

FACT SHEET

Vega

Introduction

The Vega programme has its origins back in the 1990s, when studies in several European countries investigated the possibility of complementing the performance range offered by the Ariane family of launchers with a capability for smaller payloads.

The Italian space agency, ASI, and Italian industry developed concepts and began pre-development work based on their established knowhow in solid propulsion. Vega officially became an ESA programme in June 1998, when the Agency Europeanised the national ASI small launcher programme – in the meantime called Vega.

Vega Programme

Vega is an ESA optional programme managed by the Directorate of Launchers, which comprises an integrated project team of staff from ESA, the Italian space agency, ASI, and the French space agency, CNES.

Activities are organised in four projects: development of the launch vehicle, development of the P80 first stage, development of the ground segment and the initial exploitation phase with the VERTA (Vega Research and Technology Accompaniment) programme.

Objectives

The rocket is designed to cope with a wide range of missions and payload configurations in order to respond to different market opportunities and provide great flexibility. Unlike most small launchers, Vega is able to place multiple payloads into orbit. In particular, it offers configurations able to handle payloads ranging from a single satellite up to one main satellite plus six microsattelites.

It is compatible with payload masses ranging from 300 kg to 2500 kg, depending on the type and altitude of the orbit required by the customers. The benchmark is for 1500 kg into a 700 km-altitude polar orbit.

The programme's main objective is to provide Europe with a safe, reliable and competitive capacity to carry science and Earth observation satellites into orbit, while perfectly complementing the heavy Ariane 5 and medium Soyuz rockets already launched from Europe's Spaceport in French Guiana.

Vega launch system

The Vega launch system comprises the vehicle, including the three stages and the payload assembly

composite, and the ground segment, composed of the launch infrastructure, the ground station network and the post-flight data processing facilities. It ensures the global coherence of all the elements.

Launch vehicle

Vega has three solid-propellant stages and a liquid-propellant upper module for attitude and orbit control, and satellite release.

The vehicle has three main sections: lower composite, restartable upper module and payload composite.

The lower composite consists of the three solid-propellant stages and the four stage interface structures:

- First stage: P80 motor burning 88 t of propellant;
- Second stage: Zefiro-23 motor burning 23 t of propellant;
- Third stage: Zefiro-9 motor burning 10 t of propellant.

The restartable liquid-propellant fourth stage, known as the Attitude and Vernier Upper Module (AVUM), hosts the Propulsion Module and the Avionics Module, for attitude and orbit control. It is restartable up to five times, allowing it to release multiple satellites into different orbits.

The payload composite that accommodates the payload is composed of the fairing and the payload/launcher interface structure.

With a height of 30 m and a diameter of 3 m, Vega weighs a total of 138 t at liftoff.

Ground Segment

The Vega launch site at Europe's Spaceport is located at the previous ELA-1 complex, originally used for Ariane 1 and Ariane 3 missions.

The pad and infrastructure have been adapted to meet Vega's requirements. It retains the original flame ducts, which channel Vega's exhaust gases during ignition and liftoff. A new fixed umbilical mast provides power and environmental control connections to the launcher and its payloads from mission preparation to the final countdown and liftoff.

Launcher preparation takes place on the pad inside a mobile gantry that houses all the support equipment to assemble and check the vehicle. Its height is 50 m and weighs more than 1000 t.

Industrial organisation

The industrial prime contractor of the launch vehicle is ELV SpA, 30% of which is owned by ASI and 70% by AvioSpA. Vitrociset (Italy) is the prime contractor for the ground segment.

As the future launch service provider, Arianespace will be responsible for launch operations.

Qualification flight VV01

Vega's maiden flight, VV01, marks the completion of nine years of development by ESA and its partners ASI, CNES and ELV SpA as well as for the seven ESA Member States that contributed to the programme (Belgium, France, Italy, The Netherlands, Spain, Sweden and Switzerland).

This mission aims to qualify the overall Vega launch system, including the vehicle, its launch infrastructure and operations from the launch campaign to the payload separation and disposal of the upper module.

It will demonstrate the correct behaviour of all elements and functions of the launch system in real conditions. In particular, it will demonstrate the vehicle's performances and payload services in flight, after completion of the qualification process on ground.

Flight VV01 will reach a circular orbit at an altitude of 1450 km and an inclination of 71°. The payload mass for this launch is 700 kg.

Launch

Vega's maiden flight is planned for 13 February 2012. VV01 will lift off from the new Vega launch site at Europe's Spaceport in French Guiana.

What's on board?

The primary payload of Vega's qualification flight is the spherical LARES laser relativity satellite and ALMASat-1 (ALmaMATER Satellite) along with seven ESA CubeSats.

LARES from Italy's space agency ASI will study the Lense–Thirring effect – the part of Albert Einstein's theory of general relativity that describes the distortion of space-time caused by the rotation of a body with mass.

ALMASat-1 is an ASI educational microsatellite built by the University of Bologna, Italy. This technology demonstration satellite is a 30-cm cube designed as a modular structure that could be used for various technology demonstration or Earth observation missions. The main objective of its first mission is to test the key performance of this low-cost multipurpose bus in preparation for future missions.

Seven picosatellites sharing the same 'CubeSat' design (1 kg, 1 W, 10 cm cubic structure) and developed by European universities will also fly on Vega's first flight. They will be released by three P-PODs (Poly-Picosatellite Orbital Deployers) mounted on the support structure into an orbit of 300 x 1450 km at an inclination of 69.5°.

- **Xatcobeo** (a collaboration of the University of Vigo and INTA, Spain): a mission to demonstrate software-defined radio and solar panel deployment;
- **Robusta** (University of Montpellier 2, France): a mission to test and evaluate radiation effects (low dose rate) on bipolar transistor electronic components;
- **e-st@r** (Politecnico di Torino, Italy): demonstration of an active 3-axis attitude determination and control system including an inertial measurement unit;

- **Goliat** (University of Bucharest, Romania): imaging of Earth using a digital camera and in-situ measurement of radiation dose and micrometeoroid flux;
- **PW-Sat** (Warsaw University of Technology, Poland): a mission to test a deployable atmospheric drag augmentation device for deorbiting CubeSats;
- **MaSat-1** (Budapest University of Technology and Economics): a mission to demonstrate various spacecraft avionics, including a power conditioning system, transceiver and onboard data handling.
- **UniCubeSat GG** (University of Rome 'La Sapienza', Italy): a mission to study the gravity gradient.

Preparing the exploitation phase: VERTA

Flight VV01 will pave the way for the next five missions that will demonstrate the system's flexibility, as part of the VERTA programme. The VERTA flights will carry four ESA missions: Proba-V, Aeolus, LISA Pathfinder and the Intermediate Experimental Vehicle (IXV).

At a planned rate of two launches per year, the programme will allow the smooth introduction of Vega for commercial exploitation.

The first VERTA flight is scheduled to take off in the first half of 2013 following the launcher's qualification flight.

Vega's first commercial launch contracts were signed on 14 December 2011 for the Sentinel-2 and Sentinel-3 satellites, which are now scheduled for launches in 2014–16.

General information about this and ESA Launchers can be found at:
<http://www.esa.int/SPECIALS/Vega/>

For further information, please contact:

ESA Media Relations Office
Tel: +33 1 53 69 71 55
Fax: +33 1 53 69 76 90
Email: media@esa.int