



Corporate overview

November 2016

Avio: a key player in EU Space Launchers



Ariane 5



- 10 tons to Geostationary Orbit
- Large Telecom & Broadcasting Satellites
- Current flight rate : 6/year
- In operation since 1996



Industrial partner (ca. 10% share⁽¹⁾)

Vega



- 1,5 tons to Low Earth Orbit
- Small Earth observation Satellites
- Current flight rate : 3/year
- In operation since 2012



Prime Contractor (ca. 65% share⁽¹⁾)

Avio generates today 257M€ annual revenues



Ariane propulsion

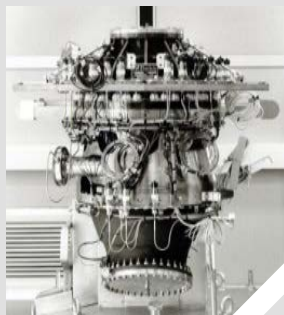
Boosters



Ariane 5

Ariane 6

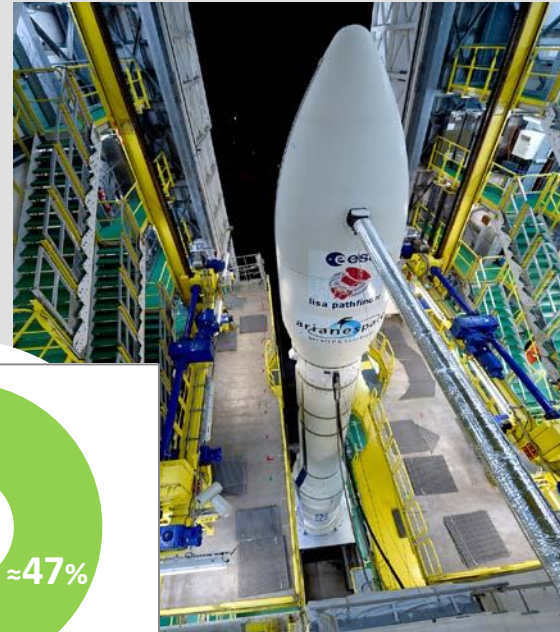
Turbopumps



Vulcain

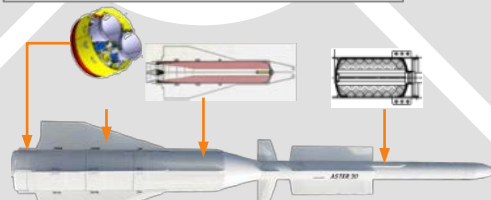
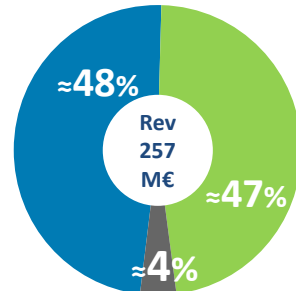
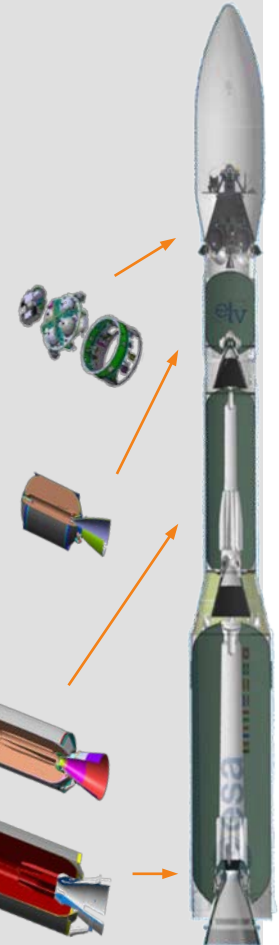
Vinci

Vega launcher



Vega

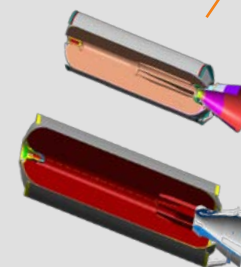
Vega C



Aster 30

Camm ER

Tactical propulsion



Production

Development

Avio has over 50 years in Space Launchers



1960

1980

1988

2012

Today



Explosives maker

Qualified supplier

Propulsionist

Prime contractor

Integrated operator

A pre-requisite to enter in the space business

Solid rocket motors supplier

Design authority of Ariane 5 P230 SRM and vulcan TP

Vega LV prime and design authority

Vega Evolution Ariane 6

Evolved from supplier to integrated operator



Today Avio has 3 main competency areas



Solid propulsion



Materials :Pre-preg and TP rubber



Insulated motor Case Mfg

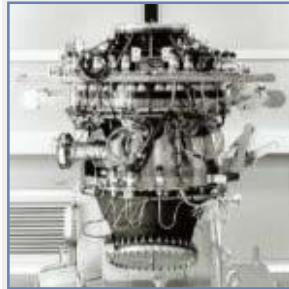


Propellant casting



Nozzles

Liquid propulsion



Vulcain Lox TP



MIRA TP and Firing Test



Vinci Lox TP



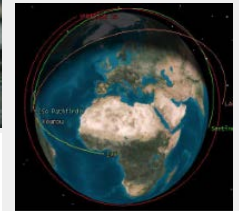
TP integration



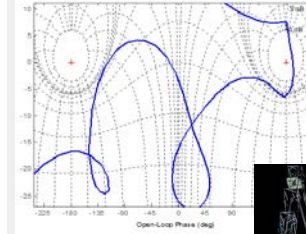
System integration



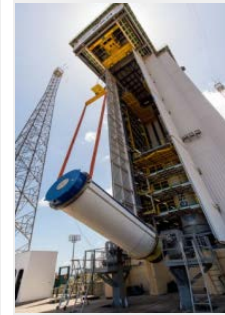
All system testing and verification



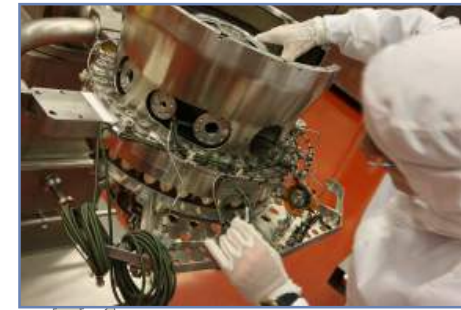
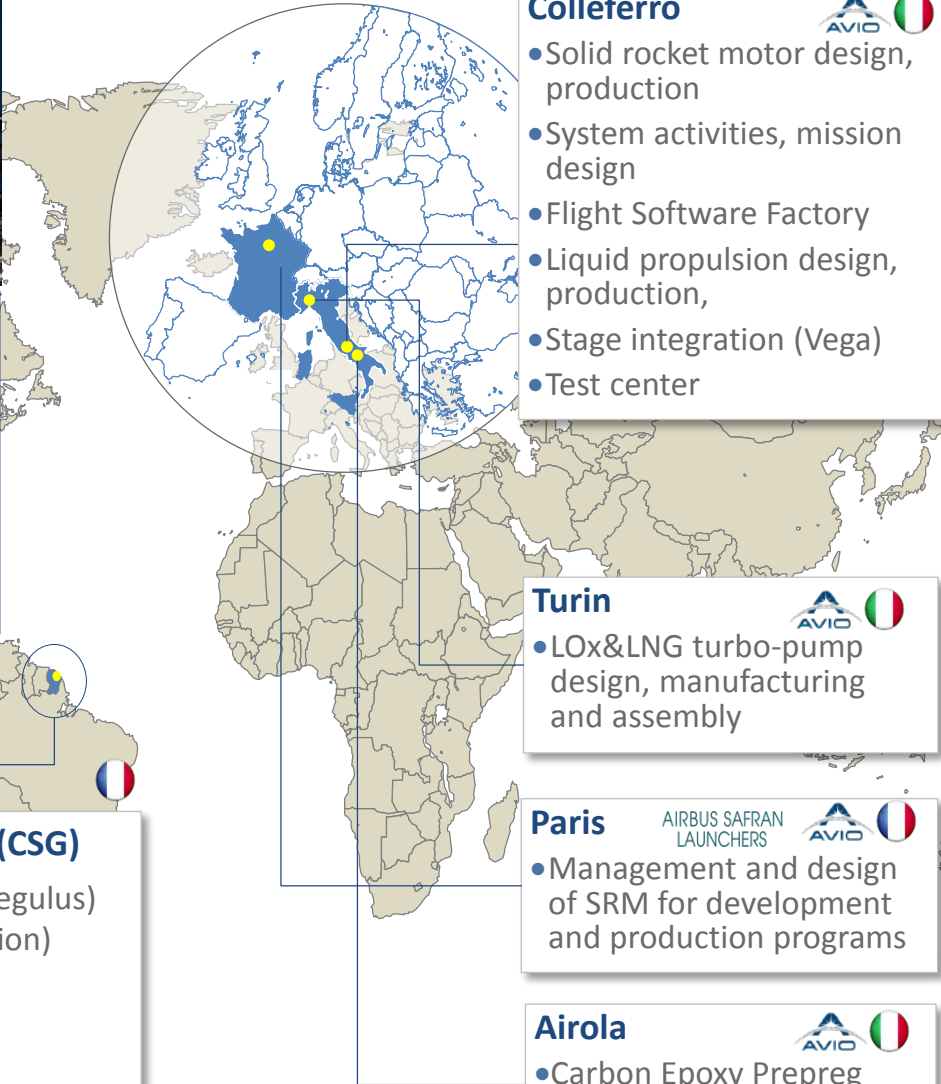
Launcher integration



Mission simulation



Avio is part of the EU critical space infrastructures




Kourou European Spaceport (CSG)

- Solid rocket motor casting (Regulus) and integration (Europropulsion)
- Vega integration and launch operations (Mobile Gantry)

Colleferro 


- Solid rocket motor design, production
- System activities, mission design
- Flight Software Factory
- Liquid propulsion design, production,
- Stage integration (Vega)
- Test center

Turin 

- LOx&LNG turbo-pump design, manufacturing and assembly

Paris AIRBUS SAFRAN LAUNCHERS 

- Management and design of SRM for development and production programs

Airola 

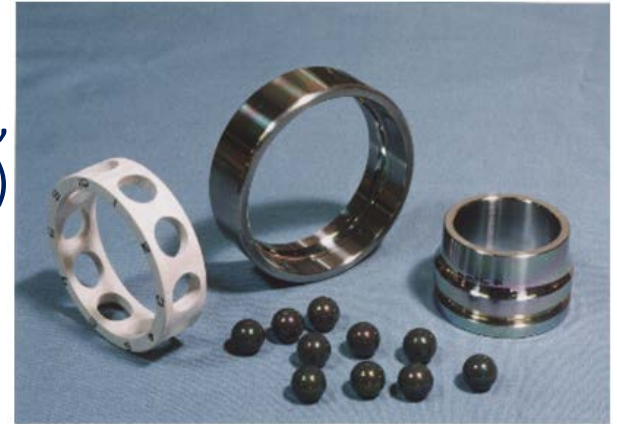
- Carbon Epoxy Prepreg manufacturing and testing



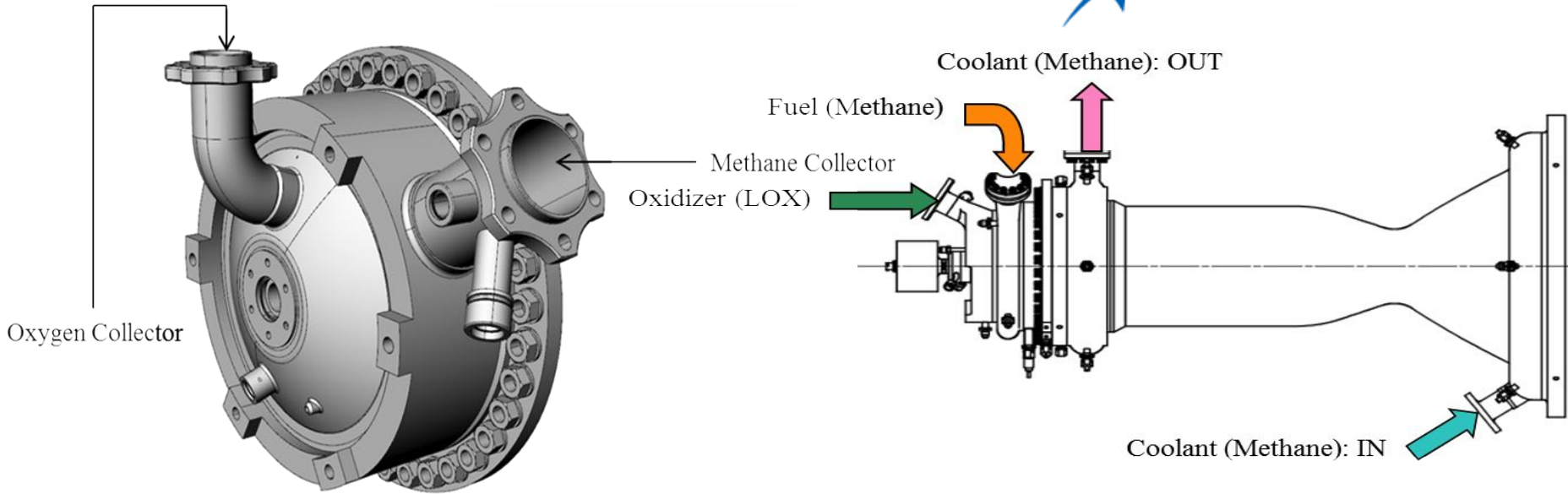
An initial partnership with Japanese space players



Avio is developing technologies for next generation of LOx-LNG Liquid Rocket Engines, in partnership with IHI, through Italian and Japan Space Agencies (ASI and Jaxa) Significant achievements are expected on *high speed cryogenic roll bearings, injectors and combustion chamber*.



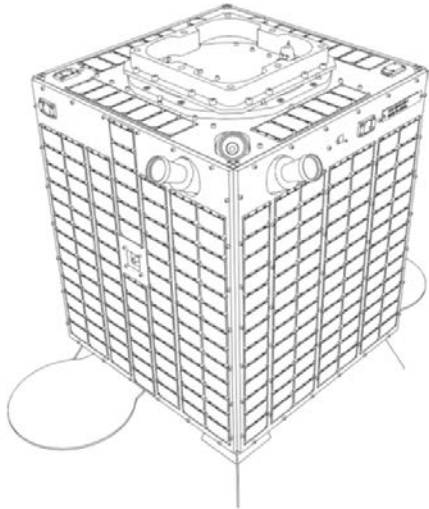
A joint Thrust Chamber Assembly in the class of **10ton** thrust will be tested in Italy by 2018.



A limited, but qualified, partnership with Japanese space players



 AXELSPACE



Grus

Courtesy of Axelspace.

Avio is exploring opportunities for cooperation with Japanese players on LEO microsatellite constellations and applications.

- We recognize the value of **high frequency refresh** in Earth observation and monitoring.
- We know that large constellations implies a **totally new approach to space business**.
- We are aware, as well, of the outstanding potentials of **Vega and its Space System** as the ultimate solution for microsatellite **constellation** deployment and exploitation.

That is why Avio intends to establish deeper relations with Japanese microsatellite companies as Axelspace, in consideration of the **unique capabilities of Vega** for launching such satellites