

IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Technologies for Future Space Transportation Systems (5)

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SPACECASE : DEVELOPMENT OF A COMMERCIAL TEST PLATFORM FOR REENTRY
EXPERIMENTS.**Abstract**

The space business is a more and more competitive market; this context forces space industry to innovate, develop and validate their solutions much faster than before. If project timeframes are an obvious target for complex space systems, all these systems rely on a large number of sub-systems and components for which the time-to-market development is a critical issue.

The SpaceCase project proposes a reentry Capsule as a flexible and affordable in-flight test platform, that allows leading experiments and validating technology during a flight of space components developed by space stakeholders. A considerable number of environmental solicitations can be proposed, as this SpaceCase capsule is able to be integrated both in heavy launchers and on sounding rockets, depending on the customer's experiment environmental requirements. The SpaceCase project can also provide support to the design of the customer's experiment itself.

Current opportunities to perform a space flight are scarce, expensive, and imply a very long lasting preparation. The SpaceCase project is the opportunity to propose a new test means which fills this gap and becomes part of space actors roadmaps when dealing with space products and technologies development. It can be considered as a major partner for in-flight experimentations.

ArianeGroup initiated in 2021 the development of the first SpaceCase demonstrator (named SC-X01) to demonstrate the capability of this space system to be a passenger during a nominal launch. This demonstrator includes basic functions such as the ability to generate and retrieve through telemetry experimental data collected during the flight, the capability of the capsule-like platform to integrate new TPS (Thermal Protection System) materials and architectures, and the compatibility with launcher interfaces and constraints, as well as regulatory constraints (i.e. safeguard). ArianeGroup targets to finalize SC-X01 development and demonstration in 2022/2023 by a first flight test.

In parallel, a second demonstrator is initiated via a European partnership to develop additional functionalities related to the commercial demand to physically recover the embarked payload. The SC-X02 capsule is also the support for the development of parachute systems, among other capabilities. It also aims at aligning its own objectives with environmental objectives, integrating materials which manufacturing processes are constrained by specific "green" requirements.

These two capsules allow validating the critical technologies needed for potential customers (agencies, private companies, laboratories, universities. . .) to increase their own product TRL (Technology Readiness Level).

ness Level). In particular, the step to shift from TRL6 to TRL7 implies an experiment in a realistic environment, which becomes affordable thanks to the SpaceCase project.

The SpaceCase capsule can be considered as a development tool which can be used by any kind of space actor and able to make:

- TPS experiments,
- Aerodynamic experiments,
- Product/Equipment development and qualification.

A future upgrade of the SpaceCase project is also to integrate experiments which would need to “stay” in space, in addition to performing a reentry under specific conditions. Microgravity, radiation, vacuum are specific physical parameters which are of high interest when it comes to orbital missions, organism development in space, etc. The Space case project has the long term goal to allow staying a few weeks/month in space offering a variety of space-like environments.