RELAZIONE VEICOLI AEROSPAZIALI

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Contents

1 Assignment 1.1

Assignment: Write down an initial list of requirements for an aircraft that shall replace A350, with an entry into service in 2030. Please, while listing the requirements, refer to the categories reported in Sect.1.4

List of Requirements

(Mainly based on Airbus A350-900 [1])

Design and Performance

- Number of pilots: 2
- Cruise Mach: 0.85
- Max Operating Speed Mach: 0.9
- Cabin Crew: 8 (2 for each emergency exit)
- Number of passengers: 440
- Wing Span: under 70 m
- Fuselage Length: under 75 m
- Range: over 16000 km
- Height: under 18 m
- Wing Surface: 450 m^2
- Max Payload: over 50 metric tonnes
- Number of engines: 2

Operational requirements

- Cruise altitude: 10 - 13 km
- Turn around time: under 60 mins
- Takeoff distance: under 1 km
- Landing distance: under 2.5 km
- Rate of climb: 3000 ft/min (Initial climb)
- Ceiling: 13.15 km (FL431)

Analysis of applicable regulations

- Number of exits: 8
- External noise (a terra a 5km di distanza) decollo: under 90 dB
- External noise (a terra a 5km di distanza) atterraggio: under 95 dB
- N max in condizioni operative: 2.5
- N min in condizioni operative: -1

2 Assignment 1.2

Assignment: On the basis of the list of Requirements elicited in the previous step, identify a good list of reference aircraft and collect data to be used as meaningful statistical population.

Several commercial aicrafts from *Airbus* and *Boeing* have been chosen, with the goal in mind of having a statistical population to compare to, as well as a reference list for inspiration with consolidated concept designs and technologies.

Design & Performance parameters	B787-10 Dre	A350 XWB-900	A330 Neo -900	B777-300ER	B777 X-900	B787-8	A340-500	A330-300	A340-600	A330-200	B767-300
Number of pilots	2	2	2	2	2	2	2	2	N.A.	2	2
Cruise Mach number	0.85	0.85	0.81	0.84	0.84	0.85	0.83	0.86	N.A.	0.86	0.86
Max Operating Speed Mach	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Cabin Crew	8-9	8-9	8-9	14	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Number of passengers	330	440	440	550	426	359	375	275	N.A.	N.A.	N.A.
Wing Span [m^2]	60.81	64.75	64	64.8	72.8	60.12	60.3	N.A.	N.A.	N.A.	N.A.
Fuselage Length [m]	68	66.8	63.66	73.86	76.72	56.72	67.93	N.A.	N.A.	N.A.	N.A.
Range [km]	11750	15000	13334	13650	13500	13620	12400	11750	14450	N.A.	N.A.
Wing Surface [m^2]	377	443	465	436.8	516.7	377	437.3	N.A.	N.A.	N.A.	N.A.
Height [m]	17.02	17.47	16.79	18.76	19.53	16.92	17.53	N.A.	N.A.	N.A.	N.A.
Max Payload [metric tonnes]	57	53	44	69.8	73.5	43.318	54	N.A.	N.A.	N.A.	N.A.
Number of engines	2	2	2	2	2	2	4	N.A.	N.A.	N.A.	N.A.

Table 1: Statistical Population

3 Assignment 1.3

Assignment: *Critical Analysis of statistical trends.* Verify whether your statistical population fits the trend reported in literature (e.g. Raymer) or suggest improvements to the simple mathematical models (e.g. updates of coefficients).

4 Assignment 1.4

Assignment: *Guess data estimation for the reference case study.* Apply the original or improved statistical trends to perform the first guess data estimation for the reference case study. Please, report all iterations needed to convergence to the design maximum take-off mass.

References

[1] Airbus. *A350-900*. https://www.airbus.com/aircraft/passenger-aircraft/a350xwb-family/a350-900.html. Accessed on 2020-11-11.