Paper ID: 28937
oral

SYMPOSIUM ON COMMERCIAL SPACEFLIGHT SAFETY ISSUES (D6)
Enabling safe commercial spaceflight: vehicles and spaceports (3)

Author: Dr. Francesco Santoro
Altec S.p.A., Italy

Mr. Alberto Del Bianco
Altec S.p.A., Italy
Dr. Alessandro Bellomo
Altec S.p.A., Italy
Mr. Giovanni Martucci
ALTEC Spa, Italy
Mr. Franco Fenoglio
Thales Alenia Space Italia, Italy
Dr. Nicole Viola
Politecnico di Torino, Italy
Ms. Roberta Fusaro
Politecnico di Torino, Italy
Mr. Francesco De Vita
Politecnico di Torino, Italy
Mr. Norul Zakaria Ridzuan
Space Tourism Society Malaysia, Malaysia

APPROACHES TO DEVELOPMENT OF COMMERCIAL SPACEPORT AND ASSOCIATED GROUND SEGMENT DRIVEN BY SPECIFIC SPACEPLANE VEHICLE AND MISSION OPERATION REQUIREMENTS

Abstract

This paper addresses approaches to evaluation of commercial Spaceports solutions, starting from specific customer needs and related to the case of a small reusable vehicle able to carry people or microgravity payloads on parabolic flights to 100 Km of altitude. The approach to the Spaceport evaluation and selection is based on the vehicle concept and associated technologies, as well as on the spacecraft reference mission scenario, in particular takeoff, landing and trajectory. With the aid of a proper functional analysis and concept of operations, specific requirements to the Spaceports capabilities will be derived for the selected reference mission, with emphasis to launch and landing operations (runway, length, width), location, climate, proximity of alternate landing sites, handling, use, storage and transportation of propellants, layout, safety. For the selected test case, rather than designing a brand new Spaceport, the used approach will start from the assessment of specific existing sites and infrastructures, and will eventually identify follow on upgrades to fulfill the relevant mission requirements, including some preliminary contingency scenarios during operations that may be driving specific Spaceport requirements. Also, new concepts of spaceports will be evaluated to enhance operations flexibility for commercial purpouses, which include sea and land based configurable platforms for VTOL Operations and associated infrastructures. The approach to the development of the Spaceports Safety analysis, of a proper Safety Risk Management and the operations integration within the applicable National Regulatory system and requirements will also be evaluated, in accordance with the relevant mission requirements. The application of Safety analysis and in general of the safety criteria will be paramount in the assessment of existing infrastructures and

in the identification of requirements to possible modifications and enhancement of specific capabilities. In particular, Safety Assessment will take into account the Spaceport existing layout, with reference to the closest populated area and traffic road, for the definition of minimum distance related to the use and storage of propellants or explosives needed for the spaceplane. The Spaceports evaluation will include a preliminary definition of the concept of a Ground Segment that provides the functionalities to support the reference mission both on ground and on flight. Ground Segment includes the ground facilities and tools that support the operations at the Spaceports, the Mission Control Center, and the Ground Stations to track the vehicle trajectory with the associated communication approach. Further considerations on future market trends will also be developed.