

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Future Space Transportation Systems (4)

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ANGELA - A NEXT GENERATION LAUNCHER

Abstract

With Ariane5, Europe possesses a launch system that guarantees independent access to space and is the most reliable in the world. However, it can only endure the commercial market with a financial support via the EGAS program. For the Ariane5ME Version this support will be reduced by increasing the payload capacity while keeping the same launch price. In the next step Ariane6 should be able to endure without this support.

A decision on the Ariane6 configuration and its development was expected to be taken after the finalization of A5ME development at the ministerial conference end 2015. The main objective of the ANGELA project is to give a technical and economical assessment and develop a German vision on the preferred launcher concept with the main focus on minimizing operational costs.

All concepts have a cryogenic (LH2/LOx) upper stage using the VINCI expander-cycle engine. The differences in the concepts that were chosen to be assessed can be found in the lower stage: either it is a cryogenic lower stage equipped with a staged-combustion engine or two Vulcain-2+ engines or solid stages/boosters are foreseen.

The three main phases of the project are a predefinition phase, a configuration phase and a consolidation phase. The project started in August 2012 and will last for 3.5 years.

At the end of 2012 it was decided during the European ministerial conference to start Ariane6 development in parallel with A5ME development. Maiden flight was set to 2021. The concept with multiple equal solid stages (multi-PH concept) was chosen to be developed. The decision, however, is not undisputed, which for instance was shown by an open letter of the Europe's Air Space Academy saying that it is a dead-end design that does not permit the flexibility needed.

The predefinition phase of all three concepts was finalized begin 2013 and the concept with the lower-stage staged-combustion engine was discarded since the development of such an engine cannot be finalized before 2021 and such a complicated system will not be cost efficient.

The multi-PH concept is a new concept that brings unforeseen problems during its development. The cryogenic HH-TwinVulcain2+ is more or less comparable with Ariane5 and has therefore less unforeseen problems. The ANGELA project gives the possibility to still assess both configurations.

This paper describes the results of predefinition and configuration phase of the ANGELA project.