

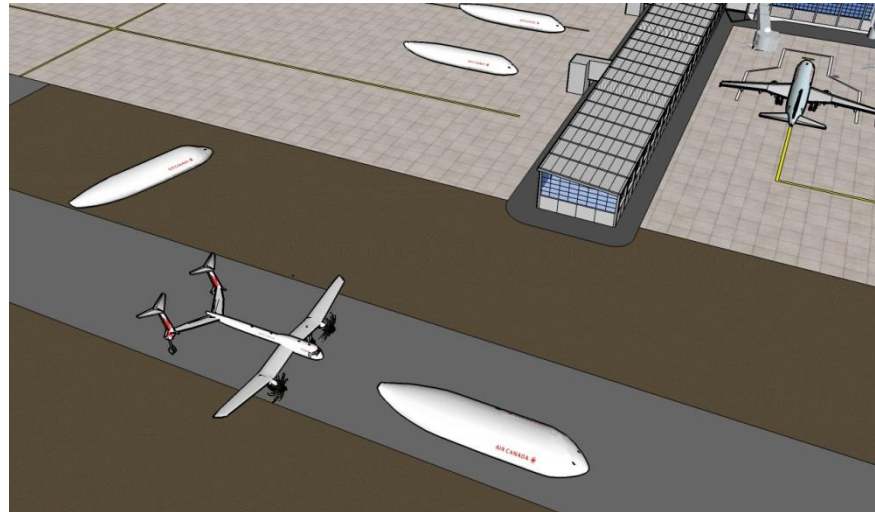
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Bee-Plane™ Project description for TRL2

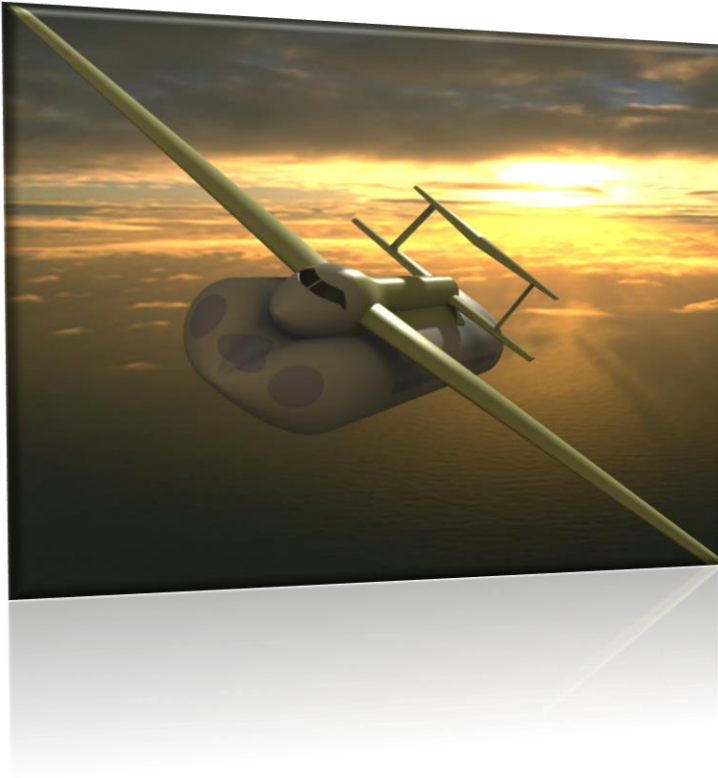


Project origin



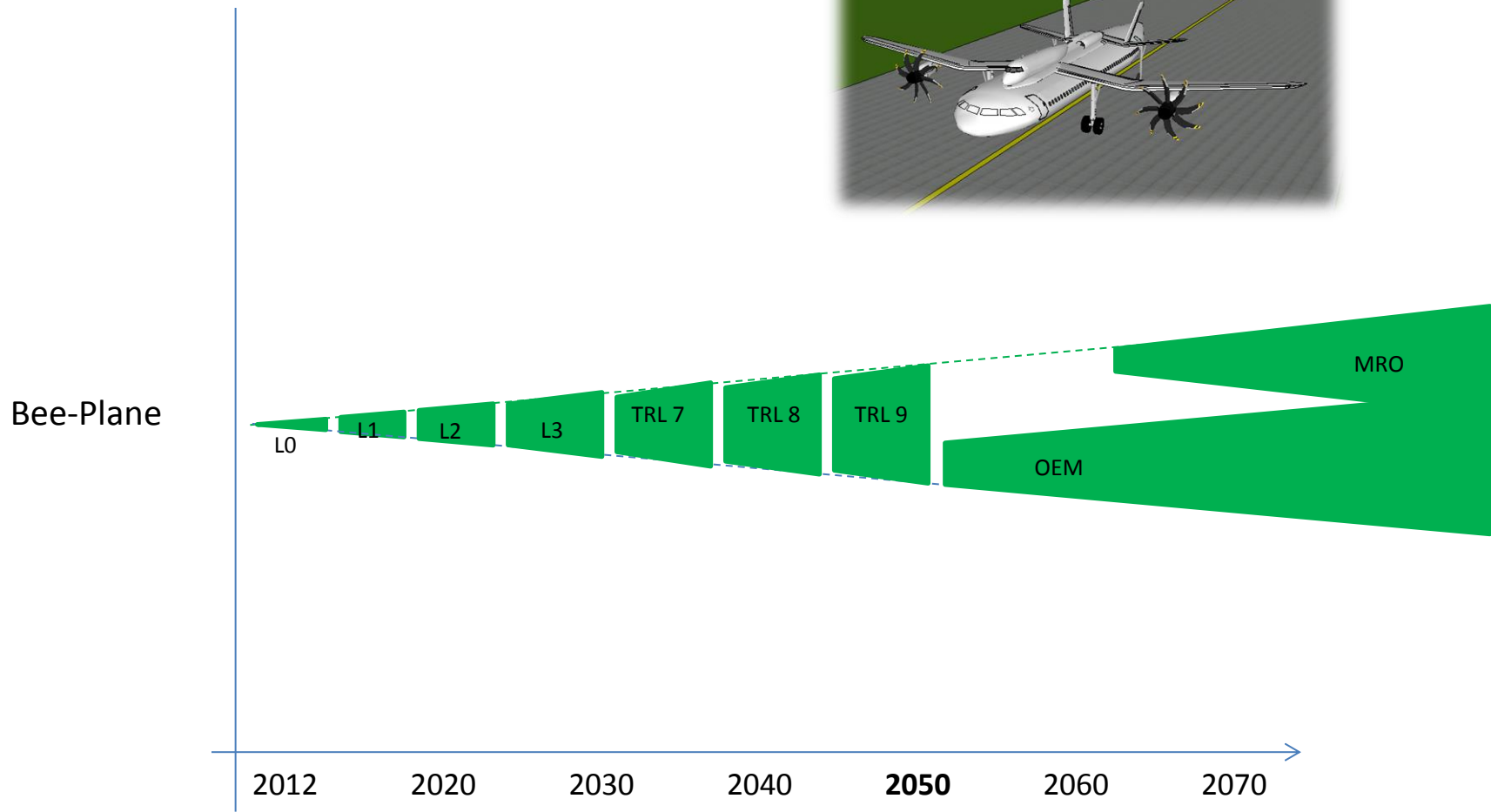
Goal : reduce by 50% cost of flight hour

Bee-Plane orientations for TRL2



Detachable fuselage
Size of an Airbus A321
200/220 PAX
Overall load 100 T
Engines : 2*TP400 + 2*Silvercrest
Multi usage baskets

Projet 2050 vision



Bee-Plane – Future markets

Nearly 20 000 aircraft to be delivered in 20 years

Airbus



Boeing



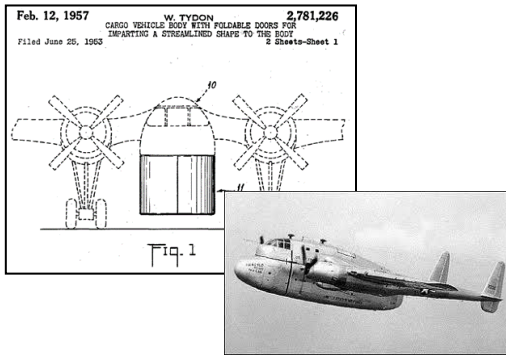
Nasa



10% of market represents 160 Md\$

Bee-Plane - State of the art

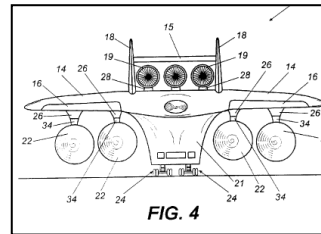
Fairchild XC-120 (US)
Years 1950s



White Knight Two (US)
Load 16t



Flying Wing



Clip Air (CH)



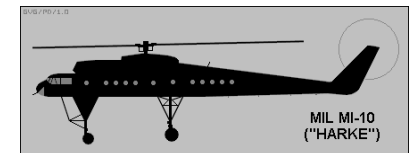
Configurable Air transport (US)



Skycrane (US)



Mil Mi-10 (RU)



Bee-Plane™ Technology review



Fairchild XC-120
Pack Plane (1950)

&



Electronic
wiring



Noise
reduction



Carbon
body



Turboprop
engine (TP400)

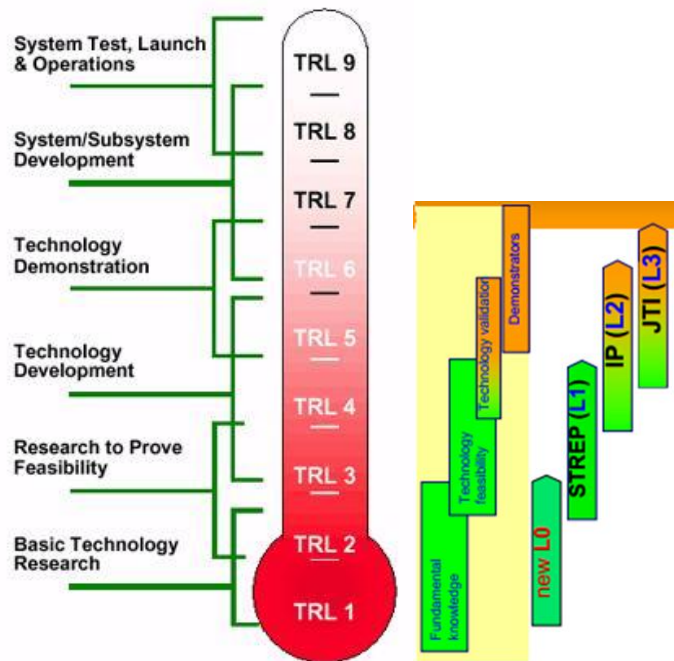
=



Double
body

Vocabulary

- « TRLs » for technical readiness level
- « Levels » for public fundings
 - Level L0 : 1m€ (public funding ~600k€)
 - Level L1 : 5m€ (public funding ~3m€)



Technology Readiness Level (TRL) - European Space Agency		
TRL	Description	Years
TRL 9	Actual system "Flight proven" through successful mission operations	
TRL 8	Actual system completed and "Flight qualified" through test and demonstration (ground or space)	
TRL 7	System prototype demonstration in a space environment	
TRL 6	System/subsystem model or prototype demonstration in a relevant environment (ground or space)	
TRL 5	Component and/or breadboard validation in relevant environment	
TRL 4	Component and/or breadboard validation in laboratory environment	
TRL 3	Analytical & experimental critical function and/or characteristic proof-of-concept	
TRL 2	Technology concept and/or application formulated	2013/2015
TRL 1	Basic principles observed and reported	2012/2013

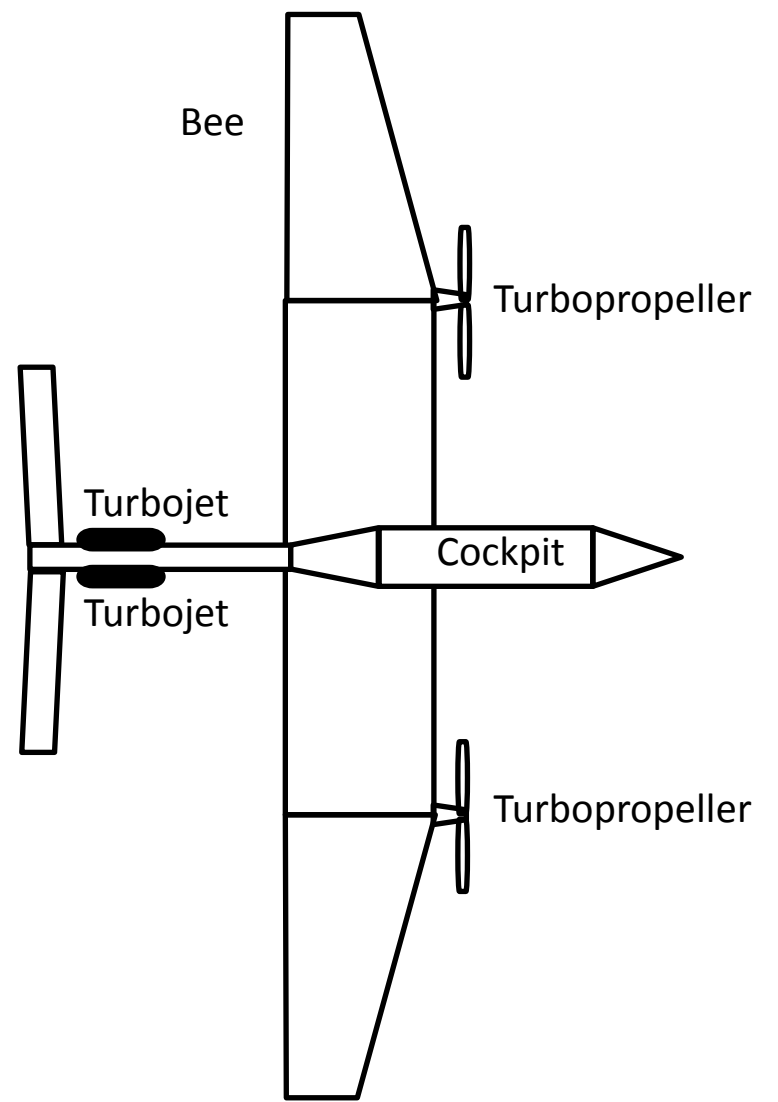
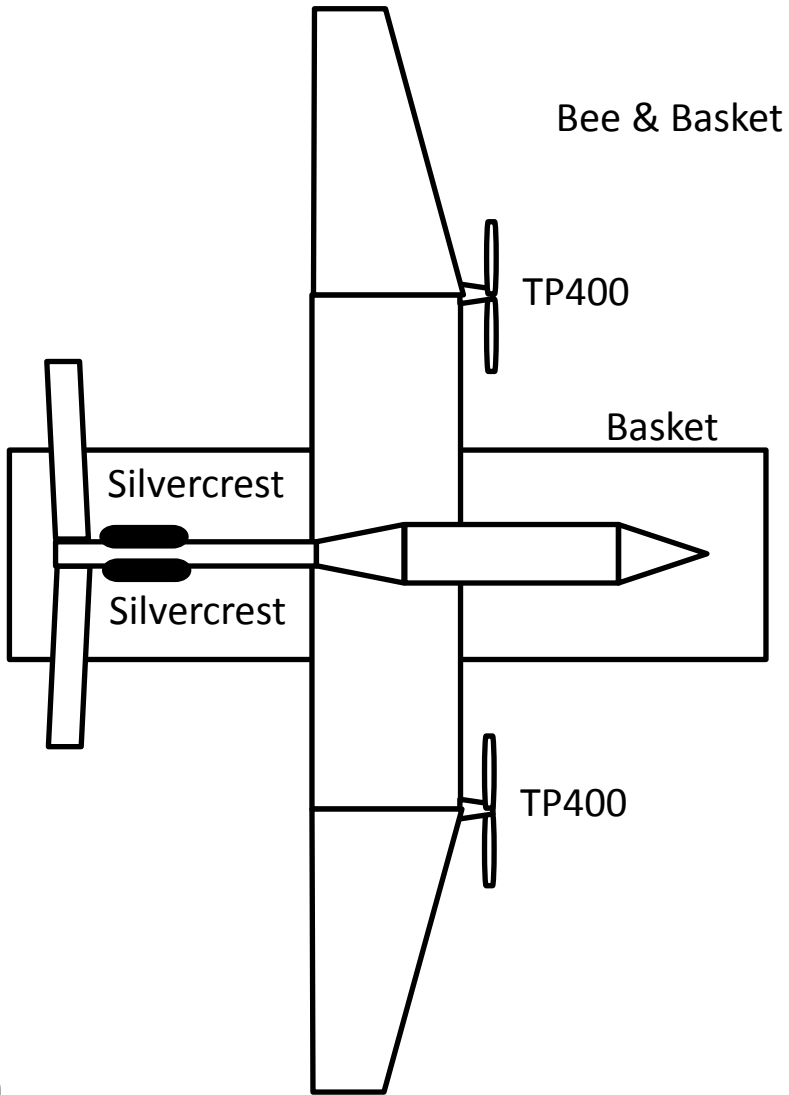
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Bee-Plane – technical description



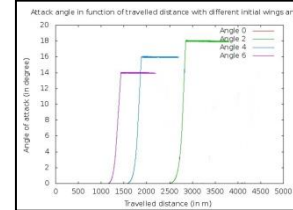
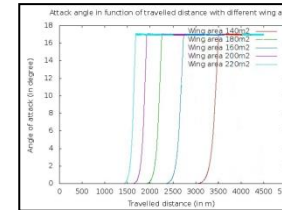
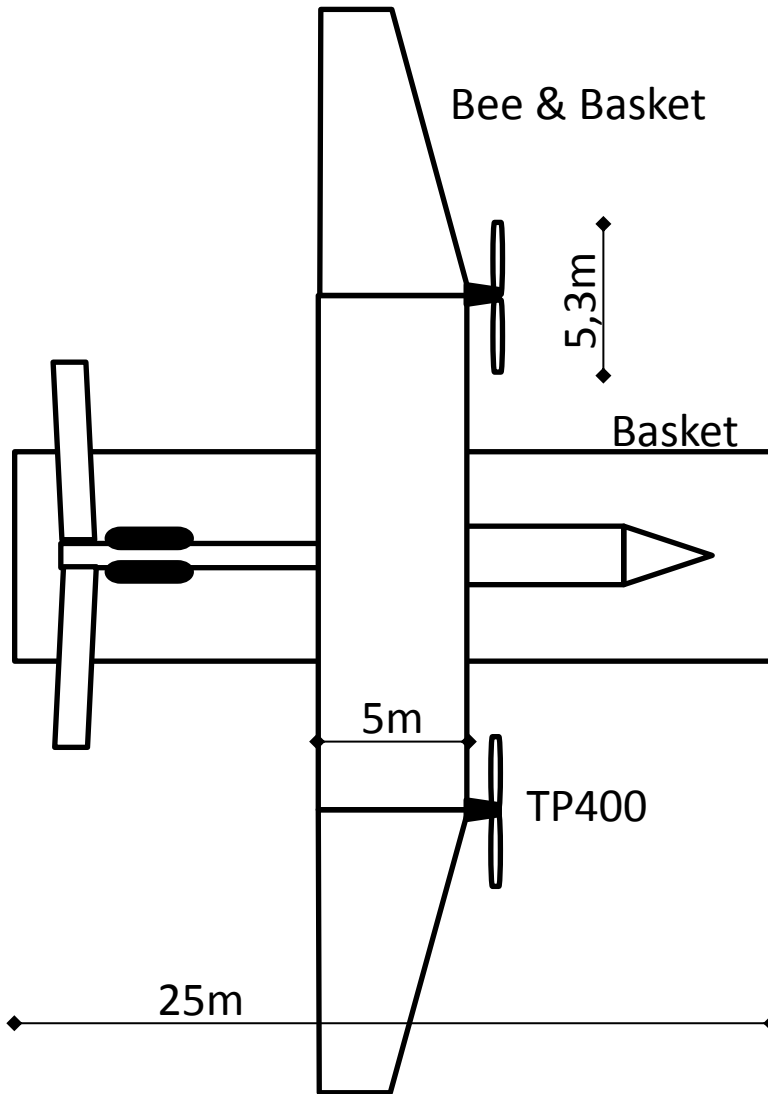
Bee-Plane



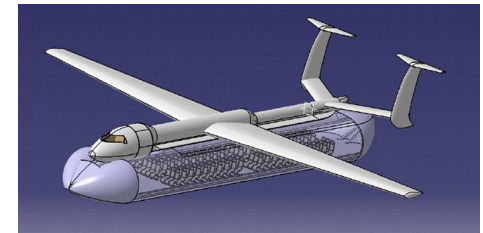
5m



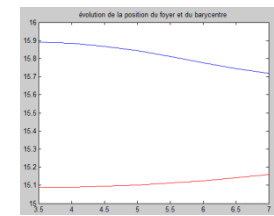
Bee-Plane



Thrust Analysis - INSA Rouen 2013



Shape and structure - Estaca 2012



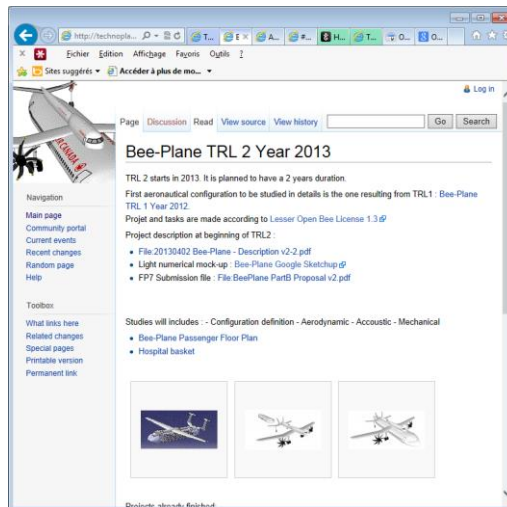
Aero parameters - Centrale Paris 2013



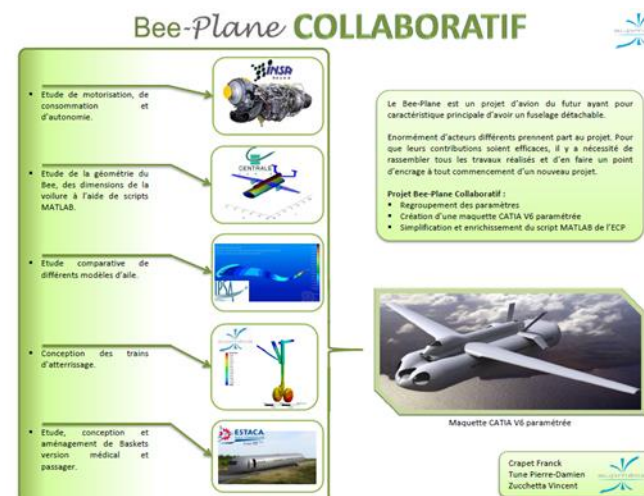
Bee-Plane Collaborative project

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<http://technoplane.hd.free.fr/MediaWiki/>



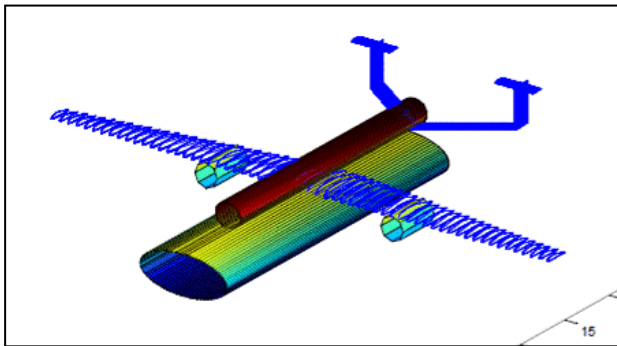
Technical wiki and coordination
Technoplane SAS



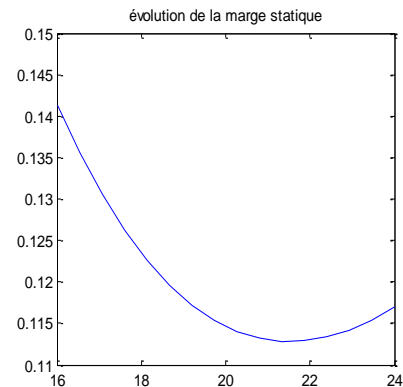
Project wrap-up - Supmecca 2013



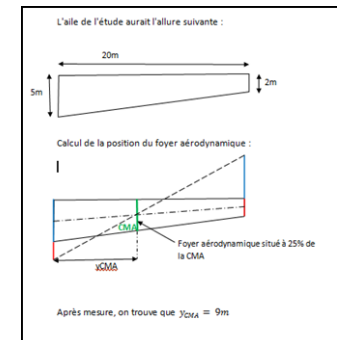
Flight stability



Centrale Paris 2013

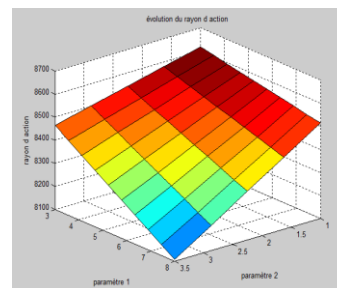


Centrale Paris 2013

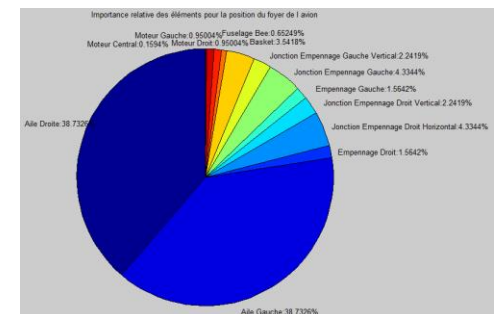


Estaca 2012

Paramètre	Valeur
Longueur des ailes	21 m
Corde à la base	5,3 m
Angle de dièdre	17 °
Incidence	2,3 °
Rapport des cordes	0,4
Longueur des empennages	5 m
Corde à la base	3,5 m
Angle de dièdre	25 °
Incidence	0 °



Centrale Paris 2013



Centrale Paris 2013



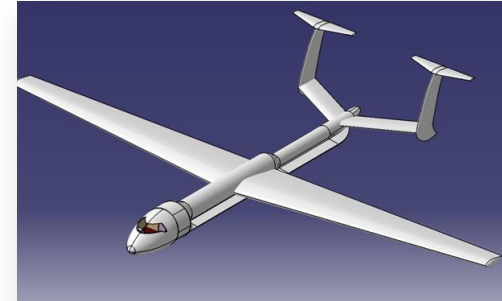
Bee numerical mock-up



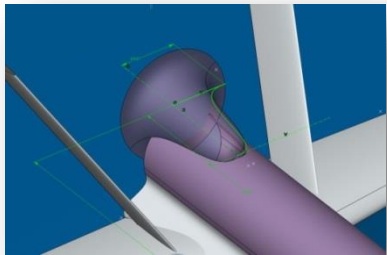
Parametric numerical mock-up - Supmeca 2013



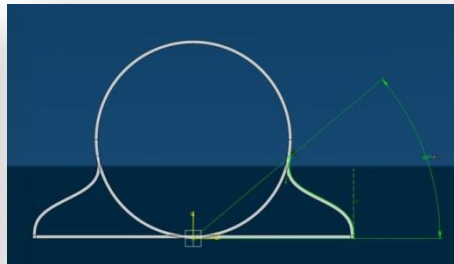
Numerical mock-up - Estaca & Supmeca 2013



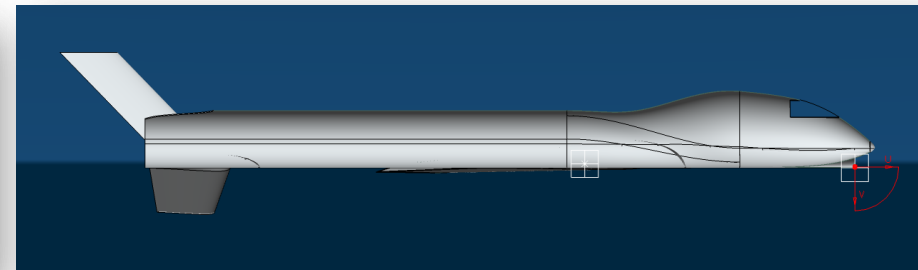
Numerical mock-up - Estaca 2013



Supmeca 2013

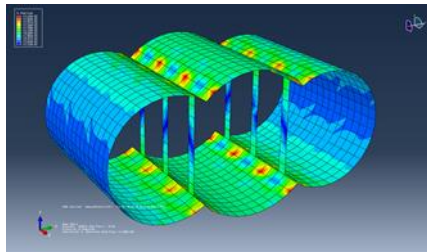


Supmeca 2013



Supmeca 2013

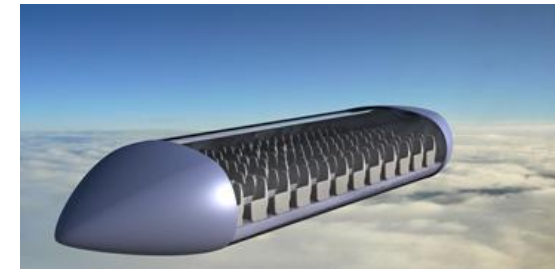
Baskets



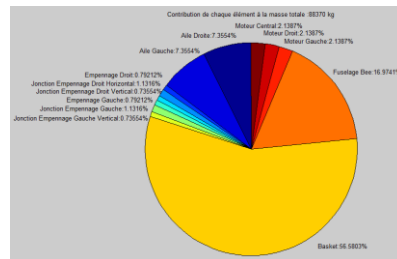
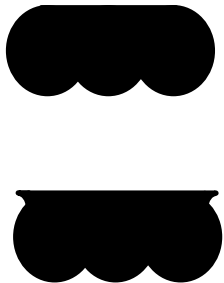
Structural analysis - Estaca 2013



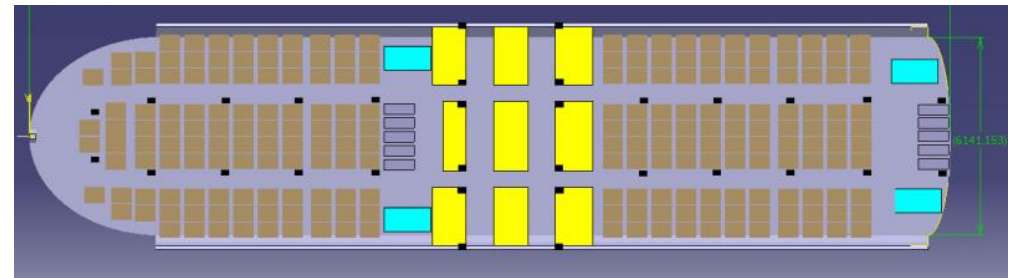
Numerical mock-up - Estaca 2013



Estaca 2012



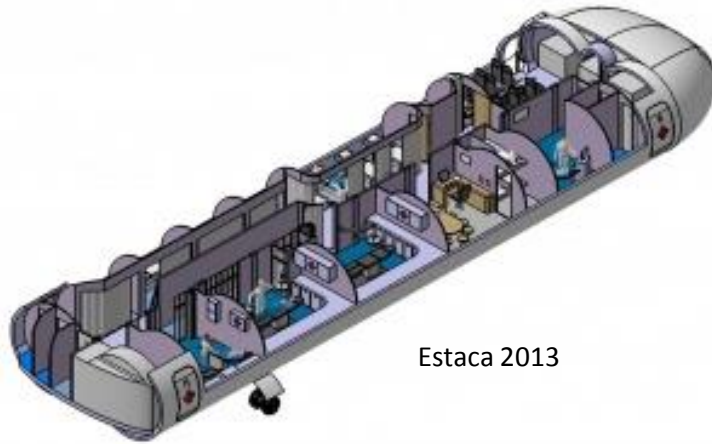
Drag analysis - Centrale Paris 2013



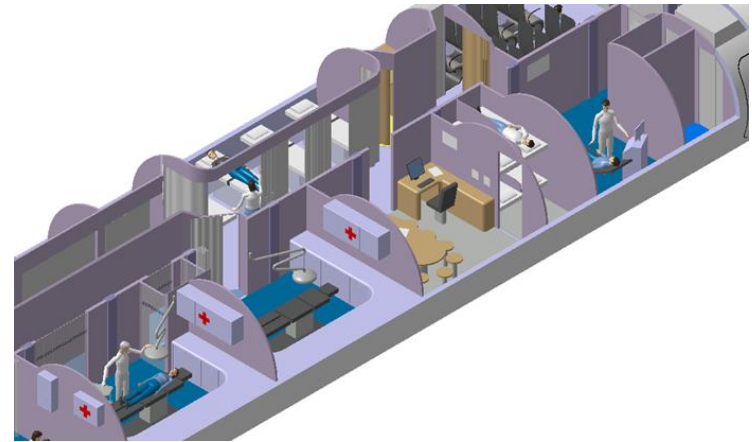
Cabin lay out - Estaca 2013



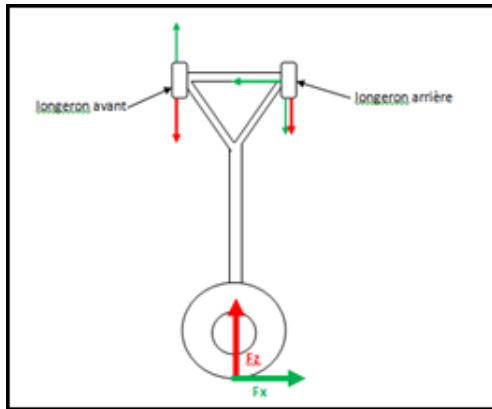
Hospital Basket



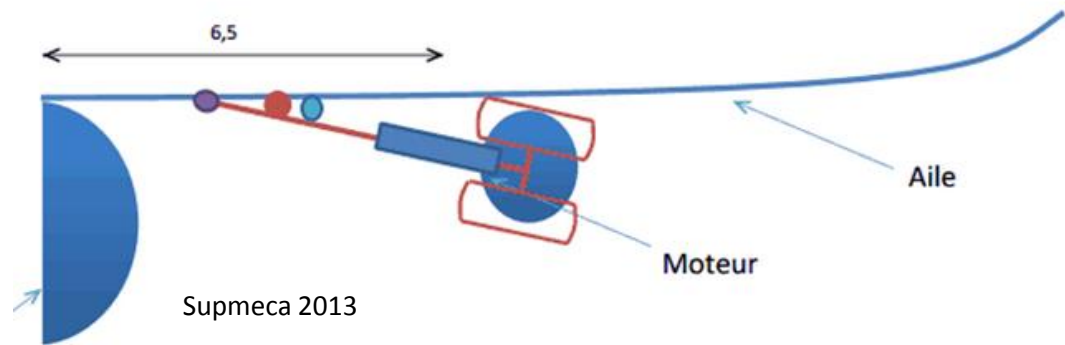
Estaca 2013



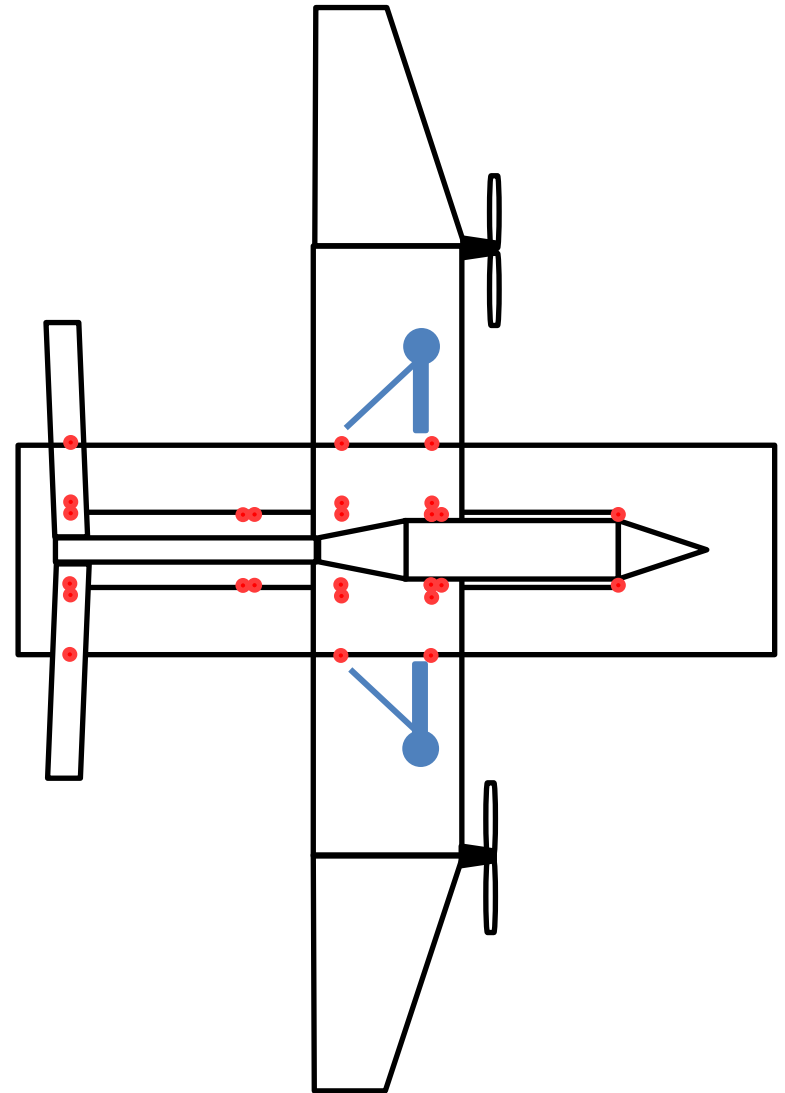
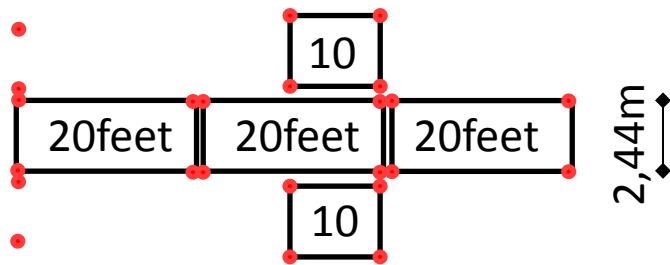
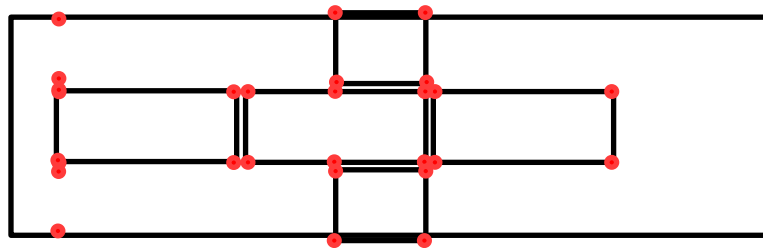
Landing gear



Estaca 2013



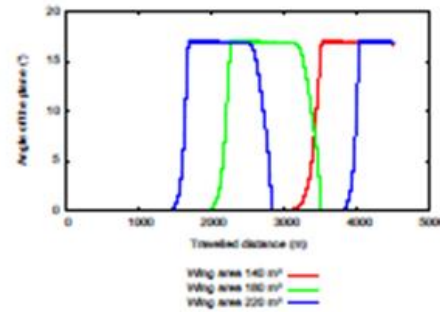
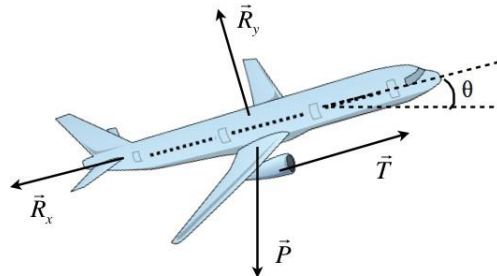
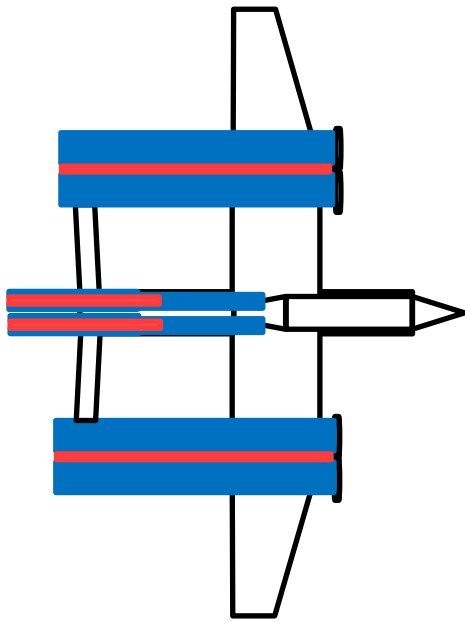
Iso attach System



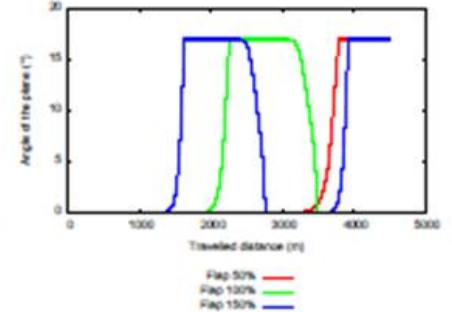
5m



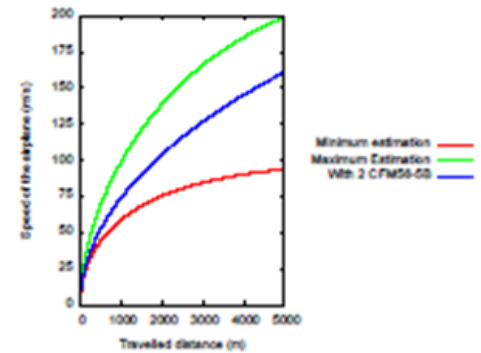
Engines choice



Results V.2: Angle of the plane with a flap that add 100% of the lift coefficient and an initial wing angle of 3°



Results V.1: Angle of the plane with a wing area of 180 m² and an initial wing angle of 3°



Main studies

Acoustic

Variable inlet casing

Downward horizontal rear wing

Collaborative project



Landing gear

Numerical mock-up

Engines

Flight stability

loading system

Aerodynamic shape

Fastening system

Wings

Logistic

Costs

Certification



Bee-Plane™

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