



WIG PROJECT - AERO TEAM MEMBER

SD2461

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## Personal Achievement

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# 1 Work and achievements

This report is gathering what I have been working on and achieving during the first half of the course SD2461 under the project Wing In Ground effect (WIG).

You have here a timeline including the main tasks I have achieved, with respect to the overall aero-team work :

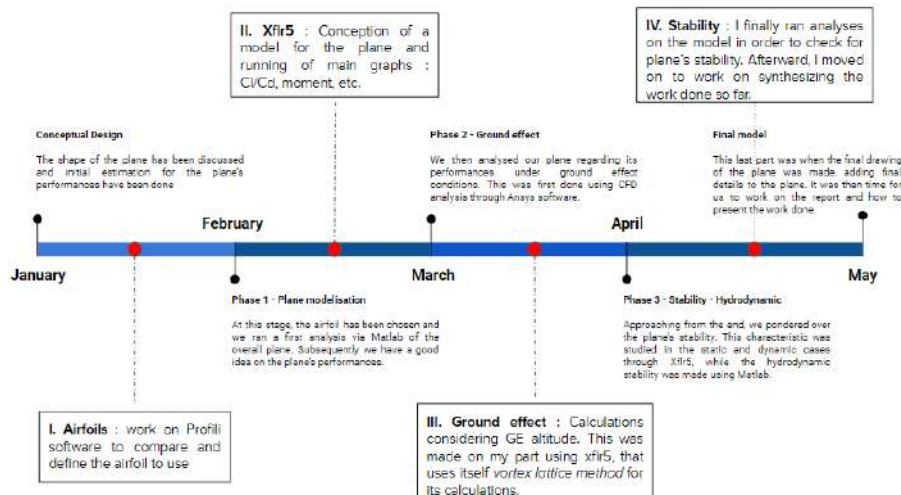


Figure 1: Timeline for aeronautical team main tasks

NOTE : each of the red points represent one of the main works I've been working on and producing.

After having gotten general knowledge on ground effect, I first headed in defining the plane airfoil. I thereby made a short list of airfoils used on seaplanes (close flight conditions) and I used *Profili* software to derive similar airfoil from it and compare them in a relevant way.

I therefore defined a consistent way of comparing the airfoil to make the final choice quick and relevant.

Then, once I got the airfoil, I aimed in optimizing it naturally, by improving its stability. To do so, I've been working on reshaping the airfoil in order to "smooth" the pitching moment curve; and I as well have redrawn some portions of the airfoil in order to enhance its performances such as the lift over drag forces ratio.

At this time of the process, we where somewhen around March. I was then working on *Xflr5* software in order to create a numerical model for the plane. The purpose was to get a simplified model of the plane to run calculations as well on the basic performances such as lift over drag ratio, and performances like plane's stability.

An other aspect of *Xflr5* is its possibility to run calculations considering ground effect. As its our main criteria of flight and that I had more hindsight on the software and more generally speaking on the project itself, I was able to show the relevance of

it (the software is indeed based on vortex lattice method for numerical calculations) and to run the associated graphs considering GE.

To do so allowed us to avoid using CFD calculation and so I have been creating a model close to the detailed one, simplifying the calculations regarding the plane.

Finally, during April, one of my main tasks was to study the plane's stability in detail. Regarding how efficient Xflr5 was at this stage, I decided that running the stability analysis with it was meaningful and in accordance with the work done so far. Thereby, using my model, I have been working on ways of optimizing again the plane natural stability and ways of studying it.

For the first point, the idea was to work more precisely on the horizontal tail at the back of the plane. The point here was to define the optimal angle for the horizontal tail such that we optimize the static margin and through it, we optimize the longitudinal static stability.

For what is up to studying the plane stability, there was also visual ways of doing it. Thus, I've been defining and modeling different perturbations to then study the repercussions on the plane.

As mentioned, I mainly took a look to the longitudinal stability as the pitching moment was here the one potentially source of instabilities (as symmetry was ensured for the two others axes).

I ended the project by doing the presentation for the aero-team. Note that I refer here to the fact that I'm the one that did the slides, making them optimal for the oral presentation, not that I did all the curves presented on these slides.

## 2 Asseessment

For what is up to the assessment, we will first see my self assessment regarding my initial objectives, the courses' objectives and what I have achieved.

Here below you can find a skill radar giving a glance to the domains I progressed in :

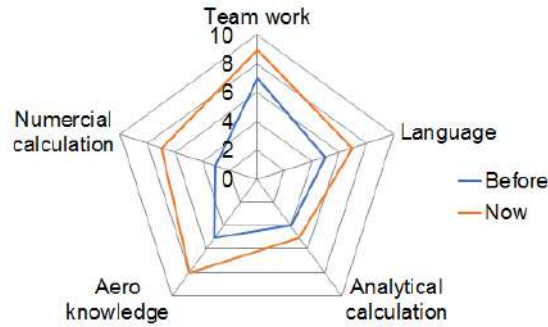


Figure 2: Skill radar summarizing my progresses

To summarize, as a bachelor student, my objectives were to work on a team project for my last bachelor year. To have been achieving the work discussed above during this semester provided me knowledge on a theoretical aeronautic aspect as well as practical one, regarding the numerical analyses I've been through.

As a grade, looking to what I did and when putting in comparison with the aero-team and the other members of the project, I would give myself a **B**.

For what is up to the other members of the project, the assessment I'm doing on them is summarized on this table :

Team members	Alfonso penela	Lucas Westin	Subham Ghosh
Grades	<i>B</i>	<i>C<sup>+</sup></i>	<i>C</i>

Jiacqui Zhang	Jerry Osele	Zlatan Ramic	Kaushik Lyer
<i>A<sup>+</sup></i>	<i>C<sup>-</sup></i>	<i>A<sup>-</sup></i>	<i>C</i>

To explain these notes, here are quick comments on each team member :

- *Alfonso Penela* : He is the student I got a look to the work the most as he was constantly updating his work and exchanging with other memebtrs ;
- *Lucas Westin* : Also from structure team, he was one of the student often present in poolen working with other members and here for team meetings ;

- *Subham Ghosh* : I don't really know what he did as he wasn't speaking a lot during presentation or with other sub-team members after confinement. Even though, the results he worked on and that he showed were consistent ;
- *Jiacqui Zhang* : He was the "team leader" (not officially but he was in the facts) of the team and made the biggest part of the job, working on various fields, always in a relevant ways. He had a lack of communication but was still here to respond and give time for the other team members ;
- *Jerry Osele* : As for *Subham Ghosh* I don't really know what he has been working on, but as he is in the same sub-team than I, it shows a big lack of communication and investment in the team work, while he was the official "team leader". Even though, it looks like he helped *Jiacqui* in several points I achieved a relevant work on the hydrodynamic stability;
- *Zlatan Ramic* : As the only member of the electronic team, he has been able to think the project on its own and to build consistent way of testing the plane. He nevertheless have had big lack in making his way to the meetings and probably lacked of the fact of being the only member of his team (no one to rely on and discuss with on technical aspects) ;
- *Kaushik Laya* : His work on communication and building the team pace was good. I didn't know before a long time if he was a member of one of the sub-team and except on the presentation, meeting, etc (which is a tremendous work) I don't really know what else he achieved regarding the project ;