AIRCRAFT LIFECYCLE FROM DESIGN TO OPERATIONS

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When the A350-1000 and A330neo (new engine option) enter service as Airbus' latest jetliner family members, these aircraft will have completed a comprehensive process called the development lifecycle.

The lifecycle's guiding principle is to provide "key deliverables" at each milestone – which are known as Maturity Gates (MGs), from MG1 to MG15.

Once an aircraft's need is established in response to market demand, the Feasibility Phase (MG1-MG3) is when the programme's overall objectives and assumptions are defined, and the basic architecture and decision solution rankings are made in response to customer needs. Potential new technologies are chosen, industrial scenarios are examined, and the initial team that will drive development in the Concept Phase is established.

The Concept Phase (MG3-MG5) includes several major decisions, such as validation of aircraft performance targets, selection of the structure and systems architecture, authorisation of resource ramp-ups, and confirmation of the industrial launch. Key deliverables are defined, including the

aircraft design, build and component concepts, plus performance and commercial margins.

During this phase, the suppliers – many of whom will work with Airbus through the entirety of the development lifecycle – are selected. Initially, several potential suppliers competing on the same work packages are co-located with Airbus teams on the programme plateau, all of them working in a fully integrated way, using the same systems, tools and design processes. Once a supplier is chosen for a specific work package, it will continue to work on the plateau during the Joint Definition Phase alongside Airbus and the risk-sharing partners.

The Design Phase and beyond

The aircraft truly takes shape in the Design Phase (MG5-MG7), when the overall design and cabin definitions are frozen, the first parts have been made, and all critical design reviews have been passed.

This phase also features the bulk of the Industrial and Test Means Development Phases. With the launch of the industrial development phase, the first elements are designed, produced and qualified for the initial aircraft assembly. The manufacturing system – including manufacturing and assembly plants, final assembly line, jigs and tools, testing, transportation, and plant logistics – are prepared and assessed to ensure that the programme will meet its industrial schedule. Furthermore, the testing means – virtual testing and simulators, laboratory benches, static and fatigue test specimens, and flight test instrumentation – are designed and produced.

During the final phases (MG7-MG15), the aircraft is built, and intensive tests – including flight trials – are performed in parallel. The objective is to assemble, certify and deliver a fully mature aircraft, starting with the programme's launch customer. At this point series production can begin.

To ensure a smooth entry into service, the first operators' pilots and staff train within Airbus facilities, and all the customer support means, tools and documentation are deployed in time for the first airline operations.

Once the processes for industrial production are streamlined and running robustly and operational feedback has been received, the development project is closed and the programme is transformed into the series production mode. The lessons learned are taken and shared with following development projects and the lifecycle begins again.

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