SYMPOSIUM ON VISIONS AND STRATEGIES FOR THE FAR FUTURE (D4)
Space Elevator Design and Impact (3)

Author: Mr. Giorgio Gaviraghi
Unispace Exponential Creativity, Italy

Mr. André Caminoa
Unispace Exponential Creativity, Argentina

3D PRINTING IN SPACE: A GAME CHANGER

Abstract

Recent advances in 3D printing technology and its applications in space programs such as the ESA sponsored lunar base represent an important step forward in the space program. 3D printing, properly utilized with "In Situ Resources Utilization" (ISRU) resources, can allow reductions in launching costs due to smaller payloads especially heavy components that could be built directly on another body. In the currently existing conditions of non-aordable space accessibility, this technology can represent a shortcut as well as a game changer. We want to explore some possibilities of 3D potential, with a few systems and utilizations that can prove suitable and eective:

- AstroHab System: a modular extraterrestrial construction system suitable for 3D printing manufacturing, being composed of single panels of same size and shape adjustable to form enclosed buildings. The panels will act as an empty form that could be lled with local regolith to ensure radiation protection and stability.
- Printed Architecture: a conceptual design of 3D printed modular habitats, which could be delivered ready to use. This system could be suitable to deliver an instant outpost in extreme environments; also, this system would mean a great leap in terms of time, quality, and constructive security and as any high-technology product, if it is applied on Earth, could quickly solve the current lack of proper and decent habitation in many parts of the world.
- Linear 3D Printer: the retriever is an asteroid deection system and a fully robotic space facility that can operate with a minimum payload from Earth and the capability to build, at destination, mining and heavy equipment, solar PV panels for power generation, rover vehicle, and requisite hardware as well as other life support systems, including habitats for future manned missions.
- 3D Contour Fabricator: a cycling asteroid transportation system could be a deected asteroid, in a cyclical trajectory, such as Earth-Moon or Earth-Mars, properly equipped, it can be utilized as a completely reusable transportation system between the two bodies.

Utilizing AstroHab as a construction system, producing mining equipment for underground facilities and following a precise Master Plan, a small asteroid can be transformed in a cycling spaceship, entirely reusable, assuring life support system for its human passenger and representing a major source of income. In this paper we analyze and develop the above concepts with details and business plans.