



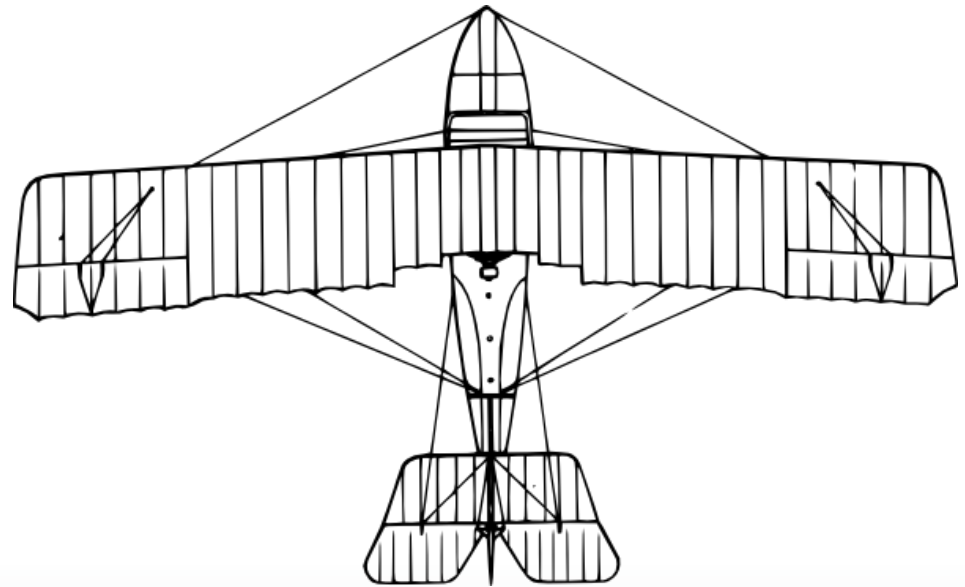
The Wright Stuff

Concept Generation and Decision Making
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Agenda

- Airfoil Planform
- Wing Configurations
- Tail Configurations
- Spar and Rib Design
- Loading Scheme
- Propeller Choices
- Future Considerations

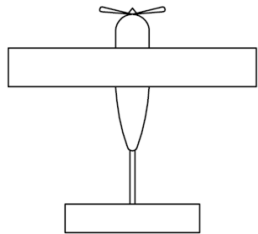


Problem Statement

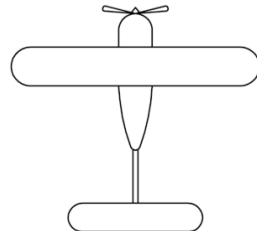
- **Need**
 - Current remote control aircraft are incapable of carrying sufficient payload
- **Goal**
 - Design and manufacture a model aircraft to carry at least 25lb of payload

Airfoil Planform

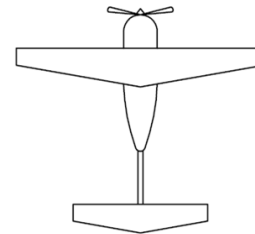
Planform: *the projected area of a wing*



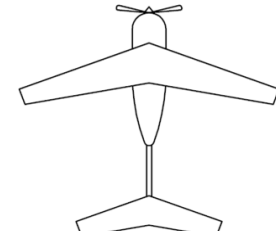
Square



Elliptical



Tapered



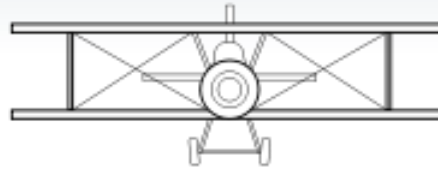
Swept and Tapered

Concept	Criteria					Score
	Lift	Drag	Ease of Manufacture	Weight	Stability	
Square	1	4	1	4	3	13
Tapered	3	2	2	2	3	12
Elliptical	5	1	5	2	3	16
Swept	1	4	4	4	1	14
Swept & Tapered	3	2	5	3	1	14

Wing Configurations



Single Mid



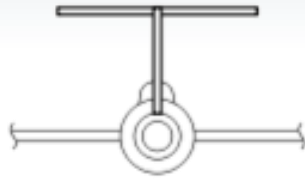
Double



Single High

Concept	Criteria					Score
	Lift	Drag	Ease of Manufacture	Weight	Maneuverability	
Single High	5	1	1	1	3	11
Single Mid	4	2	4	3	3	16
Double	1	5	5	5	1	17

Tail Configurations



T-Tail



No tail



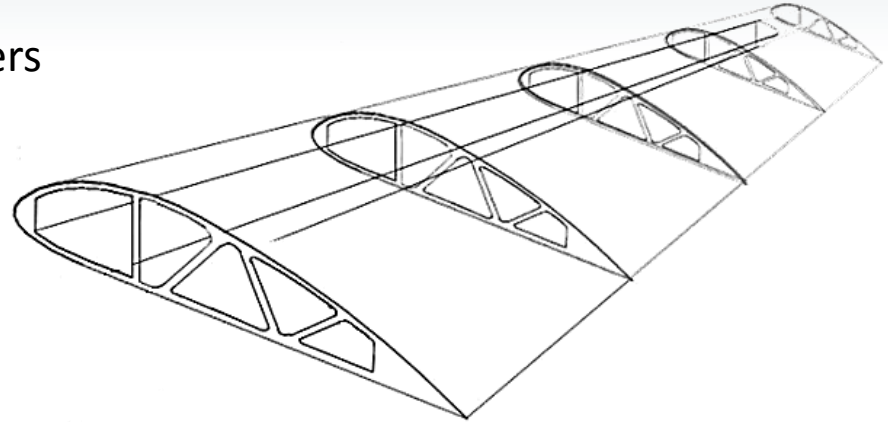
Conventional

Concept	Criteria				Score
	Lift	Ease of Manufacture	Weight	Stability	
No Tail	5	1	2	5	13
T-Tail	1	4	4	1	10
Conventional	1	3	3	2	9

Spar and Rib Design

Unique opportunity to use NAU's 3D printers

Diversion from standard construction methodology



Concept	Criteria				Score
	Strength	Weight	Workability	Cost	
Balsa	4	1	4	1	10
Polymer	2	3	1	3	9
Light Metal	1	5	4	4	14

Loading Scheme

Payload Accessibility				
Concept	Criteria			Score
	Load Speed/Ease of Loading	CG Location	Wing Location	
Top	1	2	2	5
Bottom	2	1	1	4

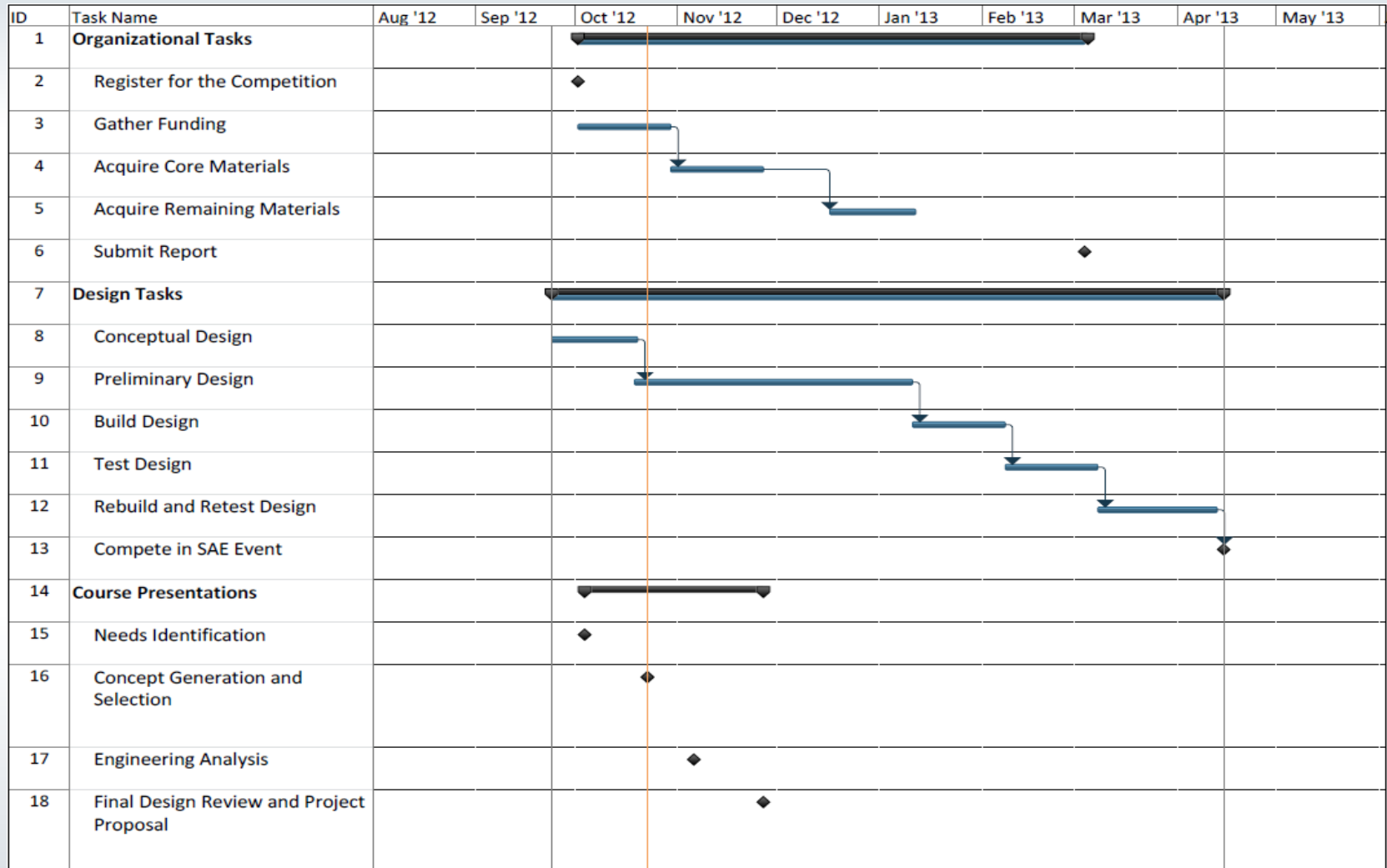
Payload Type				
Concept	Criteria			Score
	Load Speed/Ease of Loading	Adjustability of CG Location	System Integration	
Plates	1	2	1	4
Washers	2	1	2	5

Propeller Choices



Concept	Criteria			Score
	Thrust	Airspeed	Maneuverability	
Low Diameter, High Pitch	3	1	3	7
High Diameter, Low Pitch	1	2	1	4

Project Timeline



Future Considerations

- Airfoil Selection
- Static Analysis
- Landing Gear
- Maneuvering Mechanism
- Control Systems

Summary

- Airfoil Planform
- Wing Configurations
- Tail Configurations
- Spar and Rib Design
- Propeller Choices
- Loading Scheme
- Future Considerations

References

- [1] Raymer, Aircraft Design: A Conceptual Approach
- [2] Johnson, Airfield Models, <http://airfieldmodels.com/>
- [3] Anderson, Fundamentals of Aerodynamics

Questions?