3D Printed Bricks Based Off Mud Dauber Wasp Nest

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The overall goal of this project is to create more sustainable adobe bricks using the method that mud dauber wasps use to construct their nest. Previous research showed mud dauber nests have high density and strength. This was able to be determined through trends confirmed from measurements of physical and mechanical properties of mud dauber nests for over 100 mud dauber nests including penetration resistance, dry density, and moisture and organic contents. A statistical analysis of the data of the physical and mechanical properties was performed to ensure that the nests have consistency across all of their properties. The statistical analysis showed consistency in density and strength throughout multiple nest samples, confirming the mud dauber's construction technique is an insufficient inspiration to create soil bricks. A 3D printer was used to simulate the mud dauber's technique and print the soil similar to the wasp. The ultimate goal of using the 3D Printer is to create a soil layer with little to no surface defects, constant soil dimension, and only a 10% difference in the size difference between the before and after drying process. Additional layers are added and have the same requirements to make a stronger brick that is more similar to cement bricks. Strength tests will be performed to check that the bricks are strong enough to be used for civil structures.

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