



Zefiro 40 (Z40) Engine Bench Test

It will be the second stage of the new European launcher VEGA C

Colleferro, 8 March 2018 - **Four weeks** of preparation, **20 skilled technicians and operators** involved, over **500 measurements** recorded by the sensors during the **92-second ignition**, enough to burn **36 tonnes of solid propellant** and generating a **thrust 4 times higher** than the maximum power developed by the engine of a modern passenger aircraft.

The Zefiro 40 engine test took successfully place in recent day in Sardinia and it's the first functional test required to qualify this new propulsion system. During the test, which was performed at sea level, all of the parameters were gathered to calculate the engine's behaviour at conditions very close to what the Z40 will encounter in actual operation: **ignition at about 50 km above the earth's surface** after separation of the first stage P120.

In fact, the Zefiro 40 engine is the second stage propulsion system of the Vega C satellite launcher, an evolution of the current Vega and scheduled to lift off for its maiden flight in 2019. With Vega C **performance will be increased by 60%**. This extends the **market accessible to this launch vehicle from 50% to 90% of LEO (Low Earth Orbit) satellites**, a significant part of which as multiple payload launches.

"Our success in the Z40 engine bench test shows that the development of Vega C has entered a mature stage, in view of the qualifying flight at the end of 2019 - said Avio CEO Giulio Ranzo. - The extraordinary collaboration of our technicians with those of ESA, allow today to realize new technologies and cutting-edge products in an effective way, achieving ever greater performance and cost competitiveness. We are very satisfied and look forward to the latest development phase of the new Vega C launcher".

MAIN CHARACTERISTICS OF THE ZEFIRO 40:

- Engine length: 7.6 m
- Diameter: 2.3 m
- Propellant mass: 36 t
- Engine mass: 40 t
- Average thrust: 1304 kN
- Specific impulse: 293.5 s
- Burning time: 92.9 s

AVIO FOR VEGA C

Avio will be responsible for the launcher in its entirety while, in collaboration with ArianeGroup, it will be responsible for the P120C solid propellant engine, which was derived from the first stage of the Vega P80 Launcher and will be made with prepreg carbon fibre material using Filament Winding technology.

The launcher burns approximately 187 tonnes of solid propellant and 0.7 tonnes of liquid propellant. In order to achieve the greatest level of synergies among European launchers, the P120C engine has also been designed for use as a booster for the new Ariane 6.

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Avio S.p.A.

Avio is a leading international space launcher, spacecraft propulsion and space transport group. It has 5 sites in Italy, France and French Guiana, and employs over 760 people at the consolidated level. In 2016 its revenues totalled 292 million Euros.

The Avio Group manufactures the Vega launcher, with its subsidiary ELV (30% owned by the Italian Space Agency) as prime contractor. This makes Italy one of the very few countries in the world with the ability to produce a complete space launch vehicle.

Avio will build the new Vega C launcher and contribute to the new Ariane 6 launcher by providing the new solid engines and the Vinci and Vulcain liquid oxygen turbopumps.

The new solid propulsion engine, currently named P120C, for the Ariane 6 European launch vehicle and the new, more powerful version of the Vega launcher will be developed and built by Europropulsion (J.V. 50% Avio, 50% ASL). To create this engine and the new Zefiro 40 engine (entirely developed, built and tested in Italy by AVIO and designed for the second stage of the Vega launch vehicle), a new composite material made of pre-impregnated carbon fibre will be used. It will be made directly by Avio in Italy, in its research centres in Colleferro (near Rome) and Airola (near Benevento).

Avio has many years of experience in the design and construction of solid and liquid propellant propulsion systems for space launch vehicles and tactical propulsion. Avio built the liquid oxygen turbopump for the Vulcain cryogenic engine, as well as the two lateral solid propellant engines for Ariane 5, the first stage of the Aster 30 anti-missile defence missile. To date, Avio solid propulsion has been used successfully in all of Ariane's launches (which number over 230 in total) and all of Vega's launches.

In the field of satellites, the Avio Group has built and supplied propulsion subsystems for ESA and ASI to put into orbit and control over 30 satellites, including most recently SICRAL and SmallGEO.