

CONTEMPORARY POSSIBILITIES AND PROSPECTS OF SHAPING UNDERWATER RESIDENTIAL HABITATS ON THE EXAMPLE OF THE ORIGINAL PROJECT *GENESIS*

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ABSTRACT

The Genesis Project was the first experiment aimed at enabling people to live underwater. It was inaugurated in 1950 by Dr. G. Bond and the US Navy, paving the way for the development of underwater settlements [1]. The purpose of this presentation is to showcase contemporary and future possibilities for shaping underwater residential habitats, using the speaker's master's thesis as an example. The project's principles build upon the legacy of past research and expand on their ideas by fully harnessing the potential of the oceans for humanity's development without causing ecological harm.

The Genesis scientific-residential base, as a habitat entirely independent from the surface, is designed to facilitate the exploration of the seafloor without limitations of time and space. For this reason, the concept encompasses two types of facilities: main bases and residential units.

Main bases serve as megastructures that supply energy and food to the residential units. Their placement is determined by the location of energy sources and raw materials. Situating the bases near ocean currents and sources of heat allows for efficient energy extraction from the surrounding environment. This also enables energy production from hazardous phenomena such as tsunamis, hurricanes, and tornadoes, which will positively impact land-based cities by reducing their vulnerability. Hydrothermal vents are a rich source of many resources emitted in streams of dense solutions. Genesis allows the extraction of these resources without any interference with the natural environment, thereby creating an ecological alternative to traditional mining industries. To optimize energy and resource intake, the Genesis base was designed

as a mobile, double spiral that can change its shape and location depending on the availability and concentration of resource sources. The base's span at a depth of several hundred meters enables efficient exploration of multiple levels of the seafloor simultaneously. After a few hours of observing a coral reef, a quick change of position is available to analyze bioluminescence in dark areas of the water. Genesis significantly shortens the time researchers spend on daily trips to the ocean floor while avoiding spending many days in darkness.

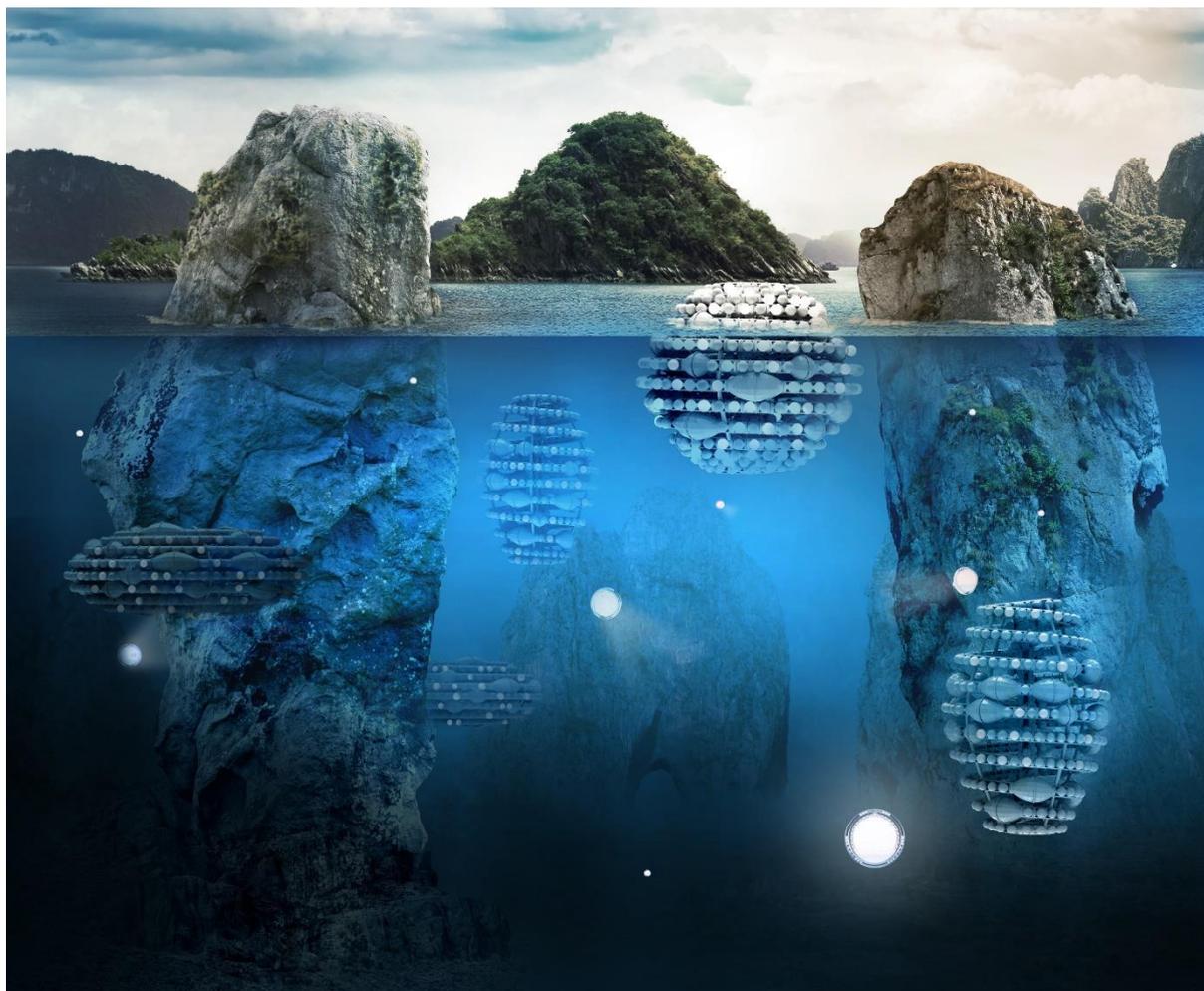


Fig. 1. Genesis – view of the base layout. Division into residential units (spheres) and main bases (spirals). Author: Katarzyna Przybyła.

While main bases are limited to energetical sources, residential units can move freely in the remaining ocean areas. Exploration of the ocean is carried out in private submarines, which also serve as residential habitats. The combination of both functions allows residents and tourists to travel to the depths of the ocean without leaving their beds, while scientists can embark on multi-day expeditions, using them as their own

laboratories. Due to the scale of the oceans, it will be necessary to use civilian units for research, equipped with appropriately automated technology for data collection or sample gathering. The habitat's construction ensures atmospheric pressure underwater, eliminating the need for decompression upon leaving the facility on the surface. The open platform system visually expands the interior, reducing potential feelings of isolation. The floor layout provides a panoramic view of the surrounding nature, while limiting access to private areas. The double geodesic dome efficiently transfers high pressure, and the axial engine belt construction allows residents to change direction freely. Thanks to the implementation of a closed-loop system, both the bases and residential units are ecologically self-sustaining.

RESIDENTIAL UNIT

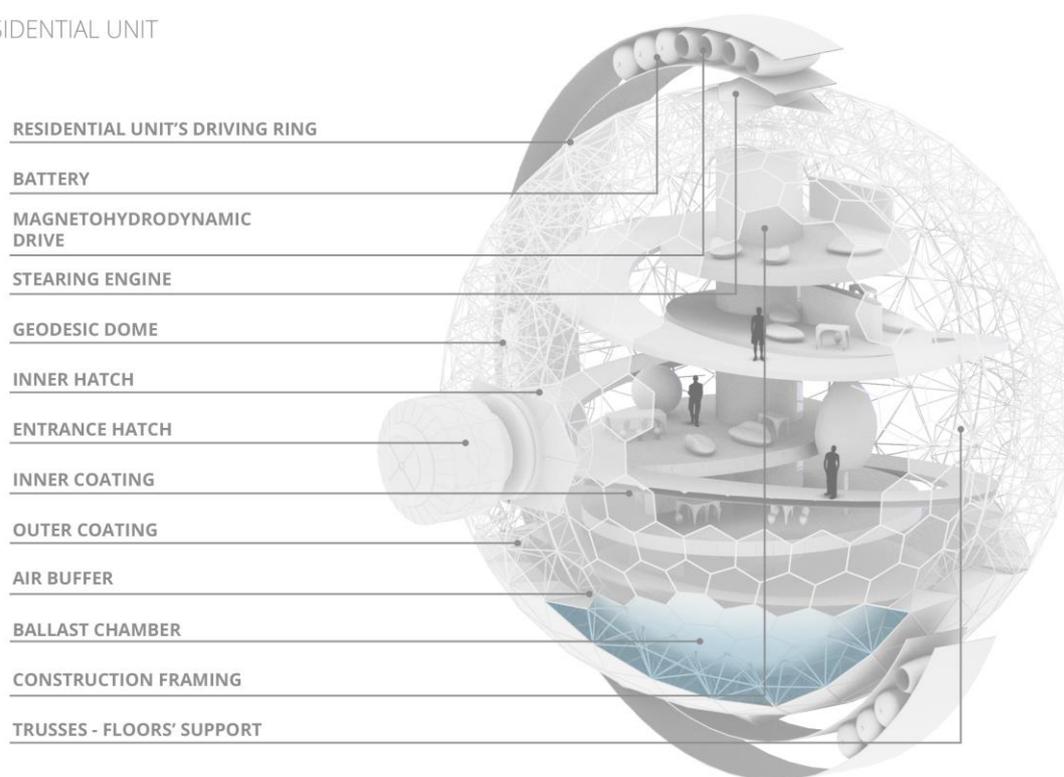


Fig. 2. Axonometric diagram of residential unit. Author: Katarzyna Przybyła.

REFERENCES

[1] J.W. Miller, I.G. Koblick, *Living and Working in the Sea*, Five Corners Publications 1995, s.15-24.