

Table of Contents

1	Introduction
1.1	Air Transport System
1.2	Air Vehicle Classification
2	Aircraft Development
2.1	Aircraft Development Cycle
2.2	Market Requirements
2.3	Design Problematic in Engineering
2.4	Design Methodology
3	Certification
4	Configurations
4.1	Actual Configurations
4.2	Unconventional Configurations
5	Preliminary Sizing
5.1	Landing Distance
5.2	Take-off Distance
5.3	Climb Rate during 2 nd Segment
5.4	Lift-to-Drag Ratio with Extended Landing Gear and Extended Flaps
5.5	Climb Rate during Missed Approach
5.6	Cruise
5.6.1	Thrust-to-Weight Ratio
5.6.2	Wing Loading
5.7	Lift-to-Drag Ratio during Cruise
5.8	Matching Chart
5.9	Maximum Take-Off Mass
5.9.1	Relative Operating Empty Mass
5.9.2	Relative Fuel Mass
5.10	Take-off Thrust and Wing Area
6	Fuselage Design
	design methodology
	cabin layout
	airworthiness
	design loads
	structural technology
	cutouts
	passenger doors
	inboard profile

- 7 Wing Design**
 - 7.1 Wing Parameters
 - 7.2 Basic Principle and Design Equations
 - 7.3 Flight and Operational Characteristics
 - 7.4 Ailerons and Spoilers
 - 7.5 Example: The Wing of the Airbus A310

- 8 Landing Gear Design**
 - gear arrangement
 - airworthiness
 - design loads
 - energy dissipation
 - retract kinematics
 - brakes, wheels
 - gear configurations

- 9 Empennage General Design**
 - 9.1 Functions of Empennages
 - Trim
 - Stability
 - Control
 - 9.2 Shapes of the Empennage
 - 9.3 Design Rules
 - 9.4 Design According to Tail Volume
 - 9.5 Elevator and Rudder

- 10 Engine Integration**
 - standard turbofan engines
 - engine attachment points
 - engine pylon
 - load transfer
 - ground clearance
 - turboprop engines
 - innovative concepts

- 11 Aircraft Configuration Design**
 - 11.1 Configuration Design Process
 - design methodology
 - structural components integration
 - CG travel
 - zero-lift drag
 - airworthiness
 - design loads
 - structural concept
 - 11.2 Configuration Design Problems
 - 11.2.1 160 – 200 Seat Medium Transport
 - 11.2.2 30 Seat Regional Transport

- 11.3 Special Configurations
- 11.4 Conclusion

12 From Aircraft Performance to Aircraft Assessment

- 12.1 Objectives of the Lecture
- 12.2 Preface for a Simple Approach to DOC
- 12.3 Operational Cost Structure
- 12.4 A Simplified DOC Model
 - 12.4.1 DOC Notations
 - 12.4.2 Fuel Demand
 - 12.4.3 Average Aircraft Weight
 - 12.4.4 Payload Range Diagram
 - 12.4.5 Unit Cost
 - 12.4.6 JAVA DOC Applet
- 12.5 Aircraft Family Economics
- 12.6 Presentation of DOC Calculation Results
- 12.7 Total Quality Assessment

13 Military Aircraft Development

- 13.1 Development Scenario/Environment
- 13.2 Requirements
- 13.3 Development Process and Tools
- 13.4 Technologies
 - 13.4.1 Composites
 - 13.4.2 Ejection Systems and Pilot "g" Protection
 - 13.4.3 Unstable Configurations and Digital Flight Controls
 - 13.4.4 Thrust Vectoring
 - 13.4.4.1 X-31 Enhanced Fighter Manoeuvrability (EFM) Program
 - 13.4.4.2 The VECTOR Program
 - 13.4.5 Aircraft Signature
- 13.5 Unmanned Systems
- 13.6 Future Aspects

References (from Chapters 5, 7, 9)

Appendix