Abstract

Earthen materials are considered as one of the oldest materials in home building on the planet. Earth-based building materials are eco-efficient, sustainable, renewable, recyclable, and carbon-zero or even carbon-negative materials for the case of hempcrete. Earthen building materials are used together with bamboo to enhance the strength of the structures. Bamboo has been used for centuries as a central pole or frame of the house to support the structure and the walls. The use of green materials in construction is becoming highly desirable since it helps reduce the environmental impact during construction and use phases. Not only the use of material, but also the method of construction highly impacts the sustainability of home building. The construction method of 3D printing reduces the use of wooden formwork, and this can help reduce or eradicate deforestation. The use of clay and earthen materials for 3D printing has recently gained attention due to its low environmental impact in comparison to concrete. With the current high demand of using earthen materials with the interest of modernizing the material mix, construction methodology, and geometry usability, relevant theoretical and experimental studies are necessary. The main goal of the research presented in this paper is to discuss the previous experimental literature on cob, hempcrete, and bamboo components for home building and identify the necessary requirements needed for transition toward 3D printing.

Introduction