IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Small Launchers: Concepts and Operations (7)

Author: Dr. Andre Guerra
Ceiia - Centro De Engenharia, Portugal, andre.guerra@ceiia.com

Mr. Daniel Alonso
RFA - Rocket Factory Augsburg, Portugal, Daniel.Alonso@rfa.space
Ms. Catarina Silva
RFA - Rocket Factory Augsburg, Portugal, catarina.silva@rfa.space
Mr. Alexander Costa
Ceiia - Centro De Engenharia, Portugal, alexander.costa@ceiia.com
Mr. Joaquim Rocha
Ceiia - Centro De Engenharia, Portugal, joaquim.rocha@ceiia.com
Mr. Luis Colaço
Ceiia - Centro De Engenharia, Portugal, luis.colaco@ceiia.com
Mr. Sandra Fortuna
Ceiia - Centro De Engenharia, Portugal, sandra.fortuna@ceiia.com
Mr. Tiago Pires
Ceiia - Centro De Engenharia, Portugal, tiago.pires@ceiia.com
Mr. Luis Pinheiro
Ceiia - Centro De Engenharia, Portugal, luis.pinheiro@ceiia.com
Mr. Nuno Carneiro
Ceiia - Centro De Engenharia, Portugal, nuno.carneiro@ceiia.com
Mr. André João
Ceiia - Centro De Engenharia, Portugal, andre.joao@ceiia.com
Mr. Gonçalo Araújo
RFA - Rocket Factory Augsburg, Portugal, goncalo.araujo@rfa.space
Mr. Pedro Meireles
RFA - Rocket Factory Augsburg, Portugal, pedro.meireles@rfa.space
Mr. Stephan Schmid
RFA - Rocket Factory Augsburg, Germany, stephan.schmid@rfa.space

DEVELOPMENT, MANUFACTURING AND TESTING OF SMALL LAUNCHER STRUCTURES FROM PORTUGAL

Abstract

During the last decades the Aerospace Industry has seen the number of Earth orbiting satellites rise at an alarming rate. This race stems from the need to monitor Earth and better understand its environments at different scales as well as to establish global communication networks, for example. Nano, micro, and small satellites have been a prime tool for answering these needs, with large and mega constellations planned for the near future, leading to a potential launch gap that can only be answered by an increase on the number of yearly launches, to keep up with demand as well as replenish established capacity. An effective and commercially appealing solution is the development of small launchers. These can complement the current available launch opportunity offer, serving a large pool of different types of

clients, with a flexible and custom service that large conventional launchers cannot adequately assure. Rocket Factory Augsburg, who has been developing its own small launcher for the last two years, has partnered with CEiiA, a Portuguese engineering and product development centre, for the development of several structures for the RFA One rocket. The objective has been the design of solutions that are low-cost, light, and custom-made, applying design and manufacturing concepts as well as technologies from other industries, like the aerospace and automotive, to the space one. This allows for the implementation of a New Space approach to the launcher segment, while also building a supply chain and a set of solutions that enables the industrialization of such structures for this and future small launchers. The two main systems under development have been a versatile Kick-Stage, for payload carrying and orbit insertion, and a sturdy Payload Fairing, both with multiple configurations. Even though the use of components off-the-shelf have been widely accepted in the space industry for satellites, these two systems pose different challenges as they must be: highly reliable during the most extreme conditions imposed by the launch, so that they can be considered safe to launch all types of payloads; while allowing for the maximum payload mass and volume, making its business case sustainable. Additionally, the manufacturing methods had to be such to allow the easy scale up and ultimately the creation of a production line for these structures. This paper thus dives deep on the solutions developed in the last few years, presenting also lessons learned during the manufacturing and testing of these structures.