

WELCOMING NEW LAUNCHERS REPEATABILITY, INTEROPERABILITY & MODULAR APPROACH ON GROUND SUPPORT EQUIPMENT

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Abstract:

Over the past decade, the space industry has undergone a major upheaval, with the arrival of private players and start-ups in a market that has historically been in the hands of institutions and the defense industry. This impetus is opening the door to new business models, and traditional markets are being transformed into a tertiary economy, based on services and commercialization of space data on a large scale.

If in this revolution launchers and satellites through the «space as a service» concept carry the main innovations, the ground segment must be able to adapt to meet a growing demand for launches. With more and more actors and launchers on the market (between 10 and 15 mini- and micro-launchers projects in Europe⁽¹⁾) and a growing demand for satellite and nano-satellite launches, the ground segment has a key role to play, because it is an actor of the economic success for launch operators.

The huge experience of Eiffage Energie Systèmes – Clemessy gathered in other industries will leverage its competitiveness in the space ground segment. We have experienced ground-based facilities since 1965. All the past experienced have been acquired first thanks to structuring projects held by CNES, secondly by managing the knowledge of the development team in Europe with the field experienced of the launch operators and lastly by internal research & development mixed with starts-ups projects.

In the same way, the race is so strong in the micro-launch segment that the investments of these start-ups are concentrated on these developments and not on support means such as control benches. Yet these will have to be adapted to each launcher.

With ambitious launch rates, up to one launch per week, it is mandatory that ground support equipment have the capacity to ensure a proven level of performance and adapts quickly and efficiently to the various launchers. Thus, three words are key to enable the control bench and the ground support equipment to adapt to each launcher: **repeatability**, **interoperability** and **modularity**. These are an essential criterion for reducing launch costs, a central issue in the newspace industry.

The EES-CLEMESSY efforts are totally based on a platform approach: start small but become big by incremental growing, and reuse technological modules which had proved their efficiency.

In this ground eco-system, the control bench that supervises all ground operations before launch must be able to adapt to the launchers and their specificities: fueling, communication, final checks, power supply, final countdown, etc.

Several concurrent subjects are dealt in parallel. In order to optimize launch costs, the control bench could be shared for multiple activities: R&D, AIT, launch, and in-flight satellite monitoring. In addition, the control bench could be remotely operated rather than at the launch site.

Besides, why not consider combining the utilities control bench and operational control bench into a single system for greater versatility and lower operating costs with a single central solution ?

Numerous technological subjects are also integrated : a numerical twin of the launch pad using Artificial Intelligence, the miniaturization of computer components...

If many questions and concepts remain unanswered at the present time, they will undoubtedly play a key role in the coming years. But first, the general idea is to propose ready to use ground support equipment packaged for user experience. Why? Because this is the direct need of the upcoming launchers operators.

References:

1. Eugène Calat, EC, *La Tribune*. **2021**, *Projets de mini et micro-lanceurs : il n'en restera qu'un ou deux en Europe*