

PROGRESS OF THE P160C SOLID ROCKET MOTOR DEVELOPMENT, FUTURE COMMON PROPULSIVE SRM FOR ARIANE 6 BLOCK2 AND VEGA-C/VEGA-E EUROPEAN LAUNCHERS

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T. Germani¹, E. Bandelier¹,
Ph. Cloutet², D. Ribéreau²,
D. Garitta³, M. Angelone³,
A. Ciucci⁴, D. Scoccimarro⁴

⁽¹⁾ Europropulsion, 22 Quai Gallieni 92150 Suresnes, France,
tarquinio.germani@europropulsion.fr, etienne.bandelier@europropulsion.fr,

⁽²⁾ ArianeGroup, Rue de Touban - Les Cinq Chemins - 33185 Le Haillan, France,
philippe.cloutet@ariane.group, dominique.ribereau@ariane.group,

⁽³⁾ Avio SpA, via Ariana Km 5.2 00034 Colleferro, Italy,
davide.garitta@avio.com, marcello.angelone@avio.com,

⁽⁴⁾ European Space Agency 52 Rue Jacques Hillairet, 75012 Paris, France
alessandro.ciucci@esa.int, dario.scoccimarro@esa.int,

ABSTRACT:

The Ground Qualification of the P120C SRM, designed to be the Common Solid Propulsive Module as strap-on booster on Ariane 6 Launch Vehicle for both 62 and 64 versions and as first stage for Vega Consolidation and Vega Evolution vehicles, was successfully achieved in 2021 in the time frame scheduled despite a design to cost approach driven by a very ambitious low recurring cost objective. Following this ground qualification, the P120C SRM successfully flew on Vega-C VV21 (maiden flight) and Vega-C VV22. It is still waiting for its first flight on Ariane 6 Launch Vehicle.

The Design Definition Authority of the P120C SRM was entrusted by the Launcher System Prime Contractors to Europropulsion who has been responsible for the development and is in charge of production exploitation of the P120C SRM with the support of Avio and ArianeGroup.

Feedbacks from the market of satellites in this phase of preparation to the first Ariane 6 commercial flights, showed that a very promising opportunity is represented by the launch of satellites constellations in Low Earth Orbit (LEO).

The first analyses performed at Ariane 6 System level indicated however the need to increase the A64 payload capability in LEO to be competitive in this interesting but very challenging market.

Among the potential Launcher performances improvement options, the increase of SRM

length by one meter increasing the propellant mass up to about 156T and the Launcher performances by 10%, has been identified as the best compromise to reinforce A6 attractiveness for Constellations customers with reasonable development duration and affordable investments on already existing facilities and MGSE.

With maiden flight in mid-2025, the development and qualification of this P120C design evolution, called P160C, is driven by the following set of constraints:

- To preserve the product commonality for both families of European Launch Systems, Vega and Ariane, allowing a 30 years life time for the operational product;
- To make feasible the P160C development in parallel of present P120C production exploitation to satisfy the needs of both Ariane 6 (A64 and A62) and Vega C;
- To comply with the strict requirements of time to market, recurring cost, production rate still respecting the Non-Recurring Cost and assuring robust technical compliance.

To this end, the decision on the development of the P160C SRM was confirmed at the ESA Council at Ministerial level in November 2022. The P160C SRM development will be taking advantage of the industrial organization and of the technologies, facilities and hardware developed and used in the Ariane 6 and Vega C

programs, in particular through the heritage of P120C SRM qualification and exploitation.

Considering the very challenging objective of achieving ground qualification in Q1 2025 for delivery of the first flight units in 2025, the P160C development activities have started beginning of 2022. The SRM Preliminary Design Review (PDR) was successfully held in June/July 2022 and the subcomponents (Nozzle, Insulated Motor Case and Loaded Motor Case) Preliminary Design Reviews were successfully held within October 2022. To be noted that it should be possible to justify the use of P120C Igniter on P160C SRM without design modifications.

Using the huge experience gained through the P120C development and from beginning of its exploitation phase, only one ground Static Firing Test (SFT), called QM3, will be performed to achieve the ground qualification of the P160C SRM.

After a quick recall of the P120C SRM development achievements, this paper reports a description of the selected configuration and the current status of its justification as well as the main objectives and the logic / schedule for P160C development.