

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Future Space Transportation Systems Verification and In-Flight Experimentation (6)

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ESA INTERMEDIATE EXPERIMENTAL VEHICLE SYSTEM SYNTHESIS TEST. DESIGN,
VERIFICATION AND IMPLEMENTATION.**Abstract**

The ESA IXV re-entry project is currently undergoing the subsystems qualification and system integration phases phase, heading a launch campaign in 2014. As a key part of the System verification process a Synthesis Drop Test is performed in 2013 with a full scale test vehicle equipped with the real IXV flight Descent and Recovery system. Indeed, the last years have shown how critical it is, in the field of the re-entry spacecraft developments, to reach a high level of confidence for the descent, landing and recovery phase and it already happened in past international programs that important missions have been jeopardized by failures in this phase. Testing in a fully representative environment is the only way to verify the robustness of this phase. This paper describes the full process of design, verification and operational implementation of the System Synthesis Test. The test is performed in the Italian military area of PISQ in Sardinia. A CH-47 helicopter drops the full scale IXV mock-up from an altitude of 3000m and, after a free fall phase, the IXV main parachute opens in conditions representative of the real flight. The on board avionics command then the descent sequence from the jettisoning of the floatation panels up to the detection of the splashdown, that is operated via a flight-like algorithm, and the consequent activation of the recovery balloons up to the final cutting of the parachute bridles and the switching off of the power units to allow a safe recovery thus reproducing the same timeline of the real mission. Two beacons embedded in the floatation balloon system in flight configuration allow to exercise the localization and recovery operations. Moreover, the test also allows the reconstruction of the splashdown mechanical loads by means of accelerometer and pressure sensors installed on the test vehicle that is fully representative of the real IXV in terms of shape and mass properties. The IXV System Synthesis test preparation and implementation is carried out by Thales Alenia Space – Italy as prime contractor of the IXV project with the support of several partners of the IXV industrial consortium. Among these, the Italian Aerospace Research Center (CIRA) has developed the dedicated avionics system, the flight chain and it is in charge of the test operational implementation.