Aerodynamic study on the design and optimization of flatback airfoils for wind turbine applications

BUDGET

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Budget

The budget of this project considers the main expenses effectuated during all the process, including numerical calculations and writing of the study. Considering that this project consist basically in a numerical simulation that is effectuated with a computer, there are not expenses for material. A brief explanation of the expenses that create the budget of the project is shown below.

1.1   Description of the expenses of the project

- Human resources: The hole analysis is elaborated by a student of the last year of Enginyeria en Tecnologies Aeroespacials degree. Considering that this project is normally elaborated by an engineer, the usual cost per hour for an engineer is about 15 €/h.

- Computational resources: The project consists in a computational study done by means of a computer or more than one. So, the main cost of material is the use of computers and software. This last item is the most expensive cost of computational resources. The other costs, like energy consumption or usage of the computer are so smaller compared with the software cost, it is for this reason that these expenses will not be considered.

1.2   Time dedication

The main tasks realised during the project are the same explained at the project charter of this study, the amount of hours spent for each task have changed a little bit respect

with the project charter, considering that during the elaboration of the report some problems have been affronted.

The final amount of hours spent on each task, the cost per hour of each task and the final cost of the human resources of the project is specified at the table below 1.1.

Task	Time [h]	Unit cost [€/h]	Cost [€]
State of the art	15	15	225
Research information	15	15	225
New geometry	20	15	300
Learn software	40	15	600
Create a mesh	70	15	1050
Simulations of each profile	100	15	1500
Post-process	10	15	150
Results evaluation	40	15	600
Writing of the TFG	70	15	1050
Revision	10	15	150
		Total	5850

TABLE 1.1: Cost of the tasks of the project and final cost of the human resources.

1.3 Project cost

The costs of the project can be computed as the addition between the human resources time and the computational costs. As has been said before the computational expenses only include the price of the licence of the software used. In this project the software used is ANSYS Fluent 15.0. A licence is necessary to use this program, this licence is about 24903.36 €. Considering that this licence is annually and that this project has been done during 3 month, the cost of this software for this time is 6225.84 €. So, the final cost of the project appears at the following table, 1.2.

	Cost [€]
Human resources	5850
Computational resources	6225.84
Total	12075.84

TABLE 1.2: Final cost of the project