The Challenging Task of the A321XLR Development and Flight Test

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11. January 2024
A321 XLR
The single-aisle Xtra Long Range route opener

- A world of opportunities
  Linking primary and secondary cities all around the globe

- Flying up to 4,700nm/8,700km
  Seating capacity 180 to 244

- Higher Efficiency
  30% lower fuel burn and CO₂ emissions and 50% smaller noise footprint*

- Unique passenger experience
  AIRSPACE
  Ambience, comfort, design & services

- Full aircraft connectivity
  skywise and AIRSPACE Link
  Data-driven operations and passenger services

- Flying with Sustainable Aviation Fuel
  Up to 50% today | 100% by 2030

*Based on long-haul operations
A320
Launched 1984
First Flight February 1987
CFM56 & IAE Engines
MTOW 79t
A321
Launched 1988
First Flight
March 1993

CFM56 & IAE
MTOW 93.5t
Range 3200NM
PX max 230
A319
Launched 1993
First Flight
Aug 1995
MTOW 75t
Range 3700NM
PX 160
A318
Launched 1999
First Flight
Jan 2002
MTOW 68t
Range 3100NM
PX 136
A320/321
Sharklets
Started 2006
Launched 2009
Delivered 2012
A320neo
Launched 2010
First flight 2014
Delivered 2016

CFM & PW
NEO: innovation where it matters

- Sharklets: State of the art aerodynamics
- Innovative cabin enablers: Optimization of cabin space, More seats
- Lower maintenance cost
- New generation engines: Optimized fuel efficiency, Lower noise

Delivering Today:
- 20% fuel savings vs. CEO
- Up to 4,700NM
Airbus delivers 1,000th A320neo Family
A320neo unbeatable fuel efficiency

- 50% reduction in noise footprint and NOx emissions vs previous generation aircraft
- 20% fuel burn per seat vs previous generation aircraft

Altogether IndiGo has ordered 530 A320 Family aircraft

The world's biggest customer and operator for the A320neo Family

IndiGo fly to 22 international destinations within 17 different countries

The most successful aircraft family ever
A321 Range Evolution

1,700nm more range within 10 years of incremental developments

- Sharklets | +150nm
- NEO Engine | +300nm
- MTOW | +500nm
- MTOW | +700nm

A321XLR

4700nm
A321 XLR
The single-aisle Xtra Long Range route opener

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*Compared to previous generation competitor aircraft

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A321XLR - What’s behind?

ATA 27
- E-rudder introduction (incl. 2ELAC/2SEC architecture)
- Generic Laws
- Enhanced Take-off conf. (ETOC)
- Flap Load Relief System

Wing & Movables
- Inner flap changed to single slotted and re-profiled

Fuel
- Increased fuel capacity with a new Rear Center Tank (RCT)
FWD ACT optional

Fuselage
- Local reinforcement on all sections
- Specific modification for RCT
- Extended aft Belly Fairing

Landing Gear
- Reinforced Nose & Main Landing Gear
- New wheels, tires
- Extended max brake energy

Cabin
- Airspace as Standard (with 2 bin size options)
- Cabin comfort improvements (incl doors 1&4 insulation)
- Supplementary Potable Water & Waste capacity

Weight
- MTOW to 101t

Engine & Nacelle
- Current CFM/PW engines as baseline

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A321XLR Flight Test Program: Airframe Development and Certification

Initial Development & AFM tests → Development & Certification → Long Flights & Certification → Continuous Improvements

- First Flight
- Entry Into Service
- Envelope Opening
- Configuration Freeze
- Fuel Systems
- Noise
- A/C Performance
- Flight Physics
- Autopilot
- Cold
- Long Flights
- Type Certificate
- Continuous Improvements

A321XLR: 60% of the flight testing of a completely new aircraft
# A321XLR Flight Test Campaign: Highlights for 2023

**4 Prototypes**

- **FTI A/C**
  - MSN11000 (CFM)
    - First Flight: 15 June 22

- **FTI A/C**
  - MSN11058 (PW)
    - First Flight: 23 September 22

- **CABIN A/C**
  - MSN11080 (CFM)
    - First Flight: 20 October 22

- **MSN6839 (CFM)**
  - Early Flight test

<table>
<thead>
<tr>
<th>Category</th>
<th>FTI A/C MSN11000 (CFM)</th>
<th>FTI A/C MSN11058 (PW)</th>
<th>CABIN A/C MSN11080 (CFM)</th>
<th>MSN6839 (CFM)</th>
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<td><strong>Flutter</strong></td>
<td>Retrofit Fuel liner, Belly Fairing extension</td>
<td>External Noise</td>
<td>Brakes Max Energy</td>
<td>Fuel Certification</td>
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<td><strong>Cold Weather ATA 29</strong></td>
<td>Autoland</td>
<td>T/O Perfo</td>
<td>Fuel Certification</td>
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<td><strong>Cold Weather Cabin</strong></td>
<td>Ice Shapes</td>
<td>Cabin &amp; Maturity Testing</td>
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<tr>
<td><strong>VMU</strong></td>
<td>Handling Qualities: Prot, Flare law, Xwind, VMC, Derotation, etc.</td>
<td>Braking</td>
<td>Certification Flights</td>
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Flight Test Installation

New Generation FTI

“Fully” Instrumented Aircraft
A321XLR Velocity Minimum Unstick (VMU)
A321XLR Flight Test Campaign: Achievements

- Anemometry/clinometry calibration
- Flutter tests
- Cruise & CLB performance (incl certification)
- Minimum Unstick Speed (VMU)
- Fuselage thermal model
- Cabin comfort
- Fuel max capacity flight
- Fire detection (Main Landing Gear Bay)
- Handling qualities & autopilot development (ongoing)

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The best keeps getting better

Questions ???
After the Movie

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