

HUMAN SPACE ENDEAVOURS SYMPOSIUM (B3)
Overview Session (Present and Near-Term Human Space Flight Programs) (1)

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ANALYSIS AND MODIFICATION OF HISTORICAL UNITED STATES SPACEFLIGHT CAPSULE
DESIGNS FOR IMPLEMENTATION IN FUTURE COMMERCIAL LAUNCHES

Abstract

In fulfillment of the requirements of a senior Mechanical and Aerospace Engineering (MAE) capstone design class at the University of Alabama in Huntsville (UAH) a review and analysis of past United States (US) spaceflight capsule designs has been conducted. Additionally, recommendations are made for future capsule designs with a focus upon the structural design, interior space, astronaut safety, and ergonomics of the capsules. Attention is focused upon ocean splash-down recovery after re-entry of the space capsule from Low Earth Orbit (LEO). This type of landing was utilized on all prior United States (US) spaceflight missions and was not perfected to optimal conditions that ensure astronaut safety. Despite the issues, errors, and failures associated with the past capsules there is a movement back to capsule utilization in both the commercial and private sector, such as NASA's Orion Program. The present paper describes the past problems, errors, and design flaws pertaining to the Mercury, Apollo and Gemini capsules. Additionally, a review is provided regarding how the Orion capsule has been designed to remedy past problems and why it is the most viable replacement to the space shuttle. Finally, it is proven that the space capsule can be the most efficient spaceflight tool based on cost, design, testing, safety, and ergonomics.