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# BALANCED ARCHITECTURE: OPTIMIZING HUMAN HABITABILITY AND SPIN STABILITY IN AN ARTIFICIAL GRAVITY SPACE STATION

**Abstract**

To facilitate the expansion of humans throughout the solar system, Vast is developing space stations that produce artificial gravity via large-radius rotation. All of Vast's space stations provide large-radius rotation via rotation of the entire station, as opposed to a smaller portion within. Due to the complexity, cost, and schedule associated with constructing a wheel-like space station, as well as our species' current lack of information regarding key wheel-station parameters such as acceptable radius and rotational rate, Vast's initial space stations will be of a geometry that is not inherently spin-stable, necessitating active spin management. Nevertheless, spin management is significantly facilitated by working within the existing geometrical constraints to make the station as "wheel-like" as possible via judicious mass distribution. This priority is sometimes, but not always, at odds with the need for the internal volumes to be functional and comfortable spaces for human habitation. This paper explores how Vast is availing itself of the inherent synergies that exist between habitability and stability, and overcoming the conflicts.