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**Grau en Enginyeria en Tecnologies Aeroespacials**

**Title:**

*Study of the modelling and identification of an  
AscTec Hummingbird multirotor*

**Document content:** Budget

**Delivery date:** 12/06/2014

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## Budget

The total cost of this study is defined by the following concepts:

- **Personnel:** Expenses related with the hours of engineering. Although this study has been developed in an academic circle, it will be assumed to estimate these costs that the working group is formed by one aerospace engineer. The time spent on this study has been estimated and it has been distributed during the total duration of this project – 19 weeks.
- **Software:** Expenses related with the cost of the software's licenses used in this study.
- **Hardware:** Expenses related with the cost of the hardware used to develop this project and its maintenance. This cost has been divided in three concepts, the “code development and analysis”, “the simulation” and the “design and render”. The criterion followed to distribute the total cost among the three concepts is based on the time spent on each process.
- **Material:** Expenses related with the cost of the material used to build and perform the parameter identification experiments.

In order to cover the costs related with the personnel – telephone, transport...- and the hardware maintenance, it is applied a 10% of indirect costs over that concepts. The hardware equipment has been considered to have an average life time of three years (36 month) which will be assume to be equal to their amortization time. The software licenses have been considered to have the same amortization time.

The final total cost is presented in **Table 1**.

CONCEPT	Cost	Amortization	Price per unit/time	Amount	Total
<b>Personnel</b>					
Aerospace engineer			20 €/h	570 h	<b>11.400 €</b>
<b>Software</b>					
MATLAB	2.000€	36 month	55.56 €/month	4 month	222.24 €
3D CAD Solidworks Standard	2.800 €	36 month	77.78 €/month	4 month	311.12 €
<i>Total Software</i>					<b>533,36 €</b>
<b>Hardware</b>					
Personal computer (code development and analysis)	420 €	36 month	11.67 €/month	4 month	46.68 €
Personal computer (Simulations)	730 €	36 month	20.27 €/month	4 month	81.08 €
Personal computer (Design and render)	50 €	36 month	1.39 €/month	4 month	5.56 €
<i>Total Hardware</i>					<b>133,32 €</b>
<b>Material</b>					
Polymethacrylate plate			88.45€/ m <sup>2</sup>	0.32 m <sup>2</sup>	28.31 €
Polyester wire			8.25 €/unit (10m)	1 unit (1.5 meters)	8.25 €
Plywood plank			6.21€/unit (m <sup>2</sup> )	1 unit(0.5 m <sup>2</sup> )	6.21 €
Metallic legs			12 €/unit	2 units	24 €
<i>Total Material</i>					<b>66,77 €</b>
Indirect costs					1.153,332 €
<b>TOTAL</b>					<b>13.286,68 €</b>

Table 1: Budget