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BARCELONATECH

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Hydrofoils design for a Europe dinghy

Document:

Budget

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BACHELOR FINAL THESIS

BUDGET

In this document the costs project are determined. The activity costs as well as the materials and manufacturing costs have to be contemplated. We will consider the manufacturing of the full prototype to give a better picture of the project expenses.

The human resources costs are divided between the expenses of the project study, prototype manufacturing and thesis redaction. The contribution of the project supervisor also been considered since he participated in several meetings and contributed to the final revision of the memory.

Human resources

Task	Hours [h]	Hourly cost [€/h]	Cost
Platform study	50	15	750,00 €
Hydrodynamic design	100	15	1.500,00 €
Prototype design	200	15	3.000,00 €
Manufacturing	50	12	600,00 €
Thesis redaction	200	15	3.000,00 €
Project supervisor	10	60	600,00 €
Total:	610		9.450,00 €

Table 1: human resources cost.

The manufacturing costs have already been classified as human resources expenses. Therefore, only the materials cost of a complete prototype are to be determined. This includes the cost of a 3D printer, the materials for composite manufacturing, the fixing elements and the multiple rods that are part of the final design.

Materials & Manufacturing

Item	Units	Unitary cost [€/u]	Cost
3D printer Creality CR-10	1	396	396,00 €
PLA printing rolls	4	20	80,00 €
E-glass fibre fabric (200x100 cm fabric)	2	14	28,00 €
PVC foam sheet (200x100x2 cm sheet)	2	27,6	55,20 €
Epoxy resin + hardener (8 kg)	1	135	135,00 €
Wood plates (1 m)	3	10	30,00 €
Steel capillary tube (2 m)	1	20	20,00 €
Carbon fibre 6mm rod (1 m)	1	12	12,00 €
Steel 6mm rod (1 m)	1	8	8,00 €
Steel 3mm rod (2 m)	1	15	15,00 €
M3 lock nut	4	0,7	2,80 €
M10 hexagonal nut	2	0,5	1,00 €
M10 washer	2	0,4	0,80 €
M3 hexagon socket head cap screws	4	1	4,00 €
M10 threaded rod (1 m)	1	8	8,00 €
Nylon hinges	3	1,5	4,50 €
Total:			800,30 €

Table 2: materials & manufacturing cost.

A cost that cannot be neglected is the one related to energy consumption. The development of this project required the constant use of a desktop computer and a table lamp for all of the 600 working hours. The energy consumption of the supervisor will not be considered. Moreover, the manufacturing process requires intensive use of the 3D printer. Approximately, it has been estimated that the 3D printer would have to be working for over 300 h if all the moulds and components had to be manufactured. The energy consumption of the mentioned appliances is indicated in their respective manual and the electricity cost is estimated at 0,276 €/kWh.

Energy consumption

Appliance	Working hours [h]	Energy consumption [kW]	Electricity cost [€/kWh]	Cost
3D printer	300	0,7	0,276	29,40 €
Desktop computer	600	0,3		25,20 €
Table lamp	600	0,06		9,61 €
Total:				64,21 €

Table 3: energy consumption cost.

To manufacture the centreboard prototype, a total of three car trips were done to the N1Foils workshop. The distance of the commute is 64 km and the used car consumes an average of 6,9 l/100 km of diesel, the cost of which is 1,24 €/l. All trips required paying a 1,28 € toll.

Displacements

Trips	Distance/trip [km/trip]	Fuel consumption [l/km]	Fuel price [€/l]	Toll [€/trip]	Cost
3	64	6,9/100	1,24	1,28	20,27 €

Table 4: displacements cost.

Finally, the total cost of the project ascends to **10.334,78 €**.

Total

Human resources	9.450,00 €
Materials & Manufacturing	800,30 €
Energy consumption	64,21 €
Displacements	20,27 €
Total cost:	10.334,78 €

Table 5: total cost.



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