

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Launch Vehicles in Service or in Development (1)

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ADAPTATION OF LAUNCHERS FOR THE DEPLOYMENT OF THE GALILEO SATELLITE
NAVIGATION CONSTELLATION

Abstract

Eighteen operational satellites of the Galileo Satellite Navigation Constellation have been deployed so far and further launches are planned to take place in the 2017 to 2020 time frame for completion of the constellation with 30 satellites in total.

Two launchers are used to deploy the satellites: Soyuz ST-B and Ariane-5 ES. In order to cope with the specific injection requirements of the Galileo MEO circular orbits, the extended mission duration and required performance, the launchers and their upper stages had to be adapted and specific launch dispensers had to be developed. These dispensers allow to mount the satellites in pairs (Soyuz) or in quadruple configuration (Ariane) on-top of the launcher and they assure the controlled separation of the satellites in their final orbit positions.

On the Soyuz ST-B launcher, a modified third stage has been considered, the Fregat MT upper-stage fuel tank capacity has been increased and the launch pad facilities at the European Spaceport in French Guiana have been adapted. These modifications allow the Soyuz ST-B to launch the dual satellite payload stack into its circular MEO orbit position and it has become the baseline launcher for the Galileo satellite deployment.

On the Ariane-5 ES launcher, which is a heritage from the Automated Transfer Vehicle (ATV) deployment, modifications were extensive. A lightweight vehicle equipment bay has been installed, the upper stage system design was revisited, a medium size fairing was installed and the solid rocket boosters have been production matched. These modifications allow to launch the quadruple satellite payload stack into its circular MEO orbit position with outstanding precision.

In order to cope with the Ariane-5 mechanical load environment, satellites had also to undergo a delta qualification program, requiring a specific 'end-to-end' analysis approach, involving both the launcher and the satellites, to adequately share the available margins.

The presentation will focus on the adaptation program of the Soyuz ST-B and of the Ariane-5 ES launchers and it will provide details on the combined launcher and satellite qualification. Further to this, an outlook will be provided onto the introduction of the new Ariane-62 launcher, which is under consideration for the future deployment of the Galileo satellites. The presentation will conclude with a concise overview of the Galileo Satellite Navigation System deployment planning and the constellation status.