

Partnership file
Build2Fly
ISAE-ENSMA student project





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Introduction

We are students in the ISAE-ENSMA (Institut Supérieur de l'Aéronautique et de l'Espace - École Nationale Supérieure de Mécanique et d'Aérotechnique) french aeronautical engineering school.

As future engineers, we think about the aeronautics of tomorrow. During our studies, we understood that technical developments are necessary to meet the challenges of our society, especially environmental. These issues affect us all in France and internationally.

At our level, we can act by launching student projects in our school and with its European partners. These projects are even more important as they contribute to research and technical development in this field.

This is why we are carrying out this project, a tour of Europe's aeronautical engineering schools. We undertake this journey with a laboratory plane that we built ourselves (a P300 Kite, two-seater). The goal is to meet students in Europe, to exchange with them about the aeronautics of tomorrow but also to create and keep in contact with European aeronautics student associations in order to continue, thereafter, to exchange about the aeronautics of tomorrow.

We also provide our laboratory aircraft for research in these schools. The main study concerns the structure of the aircraft. The study of the deformations and constraints within the materials will then allow an improvement in its performance.

We are looking for partners willing to help us financially. We are at your disposal for any questions. Contacts are on the last page.

General presentation

The aim of this project is to link European universities and aeronautical engineering schools with the aircraft we are building.

It is a laboratory aircraft. We propose to the schools a structural study of the aircraft, with the flight data measured on-site. This academic trace will remain in schools throughout Europe after our visit.

These schools have been chosen among the partners of ISAE-ENSMA who have a strong attachment to the aeronautical field. On-site, we will present lectures to the students (details on page 5).

The project will last about 8 months with about 20 destinations where we will stay one or two weeks each (typical week Page 5). The departure is planned for next September.

Summary of the objectives:

- To connect **European universities and aeronautical engineering schools** using the aircraft we are building.
- To propose **conferences/round tables** to talk about the P300, our school and to present our sponsors.
- To provide **in-flight data** to schools and universities thanks to the instrumentation placed on the laboratory aircraft (strain gauges, pressure sensors, thermocouples, inertial unit...)
- To set up a **network of aeronautical student associations** to set up international projects.

The construction of our aircraft

The construction started 4 years ago by the students of ENSMAIR, the pilot and student pilots' association of ISAE-ENSMA. **ENSMAIR is currently finishing the construction of its second aircraft**, after a first MCR 01 in-kit plane, nicknamed "The Little Prince", inaugurated in 2001.

The P300 Kite in a kit plane construction was prepared at 40% by Alpi-Aviation, the supplier. Then, we took care, among other things, to install the 100HP engine, install the control surfaces and connect them to the controls, make the electrical wiring of the flight instruments, etc.

We developed a lot of skills with this project as much on technical issues as well as on teamwork. We are proud to finish this project after 4 years of intense work, made possible thanks to the passion that drives us.

The nickname of our plane will be the **Phoenix** in tribute to its predecessor *The Little Prince*.



The Tour of Europe

It is a great challenge for us: we will have to achieve maritime transits, cross several borders, and fly with new flight conditions for us. We will inaugurate our plane with this **journey exceeding 10 000 km** (between 10 000 km and 14 000 km). The provisional air route is visible on the map below, which can be modified according to the schools.

Staying a week in the country allows us to be flexible for departures in case of bad weather.



*Theoretical flight map of the trip,
visiting the partner schools of ISAE-ENSMA*

Countries for which we have approval for at least one school as of 11/07/2022:

- Germany
- Netherlands
- Sweden
- Italy
- Spain
- Portugal
- France

Program scheduled in schools/universities

A typical week :

A typical week	Monday	Arrival in flight and flight over the school (if possible)
	Tuesday	Break, debriefing with the rest of the team in France and preparation for the week
	Wednesday	Meeting with the program director at the partner school, school visit and conference
	Thursday	Day dedicated to study flights/practical work on the plane
	Friday	Day dedicated to study flights/practical work on the plane
	Saturday	City tour
	Sunday	Preparation for next flight
	Monday	Departure to the next school

Conference themes:

- Presentation of the ISAE-ENSMA school with the possibilities of double degrees and international masters,
- Our P300 aircraft and the project around it,
- A look at the aeronautics of tomorrow,
- Introduction to the study with the strain gauges placed on the P300,
- Presentation of our partners and sponsors to the students.

These lectures will of course be presented in English (or German).

The academic study and the laboratory aircraft

We are working with teacher-researchers from ISAE-ENSMA to study the deformations of the wings and the landing gear. This study was originally launched for ISAE-ENSMA students, but it will also be proposed to teachers on site, which will leave an academic trace across Europe in each school.

We have installed **12 strain gauges on the P300**, 8 on the spar, and 4 on the landing gear. These sensors allow us to study the structural constraints of a flight on our aircraft, the deformations, and the applied loads.

Extract of the technical instrumentation file of the P300 ISAE-ENSMA (in french):

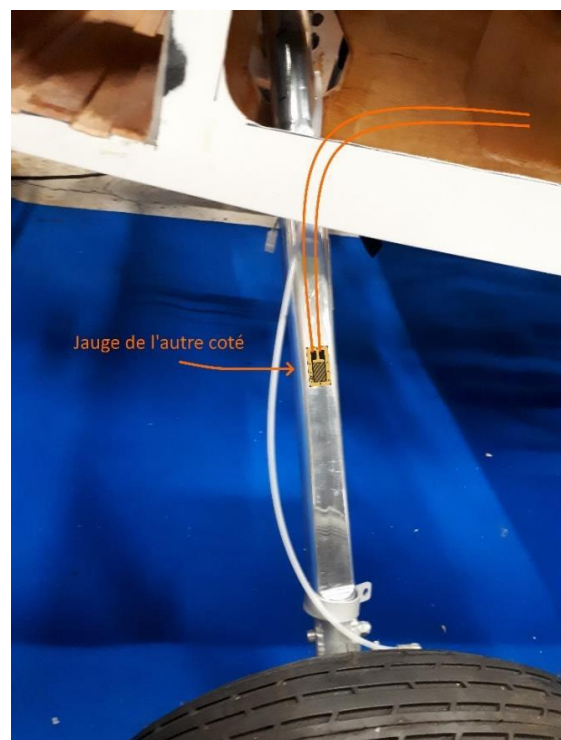
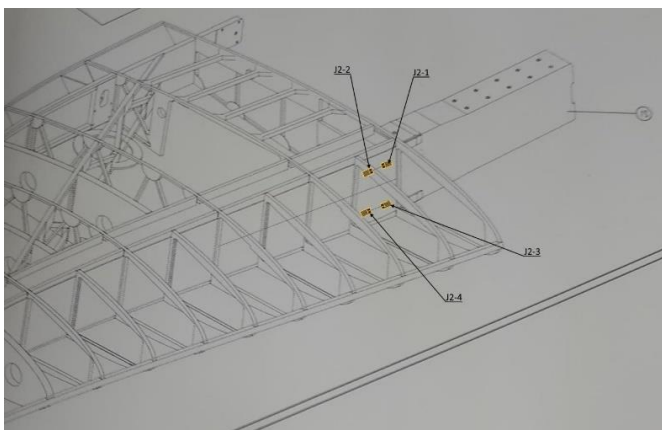
1-Definition du type de capteurs installés :

Ce projet porté par les étudiants de L'ISAE-ENSMA, va permettre d'aller plus loin dans la compréhension et l'analyse du comportement en vol des aéronefs. En effet, en concertation avec les enseignants et le personnel technique de l'école, il a été décidé d'installer des capteurs embarqués dans l'avion. Les capteurs qui mesurent la déformation en un point de la structure s'appellent des jauges de déformation. Pour les choisir, il faut répondre aux critères suivants :

- Gamme de température d'utilisation (en °C)
- Niveau de Déformation (en $\mu\text{m}/\text{m}$)
- Type de Déformation mesurée (axiale, multiaxiale, cisaillement ...)
- Dimension de la surface à mesurer (en mm^2)

Seuls quelques capteurs peuvent répondre à tous ces critères. Il a été choisi le capteur suivant :

Jauges d'extensométrie de marque HBM avec la référence 1-LY48-10-120A avec les caractéristiques constructrices données en annexe 1 (page).



Student associations

As future engineers, we think about the aeronautics of tomorrow. Aeronautics that must face the challenges of our society. Bringing together aeronautical associations allows us to launch projects together throughout Europe.

Bringing together industries and students in the field of aeronautics is already the mission of the "Cap sur l'Avenir" project launched by the **Aéroclub de France**. Cap sur l'Avenir aims to bring environmental concerns into aviation on a national scale. Thanks to this European tour, we want to widen this network to gather at the European scale the students sensitive to the durability of aeronautics. The visited associations will be able to be part of the international network of "Cap sur l'Avenir".

For more information: <https://capsurlavenir.com>



For our sponsors

- Partner logo on aircraft and clothing
- Time reserved for your company during conferences in front of engineering students *
- Press conference at the departure of our pilots
- Partner page on our website
- ISAE-ENSMA social networks and communication
- Other... (on proposal)

In details:

The livery of our aircraft, in preparation, contains spaces allocated to the sponsors' logos.

The conferences that we are going to realize will be intended for the aeronautical engineering students of Europe. We have the possibility to talk about your company, just tell us how you want us to present your company and provide us with visual aids (slides/videos...). *

A press conference is also planned by the ISAE-ENSMA communication department for the departure in Paris.

You will have visibility on a page dedicated to our partners on our website if you provide us with the text and images.

We will be present on the social networks during the entire journey, so we will obviously talk about our sponsors regularly on our networks.

We thank you for sending us communication elements (visuals, video, stickers) for the purposes mentioned above.

**: Conferences reserved for the biggest sponsors if they wish it*

Estimated budget

In order to carry out this project, we made an estimated study of the budget which concluded on a need of 35 000€ for its concretization from the beginning to the end. This study considers in the majority the following needs:

- The needs in flight (fuel, customs, parking, maintenance),
- Life on site (accommodation, food...).

Estimated budget:

For the 8 months of the project, we estimate the different costs below:

Expenses	Estimate	Comment
Flight-related expenses	18 000 €	We have to land on controlled fields to be able to speak English on the radio. The costs for landing taxes and parking are therefore high. Has to be added to the price of the flight itself.
Daily life	12 000 €	Including food and lodging for the 2 pilots
Margin of safety	5 000 €	Considering possible repairs on the plane and other expenses.
Total	35 000€	

Team members



Pierre AOUN

22 years old

Co-fondateur & pilote du projet Build2Fly

- Former ENSMAIR association president at ISAE-ENSMA
- P300 builder
- Licensed Private Pilot License (PPL) with:
 - ▶ +160 flight hours
 - ▶ +450 landings



Thibaut BUCHY

21 years old

Co-founder & pilot for the Build2Fly project

- Former vice-president of the ENSMAIR association at ISAE-ENSMA
- P300 builder
- Licensed ULM pilot (UPL) with:
 - ▶ +140 flight hours
 - ▶ +350 landings
- Licensed Private Pilot License (PPL) with:
 - ▶ +50 flight hours
 - ▶ +150 landings



H loic QUIRIN

22 years old

Build2Fly Communication Team

Former Vice President of the ISAE-ENSMA Students' Council



Grégoire MARIE
22 ans

Build2Fly Communication Team

President & founder of the Ensimulator association at ISAE-ENSMA



Antoine POLLIAND
22 ans

Environmental Project Manager for the Build2Fly project

- Former president of the ENSMAERO association at ISAE-ENSMA
- Former treasurer of the UrgENScliMA association at ISAE-ENSMA



Nicolas KUBIAK
21 ans

Build2Fly flight preparation expert

- President of the ENSMAIR association at ISAE-ENSMA
- Treasurer of the Ensimulator association at ISAE-ENSMA

Contacts

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