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THE CONCEPT OF ORTHOGONAL RING STRUCTURES IN THE ARCHITECTURE OF
PROSPECTIVE MANNED SPACE STATIONS

Abstract

The fundamental "Plan of Human Conquest of Space", which was first formulated by K.E. Tsiolkovsky in 1926, consists in the fact that the main form of human expansion into space is the creation of fully artificial space settlements. According to this plan, the increasing volume of scientific research, organization of space production, assembly of space transportation systems for Moon and Mars exploration will require the creation in the LEO of habitat for a cluster of teams, each united by a common area of activity, and all together united by a common goal. The creation of a new generation of space stations (SS), designed for large crews, requires new layout solutions. The historical experience of human development of terrestrial space shows that the process of evolution in nature of any significant spatial structures created by him, such as settlements, at the end of each cycle of development ends with the formation of a self-sufficient and stable ring structure. The same pattern can be traced in the process of spatial evolution of communications: from line - to branch, from branch - to loop, from loop - to ring. Each such transition is accompanied by a dramatic increase in the intensity and reliability of communication. At the present stage of manned SS development branch structures along three orthogonal axes prevail. Following the logic of spatial and communication deployment of terrestrial structures created by human society, we can argue that the next stage of the SS development will begin the process of creating ring structures. In the process of evolution, humans has an orthogonal axial structure of the body. During the development of earth civilization, this orthogonal axial layout has permeated all kinds of activities and many man-made forms. The history of urban planning shows that the rounded perimeter arises in large cities developing naturally over many years. Individual buildings, settlements and small cities built on a single plan are characterized by a clear orthogonal axial structure whose boundary is usually designed as a square. Based on the above presented general logic of development of structures forming the space of human life activity, the authors propose for the modern stage of manned SS design evolution the ring layout, a familiar to man orthogonal axial structure with a closed rectangular contour. The paper presents possible schemes for evolution of an orthogonal branch structure of the SS into an orthogonal ring structure.