

# **PROMETHEUS®: Precursor of new low-cost rocket Engine Family**

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PROMETHEUS® is the Precursor of a new liquid rocket Engine family designed for low-cost, flexibility and reusability.

This Project, undertaken through cooperation between CNES and Ariane Group, entered in the ESA Future Launcher Preparatory Programme after the ESA Ministerial Conference in December 2016, with Germany, Italy, Belgium, Sweden and Switzerland joining France in the support of this Programme. The aim of PROMETHEUS® programme is to design, produce, and test an advanced low-cost 100-tons class LOX/LCH4 reusable Engine. This Engine, designed for 1M€ recurrent cost, targets also flexibility in operation through variable thrust, multiple ignitions, compatibility to main and upper stage operation, and minimized ground operations before and after flight.

To reach those ambitious objectives, an extreme design-to-cost approach is mandatory, as well as innovative technologies and advanced industrial capabilities; among the major levers, there are the extensive recourse to Additive Manufacturing for the production of engine components, the introduction of a full electric command system and the on-board Rocket Engine Computer (REEC) for Engine management and monitoring.

In addition, PROMETHEUS® programme promotes the application of Agile and Frugal methodologies to get maximum profit in product innovation and value creation in operation.

This paper presents the global status of PROMETHEUS® development and gives a specific insight regarding the following milestones:

- 2022 : Mk1 engines tests realization on Themis 1G at PF20 in Vernon and preparation of P5 in DLR Lampoldhausen for 2023 test campaign,
- 2023 Mk2 improved design production and Themis 1H in-flight test preparation in Kiruna

PROMETHEUS® is the reusable key technology under demonstration to prepare long terms European launchers evolution. Final validation for first in-flight serial application is expected by end-2025.