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DEVELOPMENT OF AN ADDITIVE MANUFACTURING LIQUID METHANE AND OXYGEN STAR1 ENGINE FOR SIRIUS1 FIRST STAGE

Abstract

In the frame of the development of the new launch vehicle Sirius1, Sirius Space Services is developing a new 38 kN liquid cryogenic rocket engine called STAR1. This work presents the development status of STAR1 engine and the development logic put in place by Sirius Space Services. The configuration adopted for the engine is an open bleed cycle using liquid methane and liquid oxygen as propellant. The use of innovative technologies, among them the Metallic Additive Manufacturing (MAM), will allow decreasing by multiple factors, the launch service costs. In fact, the possibilities offered by the MAM enable to increase the performances reducing the mass of the overall system. Since the beginning of the development of the STAR1 engine, the main design drivers have been costs, industrialisation and simplicity. Therefore, Sirius Space Services has put in place a development that integrate in-house designed systems with Off-the-Shelf components.The development of the main engine subsystems is on-going. The first cryogenic test will be conducted in September 2022, while the ignition hot fire test is planned in December 2022. These tests are part of an iterative process that will end up with the first flight of Sirius 1, planned for the first semester 2025.