A380: Challenges for the Future

Capt. Jacques DRAPPIER
Senior Director Training Programmes
The A380: Flagship of the 21st Century
Launch Variants

**A380**
- 555 seats
- 8,000 nm
- 14,800 km
- EIS 1Q06

**Launch variant**

**A380-F**
- 150 t
- 330,000 lb
- 5,600 nm
- 10,400 km
- EIS 2Q08
A380 general arrangement

The 80x80m box compliance for better airport integration

<table>
<thead>
<tr>
<th></th>
<th>A380-800 / A380-800F</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPAN</td>
<td>261 ft 10 in / 79.8 m</td>
</tr>
<tr>
<td>LENGTH</td>
<td>239 ft 6 in / 73.0 m</td>
</tr>
<tr>
<td>HEIGHT</td>
<td>79 ft 1 in / 24.1 m</td>
</tr>
</tbody>
</table>
General Performance

- Taxi constraints: better than actual 747 or 777
- Take Off and landing: better than 747-400
- Altitude capability: FL 330 at Max To Weight
- Vortex generation: better than 747

- CONCLUSION: the A380 will not create piloting challenges different from actual wide body airplanes
New Technology

- **Structure:**
  - Laser welding
  - G L A R E
  - Carbon fiber panels
  - CFRP Wing Ribs

- **Electrical generation:**
  - Variable frequency generators

- **Hydraulics:**
  - Self contained Electro Hydraulic actuators
The cockpit
The cockpit

- Common features with the A320 and A340 families:
  - Overall cockpit layout (screens and controls arrangement, dark cockpit, symbology and color coding ….)
  - Flight envelope protection
  - Side sticks
  - Non back-driven thrust levers
  - FMS functions base line is FMS 2nd generation

- Cockpit improvements are driven by Flight safety enhancements, Lessons learnt from airlines and product added values:
  - camera/video, taxiing aids
  - larger & interactive displays,
  - FMS interface,
  - enhanced ECAM,
  - navigation on airports,
  - take-off acceleration monitoring,
  - on-board Information System
  - thrust indication
  - vertical situation awareness, collision avoidance
  - enhanced crew rest

The “Airbus Cockpit Philosophy”, results of customers feed-back, experience, and research on new technology
Control and Display System

8 identical potentially interactive displays

2 KCCU:
Keyboard and Cursor Control Units
Keyboard and Cursor Control Device

- back-up CCD
- functional short cuts
- screen cursor allocation
- validation

- alphabetic QWERTY pad
- wheel
- numeric pad
- track-ball
- spare keys
All FMS functions accessible through this interactive MFD with KCCU.

Lateral Flight Plan revisions graphically on ND with KCCU.
Memos, limitations, abnormal procedures, normal check-lists on WD through dedicated controls.

A/C configuration, some memos and limitations below PFD.

System pages, status accessible on the SD through dedicated controls.

Memos, limitations, abnormal procedures, normal check-lists on WD through dedicated controls.

ECP: Dedicated ECAM controls (keys and pointer).
Cockpit Thrust indication

- **ACUTE - Airbus Cockpit Universal Thrust Emulator:**
  - THR will replace N1 (or EPR/TPR) as cockpit thrust control / monitoring parameter (providing enhanced cockpit commonality).
  - Engine manufacturers will select the thrust control / monitoring parameter (N1/EPR/TPR) at engine level
    - converted to THR thrust indication via the FADEC
  - Meaningful thrust indications are displayed as “percentage thrust” using straightforward reference levels:
    - **100% THR = maximum available thrust in actual flight conditions without air bleed**
      - e.g. Max Take-off thrust in the take-off flight envelope
      - Max Cont thrust outside take-off flight envelope
    - **0% THR = engine shutdown (windmilling)**
  - Improves readability and improves scale significance
  - Fan speed will remain as primary indication (E/WD) and N2 (and N3 for R-R) will be available as secondary indications
THR Cockpit Indication - draft

FORWARD

Engine 1

Engine 2

Engine 3

Engine 4

CLB 78.0 %

THR %

3.0 Max

REVERSE

THROUGH

REV %

REVERSE

Max
ECAM Control Panel

- T.O. CONFIG
- ABN
- NORM
- ENG
- BLEED
- PRESS
- FUEL
- APU
- COND
- OXY
- BACK
- ALL
- CLR
- HYD
- EL/AC
- EL/DC
- DOORS
- F/CTL
- WHEEL
- C/B
- VI DEO
- SYS
- PROC
- MORE
- STS
- RCL

© AIRBUS
Pitch trim control and display

SPEED | ALT | HDG | LOC | MDA 550 | AP1 1FD2 A/THR

220 200 180 160 139 109.50

LOT 1010 QNH

16 17 18 19 2272

S F

33.5 %

NOSE UP

NOSE DN

AIRBUS
Both channel failure or Voluntary disconnect

AFS Backup
On one of the MFDs
ATC data link

ATC full page (access from FMS page or with direct function key on keyboard)

Attention getter

Permanent ATC Mail box
ATC permanent mail box below SD

Cruise

Fuel
- F. Used
- Total 138 200 KG
- 45 400 KG x 1000
- 2030 FF KG/H

Eng
- 15.3 OIL QT
- 15.3 15.2

Air
- LDG ELEV AUTO 510 FT
- △ P 10.5 PSI
- 21 TO 24
- 22 TO 23
- CAB ALT 3500 FT

TAT 51 °C
SAT 36 °C
ISA +5

GWCG 37.5%
GW 370 000 KG
FOB 30 000 KG

ATC CENTER

NOTIFIED WITH
KZAK 1557Z

ATC Communication full page on MFD

AIB005

INIT. NOTIFICATION

ATC CENTER

NOTIFY

OFFSET 15NM RIGHT OF ROUTE
AT ALCOA CLIMB TO FL370

1652Z FROM KZAK CTL
(REPLY TO 1652Z REQUEST)
Voice communication

3 dedicated Radio and Audio management panels
Surveillance

AESS control page
(access from FMS page or with direct function key on keyboard)

Dedicated control panel
## AESS Control Panel on Pedestal

### AESS Page on MFD

<table>
<thead>
<tr>
<th>SURV CONTROLS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SURV</strong></td>
<td>AIB380</td>
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<tr>
<td><strong>CONTROLS</strong></td>
<td>STATUS</td>
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### SURV Controls

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<tr>
<th>XPDR</th>
<th>AUTO</th>
<th>ALT RPTG</th>
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<th>CODE</th>
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<td>IDENT</td>
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<tr>
<td>TCAS</td>
<td>ABV</td>
<td>TA+RA</td>
<td></td>
<td>ALT</td>
<td>REL</td>
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<td>TA ONLY</td>
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<tr>
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<td>TURB</td>
<td>STBY</td>
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<td>MAP</td>
<td>STBY</td>
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<td>STBY</td>
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### TAWS

<table>
<thead>
<tr>
<th>TERR</th>
<th>SYS</th>
<th>G/S MODE</th>
<th>FLAP MODE</th>
<th>L/G MODE</th>
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<tbody>
<tr>
<td>ON</td>
<td>ON</td>
<td>ON</td>
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<td>ON</td>
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*Image credit: AIRBUS*
The Aircraft becomes a node on:

- Air traffic network
- Airline network
OIS objectives

- Offer cost-effective capability for implementing tools which improve A/L operations in three domains: cockpit, cabin & maintenance by:
  - Reducing paper use
  - Providing operations support to the cockpit crew and cabin crew
  - Enabling 3rd party application integration
  - Linking A/C to A/L ground network
  - Ensuring A/C autonomy with respect to ground operations
- And offer “latest standard” passengers services
OIS Scope

• Flight Operations support
  – Operation Documentation (FCOM, AFM/CDL, MEL…) random and contextual access
  – Electronic Logbook
  – Weight & Balance management and computations
  – Performance computation (T/O, Landing, in flight…)
  – Navigation Charts and Maps hosting
  – Crew e-mail ....

• Cabin Operations support
  – Crew e-Mail
  – Cabin Logbook
  – Operation Documentation (CCOM…) random and contextual access
  – Cabin inventory
  – PAX data base
  – Credit Card banking...

• Maintenance support
  – Maintenance documentation (TSM, AMM, IPC,MEL) random and contextual access
  – Support and link with OMS functions
    – Logbook, Trouble Shooting, fault reporting, condition monitoring, data loading

• Passengers Services
  – E-mail
  – Internet
  – Intranet
  – News
  – Live TV, e-commerce
Flight Operations support

- Operation Documentation (FCOM, AFM/CDL, MEL…) random and contextual access
- Electronic Logbook
- Weight & Balance management and computations
- Performance computation (T/O, Landing, in flight…)
- Navigation Charts and Maps hosting
- Crew e-mail ....
Onboard Maintenance station
Printers

second printer on side console

One printer on pedestal or on other side console (TBC)
Thank You