



Disseny d'un Petit Coet de 2 Etapes amb Recuperació Quadcopter

Document:

Fulla Tècnica

Autor:

Àlex Tersa Pajares

Director - Codirector:

Jaume Solé Bosquet / Oriol Casamor Martinell

Titulació:

Grau en Enginyeria en Vehicles Aeroespacials

Convocatòria:

Primavera, 2022

TREBALL DE FI D'ESTUDIS

Bachelor Final Thesis

Grau en Enginyeria en Vehicles Aeroespacials

DESIGN OF A SMALL 2-STAGE ROCKET WITH QUADCOPTER RECOVERY

Student: Àlex Tersa Pajares

Director: Jaume Solé Bosquet

Co-director: Oriol Casamor Martinell

ESEIAAT - Universitat Politècnica de Catalunya - BarcelonaTech

Spring 2022

This document contains: **TECHNICAL SHEET**



UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH

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

“The story of civilisation is, in a sense, the story of engineering - that long and arduous struggle to make the forces of nature work for man’s good.”

Lyon Sprague DeCamp

Contents

Contents	I
1 Introduction	1
2 QLS	2
2.1 Characteristics	2
3 E-Bay	3
3.1 Characteristics	4
3.2 Connections	4
4 Assembly	5
4.1 Characteristics	5

1 Introduction

The aim of this document is to present the different systems that compose the final prototype model. Along with the most important characteristics and parameters for each one.

The systems analyzed are the QLS, the E-Bay, and the full assembly of all the components.

2 QLS

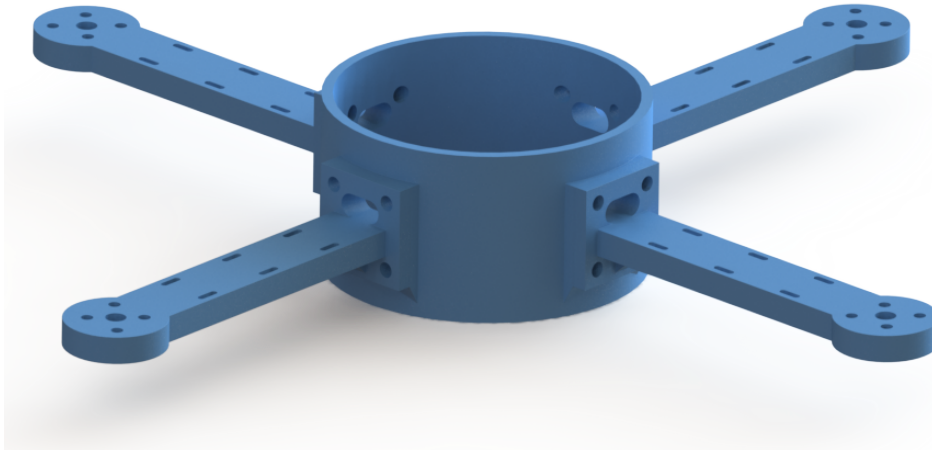


Figure 1 QLS system for the mock-up. Source: Own

The quadcopter landing system (QLS) is formed by 5 parts, 4 arms and a center hub. The aim of this system is to carry the electric motors with the propellers. Once activated, during the descending phase, the QLS slows the vehicle down, reducing its vertical speed providing the necessary thrust. Moreover, it also provides with active control over the attitude of the rocket, ensuring that the frame is maintained straight. With this system, the rocket is capable of safely landing on the ground.

2.1 Characteristics

QLS	
Material	PLA
Height	50,00 mm
Width	340,00 mm
Weight	118,00 g
Fixing Elements	×16 M4×20 mm screws
N. of Parts	5
Re-Usable	Yes

Table 1 QLS parameters. Source: Own

3 E-Bay

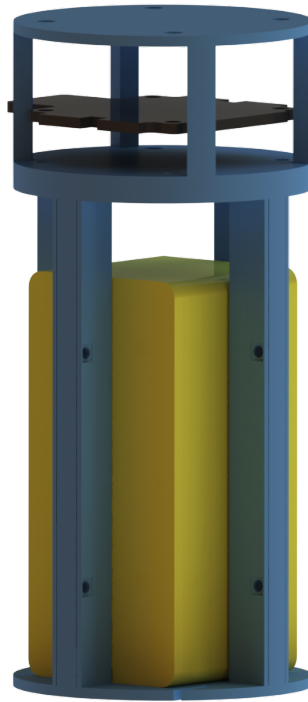


Figure 2 E-Bay for the mock-up. Source: Own

The Electronic Bay is the system in charge of protecting the avionics components aboard the vehicle. Moreover, it also organizes them, therefore it has been self-designed for the chosen components. This modulus is removable, simplifying the access to the avionics.

The components onboard the E-Bay are the following:

- Flight Controller
- ESC Board
- Battery
- Receiver
- OpenLog data logger
- GPS/Compass

3.1 Characteristics

E-Bay	
Material	PLA
Height	123,00 mm
Width	55,00 mm
Weight	350,00 g
Fixing Elements	×4 M3×40 mm screws
N. of Parts	4
Re-Usable	Yes

Table 2 E-Bay parameters. Source: Own

3.2 Connections

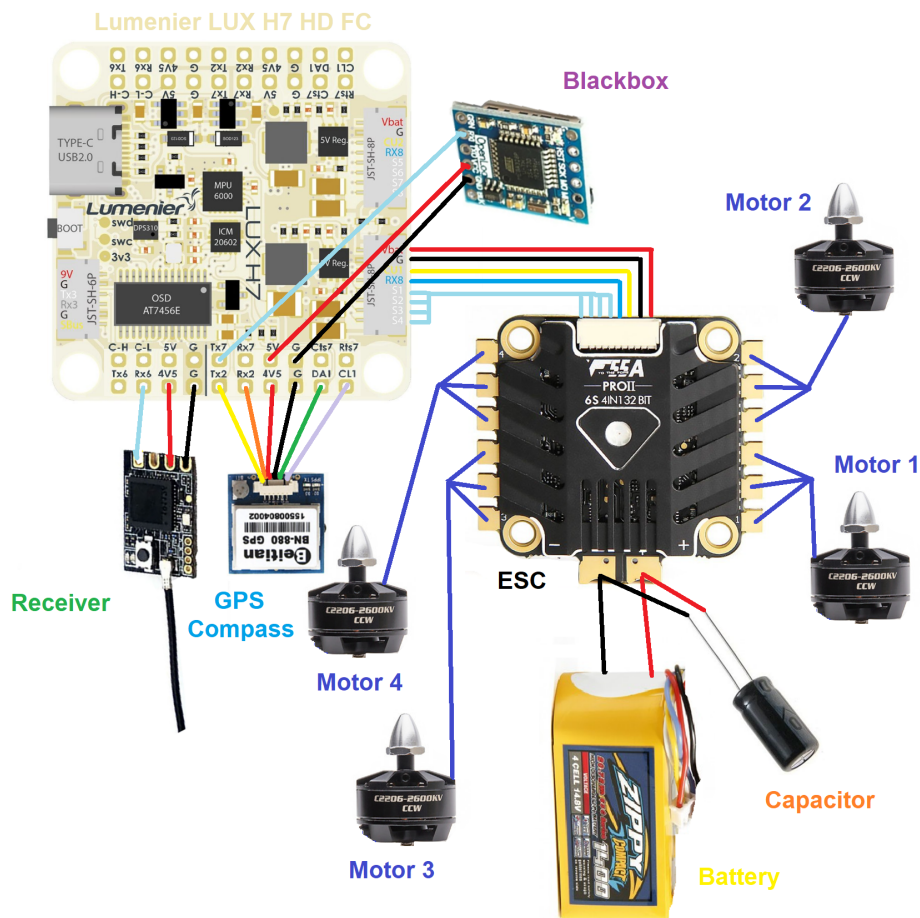


Figure 3 Connections diagram for the avionics. Source: Own

4 Assembly

The full *Perseverance QLS Rocket* is the integration of the previous systems, and the other structural components. Together, all of these parts conform a technological demonstrator of the capabilities studied in this project.

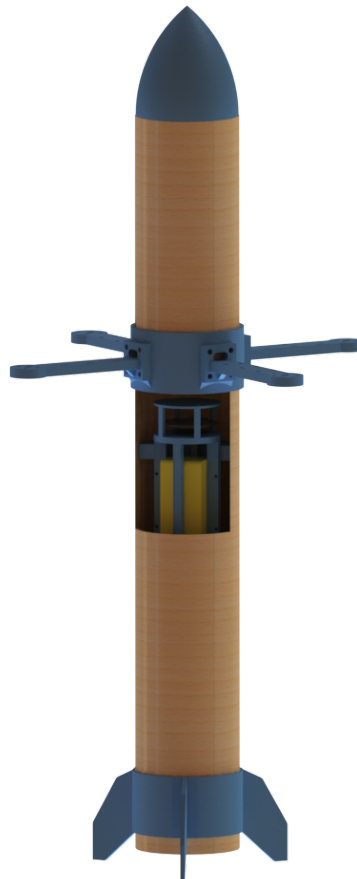


Figure 4 *Perseverance QLS Rocket* assembly. Source: Own

4.1 Characteristics

<i>Perseverance QLS Rocket</i>	
Material	PLA and Cardboard
Height	705,97 mm
Width	340,00 mm
Weight	1020,00 g
N. of Parts	13
Re-Usable	Yes

Table 3 *Perseverance QLS Rocket* parameters. Source: Own