

Thesis Abstract

In the last decade, 3D printing has taken off and become an integral part of many industries. One of those industries is the construction industry in which companies are beginning to figure out ways to build complete structures using 3D printers. These companies are utilizing several techniques in order these structures, including printing off-site and then shipping the printed parts in sections to the site. Another method of utilizing printed construction is to bring a large scale printer to the construction site and building the structure in place. Both of these techniques are advantageous over customary construction process. Current 3D printing for buildings uses only a few types of materials, such as concrete and plastic. On site printing uses concrete as the main material utilized in this type of 3D printing since it can be easily extruded and is structurally proven. DUS Architects, located in Sweden, is working on 3D printing a house using plastic as the main material¹. As in many facets of construction, 3D printing requires planning, including selecting the necessary materials, and oversight; however, 3D printing offers many advantages over the traditional construction styles, such as a drastically reduced construction period, reduces the amount of waste generated from construction, has a smaller carbon footprint, and produces less costs for clients.

The adaptation of 3D printing will change how buildings are constructed and the speed at which they are constructed. According to Behrokh Khoshnevis, our conventional construction practices are inefficient and outdated². He also claims that they are slow, labor intensive, and very dangerous. By switching to 3D printed buildings this can speed up the process of building along with eliminating some of the danger³. Printed buildings will help in alleviating the problems stated by Khoshnevis and hopefully push the field of architecture and construction forward. These methods alleviate the problems by first having all the pieces either fabricated on site by a printer or fabricated offsite and then shipped at once to increase the speed the building is erected. Printed buildings require fewer laborers to build the structure by making the pieces just need to be assembled instead of being built in steps and in pieces. The level of danger is also decreased because by having pieces that just need to be set in place it eliminates the need for laborers to climb on the structure to put finishes on it but instead the component already has the finish on it.

This thesis proposes to design a series of building components to that assemble a house. These components would be the walls, floors, roofs, etc. that all are required to build a house. Each of these components would have capability of being 3D printed to potentially solve the issues that have arisen over the years with conventional construction methods.

¹ "World's First 3D-Printed House Is Being Built In Amsterdam." Inhabitat Sustainable Design Innovation Eco Architecture Green Building Worlds First 3DPrinted House Is Being Built In Amsterdam Comments. Accessed August 7, 2015. <http://inhabitat.com/worlds-first-3d-printed-house-under-construction-in-amsterdam/>.

² Contour Crafting: Automated Construction: Behrokh Khoshnevis at TEDxOjai. (n.d.). Retrieved August 30, 2015, from <https://www.youtube.com/watch?v=JdbJP8Gxqog>

³ Contour Crafting: Automated Construction: Behrokh Khoshnevis at TEDxOjai. (n.d.). Retrieved August 30, 2015, from <https://www.youtube.com/watch?v=JdbJP8Gxqog>