Building Materials For Interplanetary Stations

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A new technology developed by Russian scientists with support of the International Science & Technology Center allows to produce antennas and telescope mirrors, walls and partitions for a space station, solar panels and even houses on the Moon or the Mars. All the above can be produced quickly, strongly, reliably, with minimal consumption of time, place, energy and money.

These building materials or rather peculiar semi-manufactured articles for future constructions will be brought to space in compact waterproof containers. They will look like plain damp sack in a dense packet. One of them might carry an inscription “Dwelling unit partition # … ”. The second will likely contain a worktable. The third – the telescope mirror. There may be a lot of options, but the way they will look like is not essential. It is important that at the station the semimanufactured articles will be connected to a compressed gas can and inflated. And several hours later, the soft damp cloth would turn into hard solid material in the form of a table, partition or antenna.
Such pneumatic hardening constructions have been invented for use in space by the specialists of the Babakin Research-and-Development Center (Lavochkin Research-and-Production Association). The technology was developed with support of the International Science & Technology Center. The developers suggest that these lightweight and strong materials should be used for construction of partitions in the space stations (so far, orbital stations), and in the future – lunar and martian stations. They are certainly not intended for the shel or roof paneling, but for internal partitions, walls, bulk installations like solar

panels, antenna or telescope mirror.

“One of the major construction problems in space is certainly delivery of materials and construction components, says Sergei Ivanov, project manager, chief specialist, Babakin Research-and-Development Center (Lavochkin Research-and-Production Association). Their weight and volume are a challenge.” That is obvious. Transportation of each kilogram of cargo from the Earth to the orbital station, let alone the Moon or other planet, involves tremendous energy and accordingly financial spending. Building the International Space Station has already required transporting into space hundreds of tons of cargo, and the station has been under construction for more than 5 years and it is not finished yet. The same applies to volume.

Bulk constructions as a whole will not find room on board the spaceship. That means that these constructions have to be conveyed piece-meal and then assembled in the orbit. Sometimes, this is extremely complicated, particularly for constructions that require special degree of assembly precision. First of all, that relates to parabolic dishes and telescope mirrors as their diameter is measured in dozens of meters, any distortion of their surface may cause mistakes, sometimes irreparable ones.

“As a matter of fact, our technology is simple, the developers say. We form the further article from a special lightweight and solid cloth on the Earth. We cut out, sew, paste. We put the article into required shape and thoroughly control it. We put inside something like a rubber bladder, similar to a football bladder. The material is impregnated with a special solution. A semimanufactured article of the future antenna or partition is ready. Now it has to be fold up, packed hermetically, delivered to the destination and inflated.”

The zest is that when drying up the solution hardens and transforms the impregnated material into a solid, tough and uninflammable “armour”. It

should be noted that in space, i.e. in vacuum, water will fly away by itself, without any assistance. The compressed gas would perform double work – it would unfold the article and put it into shape. Therefore, there is no need for additional energy consumption to inflate the construction and to solidify its form."

So far, such pneumatic solidificated constructions have not been in space. The researchers are optimizing impregnation composition, selecting the best materials for the basis, defining technology details. It is interesting to note that space vacuum conditions are being simulated simply by drying. However, it is clear now that new materials do not yield to traditional ones in durability, but at the same time these materials will be several times lighter. It is possible that the terrestrials will build the first house on the Moon or the Mars from these materials according to the technology developed in the Babakin Research-and-Development Center (Lavochkin Research-and-Production Association).

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