

IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Interactive Presentations - IAF MATERIALS AND STRUCTURES SYMPOSIUM (IP)

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EVOLVABILITY OF COMMERCIAL SPACE OPERATIONS THROUGH SOFTGOODS
TECHNOLOGY ADVANCEMENTS

Abstract

Commercial Space is rapidly evolving with emerging space markets and broad interest in habitation development opportunities. Addressing this growing economy requires the on-orbit presence of multi-use environments, similar to the International Space Station. This enables support functions for diverse payload sets, governmental and civilian human visitors, on orbit assembly and manufacturing in various scenarios including robotic, human tended, and autonomous/remote operations. Under this evolving paradigm, a full-service tailorable customer experience within the habitation volume, coupled with a configurable transportation platform to provide goods and services, enables breakthrough capabilities in these commercial platforms. In order to support a variety of disparate functions for different customers, the ecosystem of services should be diverse and scalable. The ability to scale and evolve on-orbit habitation through a broad offering of human and automation services enables realization of the vision of humanity living and working in space.

Inflatable softgoods systems provide scalable, expandable, and innovative systems that can accommodate various missions such as Low Earth Orbit (LEO), lunar surface, lunar orbit, and deep space. Softgoods systems based on scalable and inflatable architectures that leverage commonality, low mass to volume ratios, and modular interior systems are highly innovative for commercial space operations. As softgoods inflatable technology matures and moves through the qualification and certification processes, we will see global acceptance and adoption of this technology. In order to accelerate and gain acceptability, the following is recommended:

- Development of common softgoods architectures based on acceptable materials at a component level
- Development of scalable and expandable habitable volumes to meet mission parameters
- Effectively utilize of volume through interior re-configurability and commonality
- Full-service experience providing an ecosystem of expected services for the various payload manufacturers and diverse customer groups
- Integration of features such as handholds, windows and ports into softgoods structures to provide similar benefits as rigid structures

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Sierra Space is developing the LIFETM habitat (Large Integrated Flexible Environment) to enable advancements in commercial space station operations. The LIFE habitat implements advanced softgoods inflatable technology in its design, materials and application, and it will establish Sierra Space as the premier softgoods fleet leader.