Trends in industry and certification
Cabin interiors

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Airbus
- A380 almost out of production – 2nd life in re-positioning??
- A320neo – going like crazy, in particular A321 – 52 > 60 ac/month
- A330 & neo – starting to speed up, some cabin innovations also as retrofit to classics? 50 per year
- A340 out of production – end of life due to high operating cost?
- A350 – building up speed, towards higher rates (10 per month)
- A220 (C-Series) – lifting off in sales but cost reduction pressure on supply chain, 2 FALs, 70 ac/year

ATR
- Market leader in turboprop segment with 42/72 – steady as they go at 75 ac/year
- What next? No hurry.

Boeing
- 737NG- huge after market and due to Max trouble pressure on keeping them going
- 737Max – wait and see; a lot of effort required to get deliveries going and supply chain balanced again
- 747-8 almost out of production
- 757, 767 last retrofit, market waiting for NMA
- 777(X) upgrades and waiting for the new one, 5 ac/month (777)
- 787 volume production achieved, 14 ac/month

Bombardier
- DASH 8 to Viking, most programs out of production support and upgrades, -400 still in production – needs?
- CRJ sold to be closed down by Mitsubishi
- Remain in business jets
Programs

- **COMAC**
  - ARJ 21 – only for internal market, one standard + one VIP, a lot of lessons learned
  - C919 – development delayed, trend to move to Chinese suppliers for (cabin) system
  - CR929 – a complex and therefore time consuming cooperation between COMAC ands UAC (Russia)

- **Embraer**
  - E + E2 program market leader, rearranged their supply chain for the new program
  - Alliance with Boeing – effects tbd

- **UAC**
  - Superjet – due to failing customer support dead
  - MS21 – lack of money to complete development

- **Mitsubishi**
  - MRJ – new type definition for the small one due to scope clause, 90 still in development limbo
  - Benefits from buying CRJ program to be seen

- **XAC (AVIC)**
  - MA700 in full scale development, no room for foreign suppliers
Business trends

- Consolidation in the industry
  - Collins Aerospace
  - Safran/ZODIAC

- Top 3 seating companies (70% of market):
  - RECARO
  - Safran/ZODIAC
  - Collins Aerospace

- Similar picture for galleys and lavatories
  - Diehl
  - Safran/ZODIAC
  - Collins Aerospace

- Airframers return to vertical integration – want a bigger share of the aftermarket
  - Boeing and automotive seat manufacturer Adient
  - Boeing and Aviall
  - Airbus and Satair

- China picking up with AVIC cabin interiors (based on AIM and FACC purchase)

- There are many opportunities for retrofits (aircraft and seats level)
  - 50% of worldwide commercial aircraft are leased – retrofits for repositioning
  - Seats used to be changed every 6 to 7 years. Now 8 to 9 years, because they are built better
Product Development and Industrial trends (1)

Products & Services

- Efficient use of cabin space
  - More seats (Low Cost Carriers)
    - Current trend 15.5 inch width seat for economy. It's very small – long term market acceptance?
    - More space per seat (growing demand for Premium Economy (PYC) is hot topic for airlines
      - You can't make PYC seats (Premium Economy) too comfortable because it will erode your Business Class
      - But they have to be comfortable enough for economy class passengers to upgrade
  - Opportunities through
    - Optional emergency exit layouts (position, size, optional de-activation) see A321neo
    - Adapted emergency exit rating (e.g. optional Type A+ exits in A330neo) – see certification trends
    - Combined galley/lavatory units (Airbus SpaceFlex), plus new variant from Diehl/Lufthansa Technik

- Long flights with single aisle (trans-atlantic) & passenger acceptance
  - Seat dimensions (4/5/6 abreast)
  - Cabin pressure height
  - Cabin noise
  - IFE
  - Lavatory/galley capacity

- Waste reduction solutions needed
  - Handling
  - Recycling
Products & Services (continued)

- IFE is not sorted out yet
  - Still lots of development and turbulence. E.g. Bring your own device and PED, AirFi concepts, etc.
  - Past 2025, Personal Electronic Devices will have taken over fixed IFE on wide body
  - For narrow body it is expected to happen earlier

- Connected Cabin offered to improve customer services and to reduce cost and lead time of supporting services (replenishing, aircraft servicing, maintenance)
  - Mechanical cabin parts become more and more systems – effect on development and production
  - Big data analysis and app-market opportunities

- 3D printing – for what?
  - Line fit
  - Repairs and replacements?
A321neo new door configuration - EIS Q2 2018

Airbus Cabin-Flex

1 Standard overwing exit
+ optional second overwing exit

Door 3 moved back by 4 frames
+ Option to deactivate Door 3*

Door 2 permanently deleted

*in combination with single or double OWI
A321neo with Optimised Airbus Cabin-Flex in High Density

Standard: **220 seats**

With new doors: **240 seats**

Maximum capacity up to 240 seats with new door configuration
New rear Lavatory/Galley configuration - Space-Flex

Classic rear configuration

Space-Flex v1
- Available right now
- 5 Half trolleys capacity
- PRM capability

Space-Flex v2
- Available from Q1 2016
- 8 Half trolleys capacity
- Uses Smart-Lav design
- PRM capability

Space-Flex is a key enabler to achieve up to +6 seats

PRM = Person with Reduced Mobility
Product Development and Industrial trends (6)

Process & Organisation

▪ Ongoing pressure on supplier cost and Quality Assurance obligations

▪ Catalogue approach to support further transition from BFE to SFE

▪ Digital twin used to speed up product development, maybe certification (by equivalence, or by simulation)

▪ PLM integration in the supply chain (Dassault 3D experience selected by Airbus and Boeing)

▪ Production issues due to ever increasing complexity of production programs (high rates and many, complex variants (see A321)
AC with Certificate of Airworthiness after 17 February 2021 shall have dynamically tested (16g) seats
- Retrofits with older seats in a new aircraft will have to comply to 16g
- Start-up companies often focused on 9g seats. This will have to move to 16g from start

AC with Certificate of Airworthiness after 17 February 2021 or in case of replacement of thermal and acoustic isolation panels have to comply to flame propagation resistance requirements; panels in lower half of the aeroplane shall have flame penetration resistance

EASA published an Equivalent Safety Finding regarding Type A+ Emergency Exits. This ESF tries to show that max 120 pax can use the Type A+ emergency door i.s.o. 110 pax notwithstanding some non-structural design changes

No Halon in built-in fire extinguishers in toilets after 18 February 2020 in large aircraft en large helicopters, and in portable fire extinguishers after 18 May 2019

The FAA has published an update to the Aircraft Materials Fire Test Handbook (now at revision 3). The main purpose of the Handbook is to describe various fire test methods for aircraft materials in a consistent and detailed format.
Wrap up

- Questions??
- Comments??
- Ideas for cooperation to fulfil needs identified??
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