SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS (D2)
Commercial Human Spaceflight Safety (9)

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ASTRIUM SUBORBITAL SPACEPLANE PROJECT: SAFETY FIRST

Abstract

Since several years, Astrium is preparing the development of a safe and passenger friendly Suborbital Spaceplane, taking of and landing from a standard runway powered by turbofans, and using a rocket engine of proven design to get enough energy for traveling to 100 km altitude. From the very inception of the program safety was considered as a must for the project. Then from mission design to vehicle features and matters as crew licensing in between, safety is at the heart of every trade-off performed all along the System product breakdown structure of the program. A very straightforward example is the choice of the general architecture of the vehicle and then the mission design. Basically three options for general architecture are possible :

- Expendable design (multi-stage or not) with an Apollo capsule like on top
- Multi-stage winged design
- Single vehicle winged design

Concentrating on first option, Astrium concluded that safety level during last phases of the mission and braking maneuvers using a combination of different products (parachutes, braking rockets, e.g.) would be not properly manageable and this option was discarded disregarding other aspects as passenger comfort and Life Cycle Costs perspective. Second option is more attractive from a pure safety standpoint. Anyway major hurdle to overcome is the transient phase at separation from carrier aircraft and "space stage" and the potential issue of rocket engine not ignited and the returning phase to ground. At the end of the day, Astrium stated that a single vehicle combining aero-like propulsion and rocket engine was the best option when concentrating on safety especially : at every phase of the mission, the vehicle may shift to previous phase without any impact to safety level thanks to the basic design guidelines relying heavily on aeronautic state-of-the-art. The paper will detail why and how Astrium addresses safety standpoint of the program. Differences with legacy launch systems will be enlightened as well.