

Video 18: Other Planets

There are a lot of ideas about how to build large futuristic cities on the Moon or Mars without considering the resources and machinery needed for such a task. A more realistic approach was shown in the movie *The Martian*, where a settlement consists of a bunch of tents, which, again, is only suitable as a temporary settlement.

Many of those ideas look attractive, but at the end of the day, any big extraterrestrial city must follow a general logic in space, which is to gain as much as possible with minimum input.

The construction of such designs requires reinforcement beams and strong walls to hold the air pressure inside the facility. It's very unlikely that the raw materials out there would allow for a high enough load capacity.

The only kind of construction that can avoid most problems with the challenging conditions on other planets is underground construction. Again, it is possible to construct two types of underground construction: molehills and pure underground construction. Let's see how.

We saw similar pictures in the video about molehills, which are subterrain constructions based on the idea of circular-shaped towers connected with each other and covered with material.

The core idea is to construct a small cell printed with 3D printers from local materials.

The cell is constructed from simple elements like beams or plates that are not particularly big or heavy and can be joined together.

These pictures show the phases of construction of a single cell. First, the foundation should be constructed, and support beams on each foundation should be printed. Then, support beams should be connected with horizontal beams.

Then, bottom wall elements, floor elements and wall elements should be added.

If we put those cells by one another and above one another, we get a large modular object that has been constructed by simple elements and economically dimensioned to defy expected loads, which is what we need for an extraterrestrial city. We just need enough material to print the walls, beams, and other elements, along with a lot of filling material, which would be local sand in this case.

Excavation is not necessary. There are plenty of canals and craters on Mars to use for construction, so there is no additional need for digging. The best option would be canyons with sharp vertical boundaries of 10-15 m height on both sides.

Such a construction can't handle much inner pressure, so there must be an air lock membrane installed, which seals the air inside the city and doesn't cause inner pressure in cells. The amount of dust cover should be sufficient to match the inner pressure of air.

The construction of pure underground structures according to the Deep Underground concept could follow the same logic as on earth, with the main challenges of providing air and power supplies.

The final result should be isolated facilities that are safe from outer influences like radiation and temperature fluctuations, where relatively normal living is possible.

We believe that the only possibility of living on other planets is to live underground.

Therefore, the Deep Underground concept is ideal for construction on other planets because it doesn't need a lot of mechanisation and workforce using 3D printers for molehill versions. The pure underground version allows fast construction of huge underground facilities with a relatively small amount of material to be excavated.