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TERRAFORMING OF MARS PLANET

The main task is the terraforming of Mars planet. Nowadays it is a very important task, because there are a lot of problems on the planet Earth, which deals with the exhaustion of natural resources. The solution is in the colonizing, building and transport formation on Mars planet. After researching with a help of NASA devices, scientist could develop different ideas about constructions and transport inventions for new planet of human.

Introduction . Mars is the fourth planet from the Sun. It is also the nearest planet to the Earth and will probably be the first planet visited by humans. Mars is actively investigating the possibility of humans colonizing this planet, because Mars is the most Earth-like planet of all the planets in the solar system. (fig.1)

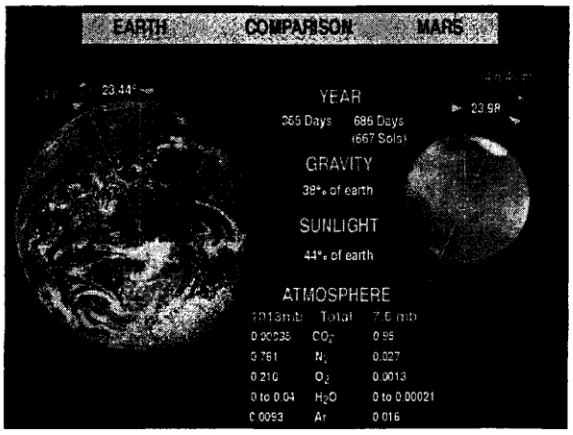

Fig. 1 Comparison of the planet Earth and Mars

As it was mentioned above, Mars is the most like planet to the Earth, but there is one main problem – the absence of the atmosphere with oxygen that's why the main tasks are in thickening Martian atmosphere, warming it to comfortable levels and transforming it into breatable air.

The idea of achieving these goals can be realized, because the Mars colonizing has following advantages:

- it has a very similar length of day. A Martian day is 24 hours and 39 minutes, so plants and animals might find that familiar;
- it has an axial tilt very similar to Earth. This gives it familiar seasons to our home planet;
- it has vast reserves of water in the form of ice. This water would be essential for human travelers to Mars, and could also be used to make rocket fuel and hydrogen for fuel;
- the advantages to having a Mars colony are to be able to conduct long-termscience studies there, and to be able to travel over large distances on the surface repeatedly.

Study Area. Mars is the most likely to have substantial quantities of water, making it the best bet for sustaining life. But the most significant question is in possibility to live there, not only from economic point of view, but an engineering also.

The atmosphere of Mars is very thin. Its density is about 1% of that of the earth. It creates problems for heavy spaceships on the surface of Mars. Thus, a specially designed braking and landing system is needed. The currently used robotic systems for landing on Moon and Mars cannot be used in this case. The effects of Martian gravity on human health have not been studied yet. So, it is difficult to predict whether Mars can support human life in the long term.

Robert Zubrin, in his book, "The Case for Mars", explains how future human colonists mig be able to live off the land when traveling to Mars, and eventually colonizing it. Instead of bringi all their supplies from Earth – like the inhabitants of the International Space Station – fut colonists would be able to make their own air by splitting water on Mars into oxygen and hydrog This Martian water would also be used for drinking, and even rocket fuel.

Preliminary experiments have shown that Mars soil could be baked into bricks to cre protective structures. Earth plants could even be grown in Martian soil, assuming they get enou sunlight and carbon dioxide.

To realize these first colonists should to construct the underground shelter. (fig. 2)

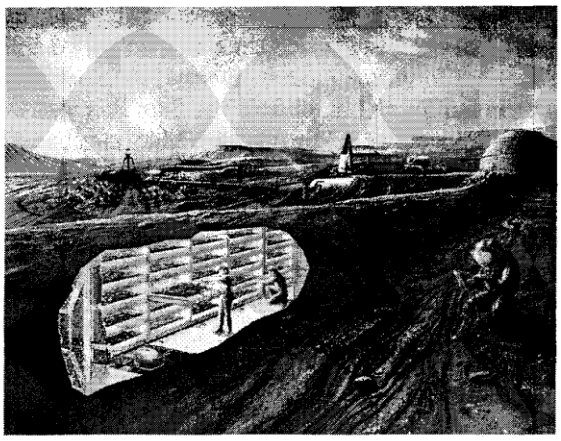

Fig. 2 Underground shelter in cross-section

It is very important to construct underground shelters for Martian people, because the atmospheric pressure is low, and the solar radiation is too big and dangerous at which people can't survive without pressure suits.

Initially, the planetary engineers and early colonists would live in their spacecraft and in prefab habitation modules brought from Earth, but soon construction would need to begin on permanent Mars structures. Since there are neither forests existing yet on Mars to harvest, nor any cement factories, structures would need to be constructed with the available material. On Mars, rocks and dirt are plentiful, and similar materials have been used for building on Earth for thousands of years. Examples of this construction include caves, stacked and mortared stone, adobe and rammed earth. More modern examples include cast stabilized earth, earth-bag structures and excavated underground spaces.

Transport and buildings formation. The main task is in research the planet and its structure by the help of NASA's Mars Exploration Rover (MER). This mission is an ongoing robotic space mission involving two rovers, Spirit and Opportunity, exploring the planet Mars. It began in 2003 with the sending of the two rovers—MER-A Spirit and MER-B Opportunity—to explore the Martian surface and geology. (fig.3)

The scientific objectives of the Mars Exploration Rover mission are to:

- Search for and characterize a variety of rocks and soils that hold clues to past water activity. In particular, samples sought will include those that have minerals deposited by water-related processes such as precipitation, evaporation, sedimentary cementation, or hydrothermal activity.
- Determine the distribution and composition of minerals, rocks, and soils surrounding the landing sites.
- Determine what geologic processes have shaped the local terrain and influenced the chemistry. Such processes could include water or wind erosion, sedimentation, hydrothermal mechanisms, volcanism, and cratering.
- Perform "ground truth" -- calibration and validation -- of surface observations made by Mars orbiter instruments. This will help determine the accuracy and effectiveness of various instruments

that survey Martian geology from orbit.

- Search for iron-containing minerals, identify and quantify relative amounts of specific mineral types that contain water or were formed in water, such as iron-bearing carbonates.
- Characterize the mineralogy and textures of rocks and soils and determine the processes that created them.
- Search for geological clues to the environmental conditions that existed when liquid water was present. Assess whether those environments were conducive to life.

Fig. 3 Mars exploration rover

After researching with a help of NASA devices, scientist could develop different ideas about constructions and transport inventions, which could be constructed on the planet Mars, and which give the possibility to live there in future.

The underground constructions have many benefits such as a more stable temperature, very secure and stable surroundings, and protection from solar radiation and micrometeorites. On Earth human underground construction is accomplished with large equipment that digs holes, explosives that break up rock, and conveyance systems to remove the debris. Since protection from above is the goal, simply digging a hole wouldn't be sufficient. Spaces would need to be created as tunnels that were expanded to form caverns. The logical choice for this is a mining device called a road header. (fig.4)

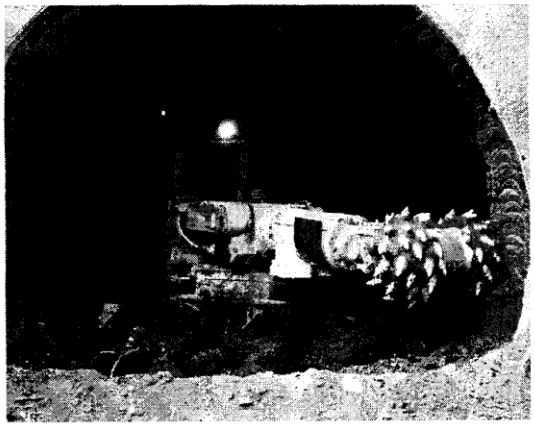

Fig.4 A road header during work procedure

A road header consists of a treaded body with an extending boom that sweeps across a rock face with a cutter head. Large road headers are capable of removing about 40 cubic meters of rock before moving the base forwards. Recent advancements in mining technology have produced automated road headers, capable of selectively cutting rock faces to extract valuable ore while

ignoring the rest of the rock.

The entire terraforming (fig.5) (*Terraforming* - of a planet, moon, or other body is the hypothetical process of deliberately modifying its atmosphere, temperature, surface topography or ecology to be similar to those of Earth to make it habitable by terrain organisms) process should take around a century, during which time technological advances on Earth would be occurring in the areas of energy production, nanotechnology, food production and every other aspect of our society.

Fig. 5 Terraforming of the planet Mars

Conclusions

Many of the sustainable practices being developed here on Earth would be implemented on Mar because there are very little resources there. Every part of the colony would need to be carefully planned to account for this, but this would serve as an opportunity to create a completely new model of human civilization, doing things right from the very start.

There are different ideas and suggestion for developing the new planet for living conditions. People should to apply immense efforts for realization such space project. The implementation of new technologies will create a powerful world, which will help Earth in future.

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