AIRPLANE LIFE CYCLE

Michelle Albert - Boeing
Roser Roca Toha - Airbus
AIRPLANE PRODUCTION CYCLE

Purchase Agreement for group of N aircraft

Kick-Off Meeting for aircraft group configuration

Aircraft configuration freeze decision for all aircraft group

Delivery to airline of the first aircraft of the group

Aircraft 2..... Aircraft N deliveries

Definition phase

Development, certification
Production phase

Aircraft group delivery stream

Fleet in-service phase

Time between the Aircraft configuration freeze and the delivery of the last airplane can be XX years!
If an airline wants to have \( N \) number of aircraft with a cabin configuration, and \( M \) number of aircraft with a different cabin configuration – the process below needs to happen twice.

**Purchase Agreement** for group of \( N + M \) aircraft.
Airlines might need different aircraft configurations for different routes

- A number of aircraft will operate longer flights → will need First Class and more galley space
- B number of aircraft will operate shorter routes → will need Economy Class and less galley space

Airlines minimize the number of different fleets/cabin configurations as it impacts costs (Additional crew training, different catering, different reservation system, less flexibility in rotating aircraft...)

- Even if the change was introduced in a second fleet only, lack of fleet commonality would induce additional costs for the airline

Single aisle aircraft definition and production cycle is typically much shorter than wide bodies

From design freeze to delivery is less than a year. After design freeze, no changes can be accommodated

- By introducing late unexpected changes, the production line is negatively impacted (eg: domino effect to following aircraft)
KIC KOFF MEETING AND DEFINITION

Areas typically changed during configuration development

B737-700

A320
Day 1

Purchase Agreement

Kickoff meeting and Definition Phase

Aircraft Cabin Configuration

Day 1 + B

Day 1 + C

Day 1 + D

Day 1 + E

Day 1 + F

Day 1 + C + 5 years

Development, Certification, Production
For single aisle aircraft this is less than 1 year

Delivery: 1st aircraft

Delivery 2nd aircraft

Delivery 3rd aircraft

Delivery 4th aircraft

Design and engineering is complete for the group of 4 airplanes (in this example) at this time, even though the whole airplane group may not be delivered for 5 years.

These airplane interiors are all the same

What happens if new PRM Lavs are mandated in the middle of a delivery stream?
WHAT DOES THIS MEAN FOR THE ACCESSIBLE LAV COMMITTEE?

If new PRM lavs are required in the middle of a delivery stream:

• Process needs to restart again for all the remaining aircraft
• New engineering is necessary
• New build plans are necessary, assembly line overall delivery stream affected
• Supply base would need to build new lavs, supplier contracts need to be renegotiated
• Airline operations are impacted

This activity was not part of the business plan

For a tier 2 concept:

• Includes significant new recurring engineering hours for each of the airline configurations
• Affects the airline operations route structure (due to pax count/config), crew training, catering, maintenance cycles

Cabin monuments are the longest lead time items in aircraft production!
• **Single aisle aircraft production rates increasing rapidly**
  
  - OEMs have never produced as many aircraft as today:
    - 737 current product rate is 42/mth with a plan for 47/mth in 2017, 52/mth in 2018, and 57/mth in 2019
    - This is only possible if airplane design and build is stable
    - This results in less time available between cabin configuration freeze and delivery
    - Change into this highly compressed production system may not always be possible
    - Supply chain may be unable to support
    - Resources for non-recurring and recurring design may not be available
    - The cost may be prohibitive
      - Engineering resources
      - Supply chain cost assertions
      - Crew training
      - Revised route structures
      - Revised catering capability and plans
      - Revised maintenance procedures
INDUSTRIAL “RAMP UP”

- Lavatory suppliers and OEMs need time to gradually change their production systems.
TAKE AWAY POINTS

• If accessible lavs are mandated, the implementation plan is critical and a detailed understanding of the airplane development cycle and operational impact must be considered to ensure adequate costs and benefits are captured.

• Given the speed of process, design changes are much more difficult to implement in single aisle aircraft than for twin aisle aircraft.

• Considering the high volume of aircraft produced, and shorter Single Aisle aircraft production cycle, time is of the essence in OEMs Assembly Line.