



UNIVERSITAT POLITÈCNICA DE CATALUNYA  
BARCELONATECH

Escola Superior d'Enginyeries Industrial,  
Aeroespacial i Audiovisual de Terrassa

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# AERODYNAMIC STUDY OF THE WAKE EFFECTS ON A F1 CAR

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Budget Document

Bachelor's degree in Aerospace Vehicle Engineering

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# Budget

In regards to the budget concerning this study, Figure 1 displays the general costs taken into account. The summary is divided into **4 sections** —Engineering, working tools, software and electrical power— to discern and detail properly each aforementioned category that add up to a total cost .

Firstly, the manpower salary is set according to the industry standards for a project of such magnitude, contemplating the complexity of the work and the quality levels of a motorsport category such as F1.

It has to be considered, that the elaboration of the Project Charter is stated to be free of any cost assuming the commissioning of this project, otherwise, the correspondent cost must be added should the project not be accepted.

On the other hand, an amortization coefficient is considered when accounting for the material goods, such as the personal laptop —considering a useful life cycle of 4 years— or the annual Matlab license. The other software derived costs are free as Simscale does not charge any quantity to join its Academic program —other professional or enterprise subscription plans do require a payment option—.

Finally, an extra 5 % of the cost is considered from the total costs after taxes for unforeseen events. This adds a total cost of **fifteen thousand five hundred and ninety euros** (15590 €).

## Budget Document

Field	Description	Quantity/ Amortization coefficient	€/item	Subtotal
<b>Engineering</b>	Project Charter elaboration	5 hours	Free if the project is commissioned <sup>1</sup>	€0
	Documentation and research	50 hours	20 €/hour	€1000
	Simulation process	300 hours	20 €/hour	€6000
	Analysis of the results	50 hours	20 €/hour	€1000
	Drafted document	195 hours	20 €/hour	€3900
<b>Total Engineering</b>				<b>€11900</b>
<b>Working Tools</b>	Personal Laptop	0.104	€1200	€125
<b>Total Working Tools</b>				<b>€125</b>
<b>Software</b>	Simscale Academic	1 unit	€0	€0
	Salome-Meca	1 unit	€0	€0
	Matalb License	0.417	€70	€29.17
<b>Total Software</b>				<b>€29.17</b>
<b>Electrical Power</b>	Laptop consumption (0.2 kW)	600 hours	0.14 €/kWh	€16.80
	Internet connection	5 months	40 €/month	€200
<b>Total Electrical Power</b>				<b>€216.80</b>
<b>Total Costs</b>	Without Taxes			€12270.97 (1)
	VAT	21 % of (1)		€2576.9
	Total costs after taxes			€14847.87 (2)
	Unforeseen events	5 % of (2)		€742.39
<b>Final cost of the project</b>				<b>€15590</b>

<sup>1</sup> If not, 20 €/hour have to be contemplated.

Figure 1: Economic summary.

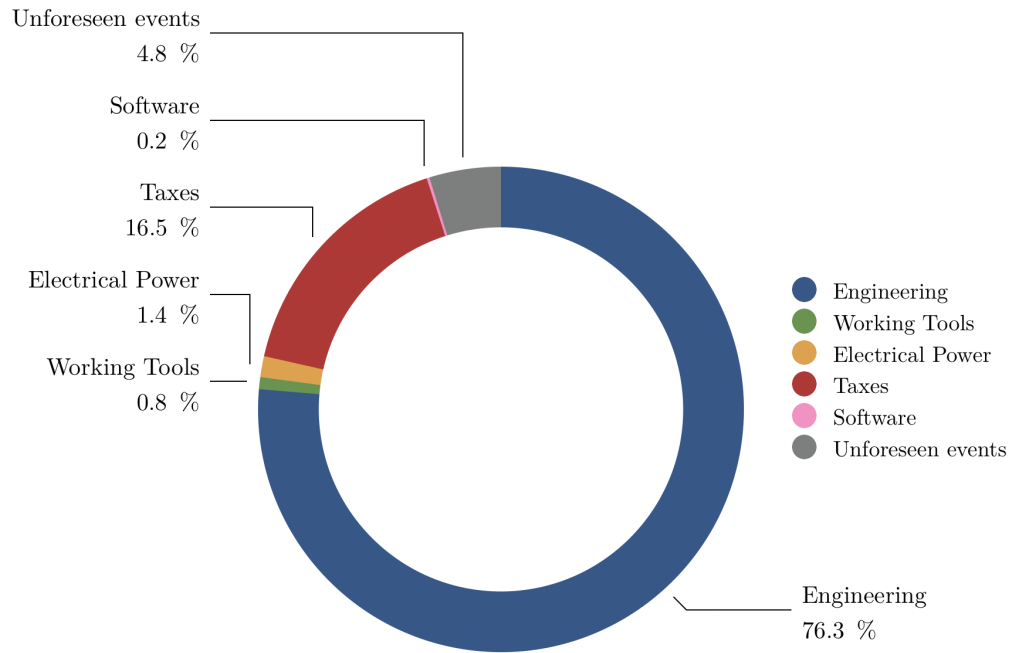


Figure 2: Graphical representation of the budget.

As reflected in Figure 2, the biggest category—in terms of total percentage—refers to the engineering costs (76.3 %). Besides, as specified earlier in Figure 1, it is evident that the VAT quantities and the unforeseen events are referred to different amounts, that is why the final percentage of each of these two categories—referred to the total cost—differs from the one mentioned above.