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ARCLIGHT - A LOW COST PLUG-AND-PLAY RIT ELECTRIC PROPULSION SYSTEM

Abstract

Over the last years, the satellite market was more and more the target of new companies, aiming at providing novel space-based businesses with the mean of small satellites. These companies have usually a clear industrial focus, and are no longer focusing on equipment performance, as more senior companies would do. Instead, they focus on affordability, reliability and large-scale availability of assets and equipment, in order to allow drastic cost decreases and thereby drive affordability. In doing so, they encourage a new way of thinking to reduce drastically the total cost, both for development and for recurring production, and allow mass production of satellite systems.

The Arclight propulsion platform is the uncompromising answer from ArianeGroup (AG) on this new trend in the satellite market and offers the first fully industrial propulsion system specifically tailored for this market. Based on the Radiofrequency-Ion-Thruster (RIT), and fielding a new breed of components, it offers an affordable high-performance plug-and-fly propulsion solution for the demanding user.

The starting point for the development was the qualified Radio-frequency Ion Thruster (RIT), which flies on Artemis. Every piece-part of the thruster underwent an in-depth review, and was re-designed with a focus on easy and affordable manufacturing.

Coping with the requirements of mass-production on tolerance and availability, a gentle functioning point has been selected, which while ensuring lower performance than other high-end ArianeGroup Electric Propulsion systems, induces less stress on the overall components: Compared to the RIT 10 EVO Thruster, the Arclight RIT thruster ISP is reduced from 3500s to about 2700s.

Arclight was designed around following central functioning point

Requirement Value Input Power 400 W Thrust 13 mN Specific Impuls (System) 2400s + Total Impulse 250 kNs+ Lifetime 6 years

The Arclight system is a simple, monobranch propulsion system: The high pressure Xenon tank, is hermetically isolated from the rest of the system during launch by a shape memory alloy valve (SMA), allowing the fulfillment of all barrier requirements. In orbit, this valve serves as priming device for the system prior to first use. Downstream of the high pressure section, a newly designed electric pressure regulator decreases and conditions the high pressure to a level suitable for the stable RIT and Neutralizer operation. Arclight fields an own breed of affordable neutralizers specially designed for this application.