



UNIVERSITAT POLITÈCNICA DE CATALUNYA  
BARCELONATECH

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

1

## BACHELOR'S THESIS

HEAT AND MASS TRANSFER TECHNOLOGICAL CENTER

# Disseny hidrodinàmic de hidrofoils per embarcacions esportives lleugeres a rem

ATTACHMENT 3: Aerodynamic results and implementation

POLYTECHNIC UNIVERSITY OF CATALONIA

ESEIAAT

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## 1 Introduction

The aim of this project is to study the hydrofoil corrections as well as to compare the performance of a rowing boat without and with hydrofoil. Therefore, the costs of this project will come from software licences and engineering hours rather than from materials or energy.

The costs are divided into direct costs and indirect costs.

## 2 Direct costs

Direct costs are the ones which concern this project only. From a company perspective, direct costs would be the material and human resources dedicated to a project.

This project has been done by an almost graduated aerospace engineering student from 12/02/2018 to 10/06/2018. This period of time has 17 weeks. The average workload has been 17 hours per week, distributed as one hour from Monday to Friday and 6 hours for each day of the weekend.

The average salary is considered to be 20€ per hour.

**Table 1: Direct costs.**

Concept	Time [h]	Price/hour [€/h]	Price [€]
Hydrofoil state of the art	20	20	400
Rowing state of the art	45	20	900
<b>Subtotal: State of the art</b>	<b>70</b>		<b>1300</b>
Rowing modelling	65	20	1300
Hydrofoil design	25	20	800
<b>Subtotal: physical modelling</b>	<b>90</b>		<b>2100</b>
Rowing implementation	40	20	800
Hydrofoil implementation	15	20	300
<b>Subtotal: Implementation</b>	<b>55</b>		<b>1100</b>
Meetings	20	20	400
Documentation	60	20	1200
<b>Subtotal: Other</b>	<b>80</b>		<b>1600</b>
<b>Total</b>	<b>290</b>		<b>6100</b>

### 3 Indirect costs

Indirect costs are all those costs necessary to carry this project, but that from a point of view of an enterprise, those costs do not materialize at the end of the project and are consumed during its development, such energy, or can be used in more than one project, such machinery or software.

Table 2: Indirect costs

Concept	Units [u]	Price/unit [€/u]	Price [€]
Student Licence, Matlab	1	250	250
Student License, Microsoft Office	1	150	150
Electricity used [kWh]	22,5	0,8	18
Gasoline [L]	14	1,2	16,8
Total			434,8

### 4 Total costs

Finally the total cost is around 6535 €.