

IAF Committee Briefs



Winter 2024

IAF SPACE HABITATS COMMITTEE (SHC)

Committee activities

The Committee will keep organizing its yearly webinar (usually in January) to help SHC members connect and share ideas between the IAC and the Spring Meetings. After the successful publication of its 2023 article in ROOM magazine, the Committee will also explore other platforms to publish a 2024 research paper featuring projects developed by SHC members. Committee members are gearing up for the 2024 IAC in Milan, including by organizing side events in space art, architecture and design to facilitate networking and inspiration.

All Committee members are working on exciting projects that aim at advancing innovation and feasibility in the field of space habitats. This edition of the Committee Brief highlights the following project: TERRA LUNARIS.



Image 01: Inflating Procedure.
Credits: Dirk Schumann, Schumannndesign.

"TERRA LUNARIS: concept for a lunar habitat", developed by Schumannndesign – Terra Lunar is a study for a lunar habitat using non-flexible construction elements, inflatable outer shell structures and variable elements for subdividing the interior of the habitat to make it properly functional and utilizable. The habitat is designed for deployment on the moon's

surface, which enables a much less massive and more lightweight construction as the effect of gravity on the moon is far less than on earth, namely by a factor of 6. The concept enables a minimized transport volume to be transformed into a utilizable volume that is many times greater, thanks to an automated configuration process conducted at the final deployment location. A core element of the habitat is the solid framework structure, together with the engine segments located externally on each side and comprising the fuel tanks needed for operation of the braking thrusters for the descent onto the moon's surface and, in the upper part of the segments, thrusters for correcting the trim during landing. The second key aspect of the concept is the possibility to avoid the need to equip the large utilizable space of the module retrospectively by bringing in the required interior elements from outside, but instead to already include 90% of these interior elements in the initial configuration and then simply take them into operation through straightforward, mostly manual work procedures.



Image 02: EVAs. Cooperative International Workshop for Advances Space Architecture, September 2024.
Credits: TU Wien.

Another interesting collaborative international design initiative is the collaborative workshop between two major educational partners SICSA University of Houston, and TU Wien, EMBA for Space Architecture program. Sharing expertise and resources will accelerate progress in the field of space architecture.

AXIS

WORLD'S
DESIGN
MAGAZINE

多様な人びとと、共に考え、共につくる
A society conceived and created with a diversity of people

特集
Feature

CITIZEN- CENTERED DESIGN



6

June 2022 | vol. 217



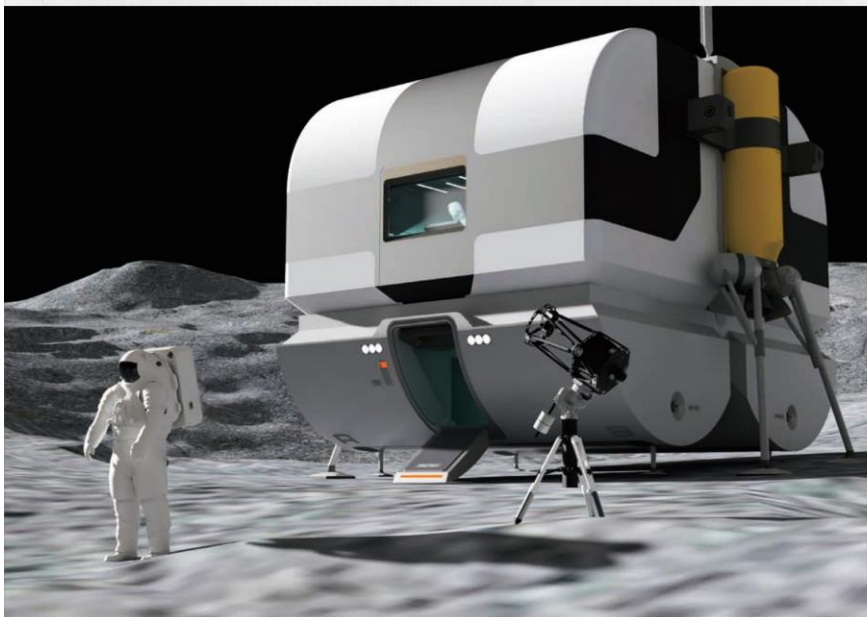
ダーク・シューマン

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1987年ドイツ・ヴェストファーレン・ヴィルヘルム大学卒業。91年ミュンスターにシューマンデザインを設立。ドイツ、イタリア、インド、タイ、中国企業のクライアントを持つ。15年には中国・廈門市に支社シューマンデザイン&ワンを開設した。06年よりドイツとシンガポールのレッドドットデザイン賞、台北国際デザインアワード、中国ゴールドロード・インダストリアルデザイン賞などの審査員を務める。自社の取り組みとして、水中や宇宙の建築物のプロジェクトを行っている。

Graduated from the department of the University of Münster, in Germany in 1987. Established Schumannndesign in Münster in 1991. Works in the field of industrial design for corporate clients in Germany, Italy, India, Thailand and China. Opened a branch office, Schumannndesign & Wang in Xiamen City, China in 2015. Schumann has served on various design juries since 2006, including the Red Dot Award in Germany and Singapore. Alongside these activities, Schumannndesign additionally concerns itself with freelance projects in the fields of underwater and space architecture.



The Terra Lunar project is the third design concept to be developed by Schumannndesign Studio in the field of space architecture and space technology. The primary focus of the project is on the practical feasibility of creating a lunar habitat that takes up a minimum of transport space while subsequently offering maximum interior volume, i.e. living space, for the occupants. By combining solid modular components with an inflatable shell structure, the inside volume available for use as habitable space is almost four times that of the transport volume.

The habitat comes already equipped with pre-installed interior elements, which fold out and make up around 90% of the interior. This therefore almost completely avoids the complex and costly task of fitting such elements after erection of the shell. The interior layout of the habitat encompasses technical and research areas, communal spaces for the crew members, sleeping quarters, and an observation deck.

In the design of habitats of this kind, technological requirements play a leading role. However, psychological factors are also a consideration of major importance as the team members find themselves in an extreme living environment. The design therefore also pays close attention to emotional aspects, supporting a sense of safety and wellbeing on the part of the occupants.

We need to approach this not only on the technological plane, but also express our cultural stance and identity in the means of transportation and the habitats that will make this widening of our living environment possible.

「テラ・ルナリス(球と月)」は、シューマンデザインが宇宙建築とテクノロジーの分野で展開する第3のデザインコンセプトです。このプロジェクトの主要な点は、月面での居住の可能性を探り、飛行のために必要なスペースを最小限に抑え、一方で乗組員への居住スペースを最大限に確保することにあります。硬いモジュール部品と膨らむシェル構造の組み合わせによって、居住スペースとして利用できる内部空間の容積は、飛行スペースのおよそ4倍の広さになります。

居住空間にはあらかじめインテリア要素が折り込まれ、すでに90%ができ上がっています。それなので、シェルを組み立てた後に複雑で費用がかかる部材の取り付け作業はほとんどありません。インテリアのレイアウトは技術・研究工

リア、クルーのメンバーの共同スペース、睡眠をとる場所、そして展望台で構成されています。

このような空間の設計はややもすると技術的な要求が主役を演じることになりがちですが、厳しい環境に身を置くクルーのメンバーにとって心理的な要素もまた重要だと考えました。それなので心理面にも細心の注意を払い、住む人の安心感やウェルビーイングをサポートするデザインとなっています。このように、私たちは生活環境を地球を超えて広げようとしています。

私たちの生活環境の広がりを実現するための移動手段や居住空間にも、技術面だけでなく文化的なスタンスやアイデンティティを表現するアプローチが必要とされているのです。

