

PLACIS project 2016-2017

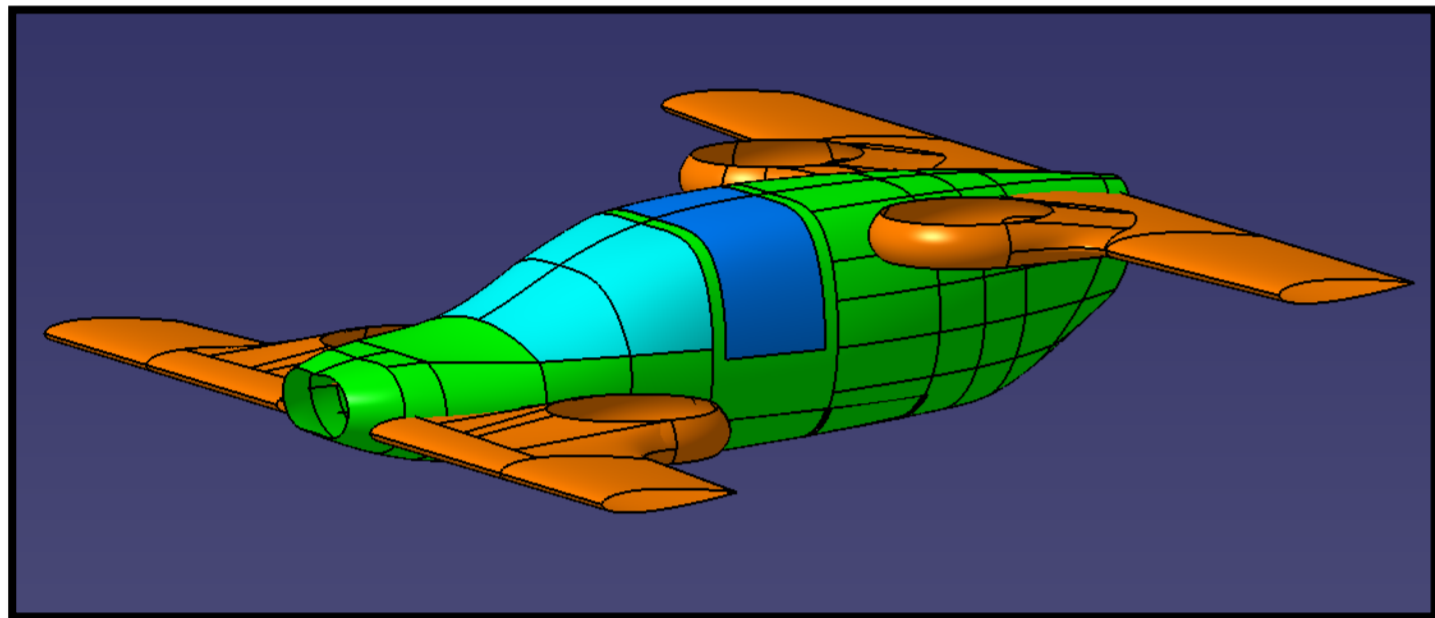


Structure design of the Mini-Bee

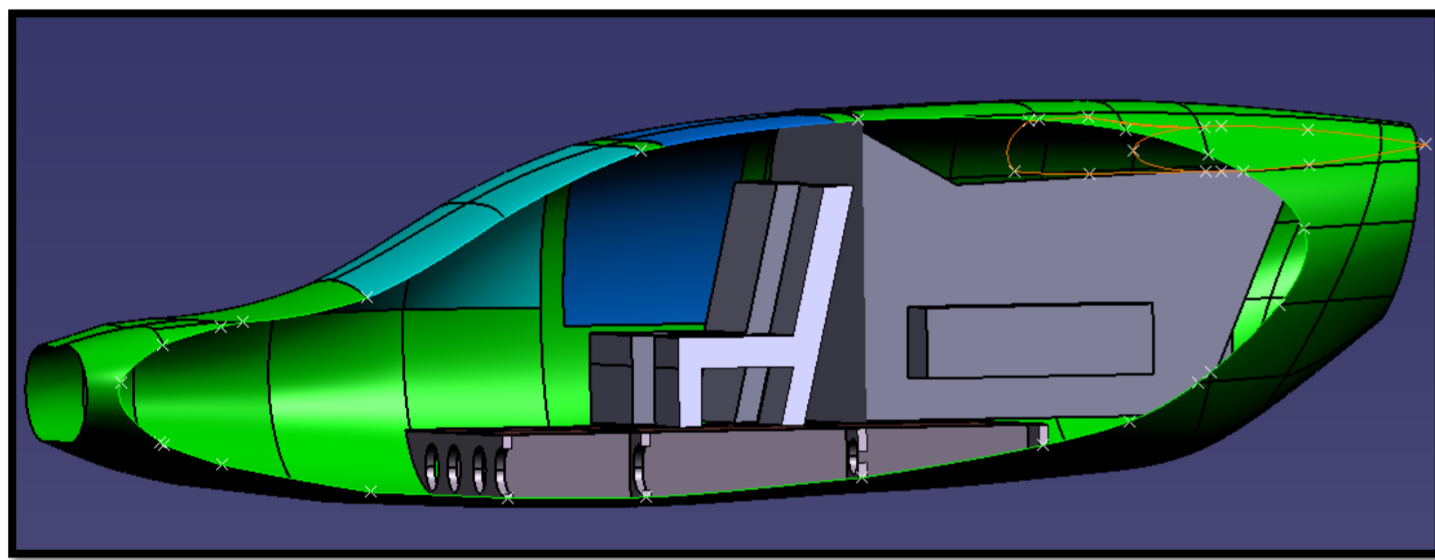
PRESENTATION

Working with the startup *Technoplane*, the goal of the project was to define the TRL2 of an innovative airplane suitable for urban and trans-urban purposes. Different models were proposed: VIP, Medical vehicle and Taxi for 2 to 4PAX.

DESIGN



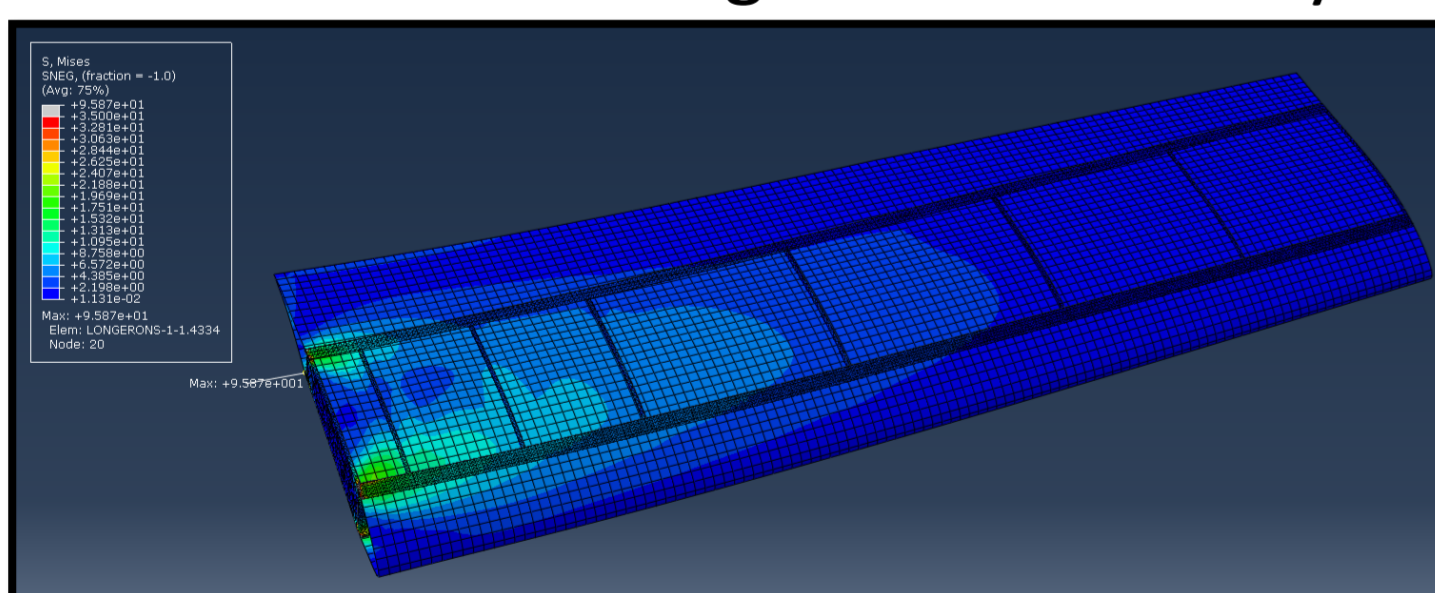
The first stage consisted in the development of an adaptive CAD from the previous work of a designer. We followed the same method as in automotive industry to do so.



The adaptive CAD allowed us to quickly modify the structure and design in accordance to aerodynamics and interior layout.

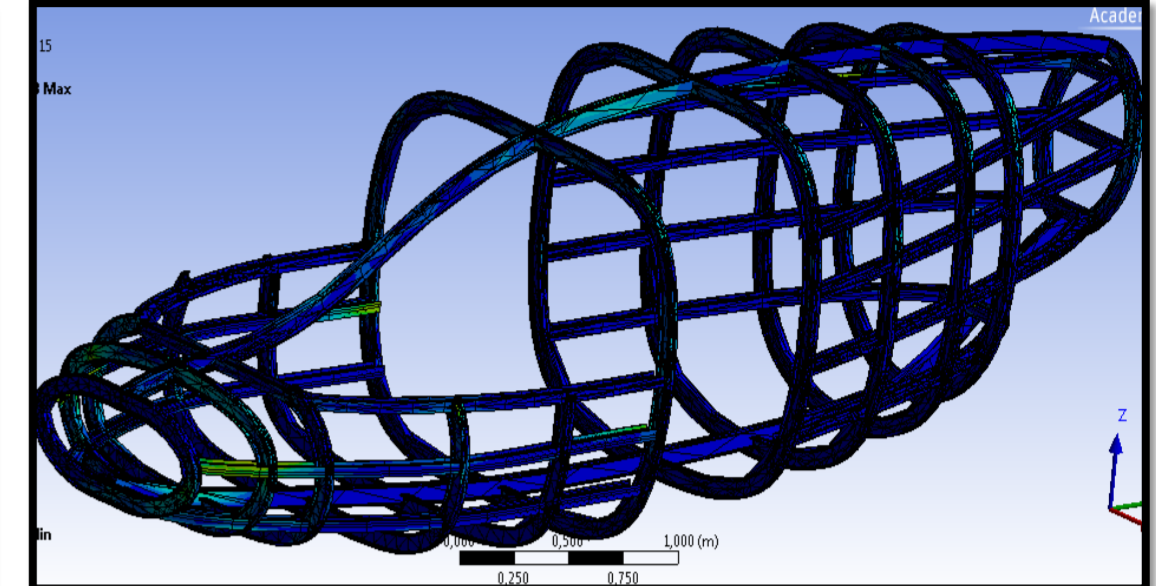
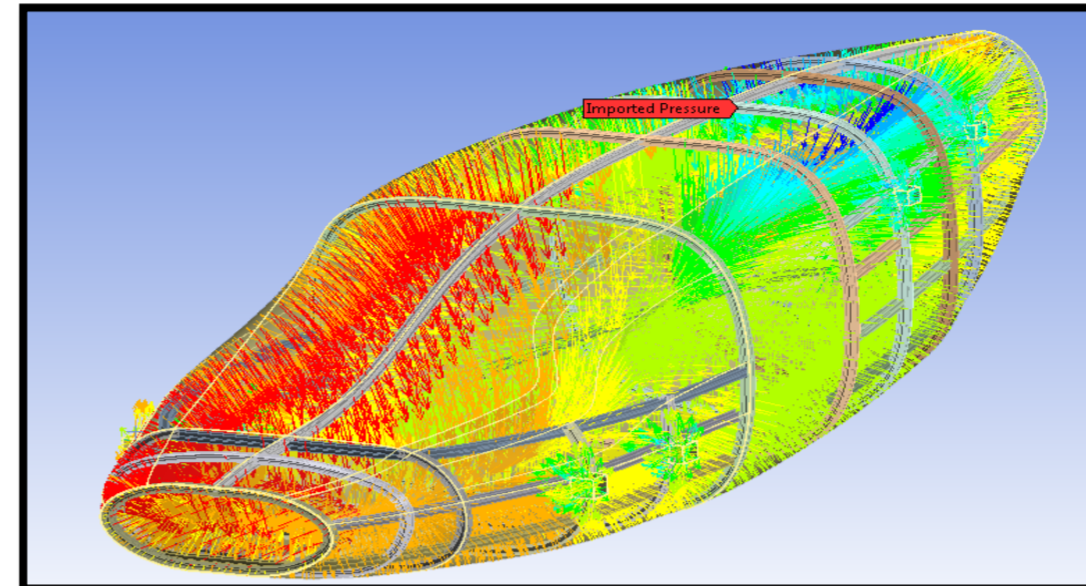
WING BOX

To improve weight of the wing with compliance of the stiffness. A topology optimization was used through SIMP method to design a structural layout.

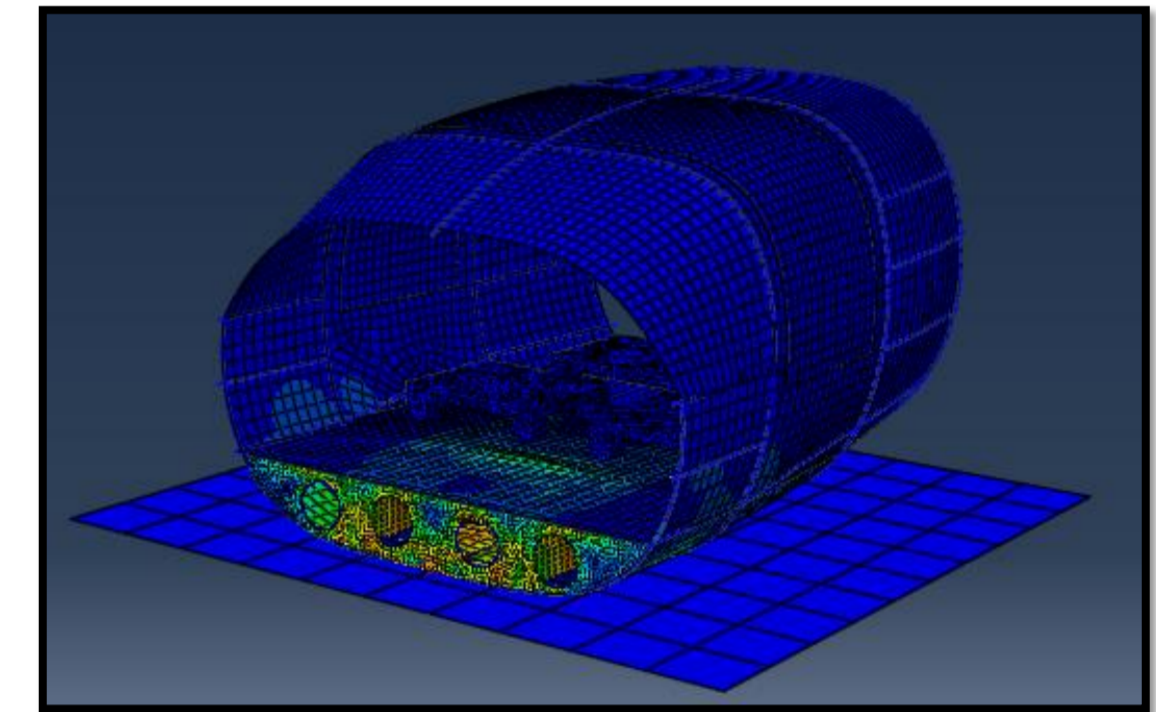


The volume distribution obtained with the topology optimization was used to decide the position of the ribs. Then the structure was simulated in order to validate the design and remove the unnecessary ribs.

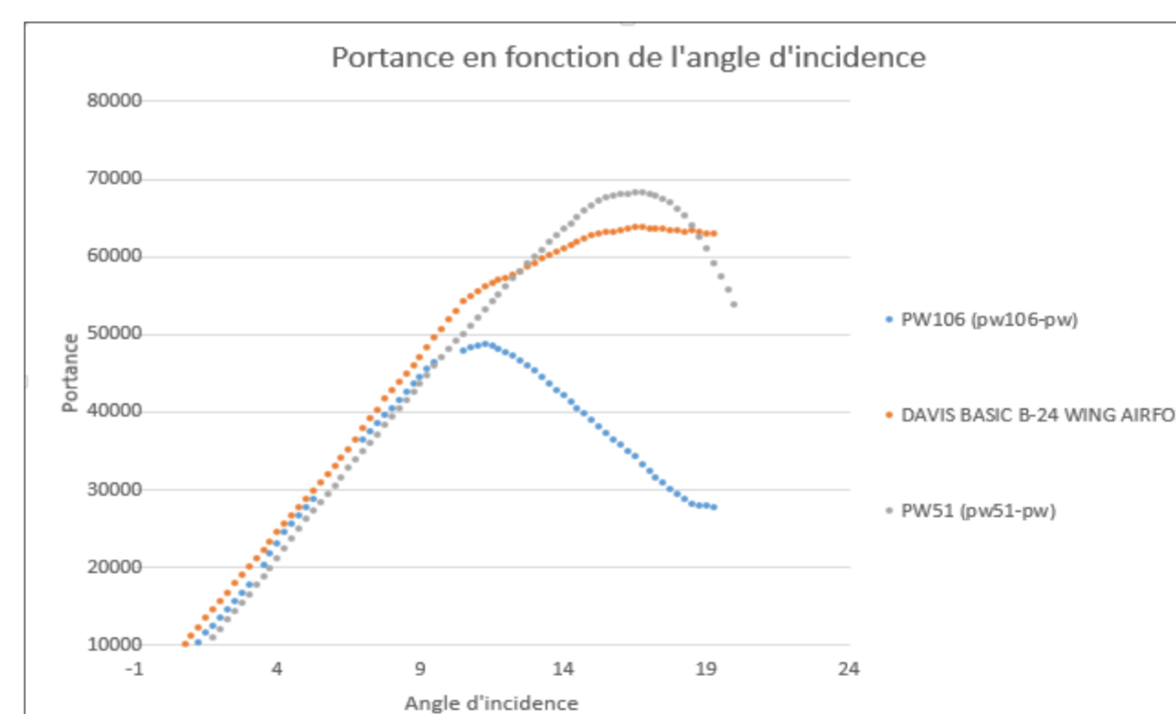
FUSELAGE



Fuselage was based on similar models of aircrafts. Simulations on buckling and crash were conducted to fulfill the requirements. The basis of the models relied on the result of a sequential coupling between fluid and structure.

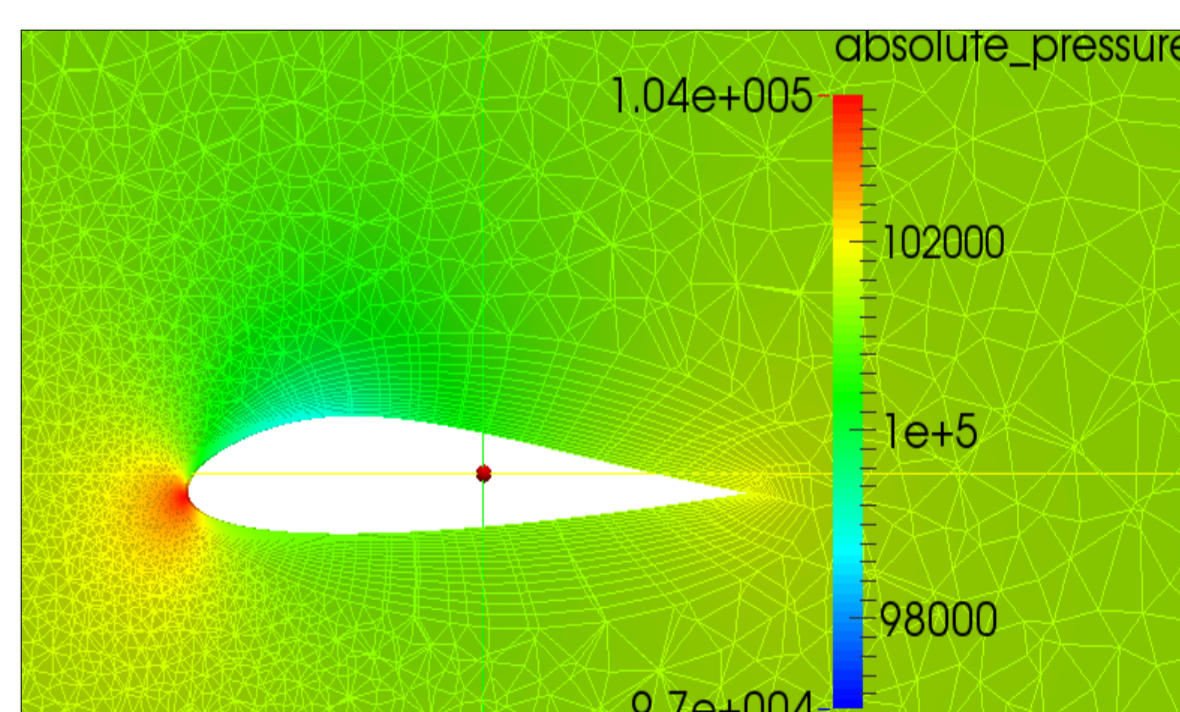
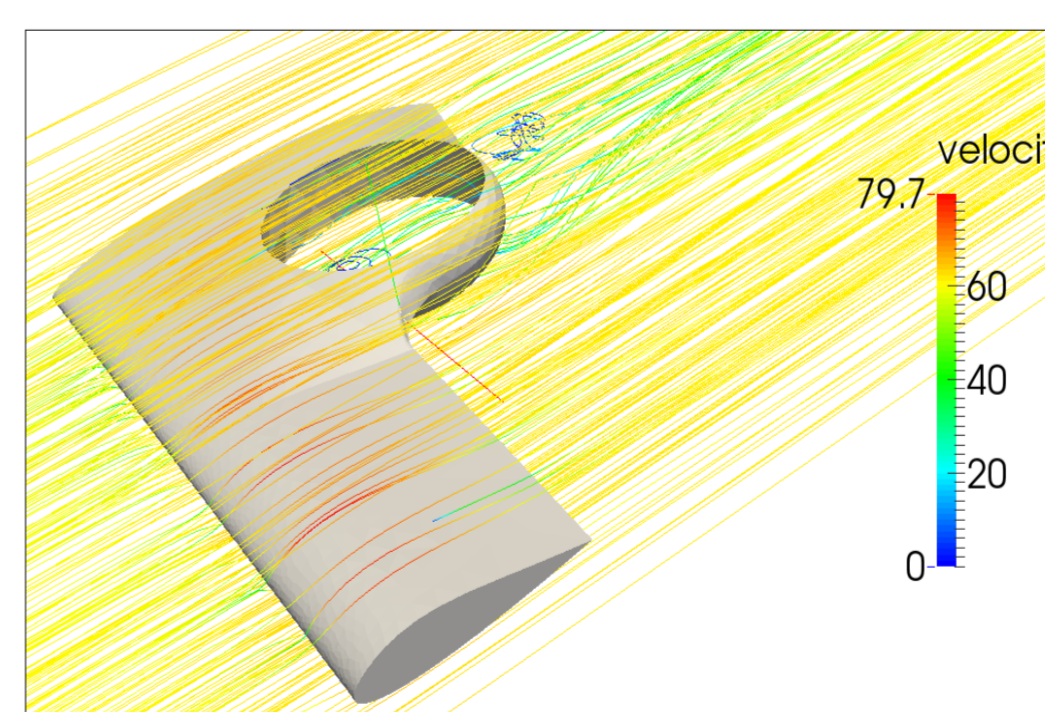


WINGS



The wings' design was based on some existing airfoil (Davis, PW51,...). The lift (and drag) depends not only on the airfoil but also on the attack angle of the wing.

Aerodynamical simulations were run in order to find the optimal configuration. As a consequence, wing's parameters, such as the attack angle or chord, and the airfoil were compared and chosen.



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