

## Final degree project

**Study:** Mechanical Engineering Degree

**Title:**

Characterization and advanced numerical simulation of the fracture process and structural strength in composites

**Document:** Preparation costs

**Student:** Aleix Gatus Adroher

**Tutor:** Pere Maimí Vert

**Department:** Mechanical and industrial construction engineering

**Area:** MMCTE-EC / EM

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**INDEX**

**1 INTRODUCTION ..... 3**

**2 PRICE TABLE..... 3**

**3 PARTIAL COSTS ..... 4**

3.1 WRITING COSTS .....4

3.2 EXPERIMENTAL MATERIAL.....4

3.3 EQUIPMENT AND TECHNICAL FACILITIES .....4

3.4 ADDITIONAL STAFF .....5

3.5 DATA PROCESSING AND SOFTWARE .....5

3.6 MISCELLANEOUS EXPENSES.....5

**4 TOTAL COST ..... 6**

## 1 INTRODUCTION

This document details the budget for the realization of this project, including both the production cost and the analysis of the results and the writing of the document.

## 2 PRICE TABLE

N	Concept	Price	Units
1	Previous research	30	€/h
2	Programming of simulation programs	30	€/h
3	Writing the final project	40	€/h
4	Test material	0	€/u
5	Epoxy resin	75	€/l
6	Fiberglass tabs to avoid damaging the test material	15	€/u
7	Personal protective equipment	10	€/u
8	Strain gauges	20	€/u
9	Laboratory hours	50	€/h
10	Amortization of testing machines	20	€/h
11	Amortization of extensometer	2	€/h
12	Laboratory technicians	20	€/h
13	LS-DYNA license	1000	€/month
14	Storage and backups	3	€/month
15	Access to publications and bibliography	5	€/u
16	Telecommunications services (internet and telephone)	2	€/h

*Table 2.1: Unit price table of the necessary elements*

### 3 PARTIAL COSTS

#### 3.1 Writing costs

N	Concept	UM (unit of measurement)	Amount	Unit price (€)	Price (€)
1	Previous research	h	50	30	1500
2	Programming of simulation programs	h	300	30	9000
3	Writing the final project	h	120	20	2400

Table 3.1: Partial budget for writing costs

#### 3.2 Experimental material

N	Concept	UM (unit of measurement)	Amount	Unit price (€)	Price (€)
4	Test material	u	60	0	0
5	Epoxy resin	l	1	75	75
6	Fiberglass tabs to avoid damaging the test material	u	60	15	900
7	Personal protective equipment	u	1	10	10
8	Strain gauges	u	25	20	500

Table 3.2: Partial budget for experimental material

#### 3.3 Equipment and technical facilities

N	Concept	UM (unit of measurement)	Amount	Unit price (€)	Price (€)
9	Laboratory hours	h	160	50	8000
10	Amortization of testing machines	h	40	20	800
11	Amortization of extensometer	h	1	2	2

Table 3.3: Partial budget for equipment and technical installations

**3.4 Additional staff**

N	Concept	UM (unit of measurement)	Amount	Unit price (€)	Price (€)
12	Laboratory technicians	h	160	20	3200

*Table 3.4: Partial budget for additional staff***3.5 Data processing and software**

N	Concept	UM (unit of measurement)	Amount	Unit price (€)	Price (€)
13	LS-DYNA license	month	4	1000	4000
14	Storage and backups	month	4	3	12

*Table 3.5: Partial budget for data processing and software***3.6 Miscellaneous expenses**

N	Concept	UM (unit of measurement)	Amount	Unit price (€)	Price (€)
15	Access to publications and bibliography	u	4	3	12
16	Telecommunications services (internet and telephone)	month	40	2	80

*Table 3.6: Partial budget for miscellaneous expenses*

**4 TOTAL COST**

<b>Section</b>	<b>Price (€)</b>
Writing costs	12900
Experimental material	1485
Equipment and technical facilities	8802
Additional staff	3200
Data processing and software	4012
Miscellaneous expenses	92
<b>Total price (excluding IVA)</b>	<b>30491</b>
<b>IVA (21%)</b>	<b>6403.11</b>
<b>Total price (including IVA)</b>	<b>36894.11</b>

*Table 4.1: Total budget*