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A TECHNICAL OVERVIEW OF A SKYLON BASED EUROPEAN LAUNCH SERVICE OPERATOR

Abstract

The paper gives an overview of the technical conclusions of the "Feasibility Study of a SKYLON Based European Launch Service Operator (S-ELSO)" conducted for the European Space Agency by an industrial consortium.

SKYLON is a fully reusable single stage to orbit launch system under active development and is expected to reach operation in the early 2020s. The objective of the study was to explore the feasibility of SKYLON as the basis for a launcher that meets the requirements established by ESA for the Next Generation European Launcher. The purpose of the study was to support ESA decision making on launch service strategy by exploring the potential implications of this new launch system on future European launch capability and the European industry that supports it.

In addition to the SKYLON spaceplane, S-ELSO would also require a spaceport, payload carriers and an upper stage.

The spaceport studied was Centre Spatiale Guiana (CSG) at Kourou. The study showed that the provision of new facilities, like SKYLON servicing buildings and a 5 km runway, and the links with existing CSG services such as payload preparation and propellant supply were feasible.

Concept designs for two payload carriers were produced. These attached to SKYLON by the trunnion interface and act as adaptors for payloads requiring different interfaces. The SKYLON Small Payload Carrier (SSPC) that could carry several small payloads ranging from small satellites (below 500 kg) down to Cube satellites carried in the standard P-POD deployment system. The SKYLON Large Payload Carrier (SLPC) carries payloads up to 10 tonnes using a standard ring interface (called USIS) that will not only be able to deploy the payload but also recover them for return to earth.

Most payloads need to go beyond low earth orbit and thus require a SKYLON Upper Stage (SUS). A concept design was produced for the SUS using the SKYLON's orbital manoeuvring engines and the USIS interface, and has a launch mass of 9 tonnes including 7.5 tonnes of hydrogen and oxygen propellant. It is deployed with the satellite from SKYLON in LEO, then with suitable phasing orbits, the SUS can deliver 6.4 tonnes to Geostationary Transfer Orbit (GTO) and then return to the SKYLON that launched it for return to Earth. The study showed that required mission model could be met by 10 flights per SUS with the last flight in an expendable mode which can place 8 tonnes into GTO.