

A Format for Report to be Submitted as Part of Structural Design Course

A Report

submitted by

GROUP X

as part of the course

AS 5220: STRUCTURAL DESIGN



**DEPARTMENT OF AEROSPACE ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY MADRAS,
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ACKNOWLEDGEMENTS

Place to thank all those who helped in design and fabrication of the aircraft: TAs, workshop people etc.

ABSTRACT OF THE PROJECT

This can be in two paragraphs. First paragraph should start with an introduction including the motivation behind selecting the mission requirements (as in why did you choose the desired payload, endurance etc.) followed by a brief description of the proposed aircraft.

Second paragraph can be on the work done so far in designing and fabrication of the aircraft. Overall, abstract should be less than or equal to 2 pages.

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ABBREVIATIONS AND NOTATIONS

$2D$	Two dimensional
$3D$	Three dimensional
α	angle of attack
b	wing span

CHAPTER 1

INTRODUCTION

Please note that all descriptions, references, figures and tables are for illustration purposes only. All figures are taken from Megson's book on Aircraft Structures.

1.1 MISSION REQUIREMENTS

Here you can include the mission requirements and motivation behind choosing the specific mission.

1.2 CONFIGURATION CHOICE

Briefly describe the configuration chosen and the rationale behind it. If any of the configuration choices are a direct consequence of the mission requirement mention that explicitly. Following are the salient features of the configuration considered:

- High wing was chosen because
- Delta wing was chosen for the following reasons: .
- Airfoil was chosen to be XYZ because of bla bla bla.

1.3 SUMMARY OF WORK DONE AS PART OF THE AERODYNAMIC DESIGN

Here, a brief description (mandatory) should accompany data/ weight estimates and diagrams.

Table 1.1: Details of the aircrafts available in literature.

Brief description	Overall Weight (kg)	Wing Span (m)	Aspect Ratio	Weight fractions		
				Pay load	Power plant	Structural
X1	a_1	b_1	c_1	d_1	e_1	f_1
X2	a_2	b_2	c_2	d_2	e_2	f_2
X3	a_3	b_3	c_3	d_3	e_3	f_3

1.3.1 Data Obtained from Literature Survey

I guess title is self-explanatory. Table 1.1 gives the details of existing aircrafts of similar configurations for which data were accessible. I have deliberately made first column left justified, next 3 columns center justified and last columns right justified for demonstration purposes.

1.3.2 First Weight Estimate

I guess title is self-explanatory. Next few sentences are included just to give you an idea as to how to include references and show you the difference between “citep” and “citet” commands. Raymer (1990) gives a description of procedure for weight estimation . Murthy *et al.* (1991) is a review paper on design of UAVs. Most UAVs below 1 *m* wing span seem to use electric motors (Muthu and Palani, 1980).

1.3.3 Second Weight Estimate

I guess title is self-explanatory. Let me just show you how to write an equation.

$$W = \frac{W_{payload} + W_{powerplant}}{1 - \overline{W}_{str}} \quad (1.1)$$

1.3.4 Third Weight Estimate

I guess title is self-explanatory.

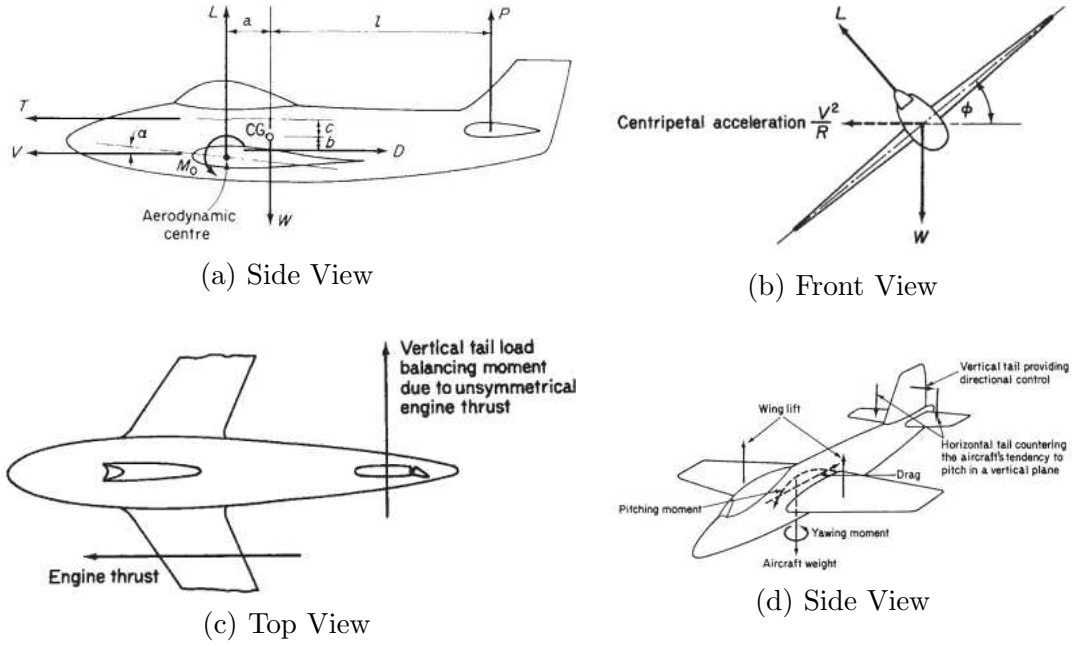


Figure 1.1: The 3D model and the meshed model of the proposed frame used for the modal analysis in ANSYS.

1.3.5 Views of the Designed Airplane

I guess title is self-explanatory. Please ensure that the size of fonts used in the figure match the font size in the main body of the text. If they dont, you can see how badly it looks (Figure 1.1) as compared to next two figures. So, please dont have figures like this!!!!

Figure 1.1 all three views of the aircraft with the detailed dimensions based on preliminary design.

1.3.6 V-n Diagram

I guess title is self-explanatory. Please ensure that the size of fonts used in the figure match the font size in the main body of the text. Figure 1.2 shows the envelope of the final V-n diagram for the chosen aircraft.

Figure 1.3 shows the envelope of the final V-n diagram for the chosen aircraft including gust velocities of $\pm U_1$, $\pm U_2$ and $\pm U_3$.

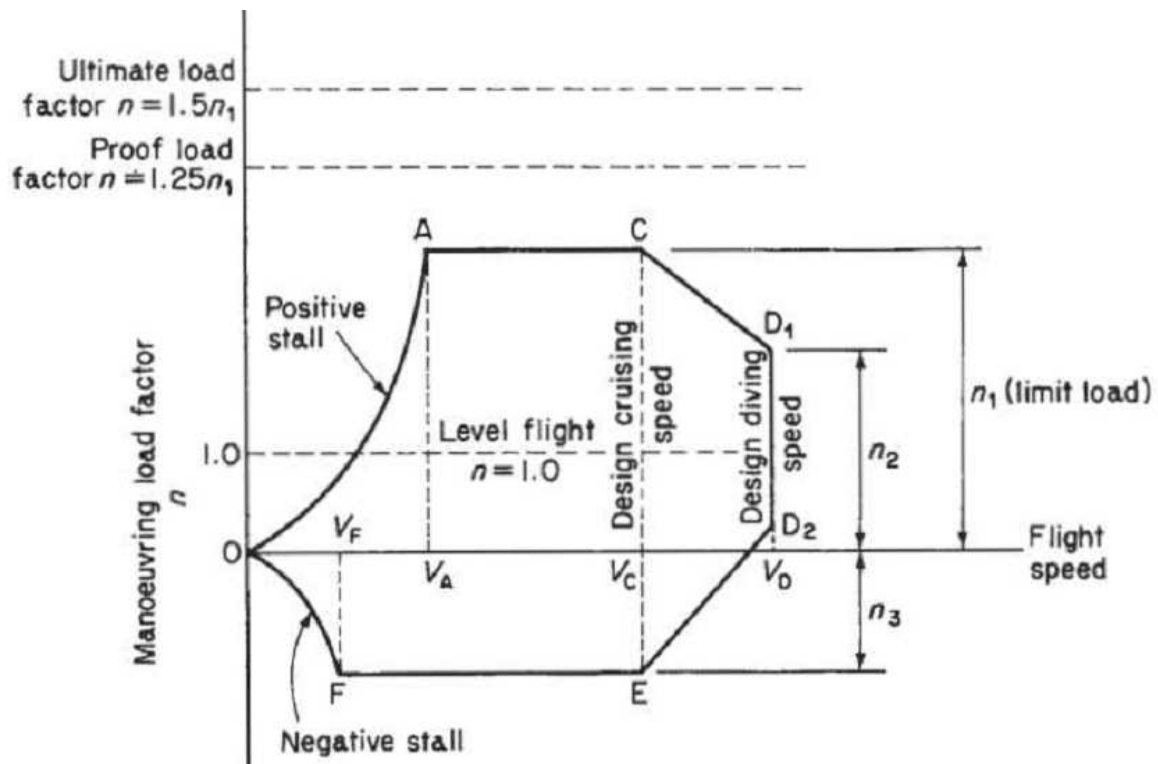


Figure 1.2: Flight envelope: V-n diagram for the given airplane.

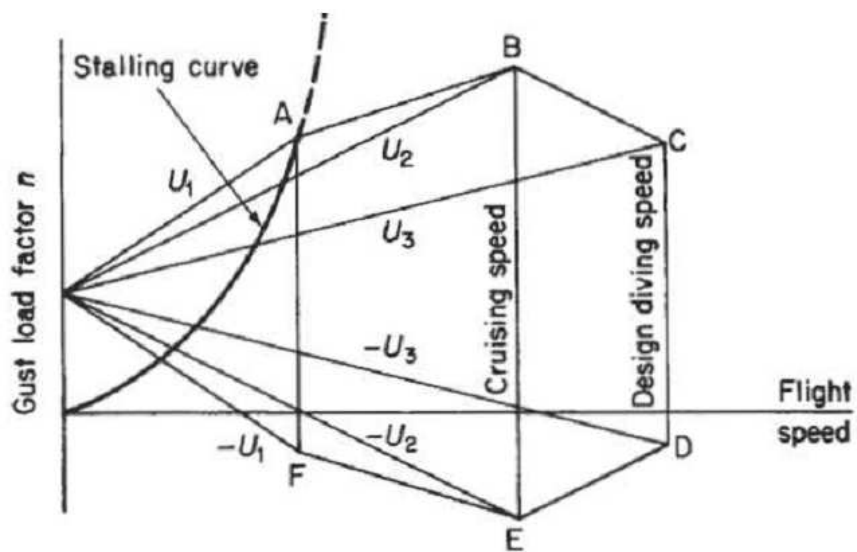


Figure 1.3: Gust envelope: V-n diagram for the given airplane for different gust velocities.

Table 1.2: Bill of materials.

item description	Suggested vendor	Approximate cost
X1	a_1	b_1
X2	a_2	b_2
X3	a_3	b_3

1.4 BILL OF MATERIALS WITH SUGGESTED VENDORS

Table 1.2 gives the details of the materials required for fabrication as well as suggested vendors and approximate cost ...

i have deliberately not put a vertical line between the first and second columns to demonstrate how to get or not to get horizontal lines separating the columns.

REFERENCES

1. **Murthy, H. S. N., P. S. Sriram, and J. George** (1991). General stuff. *ABCD*, **149(1-2)**, 353–374.
2. **Muthu, X. Y. and M. Palani**, *Random stuff*. ABC Press, 1980, 3 edition.
3. **Raymer, X. Y.**, *Design*. ABC Press, 1990, 1 edition.

APPENDIX