# Aircraft Design Project Report

Chapter-wise format, worked outline and checklist

Use this guide to plan your aeronautical final year or aircraft design lab report. The example values are illustrative – in your report every number must come from your own mission, data and calculations, written in your own words.

## Report structure

| Chapter | What to include |
|---|---|
| Preliminary pages | Title page, certificate, declaration, acknowledgement, abstract, contents, lists of figures, tables and symbols |
| 1. Introduction and mission | Aircraft type, payload, range, cruise speed and altitude, take-off/landing distance, mission profile |
| 2. Comparative study | 8–15 similar aircraft: weights, wing area, span, power/thrust, speed, range; trend graphs |
| 3. Weight estimation | Take-off weight from empty-weight fraction and mission fuel fractions |
| 4. Wing loading and T/W | Constraint diagram (stall, take-off, climb, cruise, landing) and design point |
| 5. Airfoil and wing | Airfoil choice with reasons; area, span, aspect ratio, taper, sweep, dihedral, flaps |
| 6. Fuselage, tail, landing gear | Fuselage layout, tail volume coefficients, gear position and tip-back angle |
| 7. Engine selection | Required power/thrust and selected engine |
| 8. Performance | Drag polar, L/D max, range, endurance, climb, ceiling, take-off and landing |
| 9. Stability | CG, neutral point, static margin |
| 10. V–n diagram | Manoeuvre and gust envelopes; limit and ultimate load factors |
| 11. CAD model | Three-view drawing and 3D model |
| 12. Conclusion and references | Final specification table, future scope, IEEE references |

## Worked outline – 4-seat light aircraft (illustrative)

| Step | Example value | How it is obtained |
|---|---|---|
| Mission | 4 people, 900 km, 220 km/h at 2,500 m | Given requirement |
| Take-off weight | ≈ 1,100 kg | Empty-weight fraction + fuel fraction |
| Wing loading | ≈ 70 kg/m² | Stall speed and landing distance |
| Wing area | ≈ 16 m² | S = W0 / (W/S) |
| Aspect ratio, span | AR ≈ 7.5, b ≈ 11 m | Comparative study; b = √(AR·S) |
| Airfoil | NACA 2412 | Good CLmax, gentle stall, data available |
| Power required | ≈ 130 kW | Constraint diagram |
| Static margin | 10–15 % MAC | CG and neutral point |
| Limit load factor | +3.8 / –1.5 | Typical normal-category values |

## Report checklist

- Every number has an equation, reference aircraft or calculation behind it.
- Weight is updated at least once after wing and engine sizing.
- Similar aircraft are used for trends only – not copied as your design.
- Units are consistent (SI) and a nomenclature list is included.
- Each figure and table is explained in the text.
- Similarity is checked before submission and all sources are cited.

## 25 aircraft design project ideas

Two-seat trainer · four-seat utility aircraft · 19-seat commuter · STOL bush plane · agricultural aircraft · amphibious aircraft · regional turboprop · business jet · cargo aircraft · fire-fighting aircraft · electric two-seat trainer · solar high-altitude UAV · fixed-wing surveillance UAV · VTOL tilt-rotor UAV · medical-delivery drone · competition glider · flying-wing UAV · wing spar and ribs · winglet · tail sizing · landing gear · fuselage splice joint · windshield · wheel hub and brake rotor · engine mount.

Full guide: engineersrworld.com/aircraft-design-project-report/ · Python performance code: engineersrworld.com/aeronautical-mini-projects-source-code/

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