

TANKERS

FROTIN MICKAËL 14 11 2023



LEAKLESS... FLY MORE

SOLUTION



TANKERS Create large and light envelopes with reliable assembly technology for "light" gases.

CLOSE THE GAP

Reduce the leak rate expensive **Helium by 10** and **increase** the flight time **by 5**.
We participate to enhancing resource efficiency.

COST SAVINGS

50% less... for operational cost
100% reusable

TARGET CLIENTS

Governmental agency / climate study.
The next generation for lighter than air.

TECHNOLOGIES

100% Metallic envelope Resist to the UV and the cosmic ray.
To fly many years.
First step, masse 270 g/m^2
Second step, masse 200 g/m^2
Compatible with Hydrogen Gas

APPLICATION



TANKERS

- More than 14 fields of application already explored.
- Recurring and long-term economic and industrial potential.
- Markets:
 - Surveillance with Tethered Balloon market.
 - Transport, wind-turbin parts....
 - Surveillance, Maritime and coastal
 - Large Area, agriculture field
 - Tourism, city's Tethered Balloon
 - Space agencies, Stratospheric application
 - LH2 Tank



ZEPHALTO



OUR COMPETITION

LEADERS

In Europe, A-NSE, CNIM Air Space

CHALLENGERS

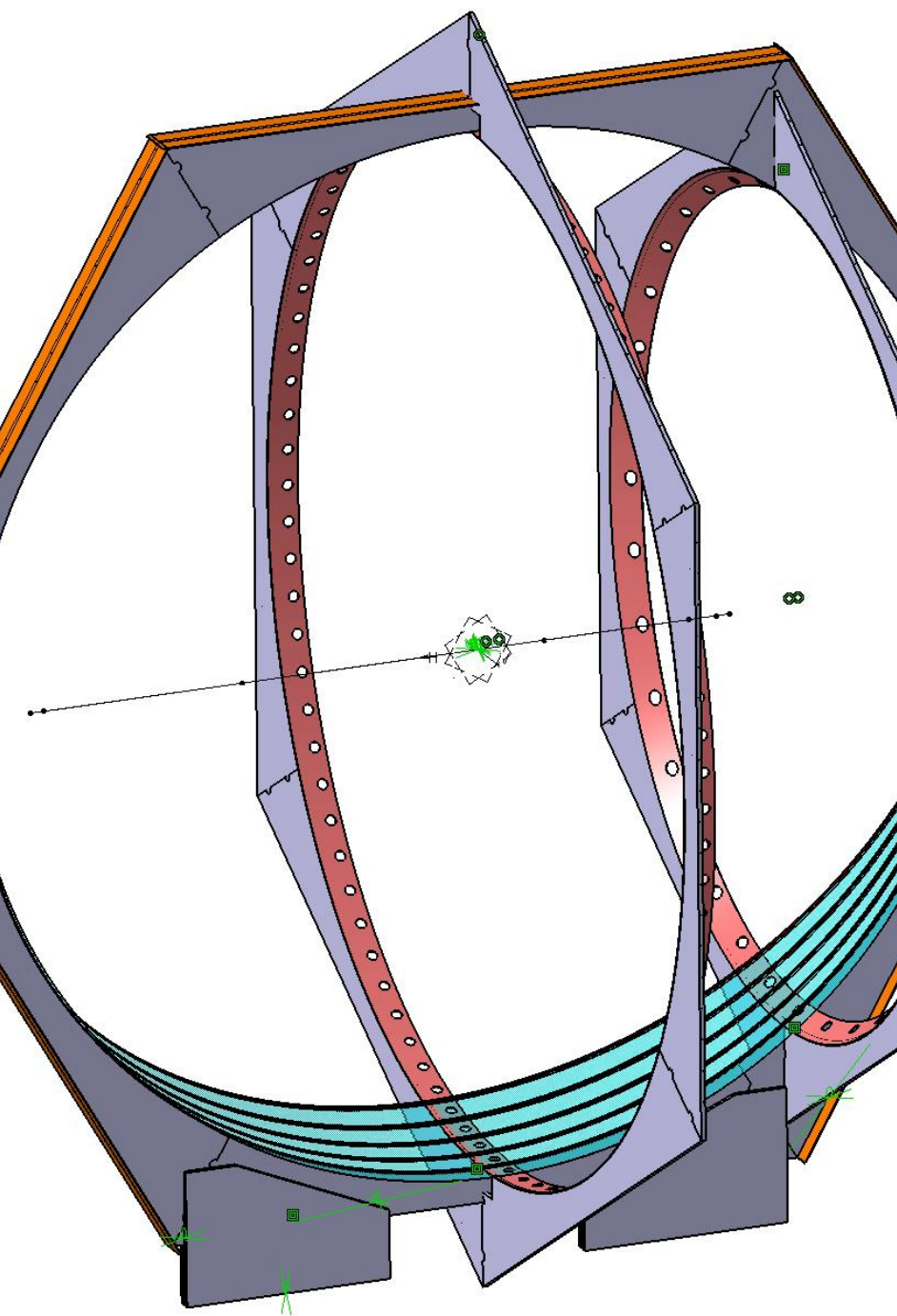
CNIM Air Space
DIATEX

POTENTIAL PARTNERS

ZEPHALTO
ZERO2INFINITY
ONERA
IPVF

POTENTIAL CUSTOMERS

CNES
FLYING WHALES
AEROVEHICULES
Thales Alenia space
Airbus
CNIM Air Space



PROOF OF CONCEPT

OBJECTIVE

Focus first on Tethered balloon market and stratospheric project

GOALS

Leakage rate measure
 10^{-6} mbar.l.s⁻¹
fly one year.



PROOF OF CONCEPT

DELIVERABLES

Spherical shape of 4m diameter
lift of 5 Kg
2km altitude
Flexible solar panel 5W

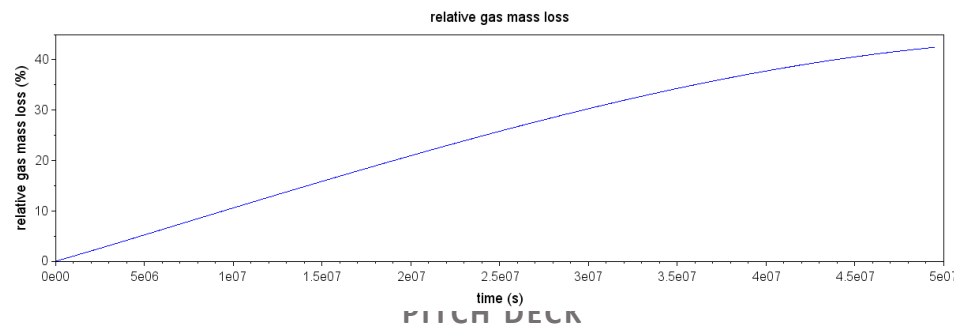
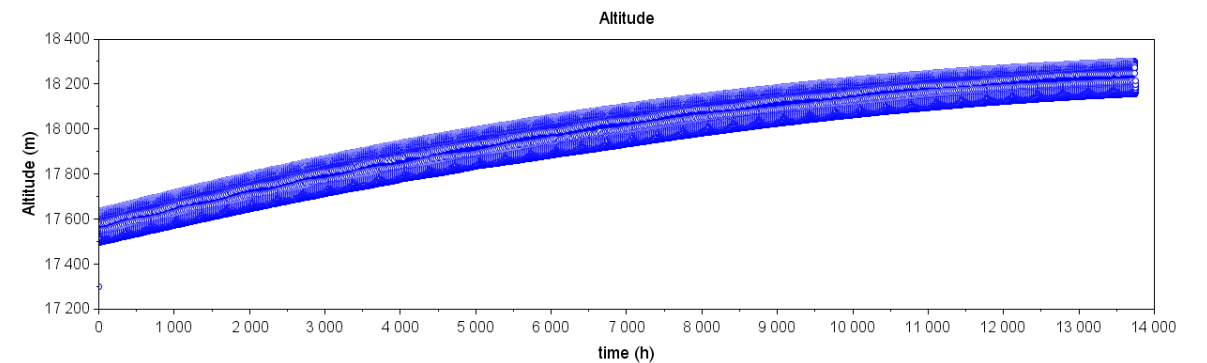
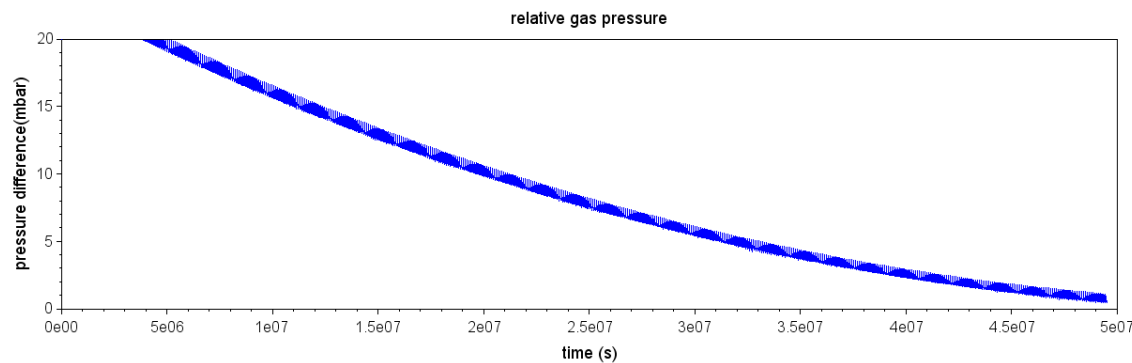
SCOPE

Done at 50m of altitude in the
INRAE field in June 23

PROOF OF CONCEPT TECHNICAL STUDIES

Material behavior : Flight times

- We have identified a material for the realization of the demonstrator. Our flight simulations, validated with real data from stratospheric flights from the LMD@polytechnique, confirm flight times of around 600 days (With leakage rates 5 times higher than expected values).

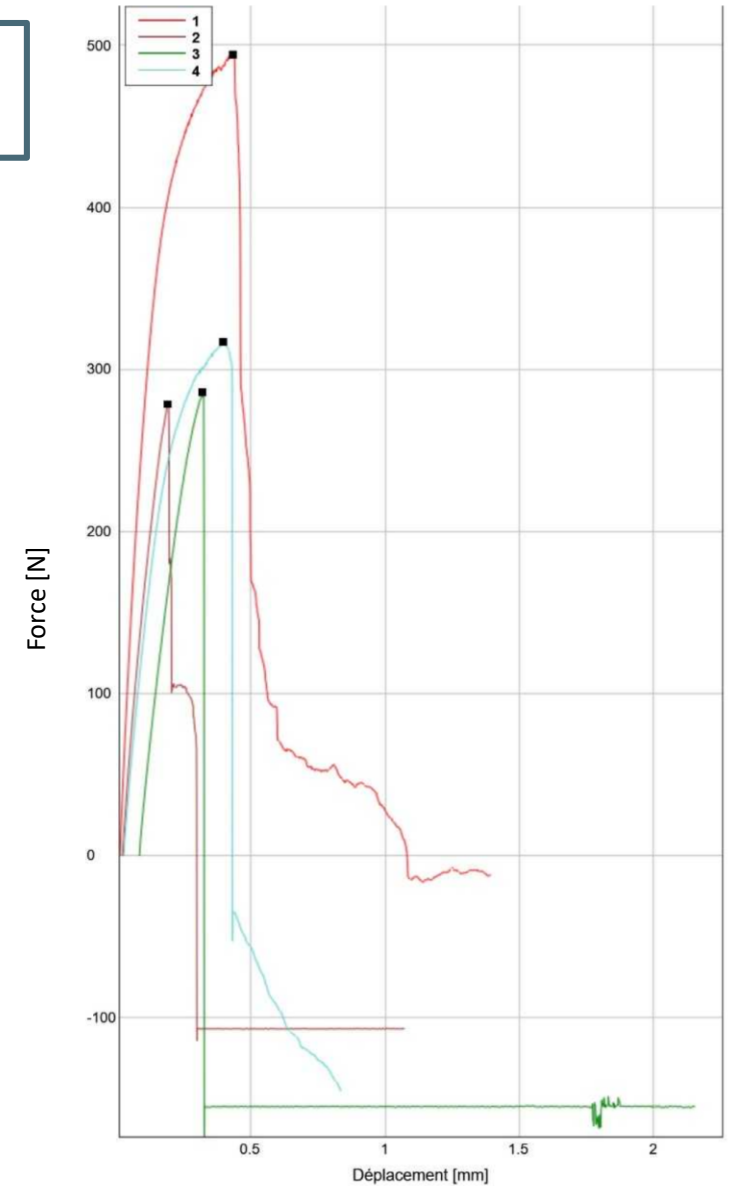


PROOF OF CONCEPT TECHNICAL STUDIES

Envelope materials qualification :

Tensile tests of assembly welds

- Breaking strength material given by manufacturer : 290 Mpa.
- Search welding parameters.
- Preliminary studies net breakage of weld edge at ~100 MPa.
- Assembly procedure to be deepened.

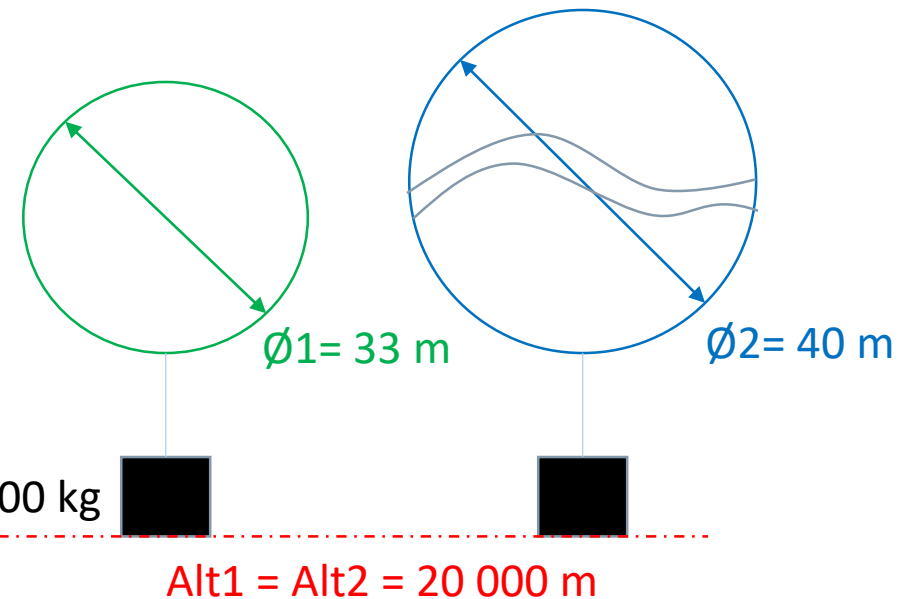


PROOF OF CONCEPT ECONOMIC AND OPERATIONAL ANALYZES

Comparison between polymer (1) and metallic (2) casing

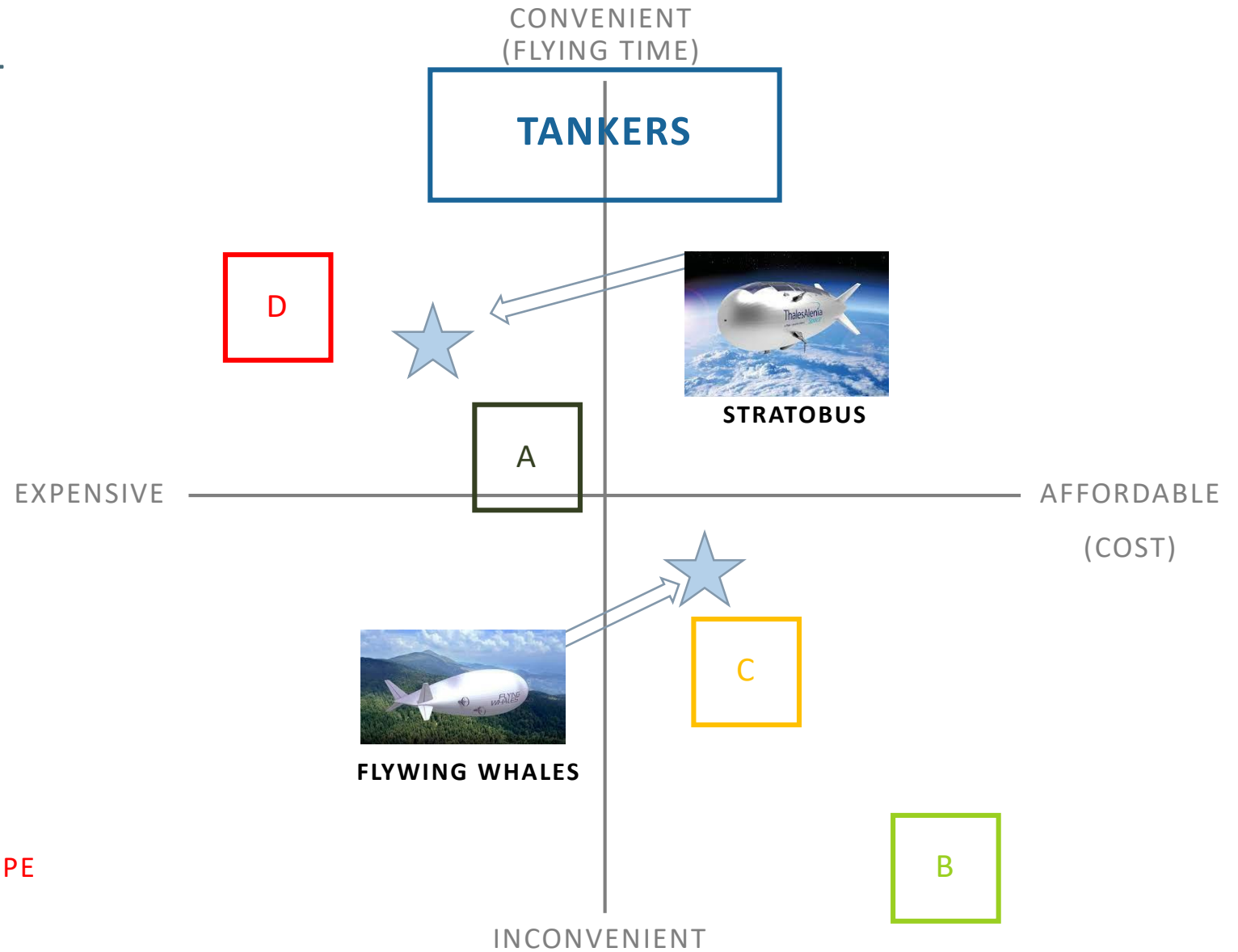
- Mass 1 : 1200 kg
- Volume 1: 18 816 m³
- Price 1 : 64 k€ envelope + 64 k€ He = **128 k€**
- Flight duration 1 : 0,5 year
- Re-use 1 : Non (polyethylene terephthalate)
- Mass 2 : 1200 kg
- Volume 2 : 33 510 m³
- Price 1 : (5024 m²* 50 €/m²)+ 77,5 k€ He= **329 K€**
- Flight duration 2 : 3 years (goal)
- Re-use 2 : Oui

The current price per m² is 250 €. The supplier considers reducing by 5 the price for that quantity.



- Total activity over 3 years : 6*128=768 k€ (+ material recovery cost*6)
- Total activity over 3 years : 329 K€ (+ material recovery cost*1)

COMPETITIVE LAYOUT TETHERED BALLOON



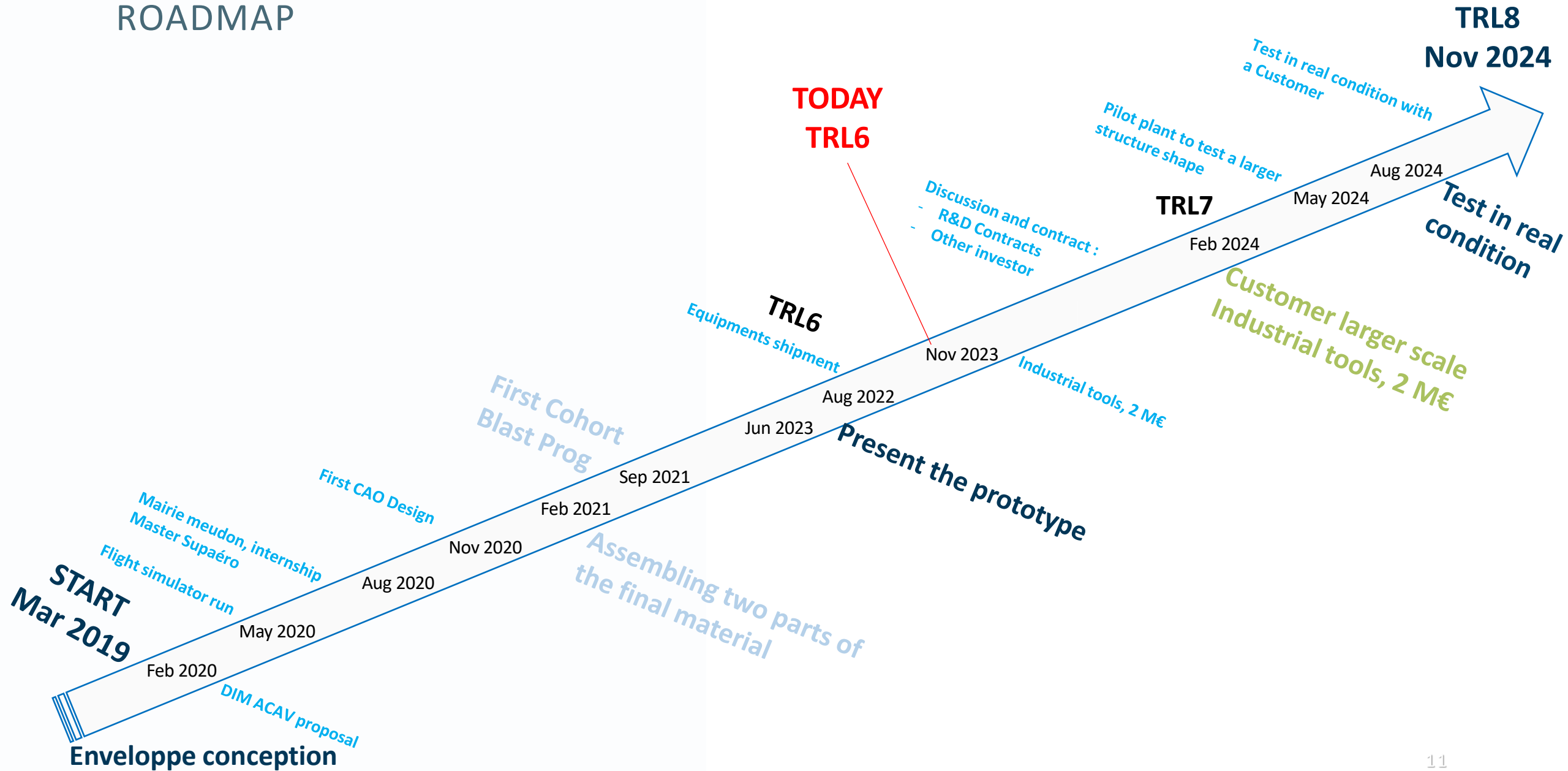
A COMPOSITE ENVELOPE

B STANDARD ENVELOPE

C P.E.T ENVELOPE

D COMPOSITE AND METALLIC ENVELOPE

ROADMAP



THANK YOU

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