

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

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TECHNOLOGICAL DEMONSTRATORS PREPARING THE FUTURE LAUNCH SYSTEMS.

Abstract

ARIANE 6 development has been decided during the last ESA ministerial council in December 2014. This decision will permit to improve the competitiveness of the European launch systems for the near future (2020).

ARIANE 6 benefits from the research and technological investments held since several years in the frame of European agencies: for instance Vinci and P80 technological demonstrators for propulsion, Opto-pyro and new avionics technologies, SRB nozzle improved materials. . .

CNES Launchers Directorate continues to invest in the research and technologies programs, targeting the mid and long terms possible evolution of our launch systems (2030), improving our knowledge of the physical phenomena for risk assessment mitigation, and preparing the future technologies.

Among these programs, several demonstrators are under development in the frame of the cryogenic propulsion:

- BOREAS: a “small size” system technological platform (10kN thrust class) allowing integrating disruptive technologies for system, turbo pumps and other components. This platform uses LOx-LH2 as the reference propellants, nevertheless methane tests are also evaluated.
- ISFM (“Engine Functional Real-Time Simulation Platform”): a ground test bench that can host real hardware (actuators and engine controller) for the preparation and the validation of future engine electrical command laws.
- PROMETHEE: a 1000kN thrust class engine demonstrator aiming at strongly reducing the cost of cryogenic propulsion through technological efforts including new process such as the Additive Layer Manufacturing. It will also permit us to evaluate the economic interest of the reusability related to

propulsive systems. Prometheus uses Lox - methane as the reference propellants, and gas generator reference thermodynamic cycle.

The developments of other demonstrators are also starting, such as:

- A Reusable Rocket Stage Experimental Vehicle which will prepare the possible future reusable boosters on next step heavy launch system.
- A demonstrator for future cryogenic stages, addressing structures and materials improvements towards cost reductions, and addressing functional aspects (propellant management devices for future missions including RLV mission profiles).
- ...

After a brief presentation of the benefit, for Ariane6, of the research and technologies programs, this paper summarizes the status of the current technological demonstrators, including their link towards the future European launch systems (2030).