

Space Studies of the Earth-Moon System, Planets, and Small Bodies of the Solar System (B)  
Mars Exploration (B02)  
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## **BUILDING A PROTOTYPE OF A MARTIAN BASE IN POLAND, AN ARCHITECTURAL DESIGN OVERVIEW AND PROGRESS REPORT**

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This talk focuses on recent advances in the construction of a prototype 1000 m<sup>2</sup> Martian outpost for 8 inhabitants. The architectural design for such a Martian base has been presented previously on COSPAR 2008, the presentation being entitled „*Architectural design proposal for a Martian base to continue NASA Mars Design Reference Mission*”. The presentation was welcomed with warm interest by various institutions, some of which offered help in building a prototype such as providing the building site or funding. This year’s oral presentation will focus on a progress report and will briefly describe the architectural design.

The architectural design is inspired by terrestrial pneumatic architecture. It has small volume, can be easily transported and provides a large habitable space. An architectural solution analogous to a terrestrial house with a studio and a workshop was assumed. The spatial placement of the following zones was carefully considered: residential, agricultural and science, as well as garage and workshop. Further attention was paid to transportation routes and a control and communications center. The issues of a life support system, energy, food, water and waste recycling were also discussed. This Martian base was designed to be crewed by a team of eight people to stay on Mars for at least one and a half year. An Open Plan architectural solution was assumed, with a high level of modularity. Walls of standardized sizes with zip-fasteners allow free rearrangement of the interior to adapt to a new situation.

The prototype of such a Polish-origin Martian outpost will be used in a manner similar to MDRS or FMARS but to a larger extent. The prototype’s design itself will be tested and corrected to achieve a design which can be used on Mars. The procedure of unfolding the pneumatic modules and floor leveling will be tested. The 1000 m<sup>2</sup> interior will be used for various simulation exercises: socio-psychological testing, interior arrangement experiments, agricultural simulations, growing plants in Martian conditions and other kinds of tests.

The presented prototype focuses on the ergonomic and psychological aspects of longer stay in a Martian environment. It provides the Martian crew with a comfortable habitable space larger than DRM modules. The practical proposal is to send this base to Mars in a DRM transportation module after prototype testing is completed. The author hopes that this or other similar Martian base designs will help in establishing a permanent presence of humans on Mars.