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Design and Performance Analysis Study of an Ion Thruster

Final Degree Project - Budget

Bachelor's Degree in Aerospace Technology Engineering

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Budget

In this section we present the budget of the work *Design and Performance Analysis Study of an Ion Thruster*. This study has involved a research in addition to a program development and implementation part.

We will divide the costs onto three main parts; human resources costs, hardware costs and software costs.

1. Human resources costs

The study has been carried out by a single junior engineer along a 4 months period. Costs The table below exposes the total human resources costs, being applied an overhead of 10 % given that the work is completed over 4 months.

Concept	*Time (hours)*	*€/h*	*Cost [€]*
Project charter	30	15.00	480.00
Research			
State of the art	40	15.00	600.00
Missions	50	15.00	225.00
Subtotal of Research	90	15.00	1350.00
Code implementation			
Mission analysis	50	15.00	600.00
Brophy's model	130	15.00	1800.00
Subtotal of implementation	160	15.00	2400.00
Writing of the report	155	15.00	2250.00
Director contribution	30	40.00	1200.00
Subtotal human costs	**465**		**7680.00**
Overhead (10 %)			768.00
Total human costs			**8448.00**

Table 1: Human resources costs.

2. Hardware costs

Material needed for performing the study consists of a personal laptop computer. We have considered a 25 % annual amortisation and a period of utilisation of 4 months.

Concept	*Units*	*€/unit*	*Amortisation*	*Cost [€]*
Hardware				
Laptop (Intel Core i7 2670 QM @2.20 GHz)	1	700.00	25 %	58.33
Total Hardware costs				**58.33**

Table 2: Hardware costs.

3. Software costs

This part accounts for the Software licenses employed during the study.

Concept	*Units*	*€/unit*	*Cost [€]*
Software			
Microsoft Office 2013	1	149.00	149.00
Matlab 8.5 R2015a (Win64)	1	105.00	105.00
Mendeley 1.16 (Student)	1	0	0
Total Software costs			**254**

Table 3. Software costs.

4. Total costs

Finally, the total budget of the project is computed in Table 4. We should note that we have included the power consumption, which has been computed considering an electrical power of 160 W for the personal computer and an electricity cost of 0.15 €/kWh, according to [1]. Moreover, an overhead of 10% has been applied.

$$Subtotal\ electrical\ costs = 0.15\,€/kWh \cdot 0.160\,kW \cdot 435\,h = 10.44\,€$$

$$Electrical\ costs = Subtotal\ electrical\ costs + Overhead\ (10\,\%) = 11.48\,€$$

Concept	*Cost [€]*
Human resources	8448.00
Hardware	58.33
Software	254.00
Electricity	11.48
Total costs	**8771.81**

Table 4. Budget of the work Design and Performance Analysis Study of an Ion Thruster.

Finally, we can conclude that the total cost of the study is estimated to be 8771.81 €. Analysing results in Table 4, we can see that the vast majority of the costs involved in the completion of the study goes towards human costs. They suppose near 96 % of the total budget. Although it is an estimation, it gives us a rough idea about the importance of human labour in this type of studies.

Bibliography

[1] Ministerio de Industria Energía y Turismo, “IV . 12 . PRECIO NETO DE LA ELECTRICIDAD PARA USO DOMÉSTICO Y USO INDUSTRIAL Euros / kWh,” Technical report, 2015.