



**ON THE WAY TO 100 YEARS  
OF EXCELLENCE IN AEROSPACE**

*Time flies*



AVIATION



SPACE



DEFENCE



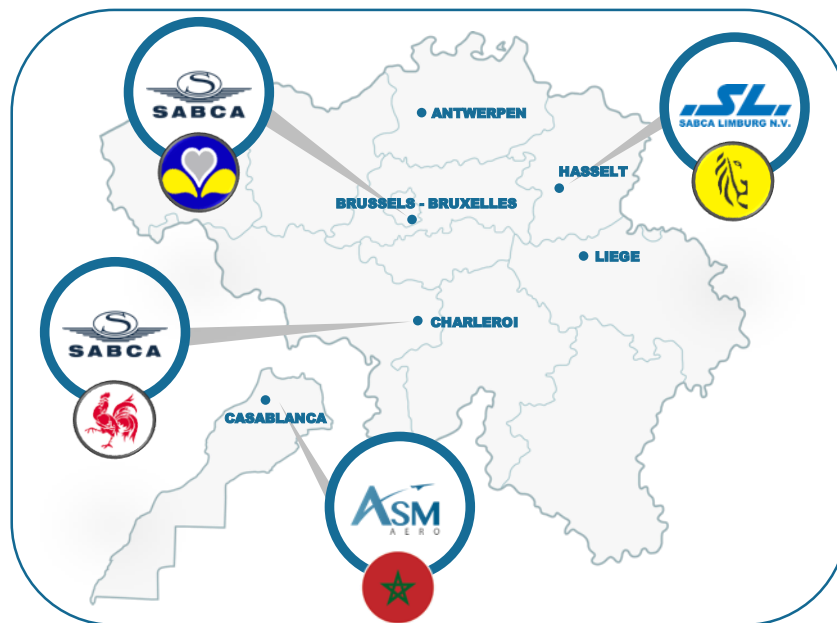
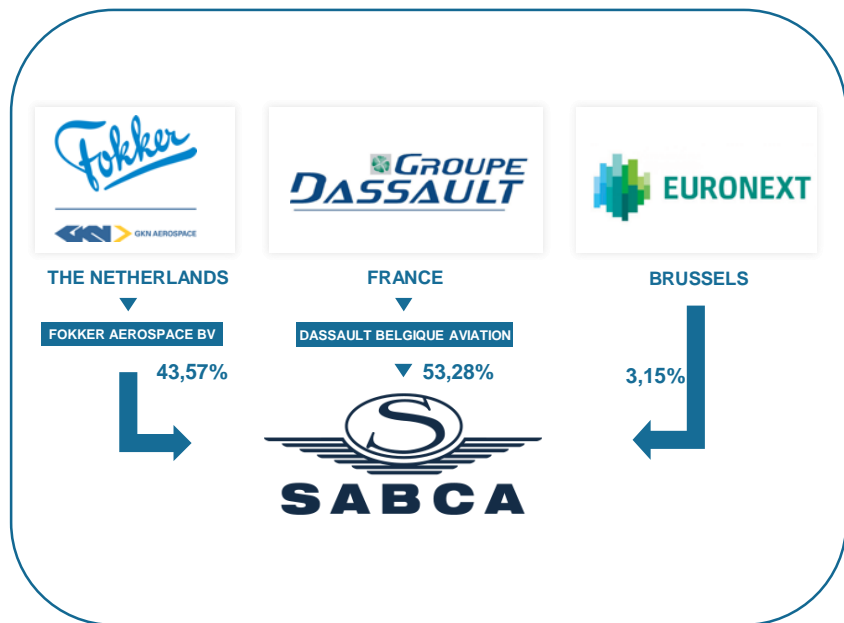
[www.sabca.com](http://www.sabca.com)



# A Quick Introduction to SABCA

# Markets & Shareholders

- > A major player in the aerospace industry, for civil, space, and defence markets
- > A designer and integrator of solutions with a high degree of added value and a strong technological and innovative content





# SABCA BRUSSELS



Established in 1920



680 employees



1,120,000 Sq. feet  
100,000 Sq. meters



- Group HQ
- Engineering Dept
- Machining
- Assembly
- Actuators
- Electronics
- Surface Treatment
- Testing





# SABCA CHARLEROI



Established in 1955



292 employees



540,000 Sq. feet  
50,000 Sq. meters

- 
- Aircraft, Helicopter, Equipment MRO&U
  - Engineering Department
  - Direct Access to Runway
  - Control Tower & Telemetry
  - Painting Facility





# SABCA LIMBURG



Established in 1992



120 employees



215,000 Sq. feet  
20,000 Sq. meters

- Composite Parts & Assemblies
- Engineering Department
- Automatic Tape Layering
- 16ft x 49ft Autoclave (5m x 15m)






# SABCA MOROCCO



Established in 2011



70 employees

- 
- Aero structure Assembly
  - Joint Venture with AAA
  - African Footprint – local supply chain



# Core Products & Services



Maintenance &  
Upgrade Fighters



Sub-Systems for Civil &  
Business Aviation



Control Systems for  
Space Launchers



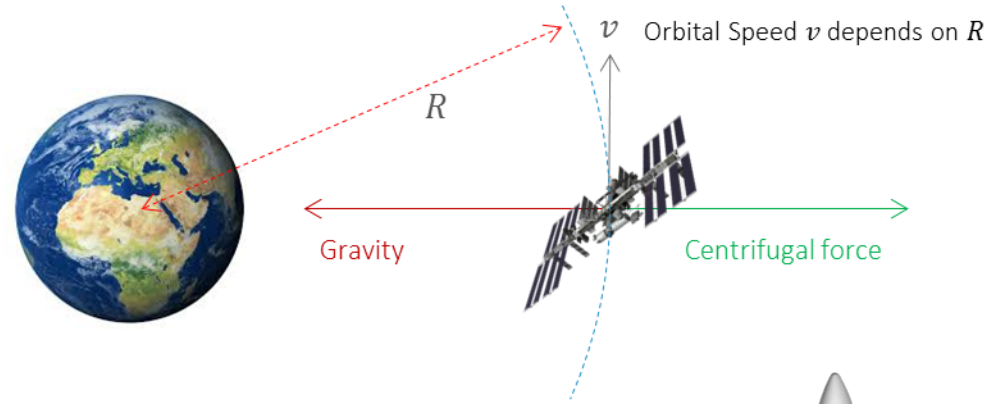
# 40 Years of SABCA in Space



# Space Mechanics

## > Typical orbits

- Low Earth (LEO)
  - 7,67 km/s @ 400 km altitude
- Geosynchronous/stationary (GSO/GEO/GTO)
  - 3,07 km/s @ 36000 km altitude



## > The energy you need to impart to a payload is stored in the form of propellant... which needs to be brought all the way up...!

- Climbing up (potential energy) and going into orbit (kinetic energy)
- Typical propellant mass fraction > 90% (11Kg propellant / Kg going in orbit)
- Practically, a fraction of the total mass is also needed for the engines, structure, tanks, etc. -> only a few % of the mass on the launch pad goes into orbit





# Ariane : Europe's Solution for Access to Space

Ariane 1

1979 - 1986



1,85 tons in GTO  
11 launches  
82% reliability

Ariane 2

1986 - 1989



2,17 tons in GTO  
6 launches  
83% reliability

Ariane 3

1984 - 1989



2,7 tons in GTO  
11 launches  
91% reliability

Ariane 4

1988 - 2003



4,3 tons in GTO  
116 launches  
97% reliability

Ariane 5

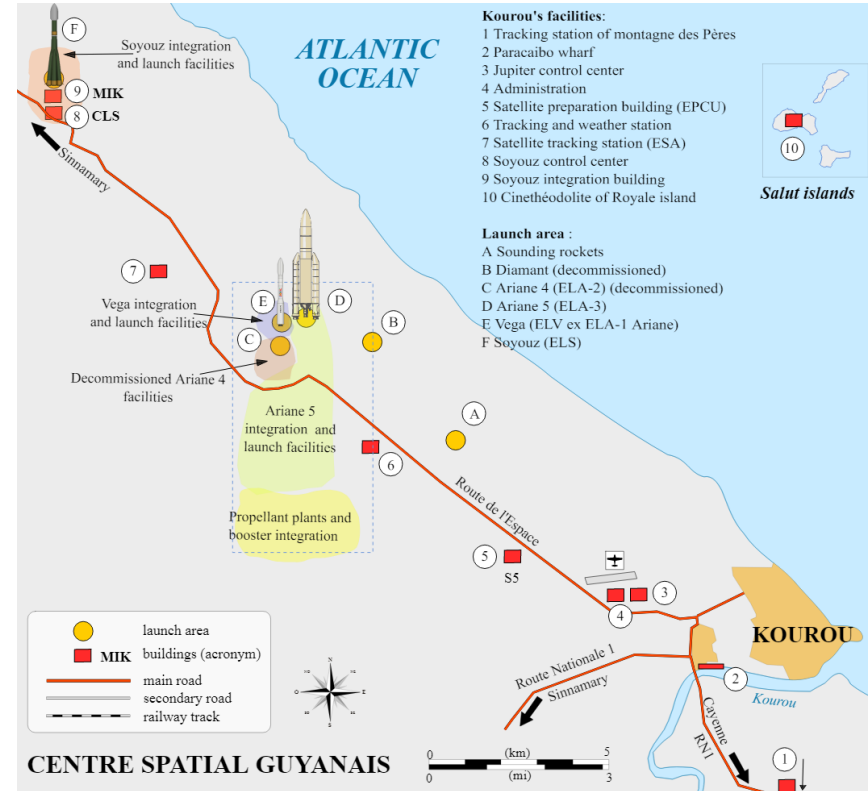
1996 - today



11,11 tons in GTO  
97 launches  
**98% reliability**



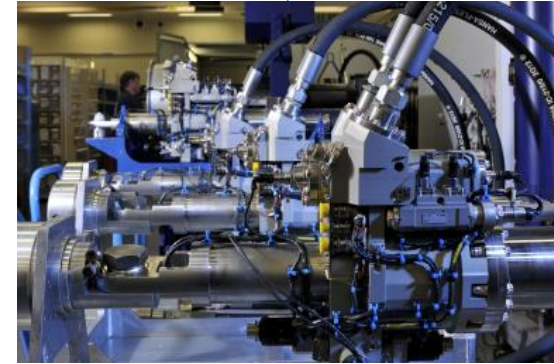
# Arianespace : A Solution for Every Need



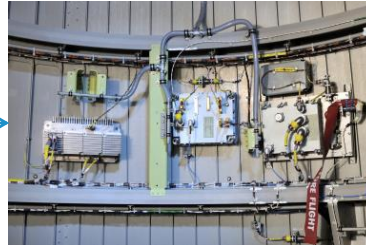
# SABCA – Part of the Story Since Ariane 1



AEROSTRUCTURES



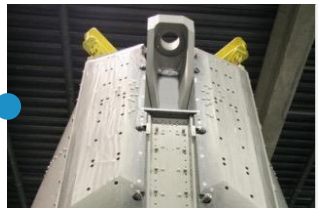
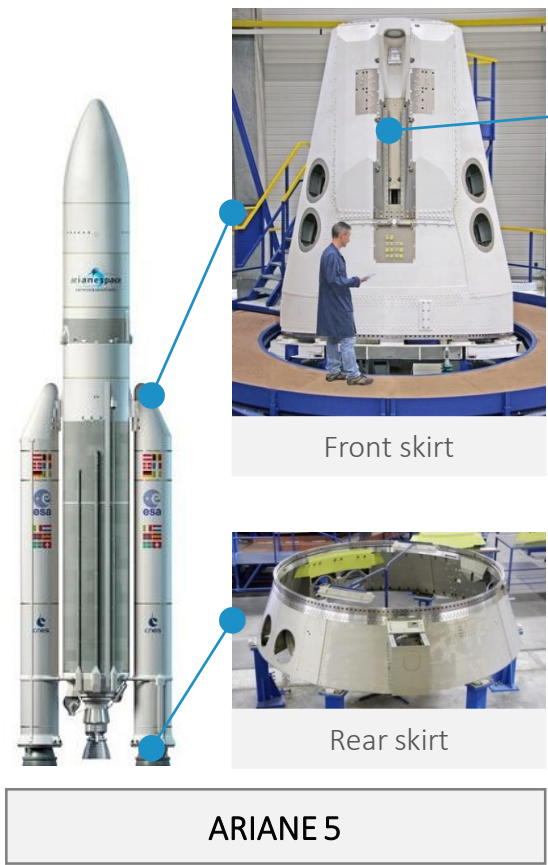
THRUST VECTOR CONTROL  
SYSTEMS



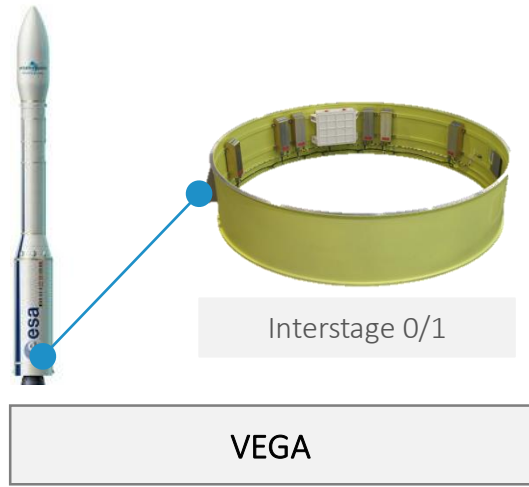
INTEGRATION



# Aerostructures

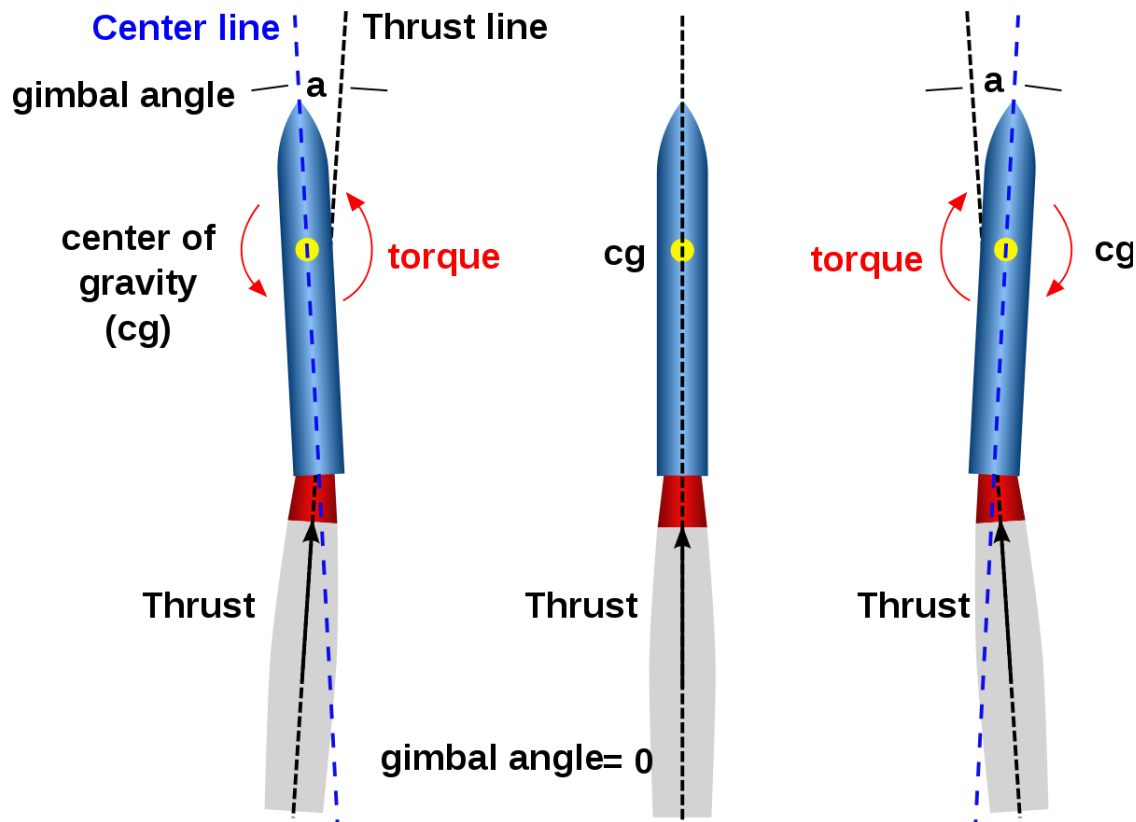


Damping mechanism,  
Transmitting 4,000 kN  
of thrust load



# Thrust Vector Control

> Making sure we go in the right direction !



Z23\_QM\_SFT (1).avi



# SABCA – The Reference European Solution for TVC



Upper stage 220 W EHA (GHSM)



Vulcain engine 8 kW HA (GAM)

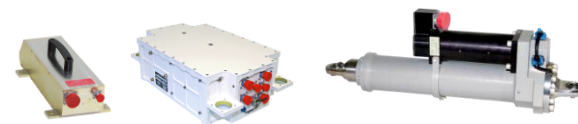


Booster 132 kW HA (GAT)

**ARIANE 5**  
TVCs with (E)HAs



AVUM upper stage 165 W TVC



Z23 / Z9 stages 7 kW / 1,3 kW TVC



P80 first stage 24 kW TVC



**VEGA**  
TVCs with EMAs

# New Technologies, New Space Nations, New Customers



**SpaceX Falcon 9**

Game-changing landing of the first stage in December 2015



**Indian PSLV**

104 small satellites launched at once in February 2017



**Rocket Lab's Electron**

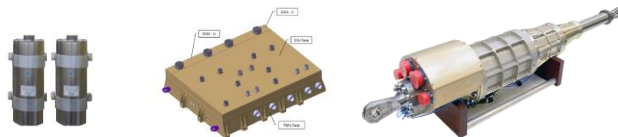
Launch in January 2018 of a rocket designed to put only 150kg on orbit



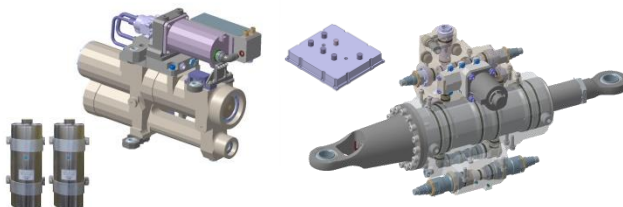
# More Efficient, in Line With the New Market Trends



# The Story Continues for SABCA – TVC



Vinci upper stage 4 kW TVC



Vulcain engine 12 kW TVC

Common architecture for Vega-C  
first stage and Ariane 6 boosters

**ARIANE 6**  
TVCs with EHAs & EMAs



Z40 stage 35 kW TVC (Z40)



P120 first stage > 70 kW TVC

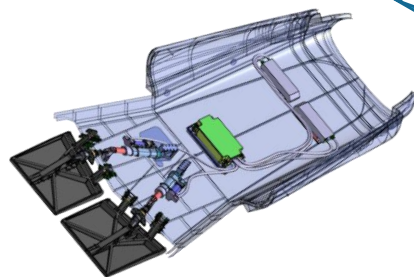
**VEGA-C**  
TVCs with EMAs



# Reusable Trans-Atmospheric Vehicles!

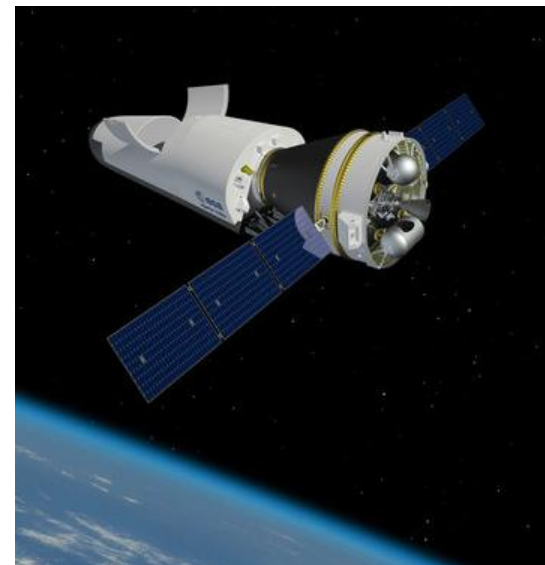
## > Intermediate Experimental Vehicle (IXV)

- Prototype spaceplane of the European Space Agency
- Successfully conducted a 100-minutes flight in Feb 2011



## > Space Rider, Europe's reusable vehicle

- Regular access to space for microgravity experimentation, in-orbit demonstrations, etc.
- 800 kg of cargo mass, 2 months of orbital operations
- Maiden flight: Q4 2020



# And Beyond?



# The Real Challenge For Europe

---

- > Space sector has a crucial role to play in answering societal challenges & improve efficiency of public policies
  - Europe's presence in the digitalised and globalised world
  - Europe's Security and Sovereignty
  - Optimal utilization of natural resources and protection of the environment
- > European institutions must address these societal challenges while generating growth, competitiveness, and benefits to citizens
- > This is obvious for USA, Russia or China who guarantee to their space industry a high and continuous level of public investment and a secured market essential for their competitiveness



# The Real Challenge For Europe

---

- > European Space Industry performance
- > Thanks to past and present joint efforts of Member States through ESA and EU
  - Europe amongst top world leaders in space with USA and China
  - 50% of open commercial markets captured worldwide
  - 20% of global launched mass put in orbit
  - Only 4% of the worldwide space workforce
  - Only 10% of the global public spending for space
  - Only 0.1% of European public spending
- > Investing in space must remain an institutional priority to preserve Europe's leadership, competitiveness, sustainability and autonomy
- > New space powers are emerging, disruptive industrial organizations and business models are massively supported by national institutional entities with growing budgets

## VP Mike Pence – 34<sup>th</sup> Space Symposium (Colorado)

*“As President Trump has said, “It is **America’s destiny** to be...the leader among nations on our adventure into the great unknown.”*

*And we’re going to write the next chapter of that adventure with **American industry** and with **American ingenuity** in a full partnership with the **American people**.”*



## When Will We Hear This ?

*“As President ??? has said, “It is **Europe’s** destiny to be...the leader among nations on our adventure into the great unknown.”*

*And we’re going to write the next chapter of that adventure with **European** industry and with **European** ingenuity in a full partnership with the **European** people.”*







**ON THE WAY TO 100 YEARS  
OF EXCELLENCE IN AEROSPACE**



AVIATION



SPACE



DEFENCE

*Time flies*



[www.sabca.com](http://www.sabca.com)

