vega

→ EUROPE'S SMALL LAUNCHER

European Space Agency

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.

Vega is an ESA programme with the participation of seven ESA Member States.

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 – as a cooperative project with other Member States.

A FLEXIBLE MISSION

Vega 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. In particular, it offers configurations able to handle payloads ranging from a single satellite up to one main satellite plus six microsatellites.

Vega 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 first launch, the Vega qualification flight, is planned for the second half of 2011 from Europe's Spaceport in Kourou, French Guiana and will pave the way for five missions that aim to demonstrate the system's flexibility.

VEGA LAUNCH SITE

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 will take place on the pad inside a mobile gantry that houses all the support equipment to assemble and check the vehicle. The gantry provides a protected environment for launch personnel. Its height is 50 m and weighs more than 1000 t.

OPERATIONAL CONTROL CENTRE

The Operational Control Centre for Vega is located in the Launch Control Centre initially built for Ariane 5. It houses Vega's operational and monitoring systems.

PAYLOAD PREPARATION COMPLEX

Vega payloads will benefit from Ariane 5's state-of-the-art facilities. The payload preparation buildings accommodate satellite and control equipment unpacking, mechanical assembly work, electrical and mechanical inspections, and checkout of the various platform and payload subsystems. Final integration of the payload composite will take place at the complex before its transfer to the launch pad for hoisting onto the top of the launcher.

EUROPE'S NEW, SMALL LAUNCH VEHICLE

Vega has three solid-propellant stages and a liquid-propellant upper module for attitude and orbit control, and satellite release. Unlike most small launchers, Vega will be able to place multiple payloads into orbit.

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

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

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

The restartable fourth stage, known as the Altitude and Vernier Upper Module (AVUM), hosts the Propulsion Module and the Avionics Module. 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.

VERTA PROGRAMME

The Vega Research and Technology Accompaniment (VERTA) Programme aims to demonstrate the flexibility of the Vega launch system. It comprises three main elements:

- Procurement of five VERTA demonstration flights;
- Customer service improvements;
- Production accompaniment and technological activities.

The first VERTA flight is scheduled to take off in the second half of 2012 following the launcher's qualification flight.

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

The VERTA flights will carry four ESA missions: Proba-V, Aeolus, LISA Pathfinder and the Intermediate Experimental Vehicle (IXV). The main customer service improvement activity includes the development of the multiple-payload launch capability for Vega.

DEVELOPMENT COSTS

The total cost for the Vega programme, including the development of the launch vehicle, ground segment and P80 engine is €710 million. Avio SpA provided an additional industrial investment of €76 million for the development of the P80 engine.

The total cost for the VERTA programme, covering the first five flights and related accompaniment activities, is estimated at €400 million.

ORGANISATION

The programme is managed jointly by an integrated project team of staff from ESA, ASI and CNES. The launch vehicle, ground segment and VERTA teams are based at ESRIN in Frascati, Italy and the P80 engine team is based at CNES in Evry, France. It therefore benefits from the technical support and expertise of both agencies.

The industrial prime contractor of the launch vehicle is ELV SpA, 30% of which is owned by ASI and 70% by Avio SpA. As the future launch service provider, Arianespace is responsible for launch operations.

VEGA PROGRAMME INDUSTRIAL GEOGRAPHICAL RETURN

	Belgium	France	Italy	Netherlands	Spain	Sweden	Switzerland
Total development	6,9%	25,3%	58,4%	3,2%	4,6%	0,6%	1,0%
VERTA	5,6%	24,1%	57,8%	2,5%	7,7%	0,7%	1,6%

Vega launch site