

Title: **High Environmental Compatibility Cargo Projectile: project development and experimental tests**

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The goal of this technological research program has been the development and test of a cargo projectile demonstrator, able to carry a generic payload of about 3 kg over about 300 m distances. The main capabilities required to the projectile are: high precision, low cruise speed and high environmental compatibility. The concept design phase and the aerodynamics studies have been presented in 2005 NLW Symposium at Ettlingen.

In this paper they are described: design and development of the selected configuration, technological demonstrator realization, test campaign data.

During the development phase they have been defined: vector configuration and parachute-based guidance and braking system, navigation and control system, system layout design including propulsion, airframe structure and auxiliary systems (launching system and mission system). The design activities have been carried out by means of tailor-made mathematical models and algorithms.

During the development, some criticalities have been focused with respect to system dynamics and criteria have been found to select and plan experimental tests, able to identify demonstrator performance.

The test phase has determined the validation of the design studies and the feasibility of the control system during the gliding flight phase. A 3 Kg mass technological demonstrator has been built with a gliding parachute system which was tailored in order to satisfy technical requirements. By means of miniUAV's, the demonstrator has reached a predefined altitude and then it has been released in order to control and monitor the landing phase. Tests have confirmed all the indications which were focused during the developing phase. The use of a tailor-made gliding parachute keeps the cargo projectile almost independent of environmental conditions; trajectory errors can be corrected and desired landing velocity and position can be achieved.