

SECOND VEGA LAUNCH FROM THE GUIANA SPACE CENTER

On the second Vega launch from the Guiana Space Center (CSG) in French Guiana, Arianespace will orbit three satellites: PROBA-V, VNREDSat-1 and ESTCube-1.

With Ariane 5, Soyuz and Vega, all operating at the Guiana Space Center, Arianespace is now the only launch services provider in the world capable of launching all types of payloads to all orbits, from the smallest to the largest geostationary satellites, as well as clusters of satellites for constellations and missions to support the International Space Station (ISS).

Vega is designed to launch payloads in the 1,500 kg class to an altitude of 700 km, giving Europe a new launcher that can handle all of its scientific and government missions as well as with commercial payloads.

Designed to launch small satellites into low Earth orbit (LEO) or Sun-synchronous orbit, Vega will quickly establish itself as the best launcher in its class.

Vega is a European Space Agency (ESA) program financed by Italy, France, Germany, Spain, Belgium, the Netherlands, Switzerland and Sweden. The Italian company ELV, a joint venture of Avio (70%) and the Italian Space Agency (30%) is the launcher design authority and prime contractor, while Arianespace handles launch operations.

For its second launch, Vega will orbit three satellites: PROBA-V, VNREDSat-1 and ESTCube-1.

PROBA-V (Project for On-Board Autonomy and Vegetation) is the fourth satellite in the PROBA series developed by ESA, and is designed to support the development of new space technologies. It will be mounted in upper position under the fairing.

The main objective of the satellite is to continue the mission performed by the Vegetation instrument carried on Spot 4 and 5. Built by QinetiQ Space Belgium and weighing 140 kg, PROBA-V will be placed into the same orbit as the Spot remote-sensing satellites: Sun-synchronous orbit at 820 km, with local time of descending node at 10:45.

The VNREDSat-1 Earth observation satellite, launched for the Vietnamese Academy of Science and Technology, will be mounted in lower position on the VESPA multiple payload adapter used for this mission.

VNREDSat-1 will be placed in Sun-synchronous orbit at an altitude of 665 km to carry out its optical observation mission, with local time of descending node at 10:42. Weighing 115 kg at launch, VNREDSat-1 was built by Astrium, which supplied the complete satellite and ground receiving system to Vietnam.

ESTCube-1 is the first Estonian satellite, designed and built in Estonia by a team of students at the National University of Tartu, under the supervision of the Estonian Space Office. It will be mounted in the auxiliary position inside the VESPA payload adaptor. Its main mission is to measure the loads that can be applied to electric solar sails.



MISSION DESCRIPTION

The second Vega launch from the Guiana Space Center (CSG) will place the satellites PROBA-V, VNREDSat-1 and ESTCube-1 into circular orbit at altitudes of approximately 820 and 665 km.

The launcher will carry a total payload of 638 kg, including 255 kg for the satellites to be released into their targeted orbits (SSO inclined at 98.7° and 98.1°).

The launch will be performed from the Vega Launch Site (SLV) at Kourou, French Guiana.

Orbit : SSO
Altitude : 820 km for PROBA-V / 665 km for VNREDSat-1 and ESTCube-1
Inclination : 98.7° for PROBA-V / 98.1° for VNREDSat-1 and ESTCube-1

Liftoff is scheduled for the night of **May 3 to 4, 2013** at exactly:

11:06:31 pm	(Local Time in French Guiana, on May 3, 2013)
10:06:31 pm	(in Washington, DC)
02:06:31	(UTC) on May 4, 2013
4:06:31 am	(in Paris)
9:06:31 am	(Hanoi)

The launch at a glance

Following liftoff from the Guiana Space Center, the powered phase of the first three stages of Vega will last 6 minutes and 19 seconds. After this first phase, the launcher's third stage will separate from the upper composite, which includes the AVUM upper stage, the VESPA payload adapter and the satellites. The lower three stages will fall back to Earth.

The AVUM upper stage will ignite its engine for the first time, operating for about 5 minutes, followed by a ballistic phase lasting about 42 minutes. The AVUM stage will then reignite its engine for about 90 seconds before releasing the PROBA-V satellite, followed by a third to separate VESPA and then fourth firing to separate VNREDSat-1 and ESTCube-1, lasting about 20 and 60 seconds, respectively.

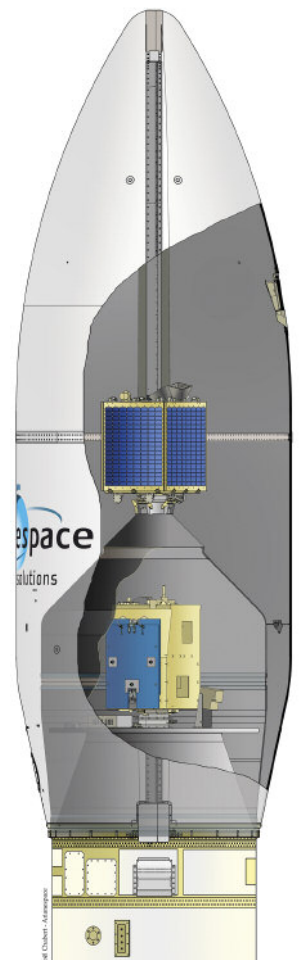
The PROBA-V satellite will be released at 55 minutes and 27 seconds after liftoff. VNREDSat-1 will separate 1 hour, 57 minutes and 24 seconds after liftoff, and ESTCube-1 2 hours and 48 seconds after liftoff.

Mission length

The nominal duration of the mission, from liftoff to separation of the satellites, is 2 hours and 48 seconds.

Vega payload Configuration

ESA's PROBA-V satellite was built by QinetiQ Space Belgium. VNREDSat-1 was built by Astrium for the Vietnamese Academy of Science and Technology. ESTCube-1 was built by and for the National University of Tartu in Estonia.



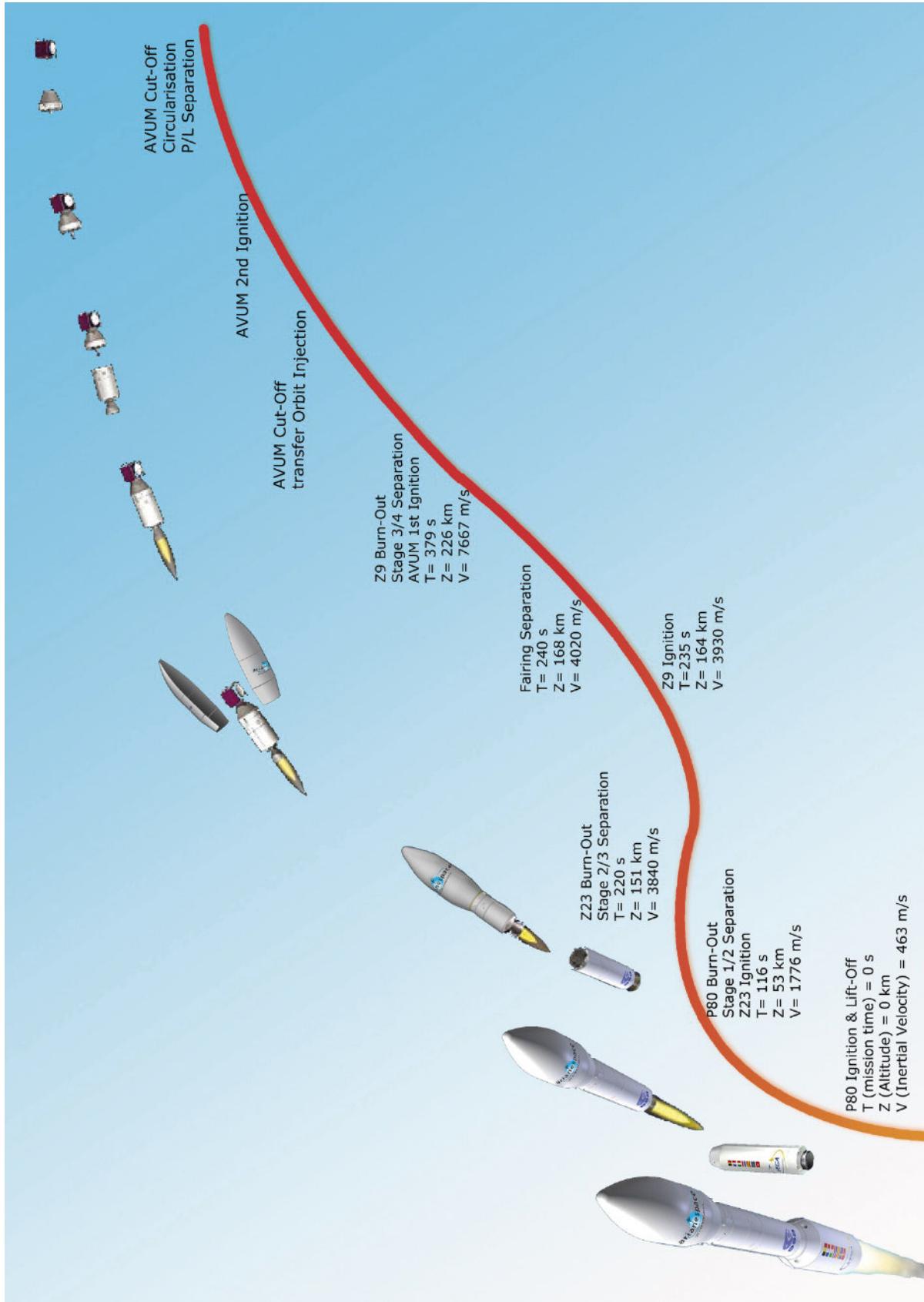
LAUNCH COUNTDOWN AND FLIGHT EVENTS

The countdown comprises all final preparation steps for the launcher, the satellites and the launch site, including the steps leading up to authorization of first-stage P80 ignition.

Events	Time (h:min:s)
Start of countdown	-07:45:00
Activation of MFU (Multi Function Unit)	-05:40:00
Activation of Inertial Reference System (IRS)	-05:30:00
Activation of telemetry transmitters	-05:30:00
Activation of onboard computer and loading of flight program	-04:55:00
Activation of SMU (Safeguard Master Unit)	-04:50:00
Synchronization of onboard clock with Universal Time (UTC)	-04:25:00
IRS alignment and checks	-04:20:00
Removal of safety devices	-03:40:00
Mobile gantry withdrawal (45 min)	-02:40:00
Activation of SRI after withdrawal of gantry	-01:55:00
Activation of telemetry transmitters after withdrawal of gantry	-01:20:00
Activation of transponders	-01:20:00
Launcher system ready	-00:34:00
Last weather report prior to launch	-00:10:00
Start of synchronized sequence	-00:04:00
Liftoff	00:00:00
Separation of first stage (P80)	+00:01:56
Separation of second stage (Zefiro-23)	+00:03:40
Jettisoning of fairing	+00:04:00
Separation of third stage (Zefiro-9)	+00:06:19
AVUM first burn	+00:06:26
AVUM shutdown	+00:11:22
AVUM second burn	+00:53:05
AVUM shutdown	+00:54:37
Separation of PROBA-V	+00:55:27
AVUM third burn	+01:04:13
AVUM shutdown	+01:04:35
Separation of upper part of VESPA	+01:51:25
AVUM fourth burn	+01:53:44
AVUM shutdown	+01:54:49
Separation of VNREDSat-1	+01:57:24
Separation of ESTCube-1	+02:00:48



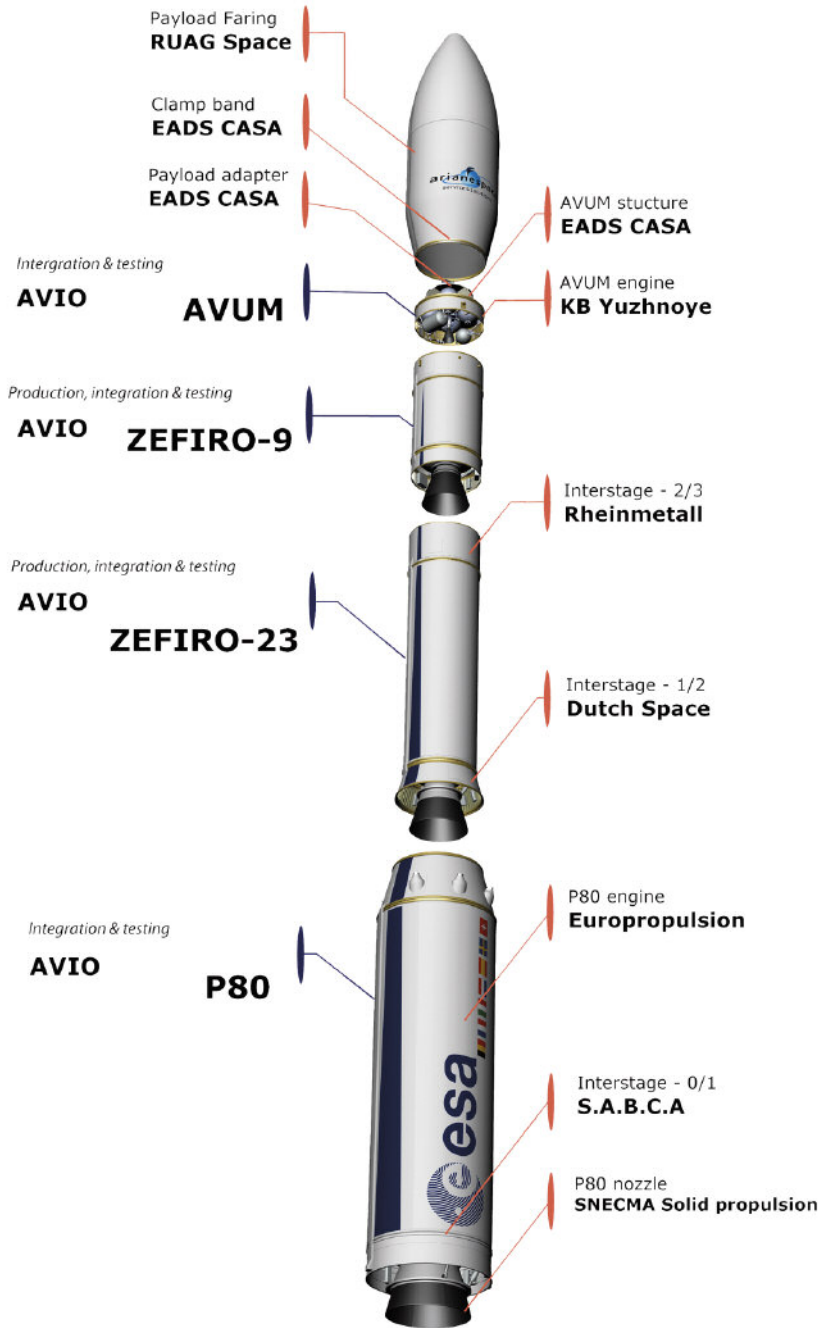
MISSION PROFIL



Pour plus d'informations rendez-vous sur
www.arianespace.com



THE VEGA LAUNCHER & THE MANUFACTURERS



- Thrust vector control system (P80, Zefiro-9, Zefiro-23 & AVUM) **S.A.B.C.A**
- Igniters (P80, Zefiro-9 & Zefiro-23) **APP**
- Avionics **Thales, IN-SNEC, Selex Avionica, CRISA, RUAG Space, SAFT**

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VEGA CHARACTERISTICS

Vega is a launch vehicle comprising three stages with solid rocket motors:

- P80 first stage
- Zefiro-Z23 second stage
- Zefiro-Z9 third stage

The fourth stage, AVUM, ensures mission versatility, injecting the payload(s) into precise orbits.

The fairing, 2.6 meters in diameter, can hold one or several payloads.

The total weight at liftoff is 139 metric tons. The launcher is 30 meter high and has a maximum diameter of 3 meters.

Launcher performance

The baseline performance set for Vega is to inject 1,500 kg into circular polar orbit at 700 km altitude, inclined 90° to the Equator, with injection accuracy of 5 km for altitude and 0.05° for inclination (1 σ).

The diversity of launch elevations possible from Europe's Spaceport in Kourou, along with the flexibility provided by AVUM, will enable Vega to inject a wide range of payloads into different orbits, including 2,500 kg payloads into quasi-equatorial circular orbit at 200 km, 2,000 kg payloads for the International Space Station, or 1,300 kg payloads to be injected into Sun-synchronous orbit at an altitude of 800 km.

P80 first stage

Vega's first stage is powered by a large single-piece solid rocket motor containing 87,732 kg of the solid propellant HTPB 1912. This SRM delivers maximum vacuum thrust of 3,015 kN and burns for 110 seconds prior to being jettisoned at an altitude of about 55 km.

The P80 stage, a filament-wound carbon-epoxy case, has the same diameter (3 m) as the solid boosters used on Ariane 5 and its overall length (11.2 m) is similar to that of one of the longest segments of the solid booster.

Zefiro stages

The second and third stages of Vega use Zefiro solid rocket motors. These two stages, each 1.9 m in diameter, comprise a filament-wound carbon-epoxy case, with low-density EPDM insulation and a nozzle with flex-joints, equipped with electromechanical actuators to direct the thrust.

The Zefiro-Z23 stage is 8.39 m long, and is loaded with 23,820 kg of solid propellant HTPB 1912, providing maximum vacuum thrust of 1,120 kN. It operates for 77 seconds.

The Zefiro-Z9 stage is 4.10 m long and is loaded with 10,570 kg of solid propellant HTPB 1912, providing maximum vacuum thrust of 317 kN. Although it is the smallest solid rocket motor on Vega, it offers the longest burn time, of 119 seconds.

AVUM

AVUM (Attitude & Vernier Upper Module) has a bipropellant propulsion system to provide orbital injection, and a monopropellant propulsion system for roll and attitude control.

It is designed to inject different payloads into different orbits, and ensures the fine pointing of satellites prior to separation. At the end of the mission, it is deorbited under safe conditions to limit the amount of orbital debris.

AVUM contains about 577 kg of liquid propellant (UDMH/NTO), distributed in four tanks. It is powered by an engine derived from the reignitable RD-869, providing 2.45 kN of thrust. It has two also sets of three monopropellant thrusters to control roll and attitude. AVUM also contains Vega's avionics module, which handles flight control and mission management, telemetry and end-of-flight functions, along with the electrical power supply and distribution.

Fairing and payload adapters

The fairing, 2.6 m in diameter and with a volume of 20 m³, is made of two half-shells, each 7.90 m long. Payloads are integrated in the launcher using a multi payload adapter, VESPA.

Launch complex

The Vega launch pad ("Site de Lancement Vega" or SLV) was built on the former Ariane 1 launch pad (ELA-1). It is located about 1 km southwest of the ELA-3 launch pad, used for Ariane 5.

The concrete launch pad was modified to handle Vega and the new 50 meter mobile gantry, weighing about 1,000 metric tons, along with the umbilical mast, stretching 32 meters high. Four 60-meter masts protect the pad against lightning strikes.

The three solid propellant stages and the bipropellant module are assembled on the launch pad. The payload composite is integrated on Vega about a week prior to launch.

The mobile gantry is displaced on its 80-meter long rails several hours before the launch.

The Vega launch center (CDL) is in the building that already houses its Ariane 5 counterpart, 1.3 km from the launch pad.

Mission control is handled from the Jupiter building, already used for Ariane and Soyuz launches.



PAYLOAD: PROBA-V, VNREDSAT-1, ESTCUBE-1

PROBA-V (V for Vegetation): Part of the PROBA series of missions, this satellite offers global coverage every two days, providing data on the influence of the climate, management of resources for surface water, monitoring of changes in agricultural zones, and food security estimates.

Customer: European Space Agency (ESA)

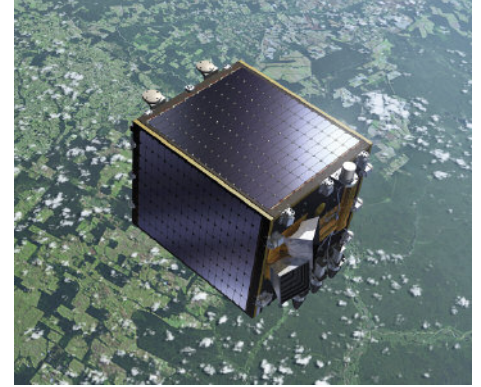
Prime contractor: QinetiQ Space Belgium

Orbit: Sun-synchronous at an altitude of 820 km, inclined 98.73°

Weight at launch: 138.2 kg

Dimensions: 0.84 x 0.76 x 0.73 m

Lifespan: 2.5 years (possible extension to 5 years)



VNREDSat-1: An Earth observation satellite for the Vietnamese Academy of Science and Technology. Built by Astrium, VNREDSat-1 will not only monitor and observe the impact of climate change, but also take measurements used to generate predictions that will help anticipate natural disasters. It will enable Vietnam to optimize the management of its natural resources. The satellite will be mounted in the lower position on the VESPA multiple payload adapter used for this mission.

Customer: Astrium for the Vietnamese Academy of Science and Technology.

Prime contractor: Astrium

Orbit: Sun-synchronous at an altitude of 665 km, inclined 98.1°

Weight at launch: 115.3 kg

Dimensions: 0.60 x 0.60 x 1.20 m

Lifespan: 5 years



ESTCube-1: Technology demonstration satellite launched for the National University of Tartu in Estonia. Its main mission is to measure and test the loads that could be applied to electric solar sails, a new concept for propulsion.

Customer: National University of Tartu in Estonia

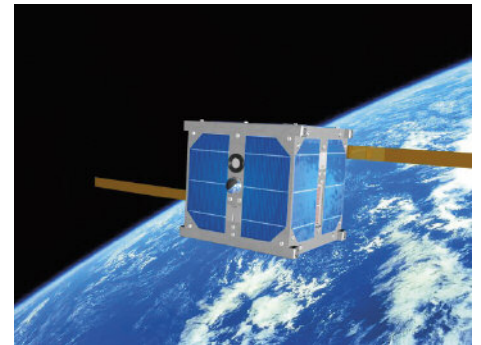
Prime contractor: National University of Tartu

Orbit: Sun-synchronous, between 600 and 800 km

Weight at launch: 1.33 kg

Dimensions: 0.10 x 0.10 x 0.10 m

Lifespan: 1 year



ARIANESPACE AND THE GUIANA SPACE CENTER

Arianespace was founded in 1980 as the world's first launch Service & Solutions company. Today, Arianespace has 21 shareholders from ten European countries (including French space agency CNES with 34%, Astrium with 30%, and all European companies participating in the construction of Ariane launchers).

Since the outset, Arianespace has signed more than 375 launch contracts and launched 313 satellites. Nearly two-thirds of the commercial satellites now in service worldwide were launched by Arianespace. The company posted sales of 1.330 billion euros in 2012.

At January 1, 2013, Arianespace had 320 employees working at headquarters in Evry, near Paris, Kourou, French Guiana, where the Ariane, Soyuz and Vega rockets are launched, and offices in Washington, D.C. (United States), Tokyo (Japan) and Singapore.

Arianespace offers launch Service & Solutions to satellite operators from around the world, including private companies and government agencies. These services call on three launch vehicles:

- The Ariane 5 heavy launcher, operated from the Guiana Space Center.
- The Soyuz medium launcher, operated from the Baikonur Cosmodrome in Kazakhstan, and from the Guiana Space Center.
- The Vega light launcher, operated from the Guiana Space Center.

With this complete family of launchers, Arianespace has won nearly half of the commercial launch contracts open to competition worldwide in the last two years. Arianespace now has a backlog of more than 40 satellites to be launched.

The Guiana Space Center: Europe's Spaceport

For over 30 years, the Guiana Space Center (CSG), Europe's Spaceport in French Guiana, has offered a complete array of facilities for rocket launches. It comprises the following installations:

- CNES/CSG facility, the technical center run by French space agency CNES, comprising all facilities and resources needed for operation of the launch site, including radars, a telecommunications network, weather station, and launcher telemetry receiving stations.
- Payload preparation buildings (EPCU), especially the S5 building.
- Launch complexes for Ariane, Soyuz and Vega, comprising the launch zones and launcher integration buildings.
- Various industrial facilities, run by Air Liquide Spatial Guyane, Astrium, Europropulsion and Regulus, which contribute to the production of components for the Ariane 5 and Vega launchers. About 40 companies from Europe and French Guiana are involved in launcher operations.

Europe's commitment to independent access to space is based on actions by three key players: the European Space Agency (ESA), the French space agency CNES, and Arianespace.

ESA is in charge of development programs for the Ariane, Soyuz and Vega launchers at CSG. Once the launch systems have been qualified, ESA transfers responsibility to the operator Arianespace. ESA has helped transform the role of the Guiana Space Center, in particular by funding the construction of the launch complexes, the payload processing buildings and associated facilities. Initially used for the French space program, CSG has gradually become Europe's own Spaceport, according to the terms of an agreement between ESA and the French government. To ensure that the Spaceport is available for its programs, ESA takes charge of the lion's share of CNES/CSG fixed expenses, and also helps finance the fixed costs for the launch complexes.

French space agency CNES plays several roles at the Guiana Space Center:

It designs all infrastructures and is responsible, on behalf of the French government, for safety and security. It provides the resources needed to prepare the satellites and launchers for their missions. Whether during tests or actual launches, CNES is also responsible for overall coordination of operations. It collects and processes all data transmitted from the launcher via a network of receiving stations, to track Ariane and Soyuz rockets throughout their trajectory.

In French Guiana, Arianespace is the contracting authority in charge of operating the family of three launchers, Ariane, Soyuz and Vega.

For Vega, Arianespace supervises the integration and inspection of the launcher built by ELV, production prime contractor. Before taking official delivery of the launcher, it coordinates the preparation of satellites in the payload preparation facility (EPCU) operated by CSG, handles the final assembly of the launcher and integrates satellites on the launcher, and oversees the final countdown and launch from Launch Control Center. 3 (CDL3)

Arianespace deploys top-quality human and technical resources to prepare the launchers and satellites. This unrivaled expertise and outstanding facilities in French Guiana enable Arianespace to set the global standard for launch services.

