



MARTIAN BIDESIGN

by Northwestern

PROGRESS UPDATE

May 1, 2018

Working alongside Skidmore, Owings & Merrill (SOM), the team has generated a general layout of the habitat in anticipation of the upcoming Virtual Design Competition. A Revit model of the layout based on dimensions from NASA's Hi-SEAS

project was generated, focusing on dividing private and public space while utilizing all available area for the design. The habitat is modeled in accordance with competition guidelines and aims to support four astronauts for one year on Mars.



3D Printing with a Robot. As humans themselves will not be able to construct the habitat on Mars, a robotic 3D printer will be necessary to erect any theoretical structure. One option is to use a robotic arm, as pictured. The robotic arm has a nozzle at the end, where the material being used is extracted as a liquid at a high temperature. The arm must be such that it can cover the desired printing area while stationary. Another area of concern when using a 3D printing robotic arm is the process with which the material is extracted. Both factors were taken into account when purchasing the robotic arm that we will be using for the competition. Understanding the 3D printing process on Earth is a vital step in developing a procedure to print a habitat on Mars.

We are in the process of purchasing a robotic arm intended for use on 3D printing of the habitat during the Construction Competition, purchased from ABB Group. The robot has a stationary base with a long-reaching arm to be able to build to the dimensions of the designed habitat. The robot will take five to eight weeks to arrive.

In preparation for the robot's arrival, we are working on designing the process to be used to mix and extrude the Martian concrete in the 3D printer. The two possible processes differ in the phase of the material passed through the arm to the nozzle, either powder/particulate or liquid. Both options pose benefits and risks that will be evaluated.

This month's fun team facts:

From Team member Jonathan Meehan: "I go by my nickname 'Bug,' which I got because I had big bug eyes as a baby."

From Team member Edmond Chen: "I like going to the sauna followed by an icy cold shower."