorption test, the T4 mix design has absorbed less water than other mixes.

3- The test for absorbing and reducing the intensity of sound indicates that the T7 material reduces the intensity of passing waves by 19.75%.

4- By studying the distribution of plastic strain by the means of ABAQUS (finite element method software), there was suitable compatibility in crack development and rupture mode between lab results and numerical analysis.

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