IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Technologies for Future Space Transportation Systems (5)

Author: Ms. Kathleen Blyth
Absolut System, France

Mr. Jérôme Lacapère
Absolut System, France

CRYSALIS – THE INITIAL DESIGN OF A EUROPEAN CRYOGENIC STORAGE AND REFUELLING IN-ORBIT DEMONSTRATOR

Abstract

In-orbit transfer and long-term storage of cryogenic propellants will be key technologies for enabling a European in-space transportation ecosystem consisting of depots and orbital vehicles. Such an eco-system will be key to ensuring sustainable, long term manned missions to Mars and the moon. However, the low saturation temperatures of cryogenic propellants introduce additional challenges in their management.

At present, neither long-term storage nor refuelling with cryogenic propellants has been demonstrated in-orbit, and the technologies and processes necessary lack maturity in Europe. CRYSALIS (CRYogenic Storage And Refuelling In-Space) is an EU collaborative project between Absolut System, The Exploration Company, the Universitat Politècnica de Catalunya, and the Université de Liège, to mature the technologies and processes necessary for the storage and transfer of cryogenic propellants, in particular liquid oxygen and liquid methane. The project aims to perform a small-scale in-obit demonstration with liquid nitrogen on-board the Nyx Earth capsule, to permit the maturation of technologies that cannot be matured on earth and to improve the knowledge of cryogenic fluid behaviour in a microgravity environment.

This paper will present the preliminary mission and demonstrator designs. This will include the initial architecture and CONOPS of the demonstration, as well as an outline of the project development plan