UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH
Escola Superior d'Enginyeries Industrial,
Aeroespacial i Audiovisual de Terrassa

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

TREBALL DE FI D'ESTUDIS

Document:
Plànols

Autor:
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Director - Codirector:
Jaume Solé Bosquet / Oriol Casamor Martinell

Titulació:
Grau en Enginyeria en Vehicles Aeroespacials

Convocatòria:
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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: **Drawings**

UNIVERSITAT POLITÈCNICA DE CATALUNYA
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"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."

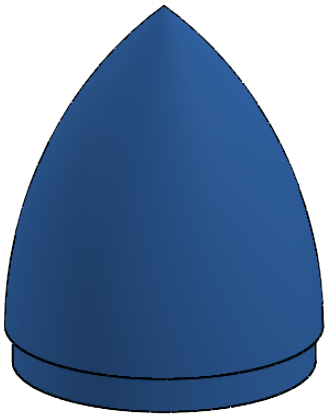
Lyon Sprague DeCamp

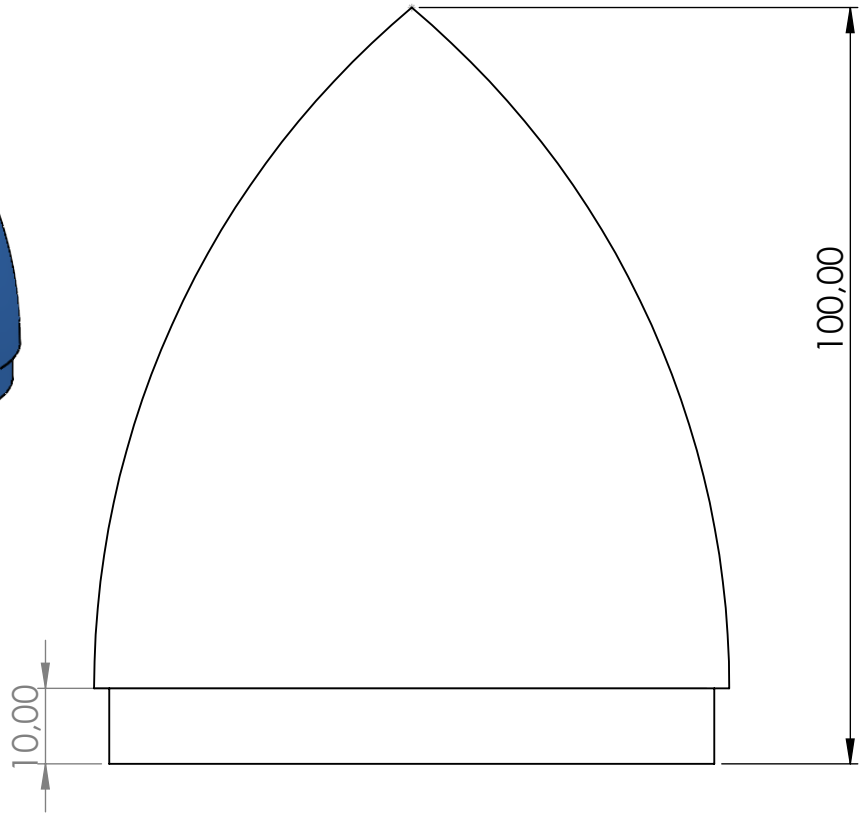
Contents

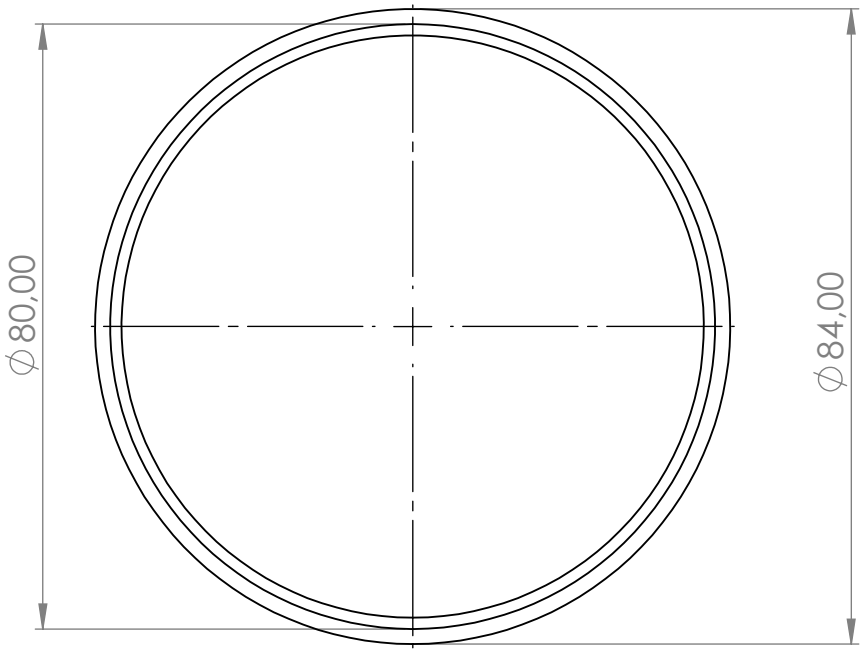
Introduction

This document contains the drawings for each designed part for this project. Two different vehicles are described here, the mock-up model, and the final 2-stage rocket. Each system is assembled and every part is referenced in this document. All the acronyms used for this document can be found in the report's Acronym List.

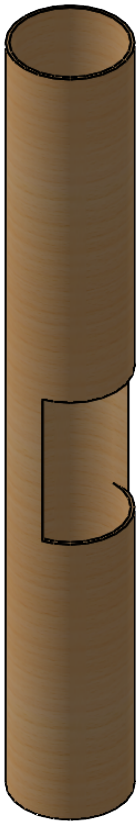
Mock-Up Model

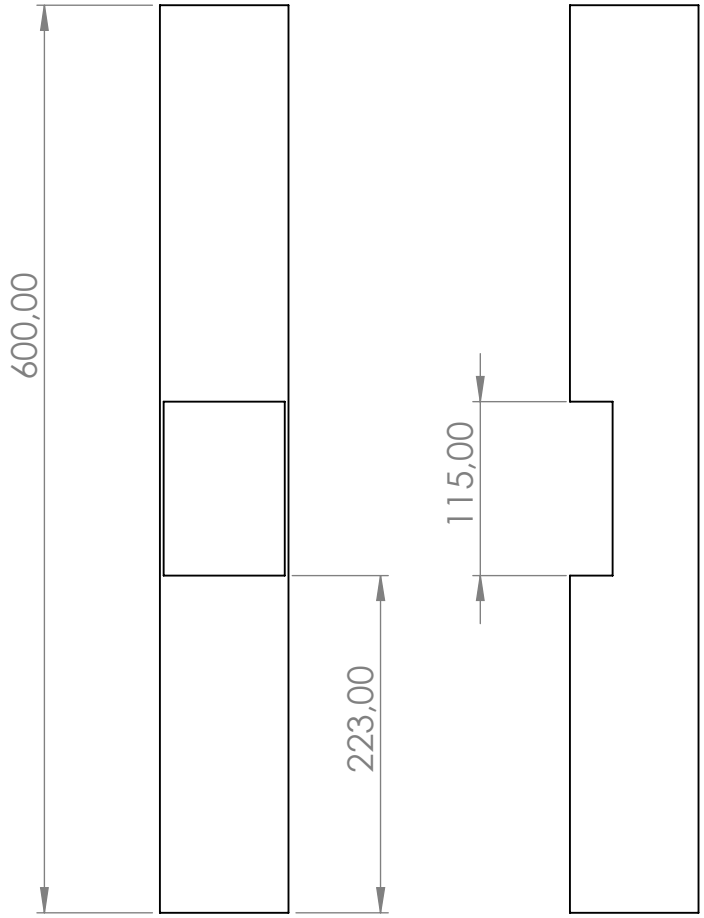


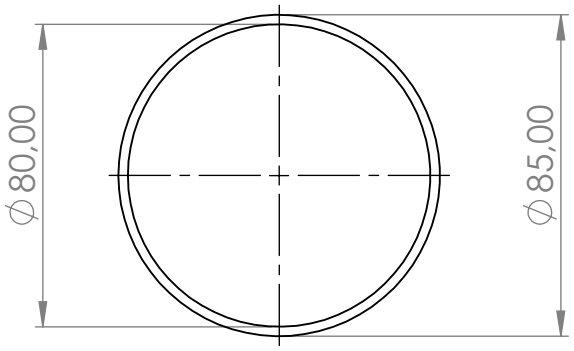




Design of a Small 2-Stage Rocket with Quadcopter Recovery	Author	Àlex Tersa Pajares	System: Mock-Up
	Date	16/06/2022	
Aerospace Engineering	Material: PLA	Units: mm	Part: Nose Cone — A4
			Scale: 1:1 — Sheet: 1 of 15

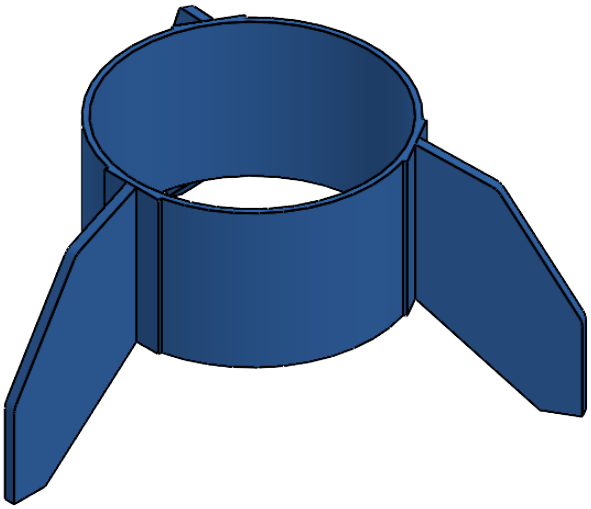


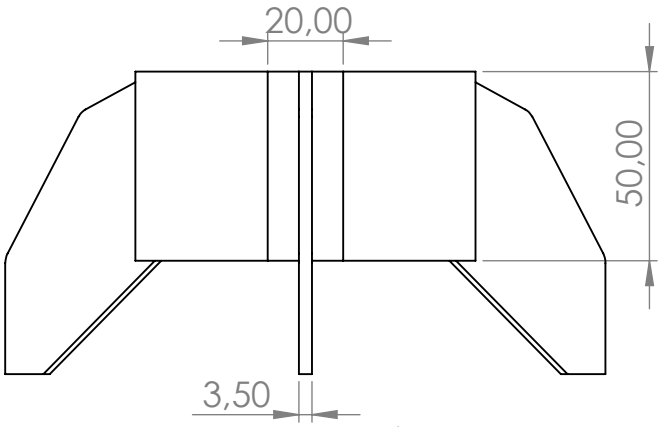


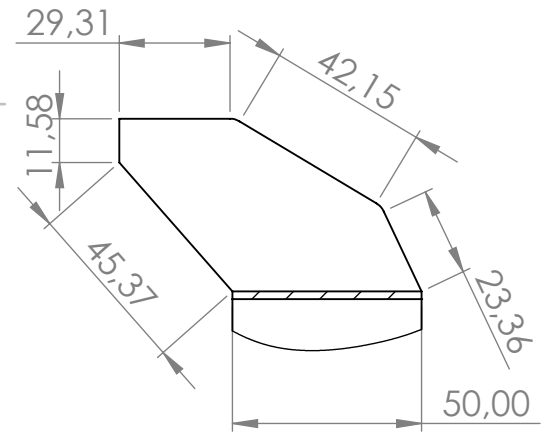


Scale 1:2

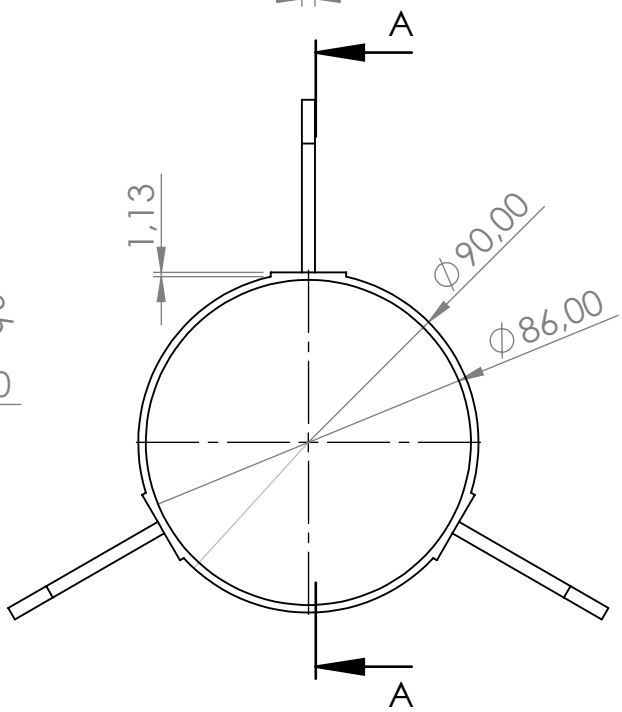
Design of a Small 2-Stage Rocket with Quadcopter Recovery	Author	Àlex Tersa Pajares	System	Mock-Up	
	Date	16/06/2022			
UPC *Aerospace Engineering*	Material	Units	Part	Body Tube	A4
	Cardboard	mm	Scale 1:5	Sheet 2 of 15	



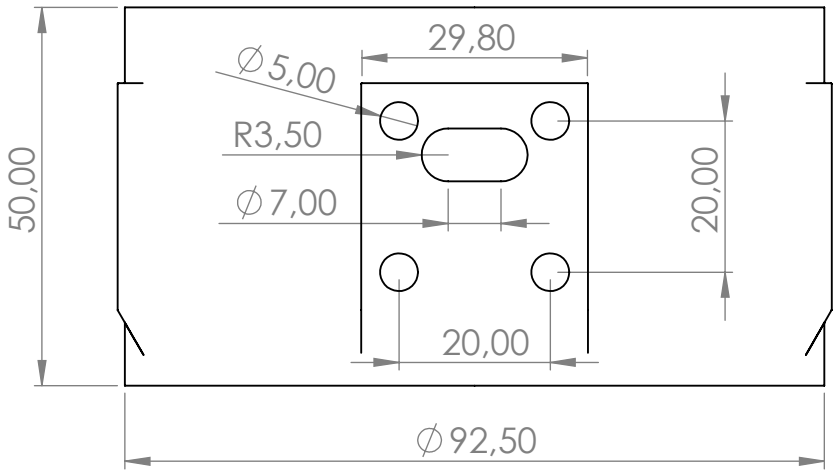


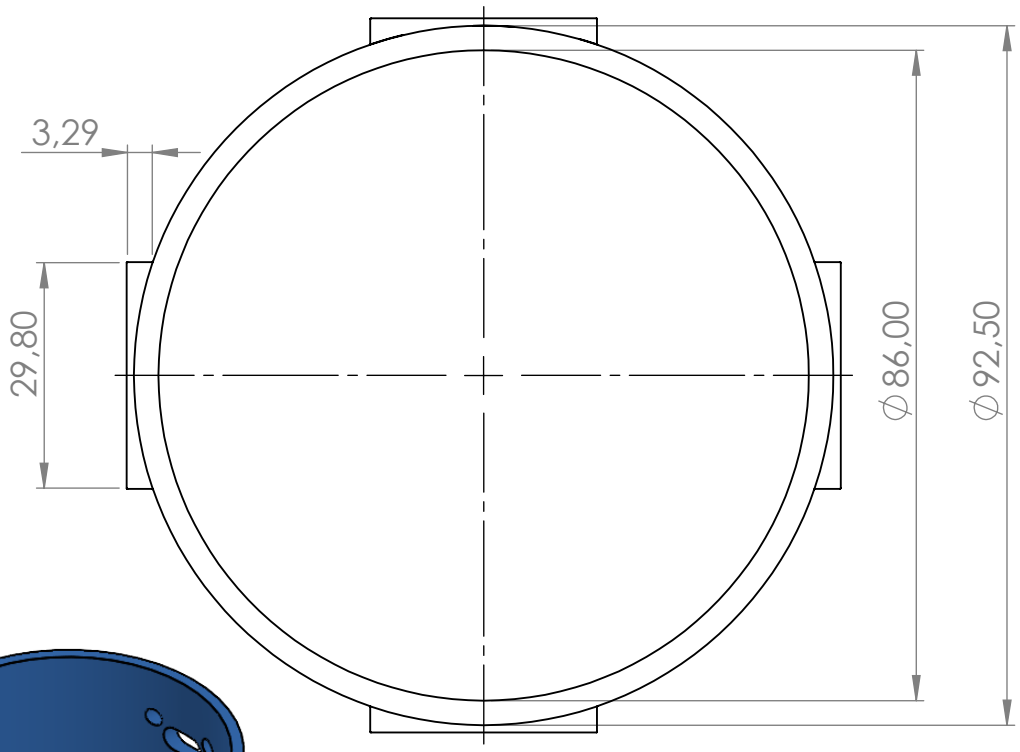


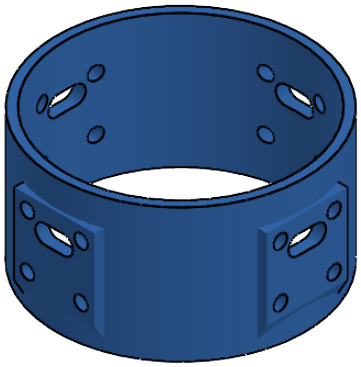
Section A-A



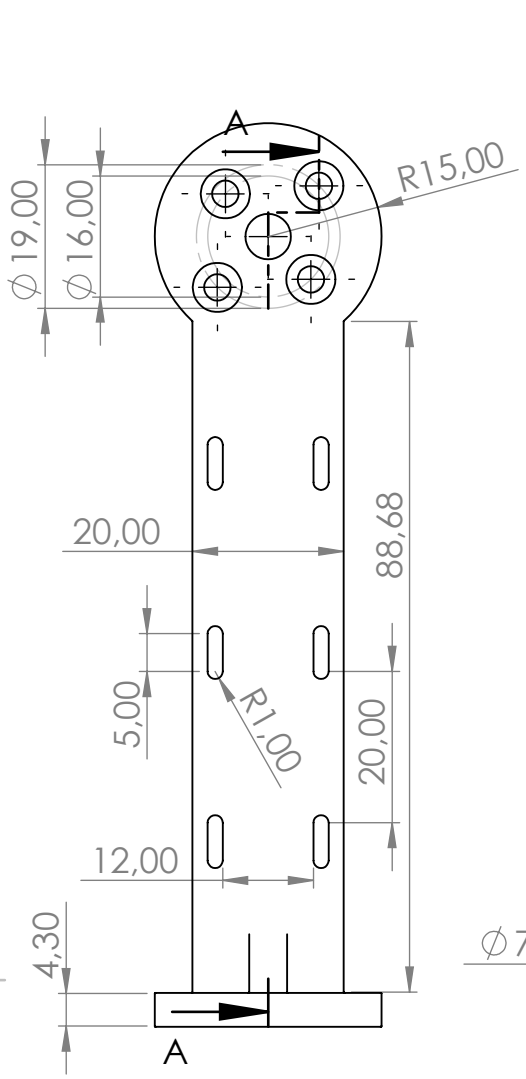
Design of a Small 2-Stage Rocket with Quadcopter Recovery	Author	Àlex Tersa Pajares	System	Mock-Up	
	Date	16/06/2022			
UPC *Aerospace Engineering*	Material	Units	Part	Fins	A4
	PLA	mm	Scale	1:2	Sheet 3 of 15

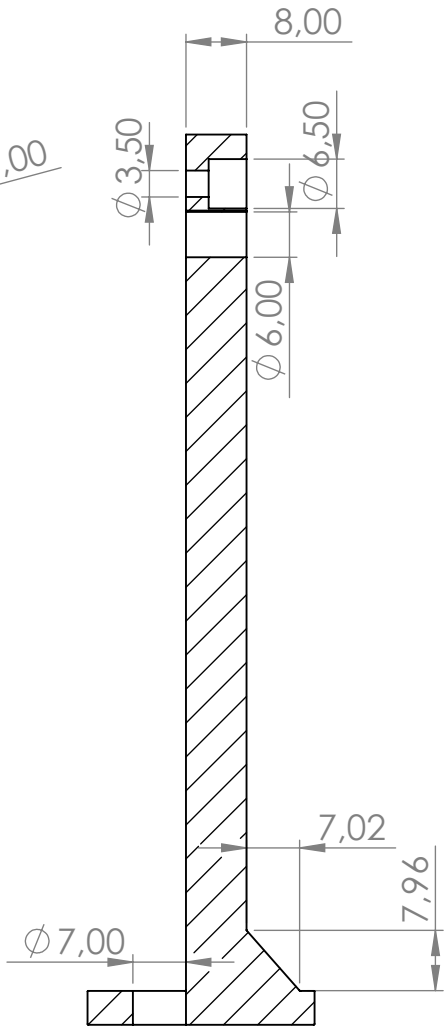




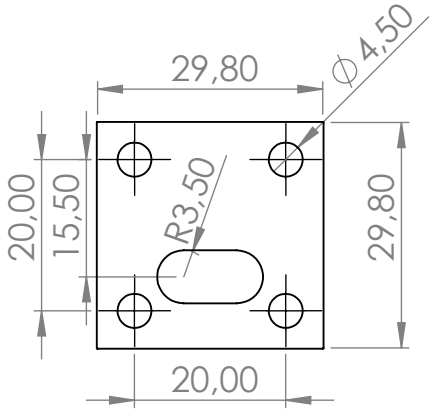


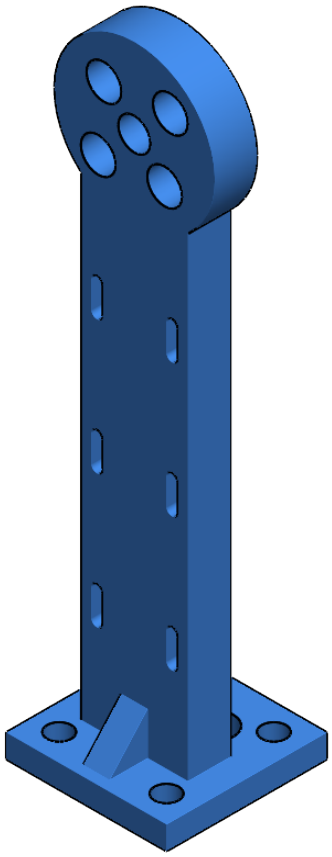
Design of a Small 2-Stage Rocket with Quadcopter Recovery	Author	Àlex Tersa Pajares	System	QLS - Mock-Up	
	Date	16/06/2022			
Aerospace Engineering	Material	Units	Part	Hub	A4
	PLA	mm	Scale	1:1	Sheet 4 of 15



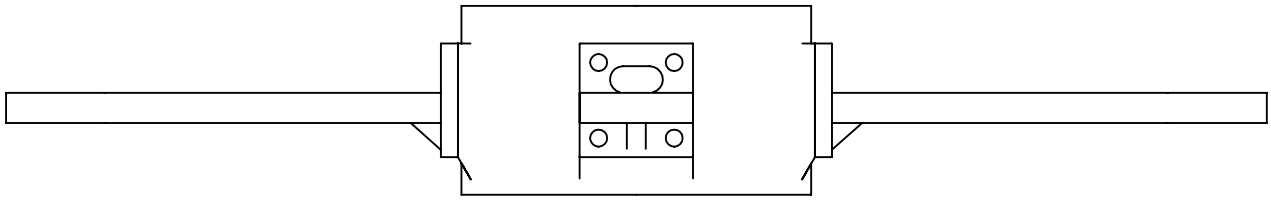


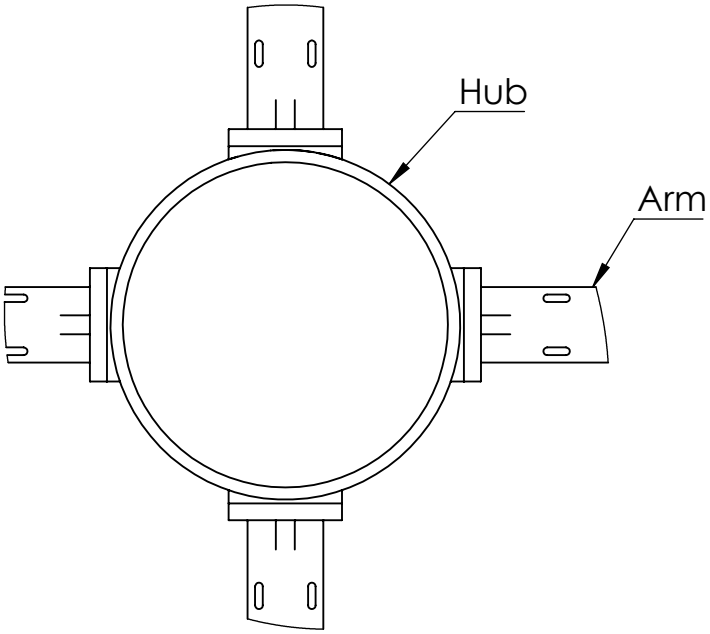
Section A-A

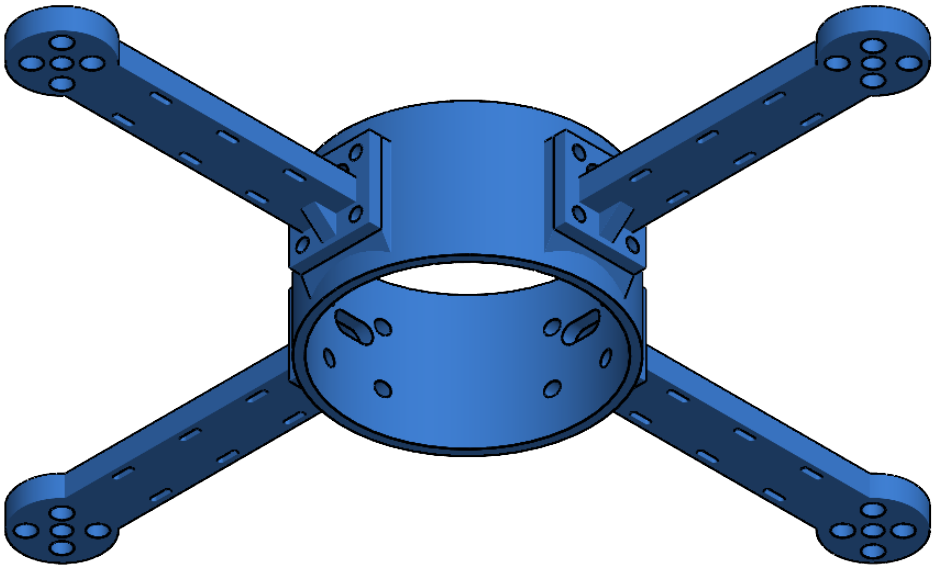




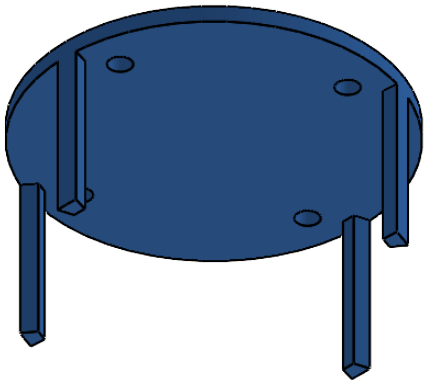
Design of a Small 2-Stage Rocket with Quadcopter Recovery	Author	Àlex Tersa Pajares	System	QLS - Mock-Up	
	Date	16/06/2022			
UPC *Aerospace Engineering*	Material	Units	Part	Arm	A4
	PLA	mm	Scale	1:1	Sheet 5 of 15

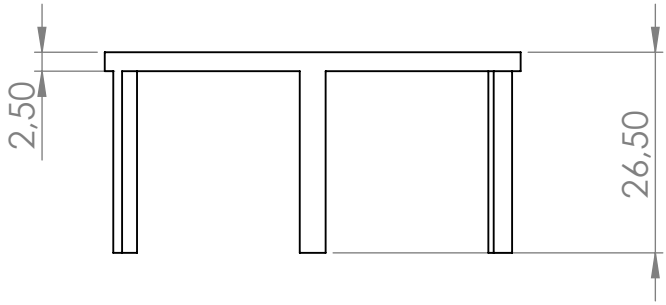


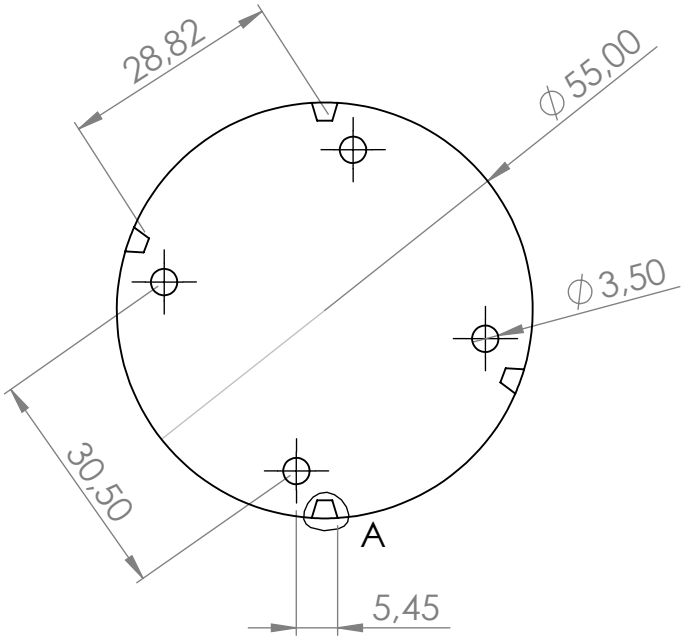


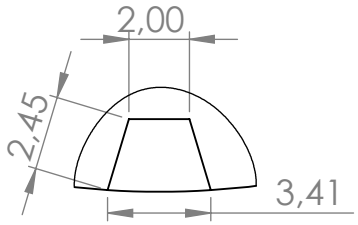


Design of a Small 2-Stage Rocket with Quadcopter Recovery	Author	Àlex Tersa Pajares	System	QLS - Mock-Up	
	Date	16/06/2022			
Aerospace Engineering	Material	Units	Part	QLS Assembly	A4
	PLA	mm	Scale	1:2	Sheet 6 of 15



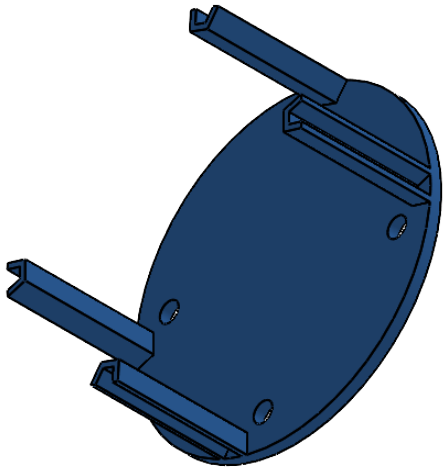


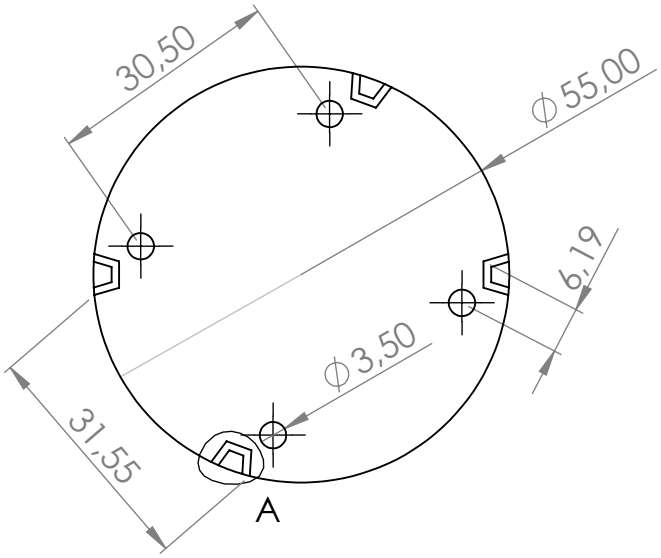


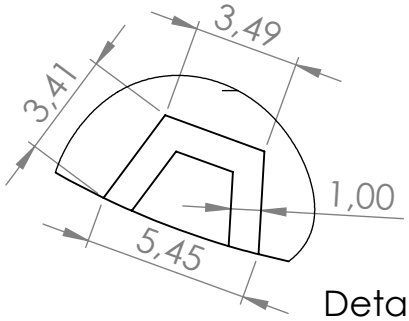


Detail A
Scale 4 : 1

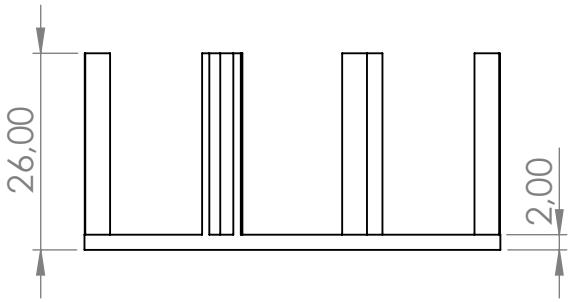
Design of a Small 2-Stage Rocket with Quadcopter Recovery	Author	Àlex Tersa Pajares	System	E. Bay - Mock-Up
	Date	16/06/2022		
Aerospace Engineering	Material	Units	Part	A4
	PLA	mm	Part 1	
			Scale 1:1	Sheet 7 of 15



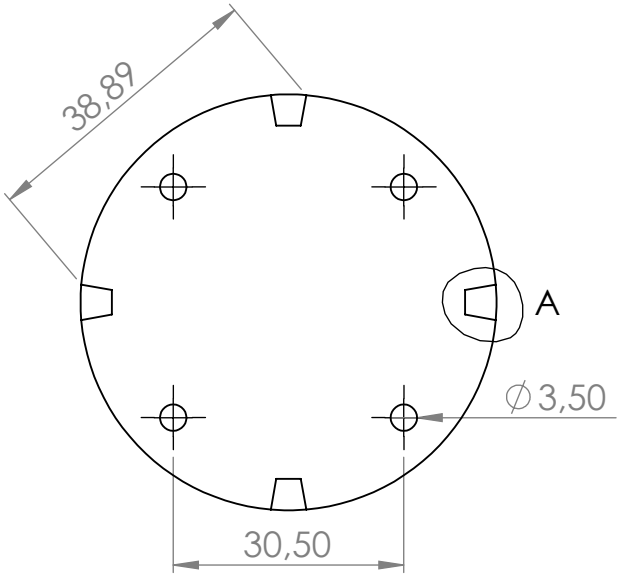


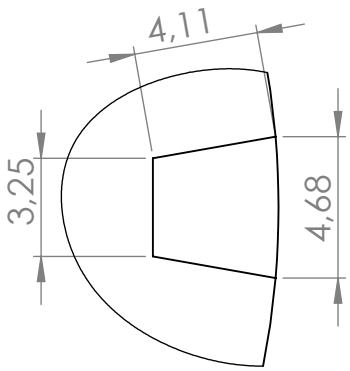


Detail A
Scale 4 : 1

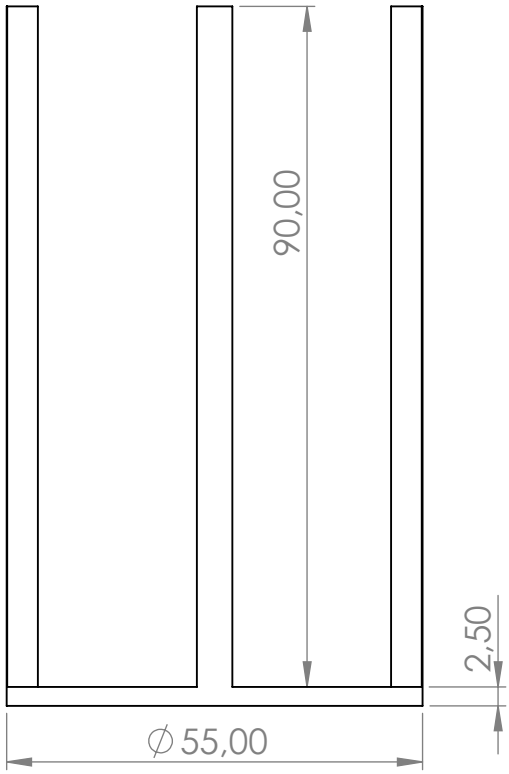


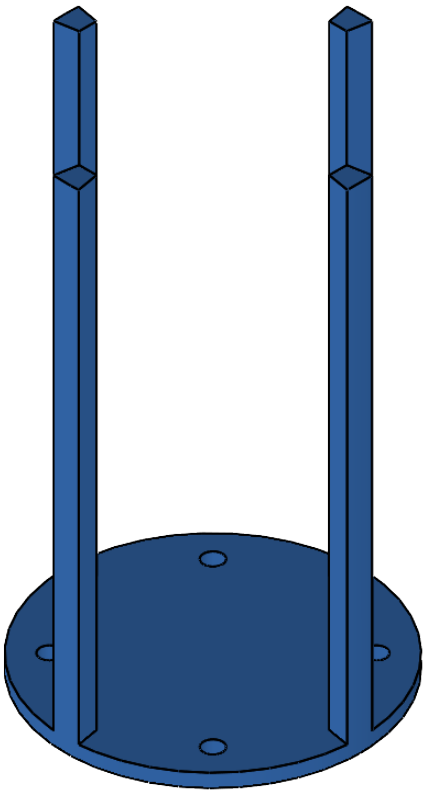
Design of a Small 2-Stage Rocket with Quadcopter Recovery	Author	Àlex Tersa Pajares	System	E. Bay - Mock-Up
	Date	16/06/2022		
Aerospace Engineering	Material	Units	Part	A4
	PLA	mm	Part 2	
			Scale 1:1	Sheet 8 of 15



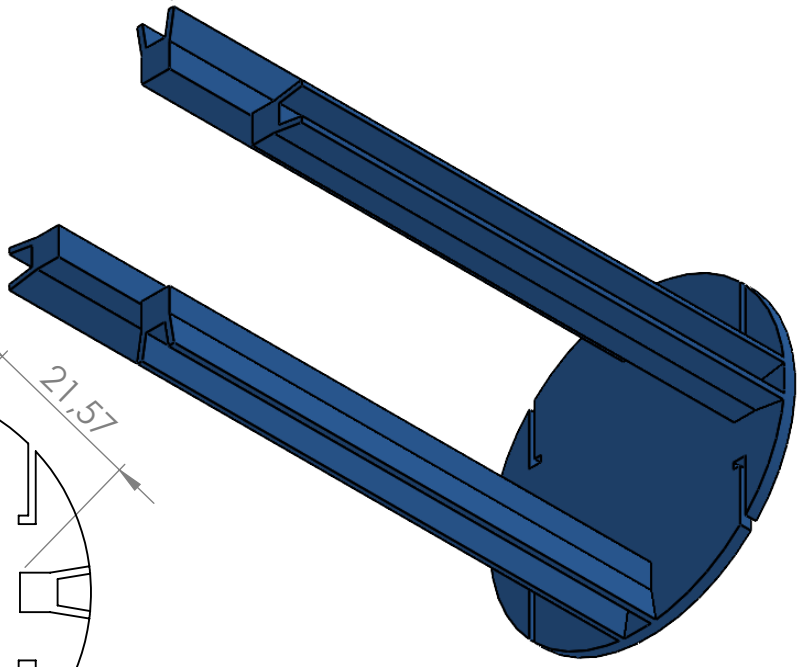


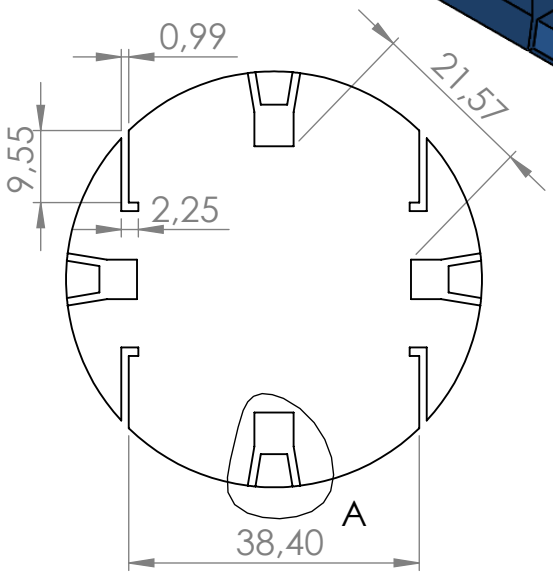
Detail A
Scale 4 : 1

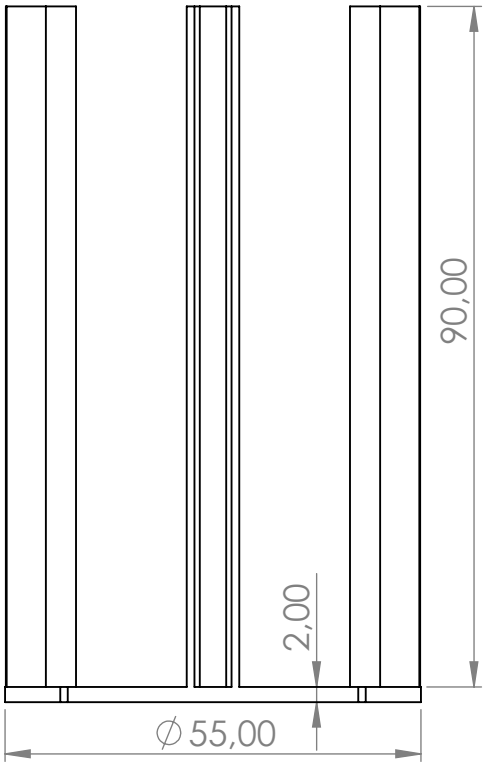


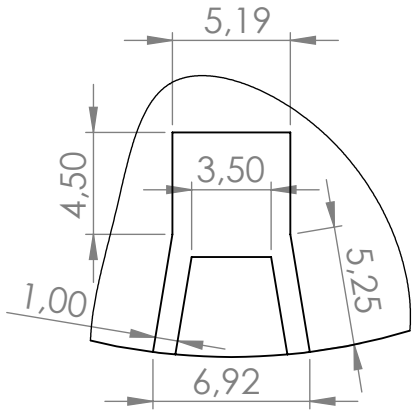


Design of a Small 2-Stage Rocket with Quadcopter Recovery	Author	Àlex Tersa Pajares	System: E. Bay - Mock-Up
	Date	16/06/2022	
UPC *Aerospace Engineering*	Material: PLA	Units: mm	Part: Part 3 — A4
			Scale 1:1 — Sheet 9 of 15



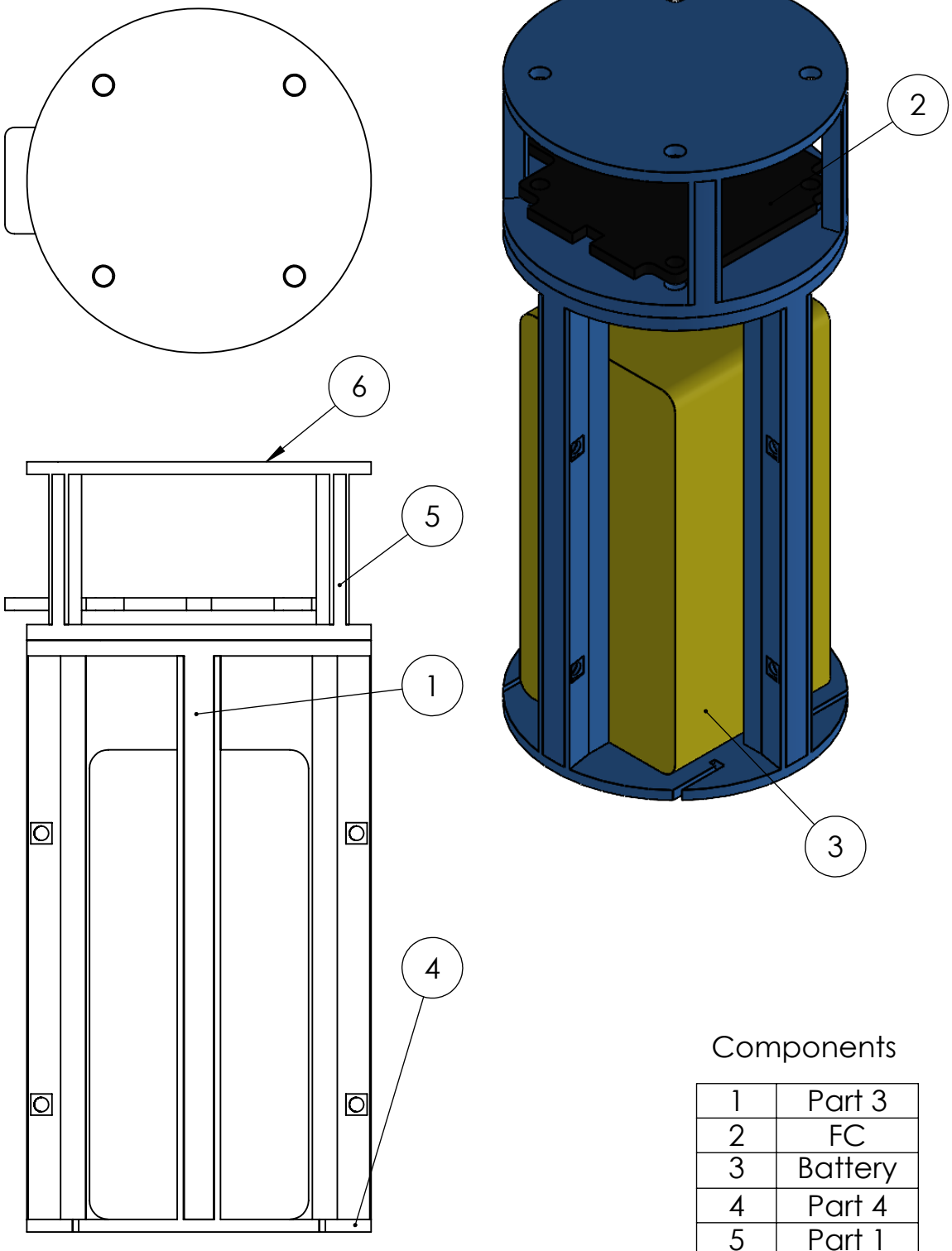






Detail A
Scale 3 : 1

Design of a Small 2-Stage Rocket with Quadcopter Recovery	Author	Àlex Tersa Pajares	System: E. Bay - Mock-Up
	Date	16/06/2022	
UPC *Aerospace Engineering*	Material: PLA	Units: mm	Part: Part 4 — A4
	Scale: 1:1	Sheet: 10 of 15	



Components

1	Part 3
2	FC
3	Battery
4	Part 4
5	Part 1
6	Part 2

Design of a Small 2-Stage Rocket with Quadcopter Recovery

Author	Àlex Tersa Pajares
Date	16/06/2022

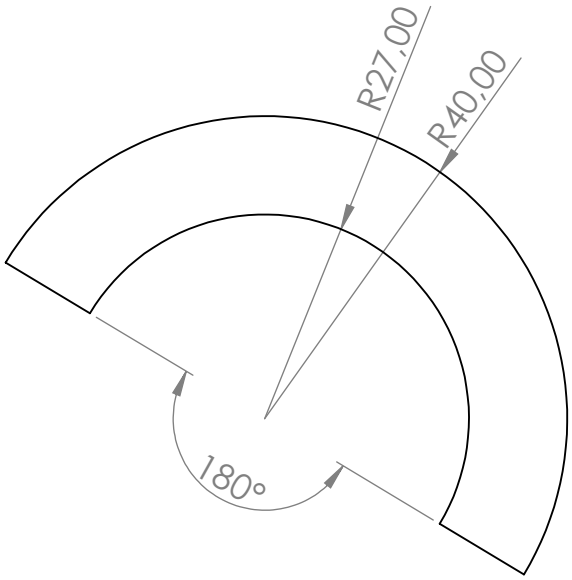
System: E. Bay - Mock-Up

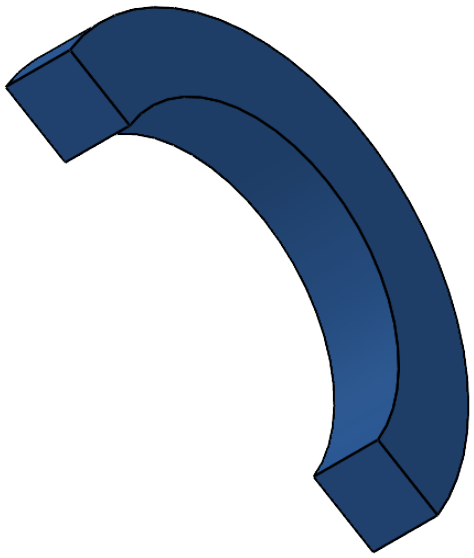
Aerospace Engineering

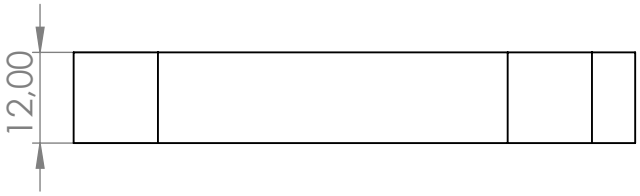
Material	Units
PLA	mm

Part: E. Bay Assembly — A4

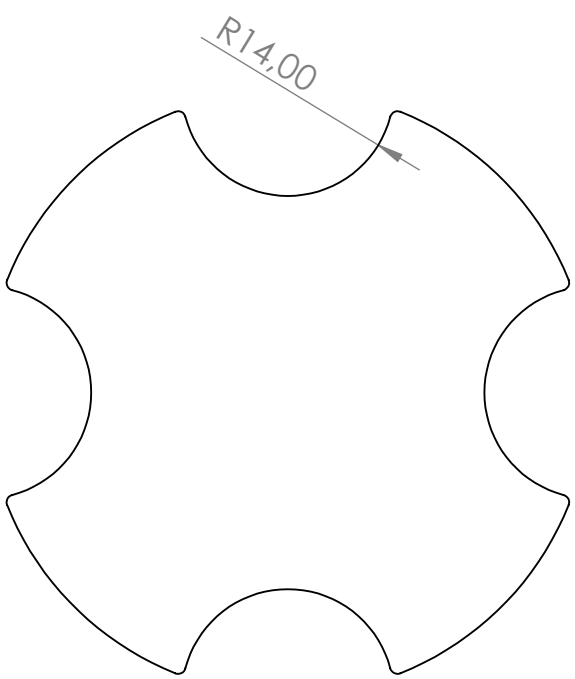
Scale 1:1 — Sheet 11 of 15

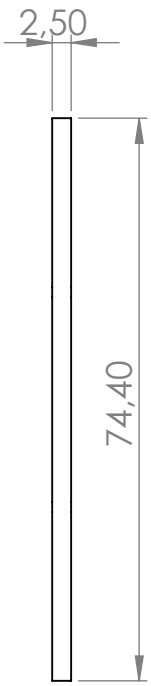


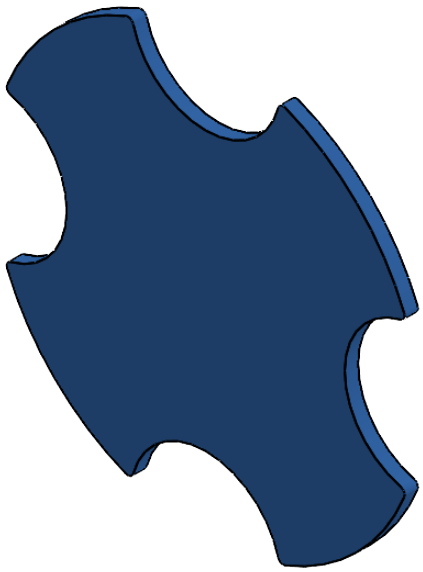




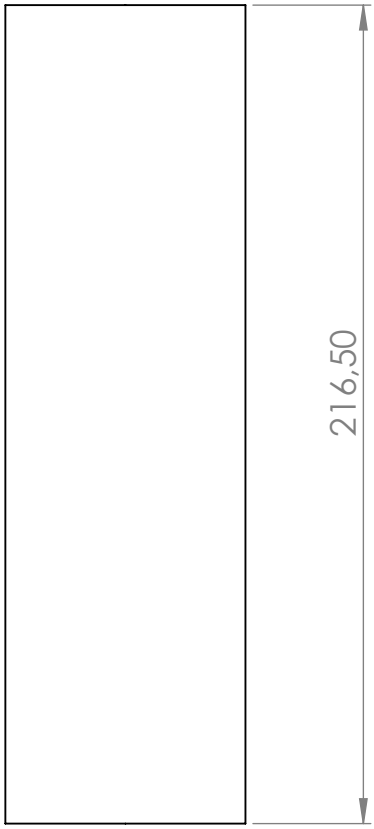
Part	Fixing Ring	
Scale	1:1	Sheet 12 of 15

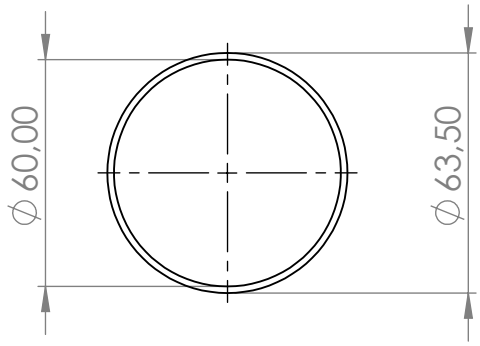




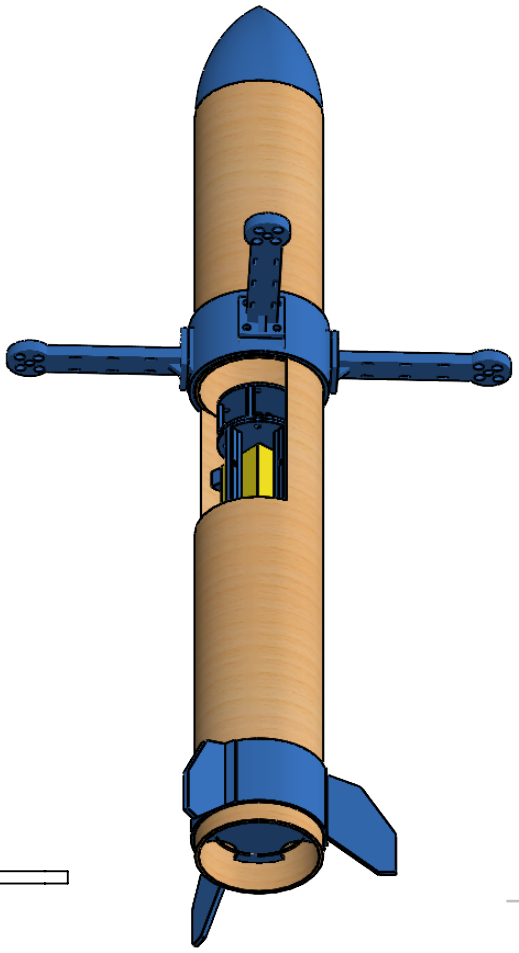


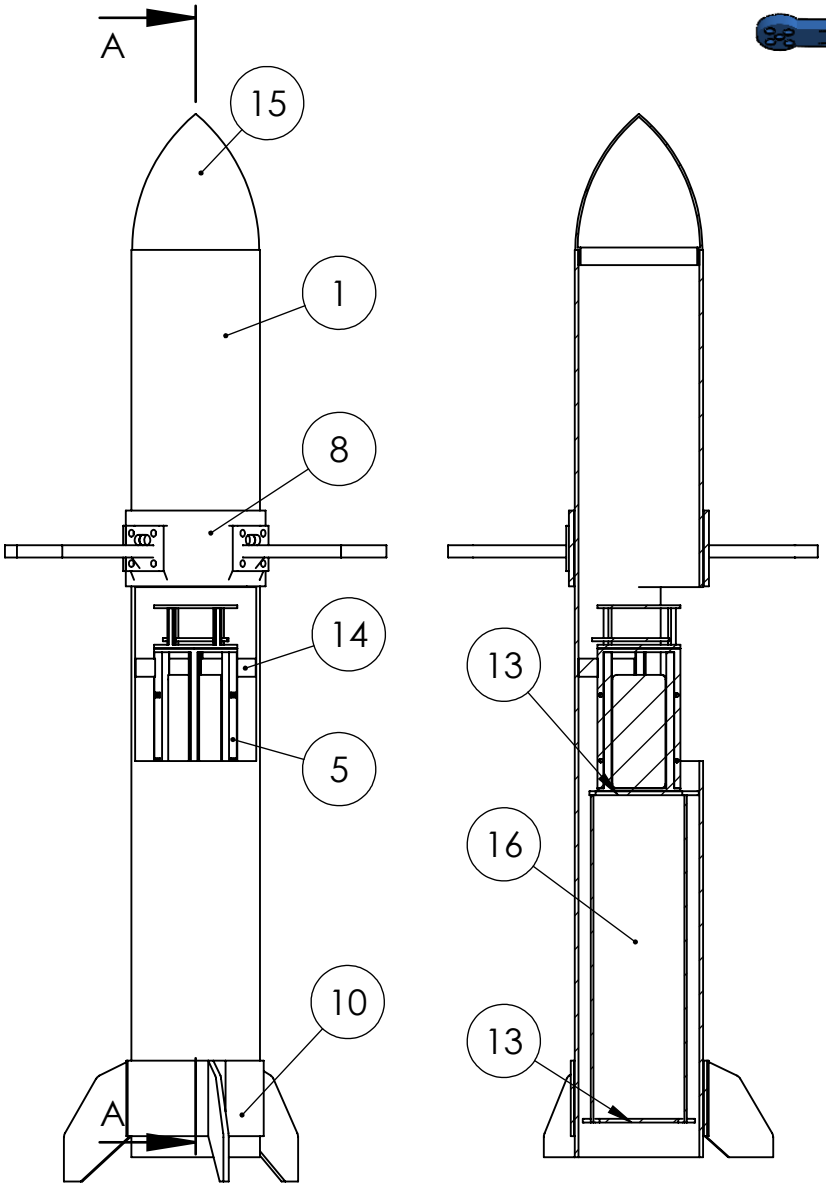
Design of a Small 2-Stage Rocket with Quadcopter Recovery	Author	Àlex Tersa Pajares	System	Mock-Up	
	Date	16/06/2022			
UPC *Aerospace Engineering*	Material	Units	Part	Platform	A4
	PLA	mm	Scale 1:1	Sheet 13 of 15	





Design of a Small 2-Stage Rocket with Quadcopter Recovery	Author	Àlex Tersa Pajares	System	Mock-Up
	Date	16/06/2022		
UPC *Aerospace Engineering*	Material	Units	Part	A4
	Cardboard	mm	Inner Tube	
			Scale 1:2	Sheet 14 of 15





Section A-A

Components

1	Body
5	E. Bay
8	QLS
10	Fins
13	Platform
14	Fixing Ring
15	Nose Cone
16	Inner Tube

Design of a Small 2-Stage Rocket with Quadcopter Recovery

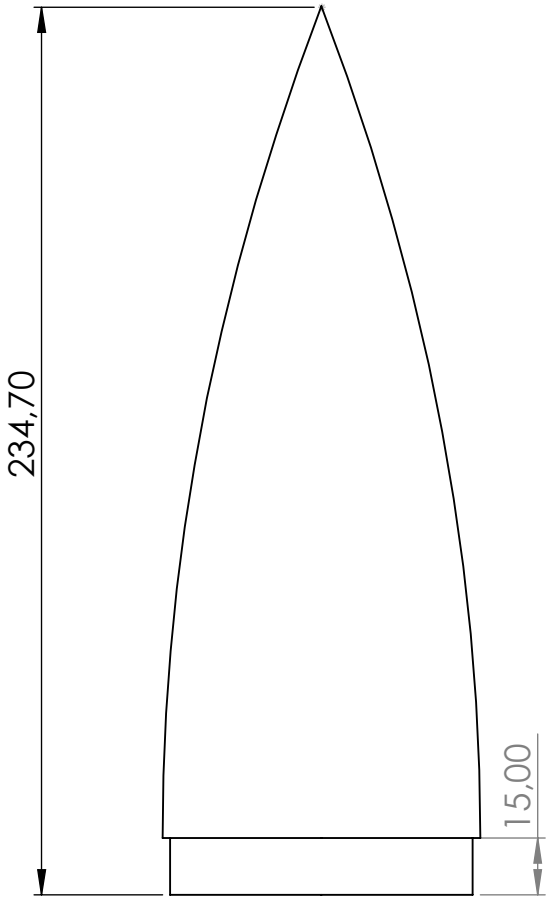
Author	Àlex Tersa Pajares
Date	16/06/2022

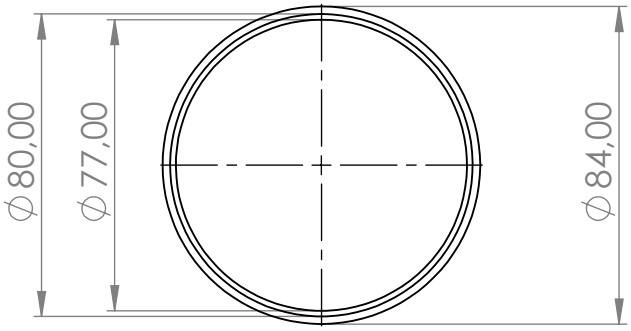
System: Mock-Up

Aerospace Engineering

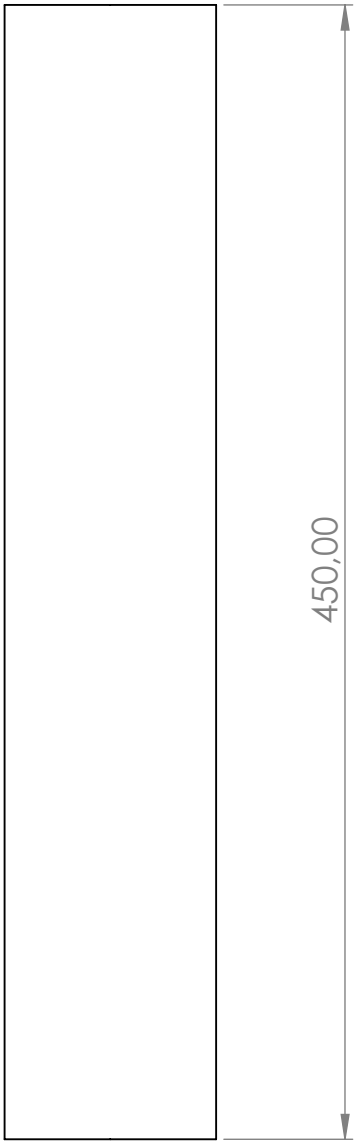
Material	Units: mm	Part: Assembly	A4
		Scale: 1:5	Sheet: 15 of 15

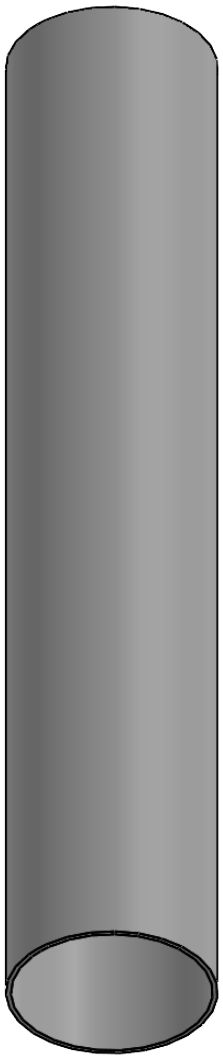
2-Stage Rocket

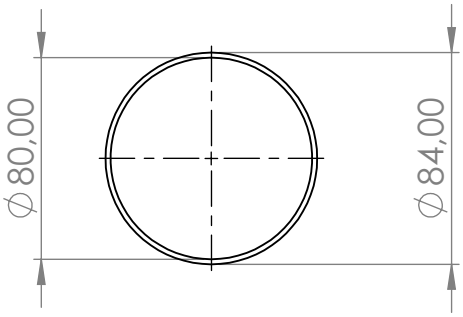




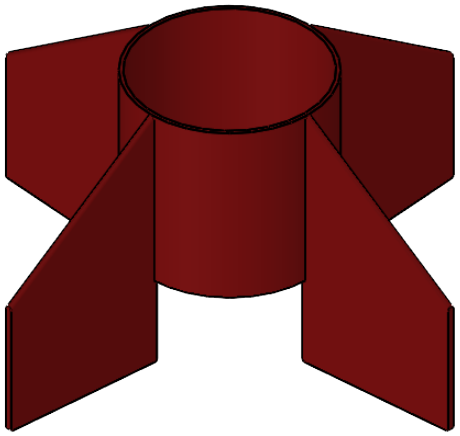
Design of a Small 2-Stage Rocket with Quadcopter Recovery	Author	Àlex Tersa Pajares	System	Stage 2	
	Date	16/06/2022			
UPC *Aerospace Engineering*	Material	Units	Part	Nose Cone	A4
	PLA	mm	Scale 1:2	Sheet	1 of 9

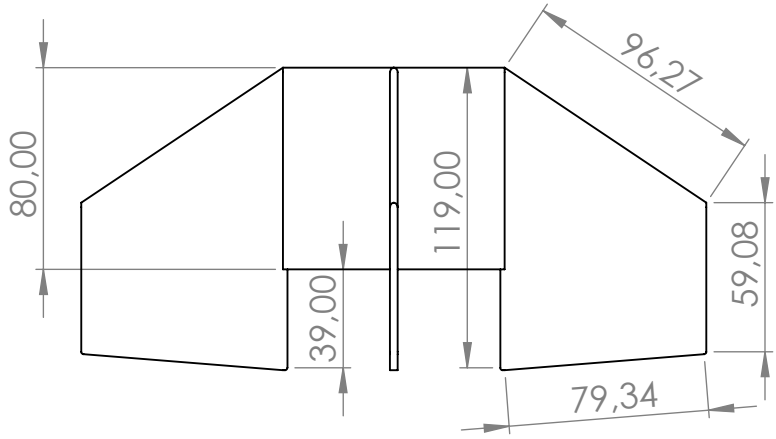


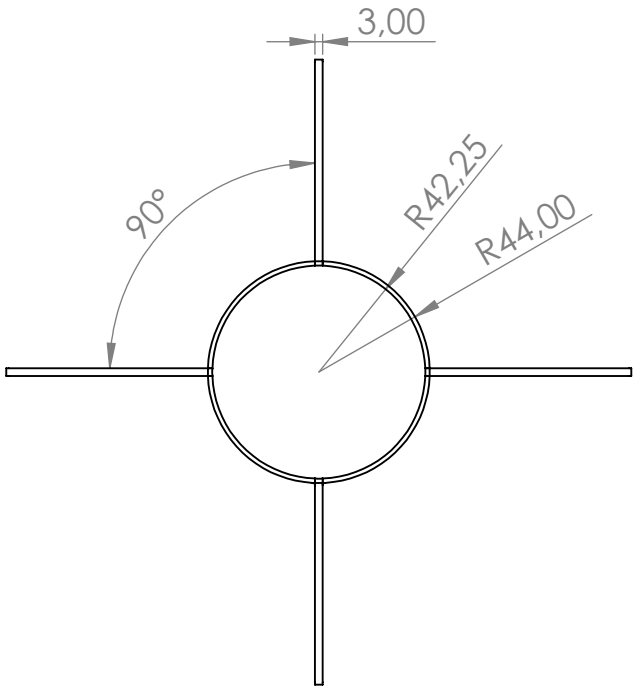




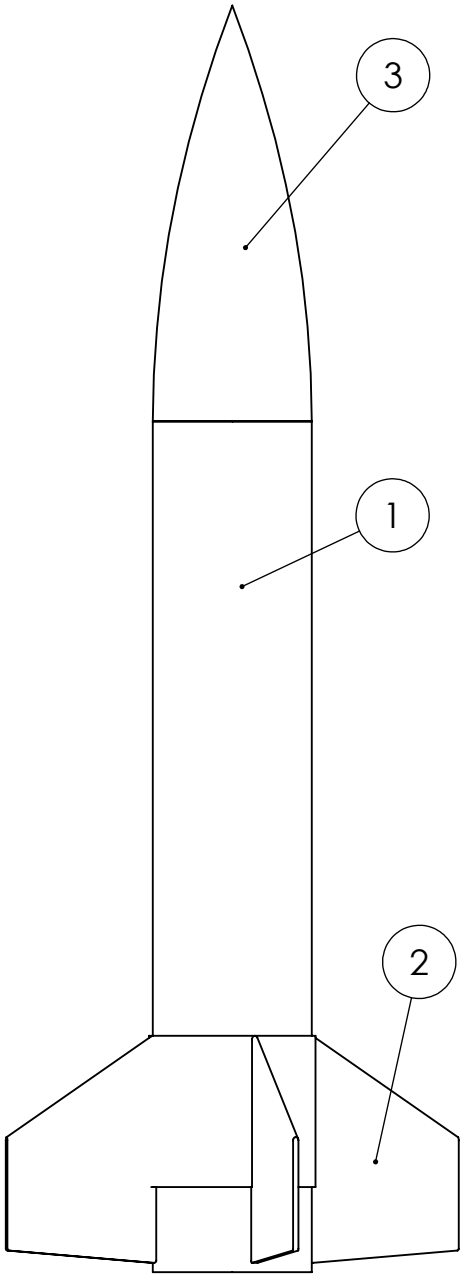
Design of a Small 2-Stage Rocket with Quadcopter Recovery	Author	Àlex Tersa Pajares	System	Stage 2
	Date	16/06/2022		
UPC *Aerospace Engineering*	Material: Cardboard	Units: mm	Part: Body Tube	A4
			Scale: 1:3	Sheet: 2 of 9

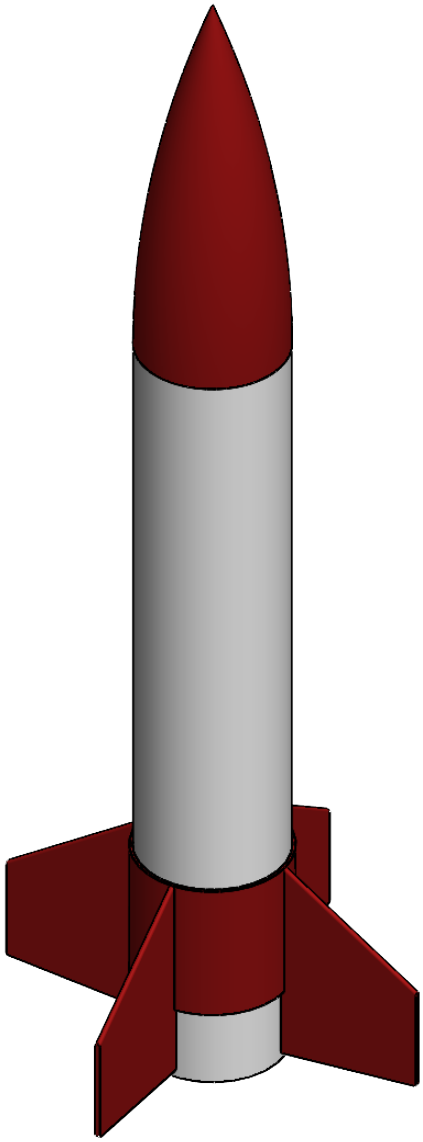






Design of a Small 2-Stage Rocket with Quadcopter Recovery	Author	Àlex Tersa Pajares	System	Stage 2	
	Date	16/06/2022			
UPC *Aerospace Engineering*	Material	Units	Part	Fins	A4
	PLA	mm	Scale 1:3	Sheet	3 of 9





Components

1	Body
2	Fins
3	Nose Cone

Design of a Small 2-Stage Rocket with Quadcopter Recovery

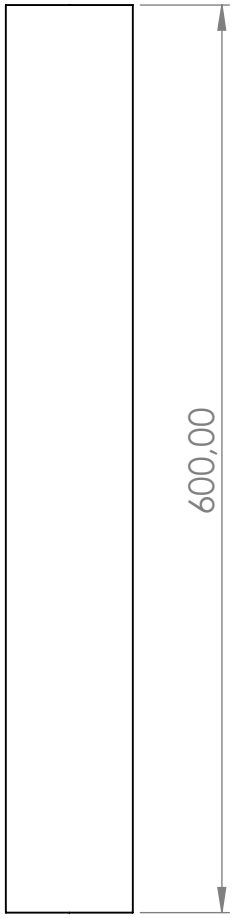
Author	Àlex Tersa Pajares
Date	16/06/2022

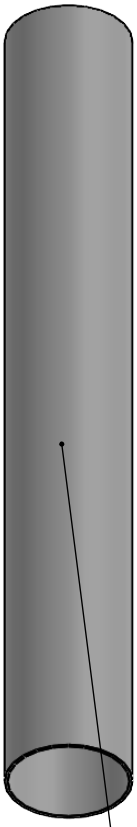
System: Stage 2

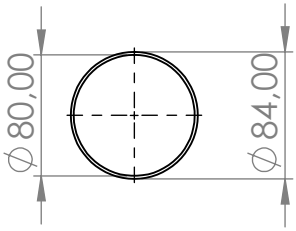
Aerospace Engineering

Material	Units: mm	Part: Assembly	A4

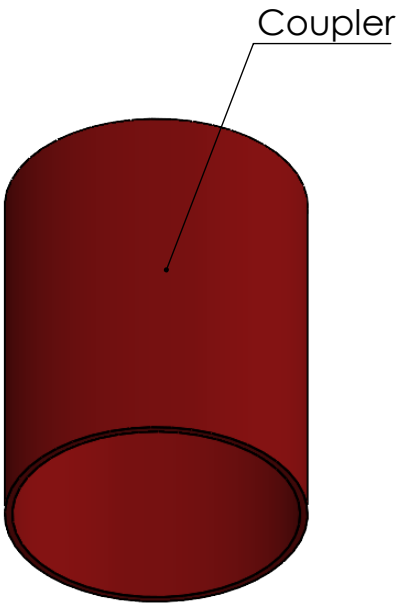
Scale 1:4 | Sheet 4 of 9

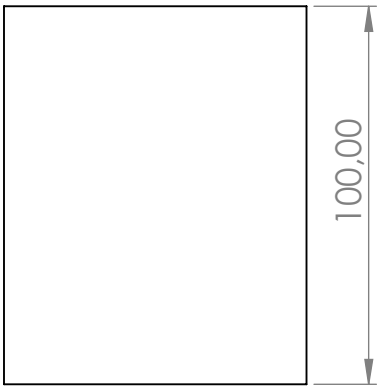


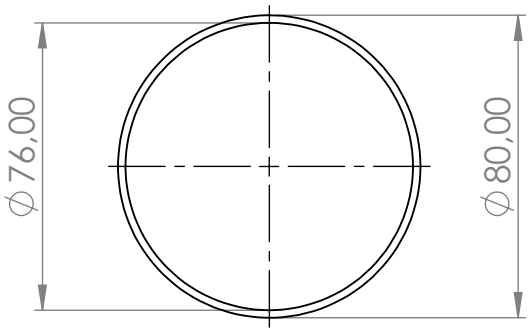




Scale 1:5

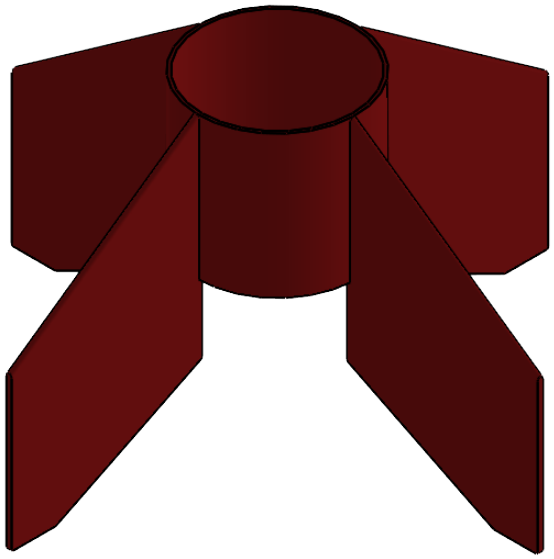


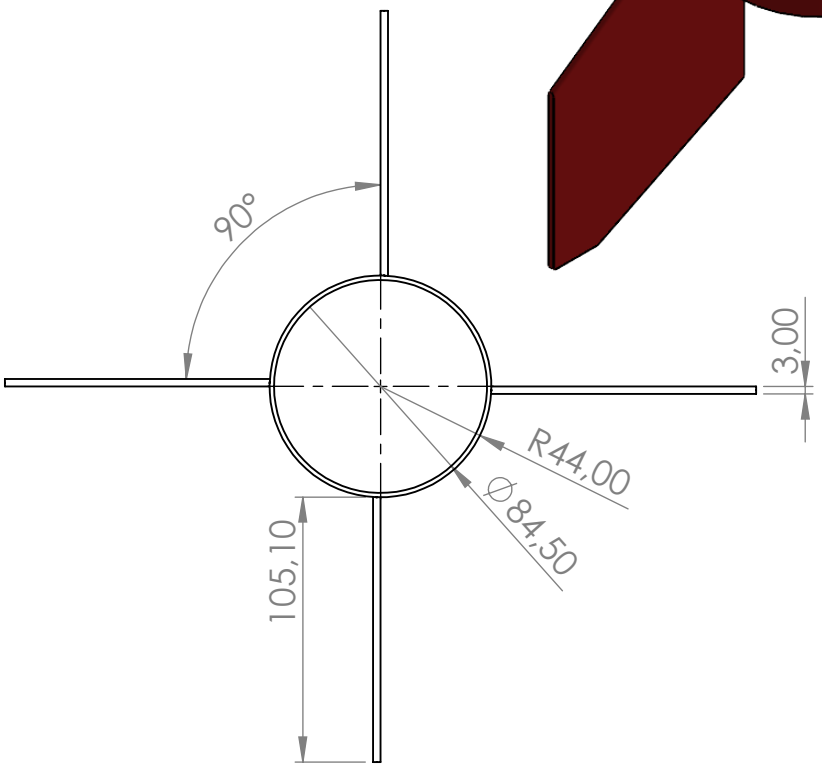


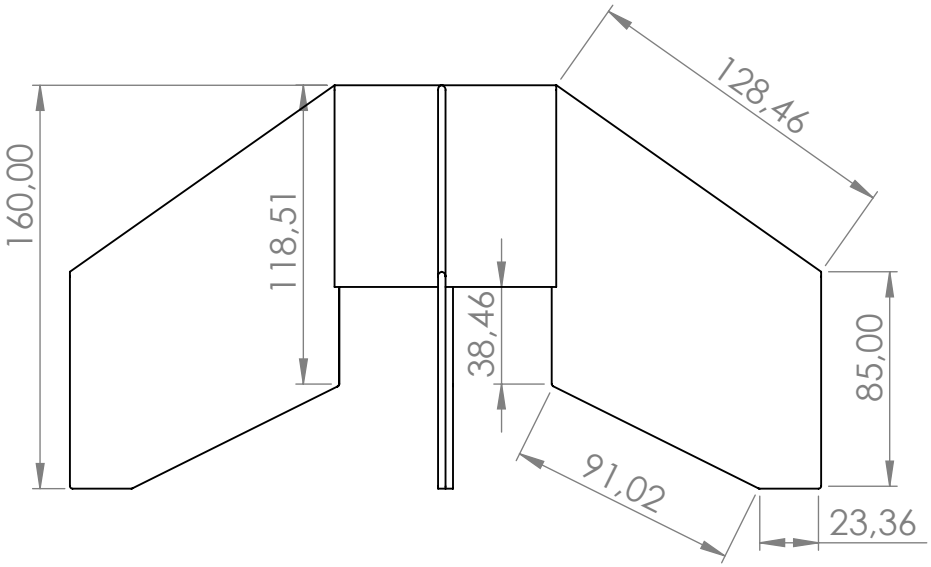


Scale 1:2

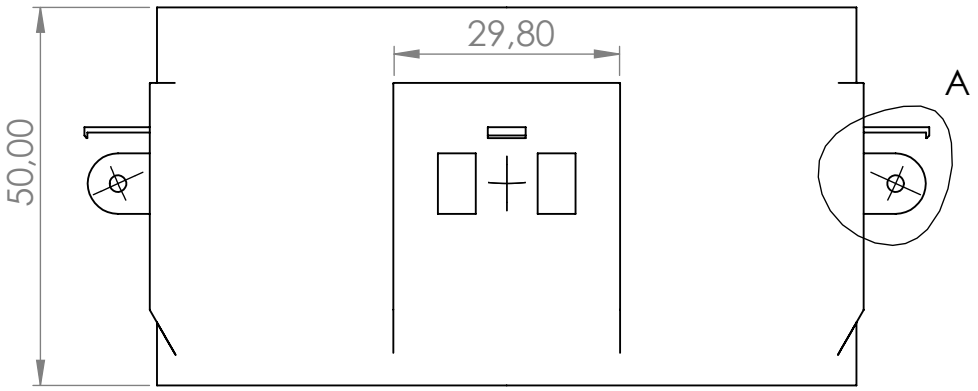
Design of a Small 2-Stage Rocket with Quadcopter Recovery	Author	Àlex Tersa Pajares	System	Stage 1
	Date	16/06/2022		
UPC *Aerospace Engineering*	Material: Cardboard PLA	Units: mm	Part: Body and Coupler	A4
			Scale	Sheet 5 of 9

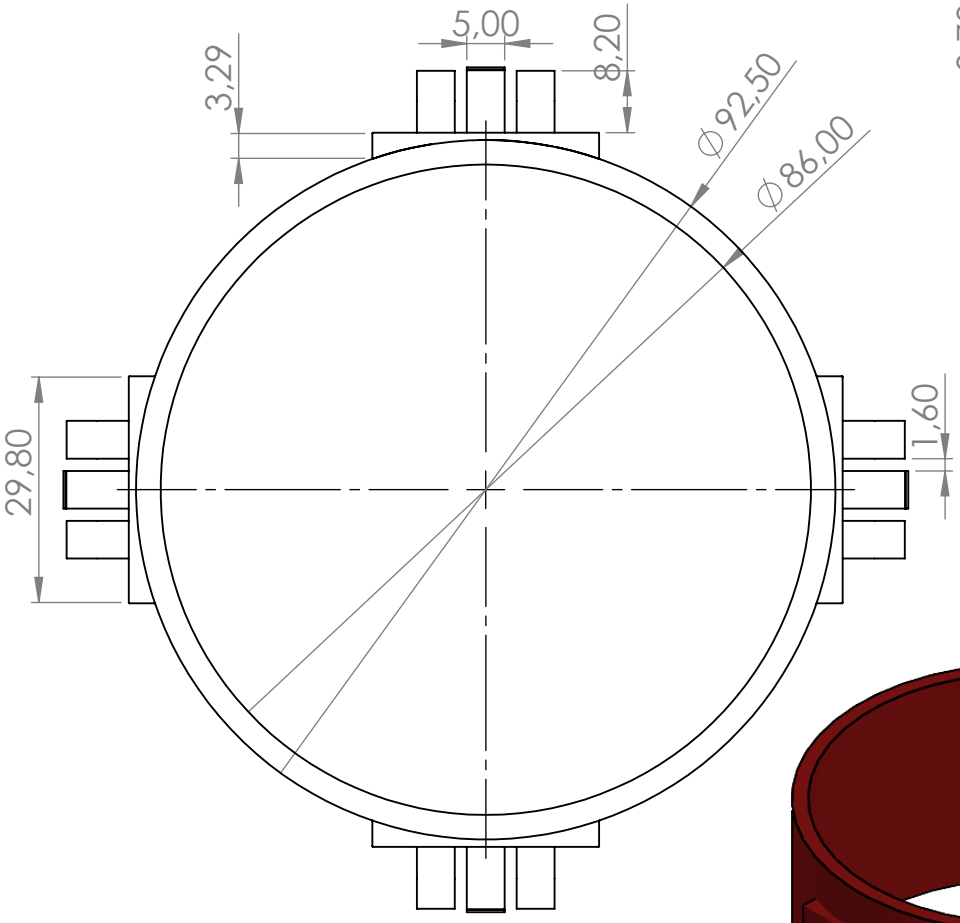


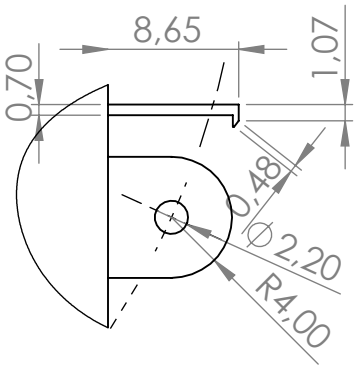




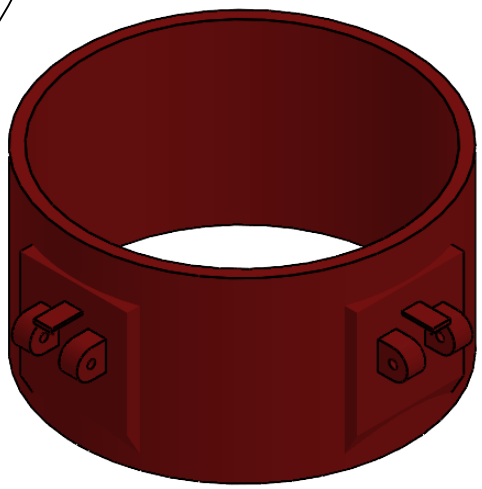
Design of a Small 2-Stage Rocket with Quadcopter Recovery	Author	Àlex Tersa Pajares	System	Stage 1	
	Date	16/06/2022			
Aerospace Engineering	Material	Units	Part	Fins	A4
	PLA	mm	Scale	1:3	Sheet 6 of 9



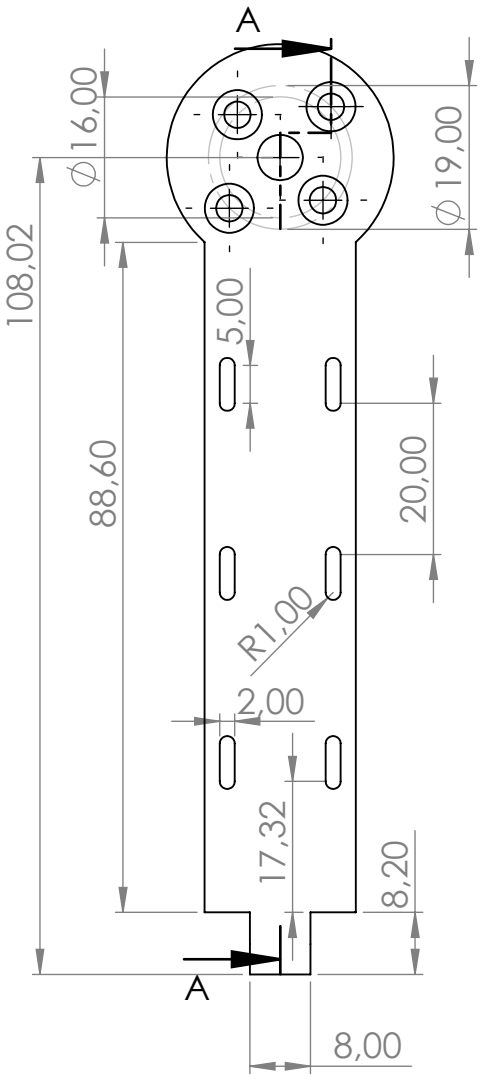


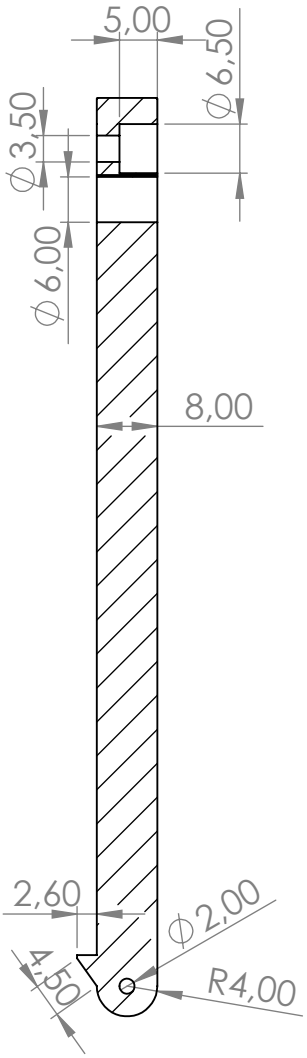


Detail A
Scale 2 : 1

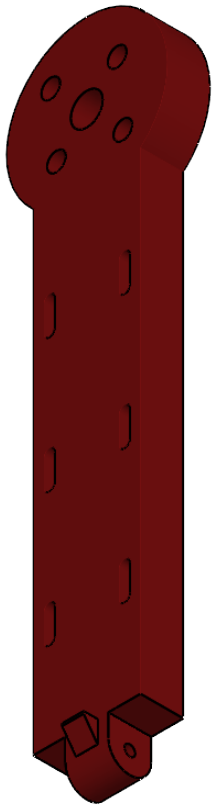


Design of a Small 2-Stage Rocket with Quadcopter Recovery	Author	Àlex Tersa Pajares	System	QLS - Stage 1	
	Date	16/06/2022			
UPC *Aerospace Engineering*	Material	Units	Part	Hub	A4
	PLA	mm	Scale	1:1	Sheet 7 of 9

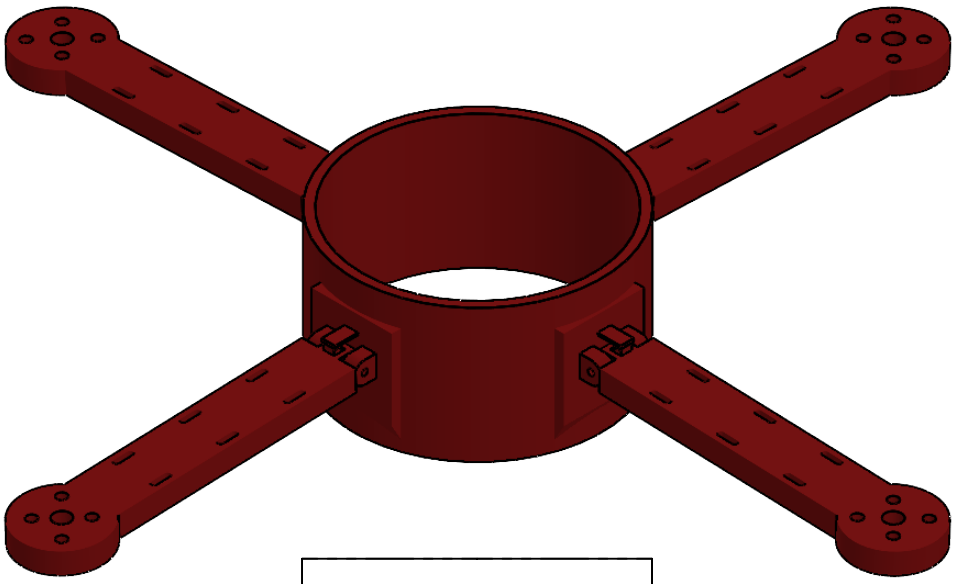


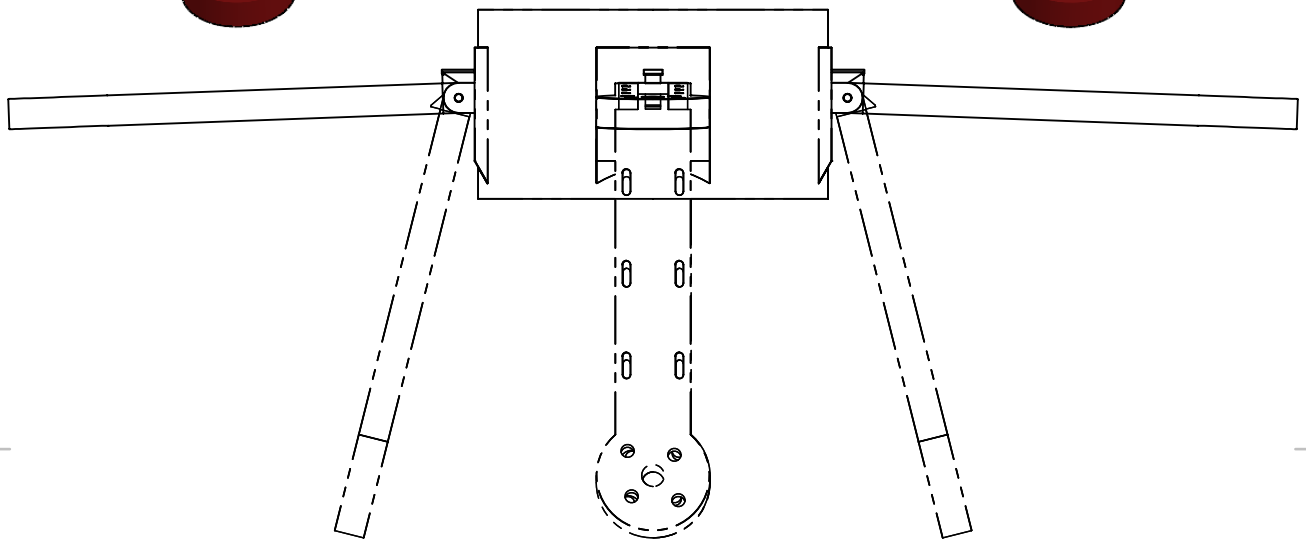


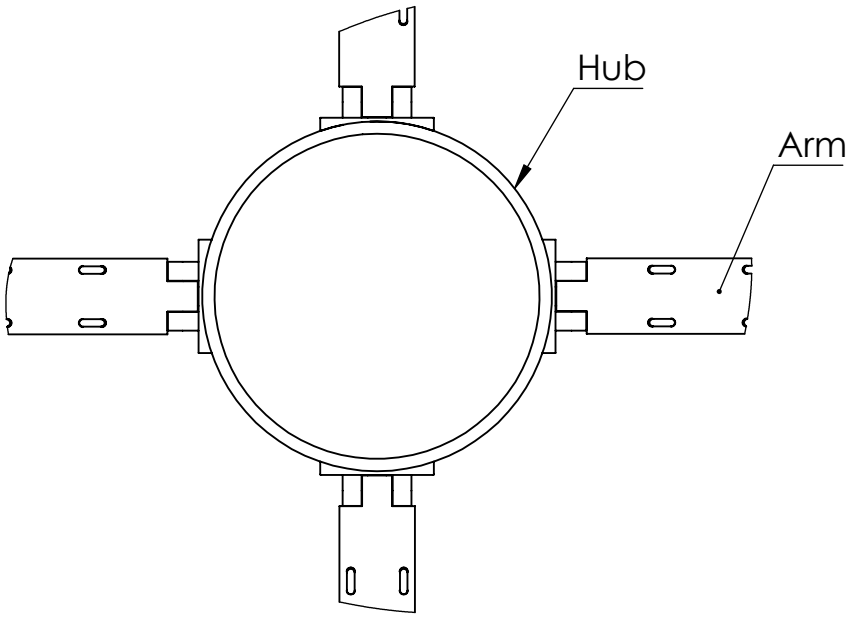
Section A-A



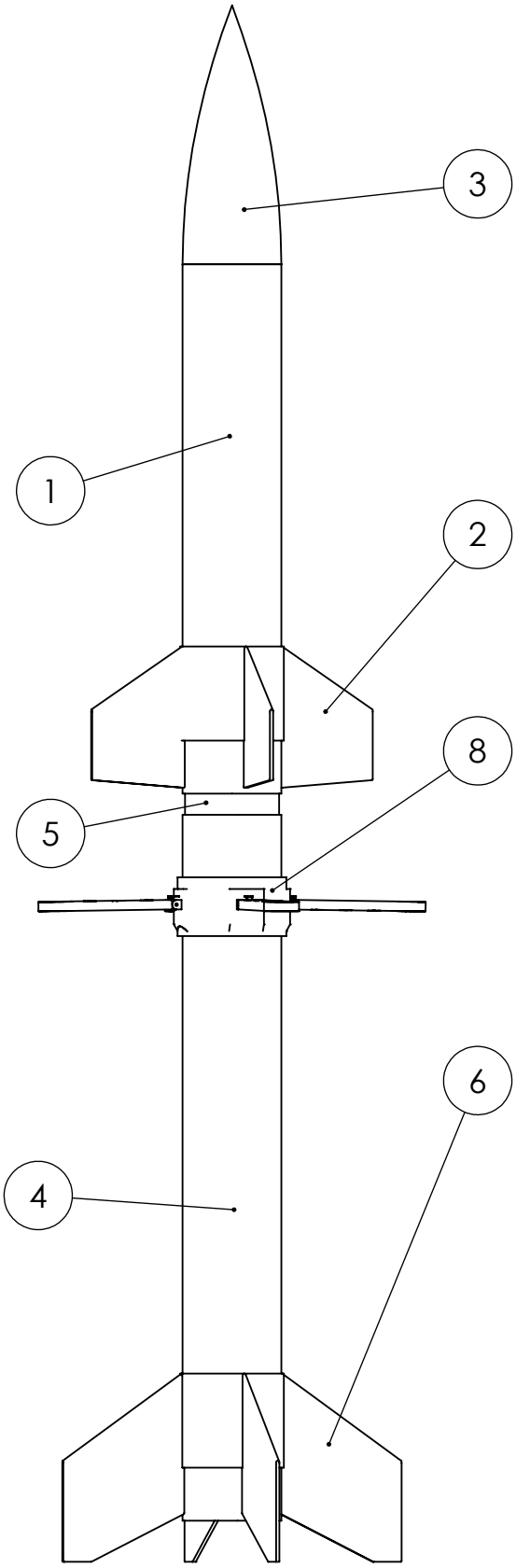
Design of a Small 2-Stage Rocket with Quadcopter Recovery	Author	Àlex Tersa Pajares	System: QLS - Stage 1
	Date	16/06/2022	
UPC *Aerospace Engineering*	Material: PLA	Units: mm	Part: Arm — A4
			Scale: 1:1 — Sheet: 8 of 9

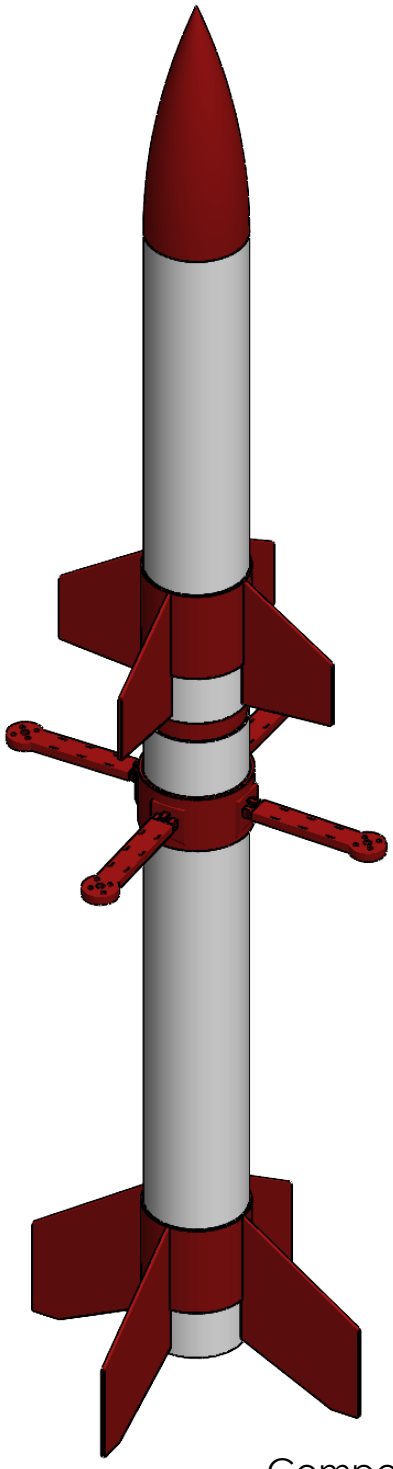






Design of a Small 2-Stage Rocket with Quadcopter Recovery	Author	Àlex Tersa Pajares	System	QLS - Stage 1
	Date	16/06/2022		
Aerospace Engineering	Material	Units	Part	A4
	PLA	mm	QLS Assembly	
			Scale 1:2	Sheet 9 of 9





Components

1	Body - Stage 2
2	Fins - Stage 2
3	Nose Cone
4	Body - Stage 1
5	Coupler
6	Fins - Stage 1
8	QLS

Design of a Small 2-Stage Rocket with Quadcopter Recovery

Author	Àlex Tersa Pajares
Date	16/06/2022

System: Stage 1

Aerospace Engineering

Material	Units	Part	
	mm	Assembly	A4

Scale 1:6 | Sheet 10