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Design reporting

Recommended reading:

Sforza: Introduction and Outline of an Airplane Design Report
Jenkinson & Marchman: Chapter 2
Virginia Tech example design reports: http://www.dept.aoe.vt.edu/~mason/Mason_f/SD1SrDesRpts.html

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Structure of a design report

A design report is very different from a lab report or a research paper and requires different structure.

You are basically selling and documenting your design - justifying/explaining the steps of how you got there is not important. Do NOT waste time on unimportant detail - DO spend time on important outcomes.

Everything that you present needs to be consistent with the final outcome - don't show steps along the way.

Simplified overview of a typical design report:

- Executive Summary
  - Highlights of design objectives
  - Design overview
    - Design highlights on a walk-around chart
    - Tabulated performance data/specifications/basic geometric dimensions
    - Cost data (if you have)
- Details
  - Details of design (i.e. conclusions) including dimensioned 3-view drawings and floor plans, etc
  - Performance analysis (show that your design meets the requirements)
  - Optimisation and design trades
- Supporting documentation (appendices?)
  - Methods and key decisions
  - Supporting data
  - References

If your design is in response to an RFP, MAKE SURE that you have addressed all the requirements.

MAKE SURE that all information provided in different sections of a design report, including drawings, is consistent. Not paying attention to this requirement is a typical trap for student design teams.

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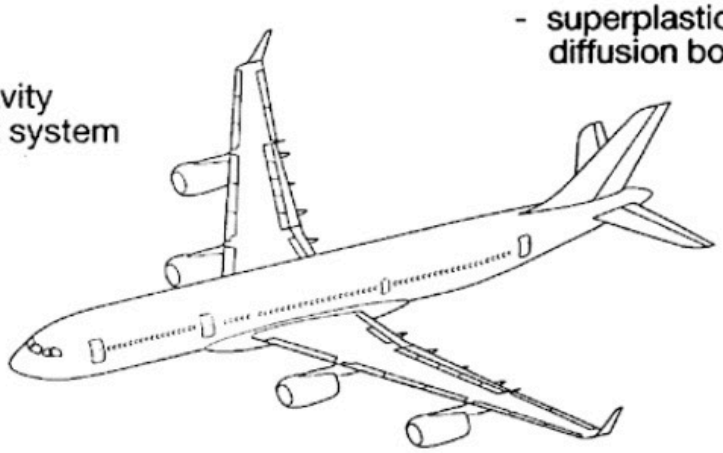
Example walk-around chart #1

- Low workload, two member crew cockpit
  - extensive avionics integration
- Maximum use of new materials and processes
  - advanced composites
  - aluminium-lithium
  - superplastic forming and diffusion bonding
- Centre of gravity management system



- Extended fly-through-computer system
  - load alleviation
  - flight envelope protection
- Increased thrust version of A320's CFM56 engine

Fielding

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Example walk-around chart #2

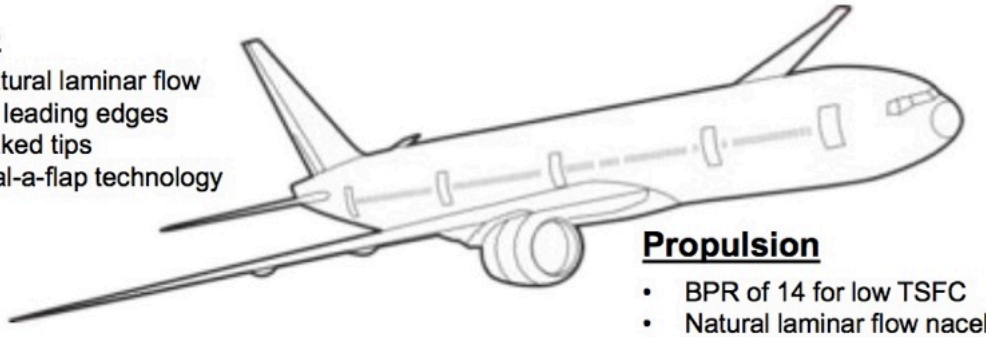
EIS	**2022**
PAX	**350**
Range	**8000 nm**
Cruise Mach	**0.85**

Systems

- Advanced cockpit layout
- Zero-loss ECS system
- All electric controls

Aero

- Natural laminar flow on leading edges
- Raked tips
- Dial-a-flap technology



Propulsion

- BPR of 14 for low TSFC
- Natural laminar flow nacelles
- Chevrons for nozzle noise
- Active noise control for diffuser
- Advanced engine/plyon/wing integration to improve gound clearance

Materials

- CFRP wings and tail assembly
- Fuselage skin made with GLARE
- Fuselage stringers and frames made with ARALL
- Fittings and fasteners below floor use Al-Mg-Sc to reduce corrosion
- Aermet 100 used for all other attachment fittings
- Titanium landing gear

Structures

- Single piece fuselage construction
- Composite spars
-

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Example tabulation of key data

PARAMETER	32 pax (SPM-32)	48 pax / Freighter (SPM-48/BC)
EIS	2024	2024
MTOW (kg)	11,079	15,901
Range (km)	780.40	780.13
Mach	0.4	0.4
Cruise speed (m/s)	123.85	123.85
Service ceiling (m)	7,600	7,600
Power (kW)	1207	1732
Wing area (m2)	43.74 (?)	62.78 (?)
Wing span (m)	20.91 (?)	25.05 (?)
Fuselage length (m)	16.13	21.15
Height to top of tail	TBD	TBD
Batteries weight (kg)	1,398	2,007
Payload weight (kg)	3,286	4,806
Structural weight (kg)	6,030	8,570

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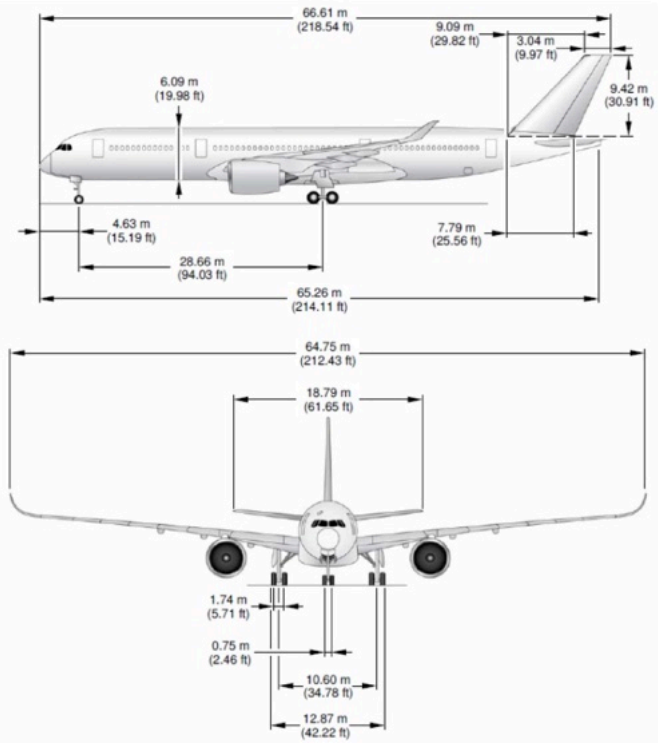
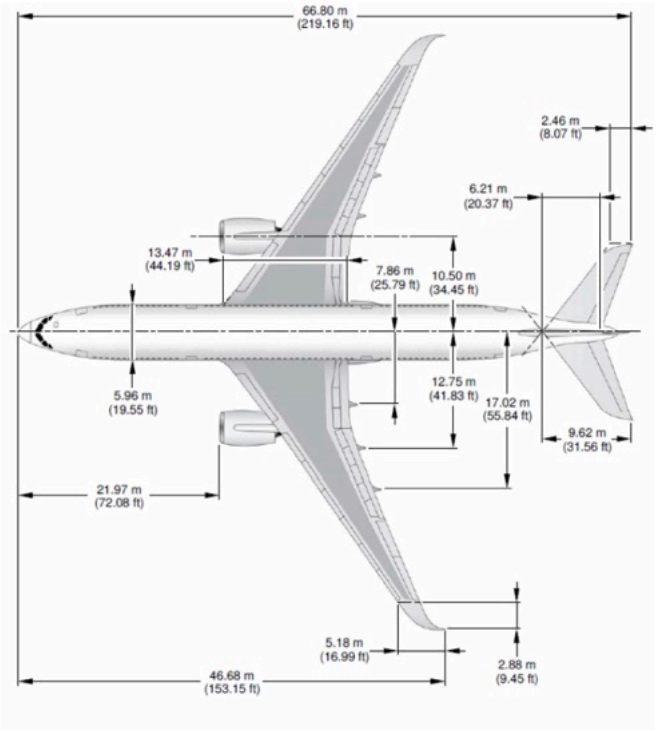
Example 3-view drawing





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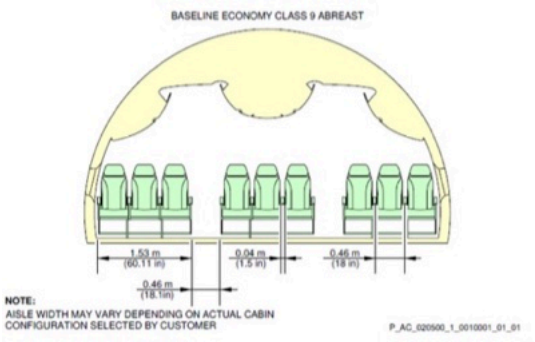
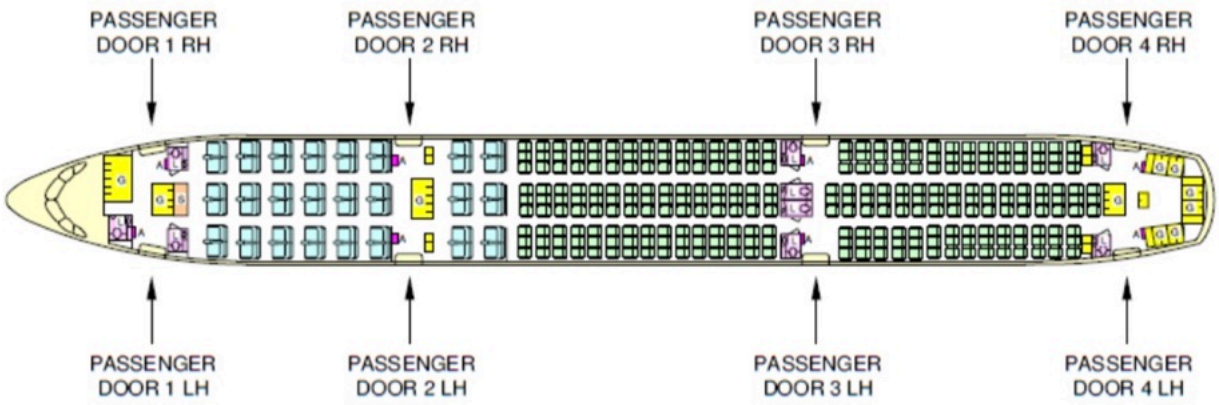
Example cabin layout for a large aircraft



350 PAX in 3-class seating

10	First Class
48	Business Class
292	Economy



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Company leadership and structure

Boeing company leadership group, 2015

Dennis Muilenburg
President and CEO

Executive Council*

Ray Conner
Vice Chairman, President and CEO, Commercial Airplanes

Chris Chadwick
Executive Vice President, President and CEO, Defense, Space and Security

Michael Luttig
Executive Vice President, General Counsel

Greg Smith
Executive Vice President, Business Development & Strategy and Chief Financial Officer

Tom Downey
Senior Vice President, Communications

Marc Allen
Senior Vice President, President, Boeing International

Timothy Keating
Senior Vice President, Government Operations

Tony Parasida
Senior Vice President, Human Resources and Administration

Diana Sands
Senior Vice President, Office of Internal Governance

John Tracy
Senior Vice President, Engineering, Operations & Technology, Chief Technology Officer

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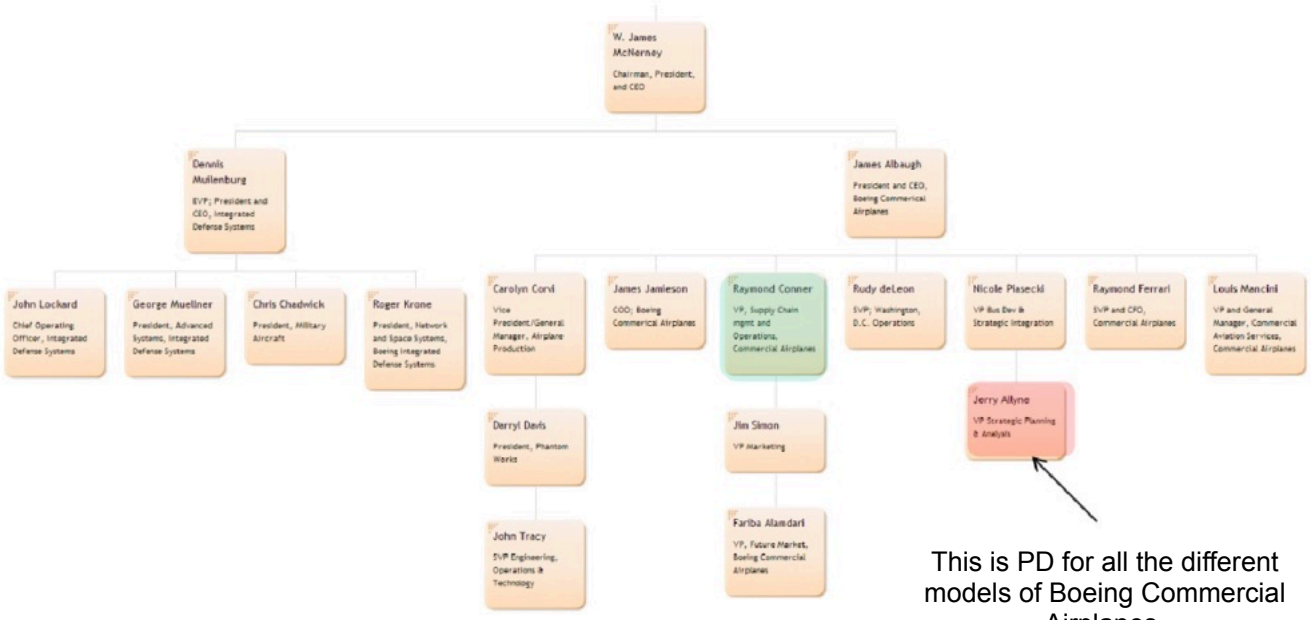
Company leadership and structure

Down the leadership chain to Product Development for Boeing Commercial Airplanes:



This is PD for all the different models of Boeing Commercial Airplanes.

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Reality in industry

1. Management wants to see your results, not your analysis
   - Only section leads care about analysis
   - It is assumed the analysis is correct after it's checked by leads
   - Don't waste management time by presenting theory
2. The higher you go, the less they want to see
   - Large companies have a lot going on
   - No matter how important you think your job is, it's only a small part

Think of your report as a document that be summarized, re-summarized, then summarized yet again. Make it easy for everyone by organizing your report that way:

- Executive summary (suitable for CEO)
- Design overview (suitable for VP of Product Development)
- Details (suitable to your management and audits)
- Supporting documentation (for long-term records and your lead) – CYA documentation.

This is fairly simplistic and every company is different, but **the point is you need to think about who you are writing for in each report section**.