On board ATR 72–600
The ATR 72–600 regional airliner marks a clear break with the ATR 42 and ATR 72–500 series aircraft by featuring a new highly innovative and high-performance avionics suite developed by Thales.

Based on an Integrated Modular Avionics (IMA) concept and drawing on Thales’s proven experience in the supply and integration of avionics suites for all types of aircraft, the ATR 72–600 offers pilots a much simpler working environment, thanks in particular to the new Flight Management System.

Thales was selected in October 2007 as lead systems integrator for the new avionics suite on the ATR 72–600. Since then, the company has completely redesigned the cockpit environment and developed new navigation, communication and surveillance functions around an integrated modular avionics architecture with five IAD68 large-format liquid-crystal displays supporting multiple applications, a highly innovative IMA platform, an AFDX data transmission network (entirely developed by Thales and a first in the turboprop segment), a Flight Management System (FMS) and a latest-generation autopilot system.

This new avionics suite offers improved performance in terms of reduced weight and electrical power consumption as well as higher reliability and better long-term serviceability. Its state-of-the-art architecture is open and evolutionary to allow new functionality to be inserted in the future.

A high-performance cockpit
- 30% fewer parts required
- 15% reduction in maintenance costs
- Better reliability
- Modular design to assure evolution over 20 years
- More flight management support

The glass cockpit: a new generation interface

One of the fundamental design criteria for the new avionics suite was cockpit ergonomics. The cockpit of a latest-generation aircraft must provide the crew with all the information they need, instantly and conveniently, so that they can assess the aircraft’s situation and act accordingly. In this respect, the ATR 72–600 cockpit has raised the bar in human-machine interfaces, offering a high level of comfort and demonstrable efficiency gains.

State of-the-art architecture
- Integrated Modular Avionics (IMA)
The ATR 72–600 avionics suite is based on a latest-generation integrated modular avionics (IMA) concept certified for the Airbus A380 programme. IMA modules acquire and exchange data and can host multiple applications, and the modular architecture means that hardware and software can be developed independently.

Compared with the shipsets for previous ATR aircraft, Thales has reduced the number of equipment items required, leading to significant gains in direct maintenance costs at the same time as optimising communication between the different systems.

- AFDX data transmission network
One of the key elements of the IMA architecture is the network that allows digital information to be exchanged between the various components of the avionics suite. Thales has developed the Avionics Full-Duplex Switched Ethernet (AFDX) data network for the ATR 72–600 — a first in the turboprop segment. AFDX paves the way for a new more standardised and modular approach to avionics design, in particular through the (partial) adoption of open-source technologies.
LCD Screens supporting innovative functions

The ATR 72–600 cockpit features five IAD68 large-format (6 x 8 inch) liquid-crystal displays supporting multiple applications, including not only the conventional display systems, but also the flight management, radio management and airport navigation systems, all of which are fully integrated in line with the modular avionics concept. This improves safety and reliability, reduces pilot workload and also helps to reduce maintenance costs and the overall weight of the aircraft.

Two Primary Flight Displays (PFDs) incorporate a range of instruments as well as the EFIS functions (EADI and EHSI indicators). Two Multi-Function Displays (MFDs) provide the pilot with navigation information and system synoptics (navigation display, system utilities pages, video, memo panel, radio management, etc.). The Engine and Warning Display (EWD) completes this array of state-of-the-art equipment and provides engine data and crew alerts as well as checklists and procedure management information.

These five screens are the same size as the displays in the Airbus A380 cockpit and offer the pilot a simplified working environment and clearer symbology.

A trusted autopilot system

The avionics suite for the ATR 72–600 includes an Automatic Flight Control System (AFCS) with precision approach capability. Development of this autopilot system required less than 100 hours of test flights — much less than ATR’s already ambitious target of 130 hours. This achievement was the result of close collaboration between the Thales and ATR teams from the definition phase through to integration of their aircraft model with our upstream validation process, followed by joint management of the subsequent development phase and the entire flight test campaign. During Cat. II approaches, the ATR 72–600’s autopilot system automatically brings the aircraft to a height above touchdown of 100 feet (30 metres), when the pilot takes over. This system has quickly gained recognition as a vital way of overcoming most of the problems associated with poor-visibility landings.

Efficient project management

When the contract was signed, Thales immediately set up integration benches, validation and integration platform and simulation facilities to ensure the best possible support for programme development. Just one year later, the Thales teams delivered the avionics suite to specifications, enabling the ATR–600 series to be powered up for the first time, and setting an impressive performance record for a new project. Over a 36-month period, several hundred people worked on the programme at Thales’s facilities in Bordeaux, Châtellerault, Meudon, Toulouse, Valence and Vendôme, and in Montréal. Thales also managed 10 avionics suppliers in Belgium, France, India, Japan and the United States, 40 partners and 70 separate items of equipment for integration and delivery to ATR as part of each shipset. Validation tests at Thales’s facilities were conclusive, and on 24 July 2009, the ATR 72–600 regional airliner made its first flight. On 31 May 2011 — less than two years later — it was awarded type certification by the European Aviation Safety Agency (EASA), authorising deliveries to launch customer Royal Air Maroc.

Thales product policy is defined by evolving air safety regulations and ongoing cooperation with customers, resulting in a fully optimised solution with the FMS220.
Programme at a glance

• 70 equipment items integrated and delivered per shipset

• 36 months for Thales to deliver the ATR –600 series avionics suite and provide support from first flight through to certification — a record!

• 2 million lines of code developed in three years

• 240 functions certified with qualified hardware

• 7,000 system tests completed

Timeline

2007 : Thales’s glass cockpit launched for the ATR family of turboprop aircraft

2008 : 17 December, power-on of cockpit installed on the assembly line

2009 : 24 July, ATR 72-600 makes its first flight

2011 : • 31 May, certification
      • August : enters service with Royal Air Maroc

2012 : • L2B2 certifications issued in April for the ATR 72 and June for the ATR 42
      • 40 airliners in service and over 40,000 flight hours logged

2013 : ATR continues to increase production

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