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Short Company presentation
(R & D guidelines, international activities, etc.)

Orbital Engenharia is a Brazilian aerospace and defense technology company dedicated to the development of advanced engineering solutions for space and strategic applications. The company conducts intensive research and development focused on high-reliability systems for space environments, contributing to the advancement of Brazil’s technological capabilities in the aerospace sector.

Its R&D activities are guided by the development of innovative technologies for satellites, launch systems, and scientific experimentation platforms, combining engineering excellence with strong collaboration with research institutions, industry partners, and government organizations. Through participation in international programs and scientific initiatives, Orbital Engenharia contributes to global efforts in space technology development and microgravity research, positioning itself as a relevant partner in advanced aerospace engineering projects.

DESCRIPTION OF ITS TECHNOLOGY AND CAPABILITIES IN R & D
(Products, technologies, applications, services, etc.)

Orbital Engenharia develops technologies and products for space and defense applications, with strong capabilities in the design, development, integration, and testing of complex aerospace systems. Its R&D portfolio includes satellite subsystems, space power generation systems, propulsion and fluid management systems for launch vehicles, and platforms for microgravity experimentation.

The company also develops specialized equipment and infrastructure for the testing and qualification of aerospace components and scientific payloads. These technologies support a wide range of applications including satellite missions, scientific experiments in microgravity environments, and advanced aerospace engineering projects.

In addition to product development, Orbital Engenharia provides high-level engineering services such as system architecture design, prototyping, integration, testing, and technical support for complex R&D programs. Its capabilities enable the company to contribute to strategic projects in the space and defense sectors while generating technological impact and innovation in the aerospace industry.

PROPOSED COLLABORATIVE PROJECT IN R & D

(As much detail as possible, both in what it offers and what you want in a potential partner)

Proposed Collaborative Projects (R&D)

Rocket Motor for Space Launch

1. Executive Summary

This project proposes the design, development, and ground qualification of a rocket motor for suborbital space launch applications, targeting scientific payloads, technology demonstrations, and future launcher predevelopment activities.

Suborbital propulsion systems provide a cost effective and flexible access to space relevant environments, enabling microgravity research, in flight technology validation, and system level verification prior to orbital deployment. The proposed activity addresses a strategic gap in propulsion system development, contributing to European standard capabilities in launch vehicle technologies, in line with ESA objectives for independent access to space and technology maturation.

The project will deliver a qualified suborbital rocket motor demonstrator, supported by validated engineering models, test data, and documentation suitable for system integration and further upscaling. The activity targets an increase in Technology Readiness Level (TRL) through structured design, analysis, and ground testing.

2. Background and Rationale

Suborbital launch systems play a critical role in the space transportation ecosystem, serving as:

- Technology maturation platforms between laboratory testing and orbital flight,
- Low risk environments for subsystem and payload validation,
- Training and qualification tools for space engineering teams.

Propulsion systems are among the most critical and strategically sensitive elements of any launch vehicle. Developing competence in suborbital rocket motor design and qualification strengthens technological autonomy, reduces dependence on external suppliers, and supports future European and cooperative launcher initiatives.

This project aligns with ESA priorities related to:

- Enabling technologies for launch systems,
- Incremental and risk-controlled technology development,
- Peaceful exploration and utilization of space.

3. Objectives

Overall Objective

To develop and ground qualify a rocket motor for suborbital launch missions, suitable for integration into experimental or operational suborbital launch vehicles.

Specific Objectives

- Define system level and mission driven requirements for a suborbital rocket motor;
- Develop the conceptual and preliminary engineering design, including interfaces and operational envelopes;
- Perform structural, thermal, and functional analyses to verify design robustness;
- Manufacture and test a representative motor configuration in a controlled ground test environment;
- Assess system integration readiness and identify evolution paths toward higher TRL levels.

4. Technical Approach

The project adopts a phased and model-based development approach, consistent with ESA best practices for technology maturation.

Phase 1 – Requirements and Mission Definition

- Definition of reference suborbital mission profiles;
- Establishment of performance, safety, environmental, and interface requirements.

Phase 2 – Conceptual and Preliminary Design

- System architecture definition;
- Trade off analyses at subsystem level;
- Identification of critical design drivers and risks.

Phase 3 – Engineering Analysis

- Structural and thermal verification;
- Material and load compatibility assessments;
- Reliability and safety margin evaluation.

Phase 4 – Ground Testing and Validation

- Execution of functional and structural ground tests;
- Instrumented data acquisition and performance assessment;
- Design correlation with analytical models.

Phase 5 – Evaluation and Consolidation

- Assessment of integration feasibility with suborbital launch vehicles;
- Consolidation of design data, test results, and lessons learned.

5. Expected Results and Deliverables

- A suborbital rocket motor demonstrator, validated through ground testing;
- Verified analytical and engineering models correlated with test data;

Demonstrated performance consistent with defined suborbital mission requirements;
Comprehensive technical documentation (design, analyses, test reports);
Clear roadmap for follow on development toward flight demonstration.

6. Technology Readiness

Initial TRL: 3–4 (Analytical and experimental concept formulation)

Final TRL: 5–6 (Component and subsystem validation in relevant environment – ground)

The project is structured to allow further evolution toward flight level qualification under subsequent ESA or national programs.

7. Impact and Relevance to ESA

Technical Impact

Strengthening of propulsion system engineering capabilities;
Reusable knowledge base for future launcher and in space propulsion developments.

Programmatic Impact

Support to ESA technology development lines (GSTP, TDE, Future Launchers);
Contribution to independent access to space competencies.

Strategic Impact

Reduced technological dependency;
Enhanced competitiveness of European space transportation solutions;
Capacity building in space propulsion engineering.

8. Conclusion

The proposed project delivers a focused, low risk, and strategically relevant development of a suborbital rocket motor, fully aligned with ESA's incremental

General comments:

- By sending this information document authorizing its dissemination.
- A company profile must be attached or a link to the company's website must be provided: <https://orbitalengenharia.com.br/>